Formation of the Primary School Teachers' Information Competency in Postgraduate Education

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Abstract: The paper investigates the problem of the information competence formation of primary school teachers in the postgraduate education. It reveals the essence of the concept of "information competency of primary school teachers". The aim of the article is to substantiate and experimentally test the methodology of the information competency formation of primary school teachers in the postgraduate education. 710 advanced training course participants of various institutes of Ukrainian postgraduate pedagogical education took part in the initial stage of the experiment; 106 primary school teachers of Zaporizhzhia Regional Institute of Postgraduate Pedagogical Education participated in the formative stage of the experiment. It was determined that the main criteria for the information competency formation of primary school teachers are the formation of motives for successful studying, cognitive interest in postgraduate education, the need for self-development and self-expression; the system of information knowledge, skills and abilities, mastery of information and communication technologies, focus on further self-development. The paper indicated the positive influence of the original methodology on the dynamics of the information competency constituents of the teachers from the experimental group: the number of teachers with high and middle levels increased by 12.6% and 21.1% under the motivational and value-based component; by 22.1% and 18.0% under the procedural and conceptual component; by 15.9% and 18.9% under the regulatory and reflexive component. This indicates the superiority of the original methodology over the existing one in the formation of information competency of primary school teachers in the postgraduate education.

Keywords: *information competency; primary school teachers; postgraduate education.*

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1. Introduction

The rapid processes of society informatization, expanded information space, increased volume of pedagogical information, the acceleration of primary school children require the search for such educational systems that could provide maximum opportunities for the information competency formation of primary school teachers in a relatively short time (Byko, et al., 2010; Lavrenova et al., 2020). The relevance of this is proved by the socio-cultural situation in general and force-majeure circumstances in particular. The countries of Europe and world staying under quarantine, caused by the spread of COVID-19, the isolation of people turned education into distance learning and exacerbated the issue of teachers gaining their information competence for social activity and professional duties (Baytiyeh, 2019; Dovzhenko, 2020; Rebukha, & Polishchuk, 2020). Thus, a system that can respond quickly to sociocultural changes is postgraduate education. It was designed to create organizational and pedagogical conditions and identify areas for effective development of information competency, to enhance the creative skills of teachers, to promote the improvement and self-improvement of their professional skills (Craciun, & Bunoiu, 2015; Ion, & Iucu, 2016; Kuzminskyi et al., 2019).

According to scientists (Aguilar et al., 2019; Bondar et al., 2020; Cantu, & Martinez, 2006; Kuzminskyi et al., 2019), postgraduate pedagogical education is a leading link that ensures the viability and efficiency of the education system, its priority is recognized in all developed countries. The purpose of postgraduate pedagogical education is to provide pedagogical and managerial staff capable of effective professional activity in a situation of instability, uncertainty and constant changes by creating conditions for their continuous personal and professional development and improving (innovative transformations) all the elements of postgraduate pedagogical education and the education sector in general. One of the main priorities of Western educational reforms is the professional competence of teachers with leading information competence. And the principal directions in many countries are the preparation of teachers for educational reforms; the consolidation of organizational structures in the field of advanced training and the implementation of the postgraduate education national systems; the improvement of the quality of professional development and teacher training; the encouragement of pedagogical skills development; focus on joint actions in the field of teachers' advanced training (Bashmanivska et al.,, 2020; Colognesi et al., 2020; Pehoiu, 2019; Tymchuk et al., 2019).

In a broad socio-cultural context, such phenomena are considered today: information space, information environment, information resources, information culture of the individual. The information competency becomes the most important factor of the successful professional activity, social security in the information society of teachers (Amelina & Tarasenko, 2018; Bicen et al., 2018; Collie, & Perry, 2019). Information competence is a component of the social competence development (Varetska et al., 2019), which provides the capability and readiness to discover and master the ways to solve a new class of social professional problems, use the resources of the social environment to establish natural social connections and social self-development by teachers (Afanasenko et al., 2020). Therefore, postgraduate education is considered as the education forming competencies in order to integrate students into the present and future society.

The process of developing information competency of primary school teachers in the postgraduate education is hampered by contradictions that exist between 1) the state's need for teachers with a high level of information competency and the inability of postgraduate education to develop it purposefully and quickly; 2) the declared requirement for the introduction of a competency-based approach in education and the lack of a common understanding of the concept of "information competency of primary school teachers"; 3) the growth of professional interests and needs of primary school teachers to master the information competency and imperfection of scientific and methodological support of this process. Overcoming defined contradictions requires special attention of scientists to this problem (Bashmanivska et al., 2020; Humphries et al., 2018).

The process of competencies formation and development is characteristic of the entire system of both university and postgraduate higher pedagogical education. Considering the competency in the system of university pedagogical education, the scientists (Fejdl et al., 2015; Pehoiu, 2019; Reid & Horváthová, 2016) focus on special knowledge, psychological and pedagogical skills, abilities, readiness of a specialist for pedagogical activity. Thus Yezhova, Pashkevich, & Gryn, (2019) point out that "the competency of a specialist with higher education is a manifestation of his efforts and abilities (readiness) to realize one's potential (knowledge, skills, experience, personal qualities) in practice for successful creative (productive) activity in professional and social sphere, understanding the social significance and personal responsibility for the results of this activity, the need for its continuous improvement".

One of the main tasks of the system of teachers' advance training is to create conditions for self-realization, to improve the methods of self-

education on the basis of acquired professional experience. To our opinion, the solution of the problem of forming the information competency of primary school teachers lies in the theoretical conclusions of Vvedenskiy (2003), who notes that the main task of postgraduate education is to create conditions for self-actualization of teachers, to improve the methods of self-education on the basis of professional experience. At the same time, it should be noted that postmodern approaches to education include the desire to form new knowledge and create conditions for self-improvement. Some researchers (Colognesi et al., 2007; Mukhamed, 2015) point out that the postmodern model of education (including postgraduate) should be based on the principle of equality between subject and object of the educational process, establishing partnerships between participants, determining the directions of their development. Thus, the information competence of the educational process participants plays center stage in order to build high-quality communicative interaction and the integration of the student community, involving innovations in the formation and implementation of new knowledge. In general, education in modern posthumanist society should be a kind of integrating factor capable of consolidating its various social groups in terms of the sustainable development of information educational technologies.

Thus, through the prism of information competence, postmodernism recognizes any form of professional knowledge development and communication, which in fact determines the relevance of finding optimal ways and means of its formation. That is why insufficient development of this problem in the theory and methodology of vocational education primarily, the lack of systematic scientific and methodological support determine the relevance of studying the problem of forming the information competency of primary school teachers in postgraduate education in Ukraine.

2. Literature review

The introduction of a competency-based approach to the educational system makes it possible to solve the general problem mastering the necessary theoretical knowledge by future teachers to solve specific tasks or problematic situations (Bykov et al., 2010). This position is decisive because more and more scientists tend to believe that the progress of mankind depends on the level of personal development, rather than on economic growth (Cojocariu, & Mareş, 2019; Kykylyk et al., 2020). This led to the change of the concept of human resources to the concept of human

competence (Sorochan et al., 2020). The competency-based approach to defining the goals and content of education is not new. The focus on the acquisition of skills, as well as generalized ways of personal activity was leading in the works of many scientists (Hrabovskyi, 2009). In this aspect, both separate educational technologies and educational and methodical materials were developed. However, this orientation was not decisive, as it was not used in the development of standard curricula. Nowadays, the implementation of the competency-based approach requires reliance on international experience, on the works of scientists who help to determine the essence of competence in general and information competence of teachers in particular (Maher et al., 2012; Ovcharuk, 2020; Sanchez Rodriguez et al., 2018).

In the definition of "information competence", the keyword is "competency", which has the greatest semantic charge. The introduction of the term "competency" is associated with the name of the German sociologist J. Habermas, who used it as a sociological concept in the context of the language communication theory (Habermas, 1981). The scientist understood competency as the ability of the subject to communicate and act, which gives one the opportunity to be a participant in the processes of conceiving and create one's own identity in them. The European Commission considers the concept of "competency" as general, or key, basic skills, fundamental studying methods, core qualifications, cross-learning skills, crucial ideas, background knowledge, the ability to apply study achievements in new non-standard settings (EC, 2019).

The studies of Bashmanivska, Bashmanivskyi, & Shevtsova (2020) presented competence as a complex synthesis of cognitive, subject-practical and personal experience, which exists in various forms and manifestations: as a degree of skills, a way of personal self-realization, the result of individual self-development, or a form of ability. Thus, competency is a way of the existence of knowledge, skills, education, which promotes personal self-realization, finding one's place in society.

According to data of Council of Europe (2019), the competency of a teacher has an integrative nature, because its source is different areas of culture (spiritual, public, social, pedagogical, managerial, legal, ethical, environmental, etc.), therefore, it requires significant intellectual development and covers analytical, communicative, prognostic and other mental processes. The authors note that the competency of a teacher covers motivational, reflexive, cognitive, operational and technological, ethical and other components of the content of training and comprehends increasing knowledge, skills, experience of professional and personal self-development

of creative activity, emotional and value-based attitudes. At the same time, the competency of a teacher is viewed as a special phenomenon, the fundamental basis of the culture of society, the link that connects the development of personality and socio-cultural processes.

In the modern psychological and pedagogical literature, there is no single approach to defining the mentioned phenomenon of "information competency of a primary school teacher". Dealing with this category, researchers correlate the concept of "information competency" with such closely related concepts as "computer competency", "computer literacy", "technological literacy", "information literacy", "information computer literacy", "information culture", "information technology competency", etc. (Amelina, & Tarasenko, 2018; Ceausu, 2018). The main aim of postgraduate education of primary school teachers in the information society is the acquisition and development of certain competencies that should provide the opportunity to work effectively under conditions of the dynamic development of the modern world (Sorochan et al., 2020; Cantu, & Martinez, 2006). Comparing the goals of higher and postgraduate pedagogical education, Ivanchuk, Kostashchuk, Machynska, & Oliynyk (2020) states that higher educational institutions are responsible for the acquisition of historically established, sustainable professional knowledge and skills, and the institutes of postgraduate pedagogical education – for the formation of innovative professional competencies.

Thus, the scientific and scientific-methodical literature states different approaches of scientists to the definition of competencies. One group of researchers emphasizes personal characteristics; the other emphasizes the priority of knowledge and skills that can be broadly transferred. Nevertheless, their definitions meet the main criteria formulated by international experts: 1) key competencies contribute to high-level results, including the social level on the way towards a successful life and a developed society; 2) key competencies are appropriate tools for important, complex needs and challenges in a broad context; 3) key competencies are important for the individual (Tymchuk et al., 2019; Varetska et al., 2019). Therefore, modern researches on professional competency can be represented by a wide range of interpretations of the essence and structure of this concept (Aguilar et al., 2019; Sánchez-Sordo, 2019; Bakholskaya et al., 2019; Bashmanivska et al., 2020):

- the teacher's awareness of the knowledge and skills and their normative features necessary to perform this work; psychological qualities desirable for its implementation, real professional activity in accordance with standards and norms;

- the teacher's knowledge of the subject and methods of its teaching, development of professional self-awareness, individual typical features and professionally significant qualities;

- basic knowledge, skills, values of a specialist, motivation, awareness of one's own place in the world, personal style of interaction with people, general culture, the ability to develop;

- a set of theoretical and practical readiness for pedagogical activities.

Besides, it should be noted that the competence formation (including information competence) is influenced by the elements of information and methodological support at different levels. According to some researchers (Aguilar et al., 2019; Bakholskaya et al., 2019; Collie & Perry, 2019), a multilevel system of information methodical and social support of teachers provides their competency-oriented professional interaction with the participants in the educational process, the formation of students' values, motivation for sound behavior, etc. These issues are quite decisive, as they allow consolidating the efforts of teachers in the work with unsuccessful students (Ivanchuk et al., 2020; Tsilmak et al., 2020). At the same time, we should not reject purely psychological indicators of personality, which are favorable in terms of the teachers' professional (primarily information) competence formation.

Despite the relatively large number of publications on the phenomenon of teacher competence, it can be argued that the information component of this concept is not always covered. The lack of research on the formation of information competency of primary school teachers in the system of postgraduate education is particularly noticeable. Therefore, the determination and substantiation of the organizational foundations of the professional activity of primary school teachers, the search for the optimal methodology for forming their information competence in the system of postgraduate education is an urgent theoretical and applied problem. Thus, **the aim** of the study is to substantiate and experimentally test the methodology of the information competency formation of primary school teachers in the postgraduate education.

3. Methodology

To achieve the aim of the study, we organized and conducted a pedagogical experiment, which included initial and formative stages. The initial stage was held in 2016-2017, it involved the students of advanced training courses of the Municipal Institution "Zaporizhzhia Regional Institute of Postgraduate Pedagogical Education" of Zaporizhzhia Regional

Council, Poltava M. V. Ostrogradskyi Regional Institute of Postgraduate Pedagogical Education, Khmelnytskyi Institute of Postgraduate Pedagogical Education, Municipal Institution "Kharkiv Regional Scientific and Methodological Institute of Continuous Education" with pedagogical experience of at least three years. The total number of respondents was 710 people. This choice of respondents made it possible to involve primary education practitioners from different regions of Ukraine.

The main tasks of the initial stage of the experiment were:

1. The analysis of the documentation on the research problem (the study of curricula, programs of special courses of the institutes of postgraduate pedagogical education, work plans of educational departments, methodical offices, methodical associations of primary school teachers in order to identify the existing normative content to solve the research problem).

2. The clarification of teachers' ideas about information competency (terminological definition, personal attitude to the problem), the essence of this phenomenon, the need for self-education and self-development, etc.

3. The subjective assessment of primary school teachers regarding the level of education and information skills.

4. Determining the motivational readiness of primary school teachers for the development of information competency in the system of postgraduate pedagogical education.

The study and analysis of documents regulating the process of advanced training showed the lack of purposeful work on the formation of information competency of primary school teachers during the course retraining and in the period between courses. The variable component of the curricula provides 8 hours, which is 10% of the total number of hours, for the development of general technological competency. To find out the existence of a work system on the development of information competency of primary school teachers, 15 work plans of district (city) methodical offices were analyzed.

The introduction of the original methodology of information competency formation of primary school teachers and testing its efficiency was carried out during the formative stage of the pedagogical experiment, which was held in 2018-2019 at the Municipal Institution "Zaporizhzhia Regional Institute of Postgraduate Pedagogical Education" during advanced training courses, and in the collegium No. 98, teaching and educational complex "preschool educational institution – primary school" No. 9 in Energodar in the period between courses. The total number of teachers who took part in the formative stage of the experiment was 106 people. All

teachers were primary school teachers. Control (CG) and experimental (EG) groups were formed from the students of advanced training courses; the number of teachers was 53 in both groups.

The tasks of the formative stage of the pedagogical experiment were:

1. To substantiate and introduce the original methodology of information competency formation of primary school teachers into the system of postgraduate education of Ukraine.

2. To check the efficiency of the original methodology.

The formative experiment was conducted in authentic conditions on the basis of standard licensed curricula for advanced training of primary school teachers within the planned educational process. It involved the same teaching staff, comprehended the participation in pedagogical, scientific-theoretical seminars, workshops, conferences, other forms of methodical work. In the experimental group, the studying process was carried out on the basis of a special course "Information competency of primary school teachers" (26 hours). In the control group, the special training of primary school teachers was reduced to the lecture "The development of primary school teachers' information competency" (2 hours) according to the working curriculum.

The lectures for the control and experimental groups addressed the issues of technological approach in world culture, the essence of the competency-based approach in education, the concept of information and communication technologies, the main directions of their implementation in the educational process of primary school. In practical classes, the students of the experimental group acquired and practiced educational and informational skills: converting information from one type to another, modeling lessons in primary school using pedagogical program means and their impact on the quality of the study in primary school, information evaluation, etc.

The leading idea of scientific research was that research and experimental work should end with the solution of the contradiction between the growth of professional interests and needs of primary school teachers to master the information competency and imperfection of scientific and methodological support of this process. To overcome the contradictions, we substantiated, developed and implemented the original methodology of information competency formation of primary school teachers, which contains the purpose, objectives, forms, and teaching aids during advanced training courses (Internet technologies, audiovisual visual aids, multimedia systems) in the system of postgraduate education of Ukraine.

The efficiency of the original methodology was evaluated by motivational and value-based, procedural and conceptual, regulatory and reflexive components.

The following research methods were used: theoretical methods – the study and analysis of psychological and pedagogical literature, regulatory framework; the generalization of the received information to define the directions of research, the clarification of definitions "information competency of a teacher", "information competency of a primary school teacher"; axiomatic method for identifying leading ideas; modeling in order to build a model for the information competency formation of primary school teachers; empirical methods – interviews, questionnaires, observation, expert evaluation, pedagogical experiment (initial and formative stages) to check the effectiveness of organizational and pedagogical conditions for the information competency formation of primary school teachers; statistical methods for processing the results of experimental work.

The study was previously approved by a Research Ethics Committee of the Municipal Institution "Zaporizhzhia Regional Institute of Postgraduate Pedagogical Education". Informed consent was received from all individuals who took part in this research.

4. Results

According to the results of the initial stage of the pedagogical experiment, it was found that in the modern psychological and pedagogical literature, there is no single approach to revealing the phenomenon of "information competency", its conceptual content. There is a correlation between this concept and closely related ones: "computer competency", "computer literacy", "technological literacy", etc. The teacher's information competency is defined as a complex integral professional quality that is manifested in information activities, formed and developed in the process of cognition and transformation of the information environment, characterized by the acquisition of value orientations, experience in certain personal and social spheres. In the context of the study, we considered the information competency of primary school teachers as a complex integrated professional quality, which includes the motivation of the teacher to carry out information activities in the educational environment of primary school; a set of professional qualities of personality, which include knowledge, skills, abilities, etc., which ensure the formation of educational and informational skills of primary school students; the capacity for reflection and further self-development.

It was established that the most significant obstacles to the formation of information competency were imperfect practice of advanced training of primary school teachers; low level of technological training and computer literacy; personal negative stereotypes about the information activities of a teacher; a large amount of functional responsibilities of a teacher. The most significant factors influencing the information competency formation were defined to be self-education; the study of the perspective experience of colleagues; the support of a teacher by the principal of the educational institution; one's own experience of information activity; studying according to a scientifically balanced special program.

We identified that the main indicators of the information competency formation of primary school teachers were the formation of motivation for successful studying, cognitive interest in postgraduate education, the need for self-development and self-expression; the system of information knowledge, the formation of educational and information skills, the ability to assess the quality of pedagogical program means for primary school, the information and communication technologies; the level of reflexivity development, the ability to carry out adequate self-assessment, focus on further self-development.

The study of the need for advanced training of primary school teachers in training courses at the Institute of Postgraduate Pedagogical Education and self-assessment of their information competency showed gaps in their knowledge of the following issues: theoretical foundations of the Internet use, office programs, methods of using pedagogical program means in primary school, bibliographic description of books, knowledge, and application of speed reading techniques, etc. (Table 1). It should be noted that 63.0% of teachers found it difficult to determine their personal silent reading speed. They did not consider the component of reading technique as an indicator of the development of information competency, but, in our opinion, it is an important professional competency of a primary school teacher, which helps to carry out high-quality information processing.

Table 1. The self-assessment of the level of information competency of primary school teachers

Source: Authors' own conception

The levels	Points	The categories of individuals				In total	
		Higher	I	II	Specialist	Persons	%
	12	28	41	47	23	139	19.6
High	11	39	27	29	18	113	15.9
	10	18	32	20	23	93	13.1
Sufficient	9	7	8	–	69	84	11.8

	8	1	2	4	51	58	8.2
	7	3	–	2	62	67	9.4
	6	6	–	2	38	46	6.5
Middle	5	1	2	1	19	23	3.2
	4	2	4	1	8	15	2.1
	3	2	14	9	1	26	3.7
Low	2	–	13	11	–	24	3.4
	1	1	11	10	–	22	3.1

The questionnaire survey showed that 100% of teachers, regardless of education, age, work experience, place of residence, mentioned that they had a sufficient level of ability to independently search new information from various sources, select, update, reproduce the necessary information, and adapt it to age opportunities for primary school students. However, the clarification interviews with teachers revealed that the majority of respondents considered "various sources" to be only paper media, not taking into account information located on external media and on the Internet, etc.

It should be noted that 95% of respondents – primary school teachers defined their level of information competence as low, they did not consider any of the presented forms of advanced training effective; 5% – mentioned the work in creative groups as the most effective. The obtained questionnaire data also showed that the majority of respondents, classified as the ones with high and sufficient levels of information competence according to self-assessment, were the specialists of the highest qualification category and specialists. These categories of primary school teachers stated a high need for further training. Such data were quite unexpected because there is a big difference between these groups of teachers in education, experience, professional skills, etc. In addition, it was found that the teachers of the highest qualification category want to attend further education courses in order to establish new professional, business, and friendly relationships; to improve professionally; they have hope for career growth. At the same time, teachers with the qualification category "specialist" believe that the knowledge and skills gained in refresher courses will be useful; they want to keep up with their students in the development of information and communication technologies; seek to learn something new to use it in professional activities; they study to improve their professional status in the team.

Due to the fact that one of the components of informational competency of teachers is procedural and methodological competency, the

result of which is the readiness of a teacher to develop educational and informational skills of primary school students, we considered it necessary to clarify the teachers' formation of these skills (Table 2).

Table 2. The formation of educational and information skills of primary school teachers (according to the subjective assessment of respondents), %

Source: Authors' own conception

Educational and information skills	The formation of skills	The lack of skills
To update and reproduce the necessary information quickly	100	–
To search for new information from various sources	100	–
To use information and communication technologies	22	78
To use catalogs	100	–
To use various reference books	100	–
To compile a bibliographic description of books	100	–
To work with graphs, diagrams, tables, pictures, etc.	100	–
To build graphs, charts, tables on the computer	15	85
To make a plan, abstracts of speeches, reports, articles	100	–
To know and apply speed reading techniques	28	72
To know and apply the techniques of text comprehension (structuring, formulation of cognitive questions, "dialogue" with the author, etc.)	100	–
To work with computer networks	10	–

The analysis of the obtained results showed that all respondents had educational and information skills in their opinion, implying that the use of information and communication technologies was optional. Most teachers did not have the skills to use computer technology. Only 28% knew how to use speed reading techniques. This is primarily conditioned by the fact that the development of such innovative methods is the subject of commerce, and the teaching methods of reading are carried out according to traditional methods at basic colleges and higher educational institutions. The comparative analysis of generalized results of the teachers' self-assessment of their information competency level with the real development of information competency under the cognitive component showed a

significant difference in indicators that determined the need for targeted work on this problem in postgraduate education.

The study of teachers' readiness for the development of information competency required a study of the motivation of primary school teachers. We identified four groups of motives that were crucial for the information competency formation of primary school teachers, namely social, psychological and pedagogical motives, motive of personal growth, and motive of external interest. The generalized results of the significance of each group of motives are presented in Fig. 1.
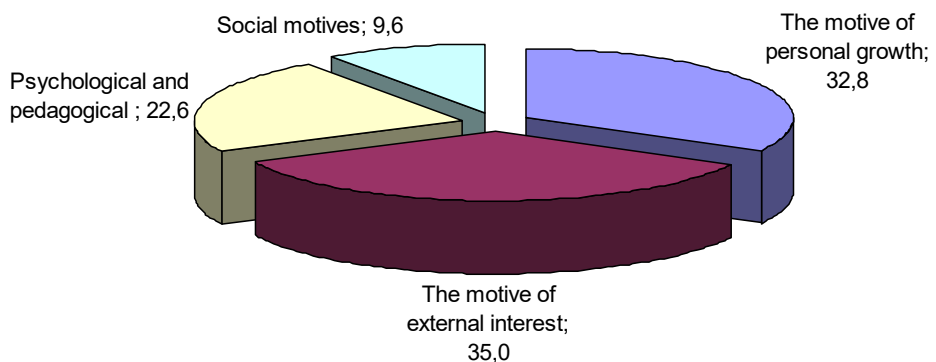

Fig. 1. The quantitative indicators of motivation for the information competency formation of primary school teachers (by groups of motives), %
Source: Authors' own conception

The results of the survey of teachers gave grounds to claim that 35% of them had indirect motivation, not related to the content of work on the information competency formation, i.e. training was a means of achieving goals that had external interest. Only 9.6% of teachers had social motives directly related to the content of the subject.

The comparison of the significance coefficients according to the classification table of the motives for the information competence development makes it possible to establish a hierarchy of motives within each group. In the group of social motives, the first place in terms of frequency of choice is occupied by the motive of the opportunity to engage in the most responsible activities in society at a high professional level (education, development, primary school children education), in the group of psychological and pedagogical motives – "the desire to teach children at a high level". Social, psychological and pedagogical motives predominate among the teachers of the highest category and specialists. In our opinion,

the motives coincidence is associated with the achievement of the highest levels of career growth (higher qualification category) and the lack of education of higher level, the actual impossibility of career growth (specialists). Among the reasons that hinder the self-development of information competence, primary school teachers most often noted "the lack of appropriate conditions at school and at home"; "excessive activity", "the lack of time", "the lack of material and other incentives", the others could not answer.

Thus, the results of the initial stage of the pedagogical experiment show that the problem of the information competency formation of primary school teachers is one of the most relevant in modern pedagogy. The objective complexity of this problem is conditioned by the sprawling structure, the probable nature of the end result, the lack of a system for measuring performance. Thus, the identification of the real state of the problem indicates the need to substantiate the modern methodology of the information competency formation of primary school teachers in the system of postgraduate pedagogical education and test of its efficiency.

On the basis of the study of literature sources and the results of our research, we substantiated the original methodology of the information competency formation of primary school teachers in the system of postgraduate education. The aim of the methodology was to achieve a medium or high level of information competency of primary school teachers. The methodology was based on the following principles: optimal studying; reliance on teacher experience; systematicity; individualization; the awareness of the need to acquire information competency.

The tasks of the original methodology were:

- to teach educators to navigate in the system of scientific and pedagogical information; to define and compare the concepts of "information", "information resources", "information technologies", "informatization", "information society", "information culture", etc.; to update and reproduce the necessary information; to find new information from various sources; to apply information and communication technologies; to use catalogs, compile a bibliographic description of books;

- to form the ideas about the competency-based approach in education;

- to provide them with the opportunity to gain practical experience in the use of information and communication technologies in primary school;

- to help the coordinators of primary education of city (district) education departments to organize teacher training on the topic of "New information technologies of education in primary school";

- to help master the technology of using information and communication technologies in classes.

The organizational and pedagogical conditions for the implementation of the original methodology were:

1) changes in the organization of the pedagogical process, updating of curricula and programs of the institutes of postgraduate education, methodical services of district (city) departments of education and educational institutions were carried out through the development and implementation of special courses "The information competency of primary school teachers" and "Mastering the methods of self-educational activities for the development of information competency by primary school teachers" in the remote mode, the workshop "Modern approaches to forming the information competency of primary school teachers", guidelines for the development of individual self-education programs;

2) scientific and educational support for the information competency formation of primary school teachers (the availability of various programs of different forms of education, recommendations, guidelines, lists of recommended literature, creative tasks for the work in the period between courses, tests, questionnaires, diagnostic tools and other teaching materials, which constitute a single educational and methodological complex that can effectively influence the formation of the information competency of primary school teachers);

3) differentiated approach to the information competency formation of primary school teachers (the implementation of education differentiation on the basis of forming the groups of students of advanced training courses with the same level of information competency; the choice of individual educational directions of teachers in the period between courses);

4) the application of information and communication technologies (Internet search engines, electronic information banks, e-mail; the involvement of teachers in teleconferences, Web-conferences, forums, chats in order to optimize educational and cognitive activities and provide computer communication between the subjects of educational process);

5) the optimal combination of innovative forms and methods of teaching with traditional ones (the use of active and interactive forms of teaching: problematic lectures, practical classes, the analysis of pedagogical situations, business games, project method, debates, presentations, portfolio, modeling of collective and individual design, independent activity, the

involvement of teachers in solving the pedagogical task of information content).

Depending on the formation level of the information competency of primary school teachers, different directions of activity and, accordingly, different teaching means were used according to the original methodology. The next means were used for the teachers with a low level of information competency: 1) enhancing interest in information activities; 2) the formation of a system of information knowledge, educational and information skills, abilities, value-based orientations; 3) the formation of professionally important qualities; 4) special course "The information competency of primary school teachers"; 5) the formation of self-diagnosis skills. The following means were used for the teachers with a medium level of information competency: 1) the development of the motivational and value-based component of the teacher's information competency; 2) psychological and pedagogical counseling; 3) the development of educational and information skills and competencies; 4) workshop "The modern approaches to the information competency formation of primary school teachers"; 5) the development of the ability to self-reflection, self-regulation. The next means were used for the teachers with a high level of information competency: 1) the organization and management of independent creative activity; 2) special course "Mastering the methods of self-educational activities for the information competency formation"; 3) collective and individual design; 4) modeling of independent activity; 5) solving creative tasks; 6) rating assessment, self-analysis.

In the process of creating educational and methodological support for the information competency formation, we relied on the research of C. Houten (2000) (European program "New Adult Learning Movement (NALM)", in which the author identifies the guiding principles of postgraduate education, namely the active use of the experience of a participant in the educational process with the educational environment, democratic choice of the advanced training program.

The methodology of the information competency formation of primary school teachers in the system of postgraduate education was focused on the development of motivational and value-based, procedural and conceptual, and regulatory and reflexive components of the teachers' information competency through the modular construction of educational process.

The motivational and value-based component involves the formed motivation for self-development, needs, abilities, orientations, emotions, guidelines, social expectations. The structural elements of the procedural and

conceptual component are special professional competences: theoretically instrumental, searching and transforming, systematization thinking, communicative and speech, procedural and methodical, general technological. The regulatory and reflexive component includes the capacity for self-reflection, the ability to carry out adequate self-assessment of information competency, to meet the need for self-improvement. Each constituent is accompanied by certain actions as components of educational activities. We also substantiated 3 levels of information competency formation of primary school teachers (high, medium, and low).

The high level is characterized by the formation of motives for personal growth, a stable cognitive interest in acquiring new knowledge and skills, the desire for self-development and self-expression; the complete and deep knowledge of the essence of information competency and its components, the educational and information skills that provide creative and innovative activities of primary school teachers, the ability to assess the quality of pedagogical program means for primary school quickly and objectively, the mastery of information and communication technologies; a high level of reflexivity, self-criticism, the ability to carry out adequate self-assessment.

The medium level is marked by the predominance of the motives of personal growth over the motives of external interest, by the situational cognitive interest in acquiring new knowledge and skills, the tendency to self-expression with the support of colleagues, interest in further self-development; the fragmentary knowledge of the essence of information competency, the educational and information skills, which are used in professional activities actively, but not always creatively; the ability to partially evaluate pedagogical program means for primary school, the desire to use information and communication technologies and modern visual aids in the educational space of primary school; a medium level of reflexivity, self-criticism, partial capacity for self-assessment.

The low level is characterized by the idea of failure, the predominance of the motives for external interest, the lack of cognitive interest in acquiring new knowledge and skills and the desire for self-education and self-development; the information knowledge of a reproductive nature, the educational and information skills formed at the level of action by analogy, based mainly on life experience; the inability to assess the quality of pedagogical program means for primary school, basic ideas about information and communication technologies and their capabilities; the unwillingness to use modern visual aids and multimedia in

the educational space of primary school; a low level of reflexivity, self-criticism, and inadequate self-esteem.

In the experimental group, the studying process was carried out on the basis of a special course "The information competency of primary school teachers" (26 hours) and was focused on the formation of information competency through the modular construction of the educational process. The continuation of this work was the self-educational activities of primary school teachers according to individual programs of self-educational activities in the period between courses. The lecture "The information competency formation of primary school teachers" (2 hours) was conducted in the control group in accordance with the working curriculum of the institute of postgraduate education.

The information competency components of primary school teachers were assessed in points for each component and indicator. The maximum and minimum grades depended on the number of indicators. For example, the number of components of the information competency formation of primary school teachers is 3. Thus, the minimum grade for one of the three components is 1 point, the average grade is 2 points, and the maximum grade is 3 points. The validity (V) of each component of information competency was determined (Table 3). The validity of each of the three identified components was approximately the same, with a slight advantage of procedural and conceptual (it was 0.11 points higher than the motivational and value-based and 0.12 points higher than the regulatory and reflexive).

Table 3. The determination of the validity of the primary school teachers' information competency components (V), points

Source: Authors' own conception

Information competency components	The number of points			Σ	V
	1	2	3		
Motivational and value-based	12	8	7	49	0.30
Procedural and conceptual	2	10	15	67	0.41
Regulatory and reflexive	13	9	5	46	0.29

The validity of each indicator of the information competency formation (M) was determined under the motivational and value-based (Table 4), procedural and conceptual (Table 5), regulatory and reflexive (Table 6) components. The primary task of the formative stage of the experiment was to organize work on the formation and development of motivational readiness of the teachers of experimental groups for the

information competency formation. The purposeful activities of all participants of the educational process for the information competency formation involved the systematic use of exercises that increased the motivational readiness of primary school teachers to carry out information activities, master the technology of planning and conducting lessons in primary school using pedagogical program means.

Table 4. The determination of the validity of indicators under the motivational and value-based component, points

Source: Authors' own conception

The indicators	The number of points				Σ	V
	1	2	3	4		
The formation of social, psychological and pedagogical motives, and the motives of personal growth of primary school teachers in the formation of their information competency	8	8	4	7	64	0.24
The cognitive interest in acquiring new knowledge and formation of educational and information skills in postgraduate education	4	5	10	8	76	0.28
The motivation for successful studying	8	10	9	–	55	0.20
The need for self-development and self-expression	7	4	4	12	75	0.28

Table 5. The determination of the validity of indicators under the procedural and conceptual component, points

Source: Authors' own conception

The indicators	The number of points				Σ	V
	1	2	3	4		
Understanding the tasks and content of information training in the course of professional development	11	9	7	–	50	0.18
The system of knowledge	6	6	9	6	69	0.26
The mastery of the methodology of selection, evaluation, use of modern information technologies in the primary school	8	5	5	9	69	0.26
The formation of educational and information skills and individual qualities necessary for the implementation of information activities	2	7	6	12	82	0.30

Table 6. The determination of the validity of indicators under the regulatory and reflexive component, points

Source: Authors' own conception

The indicators	The number of points			∑	V
	1	2	3		
Level of reflexivity	7	11	9	56	0.35
Self-criticism, the ability to carry out adequate self-assessment	5	10	12	61	0.38
The self-organization of personal activity of primary school teachers, orientation on further self-development	15	6	6	45	0.27

The analysis of the dynamics of the motivational and value-based component during the formative stage of the experiment showed that the number of the EG teachers with a high level of development of this component increased by 12.6%, the CG teachers – by 0.6%; the EG teachers with the medium level – increased by 21.1%, the CG teachers – by 1.6%; the EG teachers with a low level – decreased by 33.7%, the CG teachers – by 2.2% (Table 7). Analyzing the formation of the procedural and conceptual component of the information competency of the EG and CG teachers showed that at the end of the experiment, the number of the EG teachers with high and medium levels increased by 22.1% and 18.0%, respectively. The number of teachers with a low level of this component decreased by 40.1% in the EG.

In our opinion, these changes occurred due to purposeful educational activities during course training, which contributed to the growth of theoretical awareness of primary school teachers of the problem under study, updating the information knowledge and skills, acquiring new skills and qualities, and, consequently, forming information competency. The number of the CG individuals with different levels of this component was not changed during the formative stage of the experiment (Table 7).

Table 7. The formation levels of the information competency components of primary school teachers at the beginning and end of the formative stage of the pedagogical experiment, %

Source: Authors' own conception

Information competency components	Groups	The levels / stages of the experiment					
		high		medium		low	
		beginning	end	beginning	end	beginning	end
Motivational and value-based	EG	8.7	21.3	28.8	49.9	62.4	28.7
	CG	8.9	9.5	28.9	30.5	62.2	60.0
Procedural and conceptual	EG	19.3	41.4	33.9	51.9	46.7	6.6
	CG	18.3	21.4	30.1	32.3	51.6	46.3
Regulatory-reflexive	EG	18.7	34.6	30.2	49.1	50.9	16.1
	CG	16.9	20.7	28.3	32.1	52.2	46.9

The analysis of the dynamics of the regulatory and reflexive component of information competency showed that in the EG the number of teachers with a high level increased by 15.9%, with a medium level – increased by 18.9%; with a low level – decreased by 34.8%. There were no significant changes in the CG (Table 7). The analysis showed significant superiority of the original methodology over the existing one in the formation of the information competency of primary school teachers in the system of postgraduate education.

5. Discussion

The scientists (Bicen et al., 2018; Kuzminskyi et al., 2019) note that pedagogical knowledge, skills, abilities of teachers out of touch with information competency lead to a crisis in their professional activities, pedagogical burnout, low competitiveness of the individual in the labor market. Therefore, the information competence formation of primary school teachers in order to prepare primary school students for further study and life in modern society more productively is an urgent pedagogical task. In addition, some researchers emphasize the importance and necessity to study and implement the best practices of foreign countries in terms of education (Bondar et al., 2020; Yereskova, 2020). Thus, some key parameters are identified to ensure the competitiveness of any country: a high level of the national education systems development; the availability of high-quality educational and research infrastructure; the development of strategic

partnership; mobility development, etc. (Colognesi et al., 2020; Aguilar et al., 2019; Tymchuk et al., 2019).

On the basis of the research, theoretical and methodological principles of andragogical, informational, personality-oriented, systemic, synergetic, stochastic, activity and humane approaches and the principles of optimal learning, reliance on teacher experience, systematization, individualization, awareness of the need to acquire information competency, the ratio of information and professional competency of primary school teachers revealed the essence of the concept of "the information competency of primary school teachers". Thus, "the information competency of primary school teachers" should be considered as a complex integrated professional quality, which includes the motivation of a teacher to carry out information activities in the educational environment of primary school; a set of professional and conceptual qualities of personality that ensure the formation of educational and informational skills of primary school students; the capacity for reflection and self-development. This formulation significantly expands the content of "information competence" primarily in terms of previous scientific developments on this issue, which were limited by the personal freedom of participants in the educational process and prepared training (Afanasenko et al., 2020; Bakholskaya et al., 2019; Semchuk et al, 2018).

The study and analysis of documents regulating the process of advanced training showed the lack of purposeful work on the information competency formation of primary school teachers during the courses and in the period between courses, thus, the consideration of the issues related to some aspects of the work with information is actually episodical. A similar situation is confirmed by the results of some empirical studies (Sebalo & Teslenko, 2020; Bicen et al., 2018). However, it is noted that the significant advantages of future teachers are the skills and competencies they acquire for planning and forecasting, the development of various information resources and media, the comparison of facts, and the development of educational material, etc.

The results of the study state that the main criteria for the information competency formation of primary school teachers were the formation of motives for successful studying, cognitive interest in postgraduate education, the need for self-development and self-expression; the system of information knowledge, the formation of educational and information skills, the ability to assess the quality of pedagogical program means for primary school, the information and communication technologies; the level of development of reflexivity, the ability to carry out

adequate self-evaluation, focus on further self-development. Such issues significantly expand the idea established in the scientific literature that key competencies (including information competencies) contribute to the performance of the educational activities (Bratel et al., 2020; Baytiyeh, 2019; Collie, & Perry, 2019; Ivanchuk et al., 2020).

Besides, it should be noted that the necessary and sufficient organizational and pedagogical conditions for the formation of the teachers' information competency were changes in the organization of the pedagogical process, updating curricula and programs of postgraduate education, methodological services of educational departments and educational institutions; the scientific, educational and methodical support of the information competence formation of primary school teachers; differentiated approach to the information competency formation of primary school teachers; application of information and communication technologies; an optimal combination of innovative forms and methods of teaching with traditional ones. Such author's positions substantiate the structural components of the information competence of primary school teachers (motivational value-based, procedural and substantive, regulatory and reflexive), and also characterize the formation levels of the information competence of primary school teachers (low, medium, and high). The specific formation levels of the teachers' information competence components make it possible to determine appropriate programs of self-education and self-development.

According to some scientists (Amelina & Tarasenko, 2018; Bashmanivska et al., 2020; Ovcharuk, 2020), competence implies professionally significant skills expressed in various forms. At the same time, the process of information competence formation of teachers allows improving educational and information skills and acquiring new skills, including the following: to navigate in the system of scientific and pedagogical information; to distinguish between the concepts of information, information resources, information technology, informatization, information society, information culture, etc.; to update and reproduce the necessary information quickly; to search for new information from various sources; to use information and communication technologies; to use catalogs, compile a bibliographic description of books.

The comparison of our results with research data (Hrabovskyi, 2009; Bashmanivska et al., 2020; Sebalo & Teslenko, 2020) on the information competency formation of teachers in natural sciences and mathematics in the process of organizing advanced training courses confirmed the need to take into account a differentiated approach, andragogical principles of

learning, promising areas of applying information and computer technologies in the professional activity of a teacher. The author proved that along with the use of traditional forms and methods of teaching, it is advisable to use innovative ones – thematic discussion, work in micro-groups, project method, etc.; it is necessary for a teacher and a student to conduct joint planning of one's professional development activities in the period between courses.

The world experience shows that those countries, especially the United States, Japan, France, Germany, Spain, Poland, which had made the training of their education workers the number one task, achieved the greatest success in defense, economic, social and political, legal, and cultural spheres (Bondar et al., 2020; Fejdl et al., 2015; Ovcharuk, 2020; Tymchuk et al., 2019; Sanchez Rodriguez et al., 2018; Colognesi et al., 2020).

Besides, the developed methodology of the information competency formation of primary school teachers can be used both in domestic and foreign pedagogical practice to train teachers of postgraduate education, primary school teachers, the specialists of other methodological services of the information competency formation of primary school teachers during courses and in the period between courses, which constitute a single set of educational and methodological support for the information competency formation of primary school teachers. The methodology presented by the authors is universal because it efficiently affects the increase of scientific-theoretical and cultural levels, and the improvement of the pedagogical skills of a teacher of the European educational system. It is confirmed by the ideas of some researchers (Aguilar et al., 2019; Bondar et al., 2020) who, studying trends in education in the EU, indicate that a successful combination of the traditional forms and methods of teaching (lectures, practical classes, consultations, the exchange of experience, workshops, etc.) in combination with non-traditional (information and communication technologies, the analysis of pedagogical situations, business games, project method, debates, presentations, distance learning, etc.) provides a high level of general professional competence of teachers.

It should be also mentioned that the acquisition of information competence both by the students of advanced training courses and the employees of the Municipal Institution "Zaporizhzhya Regional Institute of Postgraduate Pedagogical Education" of Zaporizhzhya Regional Council in 2016-2017 allowed adapting to the changing socio-cultural situation in 2019-2020, caused by the spread of COVID-19. Thus, 70 new e-courses on the online platform were developed, 170 webinars were held, and 2900 teachers of the region improved their skills on the courses of a distance format. This

confirms the efficiency of the developed methodology for the formation of information competence.

6. Conclusions

1. Theoretical analysis of literature, the study of curricula, programs of special courses of the institutes of postgraduate pedagogical education, work plans of educational departments, methodical offices, methodical associations of primary school teachers and scientific researches on the problem of the information competency formation of teachers indicated the professional significance of this multifaceted phenomenon. The analysis of the essence of the information competency of a teacher confirmed the existence of several approaches: information competency as a key competency, a component of professionalism, integral quality of personality, etc. A certain composition of constituents was singled out in the specified integral formation: the system of knowledge, abilities, skills, means and ways of activity, value orientations, etc. The information competency of a primary school teacher was considered as a complex integral professional quality, which includes the teacher's motivation to carry out information activities in the educational environment of primary school; a set of professional and conceptual qualities that ensure the formation of educational and informational skills of primary school students; the capacity for reflection and self-development. It was established that the information competency of a primary school teacher consists of motivational and value-based, procedural and conceptual, regulatory and reflexive components. On the basis of modern methodological approaches, the methodology of the information competency formation of primary school teachers was scientifically substantiated as a multicomponent educational process carried out during courses of advanced training and in the period between them and based on the authentic unity of different forms of studying (including distance one).

2. It was proved that the methodology of the information competency formation of primary school teachers contributes to changes in the organization of the pedagogical process, updating of curricula and programs of the institutes of postgraduate education, methodical services of educational departments and educational institutions; provides educational and methodological development of the information competency of primary school teachers, a differentiated approach to the information competency formation of primary school teachers, the use of information and

communication technologies and the optimal combination of innovative forms and methods of teaching with traditional ones.

The introduction of the methodology of the information competency formation of primary school teachers allowed substantiating the criteria for the formation of information competency: the formation of motives for successful studying, cognitive interest in postgraduate education, the need for self-development and self-expression; the system of information knowledge, the formation of educational and information skills, the ability to assess the quality of pedagogical program means for primary school, the information and communication technologies; the level of development of reflexivity, the ability to carry out adequate self-evaluation, focus on further self-development. The levels of the information competency formation of primary school teachers (low, medium, and high) were characterized.

3. The experimental test of the efficiency of original methodology showed a positive dynamics of all the information competency components of the EG teachers studied: the number of teachers with high and medium levels increased by 12.6% and 21.1% under the motivational and value-based component; by 22.1% and 18.0% under the procedural and conceptual component; by 15.9% and 18.9% under the regulatory and reflexive component. There were no significant changes in the CG. This indicated the superiority of the original methodology over the existing one in the formation of the information competency of primary school teachers in the system of postgraduate education.

4. The proposed original methodology is universal for any educational system because it affects the increase of the specialists' scientific-theoretical and cultural levels, and the improvement of pedagogical skills. The application of traditional forms and methods of teaching (lectures, practical classes, consultations, the exchange of experience, workshops, etc.) in combination with non-traditional (information and communication technologies, the analysis of pedagogical situations, business games, project method, debates, presentations, distance studying, etc.) provides a high quality of general professional competence of teachers at the high level presented by the European educational system.

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