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**DEVELOPMENT OF ICT COMPETENCE OF FUTURE TUTORS
BY MEANS OF E-PORTFOLIO**

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Abstract

The paper is devoted to the development of ICT competence of future educators specializing in tutoring in conditions of digitalization of modern society. The goal of the study is to substantiate methodological approaches and describe methodological solutions for ICT competence development and determine its levels in the electronic educational environment of a federal university by means of electronic portfolio in accordance with the modern academic and professional standards. Future tutors should possess ICT competence to improve their qualifications lifelong for effective professional activity. The research involved 149 students enrolled in Pedagogical Education (area of specialization “Tutor”) at the School of Education, Psychology and Sociology, Siberian Federal University. The results of the research include a methodology for developing ICT competence, and the level model of its formation by means of electronic portfolio, and their probation. The methodology was designed for Bachelor’s program students – future tutors – and implemented in the teaching and learning process. Most of the students who participated in the experiment demonstrated productive and constructive levels of ICT competence. The main outcomes of the research can serve the basis for further developments in the field of effective developing professional ICT competence in training future educators specializing in different areas taking into consideration the requirements of academic and professional standards.

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Keywords: ICT competence, Bachelor, tutor, electronic portfolio.



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1. Introduction

The challenge for modern higher education is to prepare students for the digital economy of the future in the context of the rapid dissemination of information and communication technologies (ICT).

Modern pedagogical education is based on the competence paradigm. Competence-based learning provides understanding of the relevance and “viability” of knowledge and skills acquired within the process of learning. The legislative framework that provides competence-based learning for training future tutors is presented by the Federal Law “On Education in the Russian Federation” (Federal Law On Education in Russia dated from 29.12.2012 No. 273-FZ), the Federal State Educational Standard of Higher Education (Order on approval of the Federal State Educational Standard of Higher Education – Bachelor degree in Education 44.03.01 Pedagogical education. No.50362), the Professional Standard of a Teacher (Order of the Ministry of Labor of Russia of October 18, 2013 No. 544n) and the Professional Standard of a Tutor (Order of the Ministry of Labor of Russia dated from 10.01.2017 No.10n). The answer to the challenges in the system of education within the information age is the footing on personality-oriented (Asmolov, 2015; Zeer, 2002; Serikov, 1994; Yakimanskaya, 2000), competence-based (Zimnaya, 2014; Khutorskoy & Khutorskaya, 2008; Shadrikov, 2004) and system activity (Vygotsky, 1983; Leontiev, 2004; Elkonin, 2004) approaches that have a significant impact on changes in the content, methods, means, forms and technologies of education (Asmolov, 2009; Khutorskoy, 2015; Leontiev, 2004; Vygotsky, 1983; Zimnaya, 2014; and others).

The development of a competence-based learning contributed to the fact that the professional community singled out (including various professional and academic standards) basic (key, universal) competences as the most integrated that contribute to the achievement of success in life; to improving public institutions; and correspond to different areas of life. Among these competences in various national and professional standards ICT competence stands out as the “basic”, “core” or “universal” competence of the digital 21st century.

It should be underlined that in the professional standard (Order of the Ministry of Labor of Russia of October 18, 2013 No. 544n) the consolidated job function of a specialist in the field of education is the tutoring support of students. Among the significant functions mentioned in the job description template of the tutor there are the following:

- identification of individual characteristics, interests, abilities, difficulties, students’ problems appearing within the process of education;

- organization of educational environment for students, including students with disabilities, to ensure realization of individual educational routes and projects;

- organizational and methodological support for students, including students with disabilities, to ensure realization of individual educational routes and projects.

These functions cannot be carried out in the modern conditions of the digital environment without the appropriate level of ICT competence of a tutor.

The analysis of psychological and pedagogical sources displayed that at present there is no consensus on the definition of ICT competence being used. Researchers use various definitions as synonyms: “information competence,” “computer literacy,” “ICT competence,” “digital literacy,” “media literacy,” etc. The use of the terms defining professional digital competence of a teacher (PDC)

(Gudmundsdottir & Hatlevik, 2017) is associated with the active equipment of the learning process with digital resources.

Future tutors should possess ICT competence for continuous lifelong improvement of their qualifications, for effective professional activity (Gill, Dalgarno, & Carlson, 2015). Modern studies emphasize that the use of ICT tools by various teachers in their professional activity remains below the expectations of various participants of the educational process (Gill et al., 2015; Tondeur et al., 2015). The most commonly used among educators resources are common ICT resources - the Internet, email and text processing programs (Tezci, 2009).

The necessity not only to develop ICT competence of future tutors for their further individual educational needs and the needs of the students they work with (Pegalajar Palomino, 2017), but also to work out new methodologies of ICT competence development by means of current educational and pedagogical technologies, resources and means of electronic information and educational environment becomes obvious. This is the focus of this study in the context of mastering and using e-portfolio as an educational, reflexive pedagogical technology of individual and professional development in the process of training tutors at the undergraduate level.

2. Problem Statement

In conditions of the modern information society the set of functions and activities that the tutor performs is changing. The new significant functions the educator carries out are: coordination of the educational and cognitive process, development of individual educational routes, corrective and individual assessment function, diagnostic, supporting function, management of educational projects, supervision of the current students' performance, and etc.

ICT competence of a future tutor implies mastering new teaching tools to solve professional tasks using ICT resources. The analysis of practical experience of tutors working with various participants of the educational process indicates the existing contradictions associated with the insufficient level of ICT competence that impedes its further development.

3. Research Questions

The revealed contradictions allowed us to work out the research questions: What is the essence of the ICT competence of future tutors? How to effectively develop ICT competence of future tutors in the electronic information and educational environment? How to incorporate the requirements of the existing academic and professional standards in developing ICT competence of future tutors? What ICT tools are most effective for developing ICT competence of future tutors within the learning process? What methodological solutions for using an electronic portfolio in the process of training future tutors will be most effective in shaping their ICT competence?

4. Purpose of the Study

The purpose of the study is to substantiate methodological approaches and methodological solutions for improving ICT competence of future tutors and determine the level of the developed ICT

competence in the electronic information and educational environment of a federal university by means of electronic portfolio in accordance with the modern academic and professional standards.

5. Research Methods

To study ICT competence of educators and scientists and assessing the level of the ICT competence they demonstrate a complex of theoretical and empirical methods was used including system analysis and comparative analysis of psychological, pedagogical, educational, methodological, scientific and technical sources on the research problem, generalization, hypothesizing, content analysis of the existing Russian and foreign standards used in teacher training and aimed at developing ICT competence of a future tutor, validated psychological and pedagogical diagnostic methods for measuring the level of students' ICT competence, and questionnaire polls.

6. Findings

The analysis of scientific and practical resources devoted to ICT competence of tutors demonstrated that this concept is not sufficiently studied and described. The problem of the ICT competence formation and development in the context of training educators in the works of Russian researchers is presented in more detail: Lapchik (2012), Grinshkun (2014), Smolyaninova (2016), Henner (2015) and others.

Within the research it was determined that ICT competence of a tutor is an integrated and multi-component concept. The components of the ICT competence, the stages and levels of its formation are determined in accordance with various methodological bases, which are currently not clearly defined. The researchers do not single out the ICT competence of a tutor, while it is implicitly contained in the description of the required skills and qualities. We share the opinion of the leading methodologist, President of the Interregional Tutor Association of Russia T. Kovaleva that the working environment of a tutor creates tutorial action vectors: social, cultural-subject, and anthropological:

social vector: work with a variety of educational proposals, related with infrastructure of educational institutions;

cultural-subject vector: work with the subject material selected by the student;

anthropological vector: working with the student's individual psychological and physiological characteristic features (Kovaleva, 2013).

When examining the competence of a tutor, researchers highlight its traditional components: cognitive skills, communication skills, personal characteristics of the ability to evaluate the content (Gedgafova, 2014). A number of studies emphasize the role of distance learning and the use of distance learning technologies in the work of a tutor (Kovaleva, 2013). The tutoring (E-tutoring) resources are actively considered in the context of the implementing e-learning and distance learning technologies, the use of e-portfolio tools in training students in various areas of specialization (Deketelaere, Degryse, De Munter, & De Leyn, 2009; Holgado García et al., 2016; Tammaro, Calenda, Iannotta, & Ferrantino, 2017; Smolyaninova & Bezyzvestnykh, 2016).

The analysis of Russian and foreign studies and professional standards demonstrate that the activity of a tutor in the electronic information and educational environment should be provided by means of special actions, skills and knowledge. For example, a tutor should know various ICT tools for professional activity, be able to analyze them and apply them effectively in a particular situation; and possess the necessary level of ICT competence.

For tutors the necessary condition for the ICT competence continuous development is their active participation in the professional community in the Internet environment. A tutor should have the necessary level of ICT competence for productive interaction with colleagues in the electronic information and educational environment. This activity may be carried out by means of participation in regular Internet conferences, mobile schools and tutoring forums, various workshops, scientific conferences and supervisions.

In this study the ICT competence of future tutors is an integrative, dynamic personal quality, which determines their ability to voluntarily integrate ICT technologies into professional and social activities for productive solving professional tasks, and implementing tutor support for students (designing individual educational routes, implementing interaction with various participants of the educational process; pedagogical support of students' reflection on implementing individual educational routes, reflection of the curriculum and projects) in accordance with professional standards and the requirements of the modern information society.

Further we consider the specific features of ICT competence development of future tutors in conditions of electronic information and educational environment.

In accordance with the current academic standard in Pedagogical education a future tutor should have a set of different competencies (general professional, universal and professional) and effectively apply them on the basis of ICT competence.

Tutors combine various functions and roles in the context of implementing the activity-based, competence and personality-oriented approaches. The analysis of the professional standard showed that the designated activities and functions from the job description correspond to the various roles presented in Table 1.

Table 01. Correlation of the activities and roles of a tutor in the education environment

№	Role of a tutor	Content of labor activities and functions
1	<i>Teacher</i>	- carry out pedagogical support of students in developing individual educational routes, curricula, projects; - carry out pedagogical support of students in manifestation of their educational needs and interests; - hold conversations, trainings, business games, tutorials, games, creative activities with students
2	<i>Methodologist</i>	- carry out development and selection of methodological tools for the formation of an open, variable, redundant educational environment and for analyzing the results of tutoring support; - develop guidelines for teachers and parents (legal representatives) of students
3	<i>Organizer</i>	- ensure organization of parent (legal representatives) participation in the process of developing individual

		educational routes, curricula, and projects; - organize various forms of student access to environmental resources in accordance with their age, experience, and skills
4	<i>Consultant</i>	- advise students on developing individual educational routes, a project; - provide advisory support for students in the process of their professional self-determination; - hold individual and group consultations with students, parents, and teachers
5	<i>Manager</i>	- organize the learning process in accordance with the individual schedule; - manage the group tutoring classes; - coordinate the interaction of subjects of education in order to ensure student access to educational resources
6	<i>Expert</i>	- support students' assessment activities (entrance, current and final control); - assess potential of the educational environment for developing and implementing individual educational routes, curricula, and projects
7	<i>Psychologist</i>	- identify students' individual characteristics, interests, abilities, problems, difficulties within the educational process; - carry out preliminary psychological and pedagogical training for professional diagnosing and work with the individual characteristics of students;

In the process of training future tutors there is a change in the forms of interaction with students: from authoritarian and mentoring style to partnership and cooperation. Interactive methods and means of teaching are actively used: discussions, workshops, business games, case method, brainstorming, presentations, trainings and others. Education of future tutors takes place using the resources of open electronic information and educational environment of the university (e-learning courses, e-portfolios, webinars, video conferences, MOOC, etc.).

The research allowed identifying the modern ICT tools most effective for developing the ICT competence of future tutors within the learning process. The main components of the functions and actions of future tutors were identified. The most significant components of the functions and actions to be developed by means of electronic information and education environment are presented in Table 2.

Table 02. ICT tools and electronic resources supporting functions and activities of a tutor.

Components of the labor functions and actions of future teachers-tutors	Ict tools, resources of electronic educational environment
Contributes to manifestation of activity, supports students' reflection and learning motivation in an open electronic information and educational environment	E-learning courses; forums, chat rooms, interactive polls, including interactive polls in social networks and instant messengers; personal blogs and websites, mooc, individual e-portfolios

Determines using feedback the effectiveness of types of educational activities of the student, controls the correct performance of the task	Forums, chats, interactive surveys, individual e-portfolios
Holds consultations with different participants of the educational process	Webinars, online conferences
Identifies students' individual characteristics, interests, abilities, problems, difficulties	Interactive mental and resource maps, individual e-portfolios
Provides pedagogical support in designing individual educational routes	E-learning courses, individual e-portfolios

The study analyzed current academic and professional standards for the development and assessing the teachers' ICT competence. The results of the analysis allowed us to determine the levels of the ICT competence of future tutors and the criteria of their development. Among the significant Russian and foreign regulatory documents and relevant research projects were considered the following: Federal State Educational Standard in Higher Education (Order on approval of the Federal State Educational Standard of Higher Education – Bachelor degree in Education 44.03.01 Pedagogical education. No.50362); Russian professional standards of a teacher (Order of the Ministry of Labor of Russia of October 18, 2013 No. 544n) and of a specialist in the field of education (tutor) (Order of the Ministry of Labor of Russia dated from 10.01.2017 No.10n); UNESCO Recommendations (ICT Competency Framework for Teachers, 2011); ISTE Standards for Educators; ISTE Standards for IT competence (ISTE Standards for Students, Educators, Computer Scientists, Technology Coaches and Administrators by ISTE® (International Society for Technology in Education), 2017); European project "DigComp 2.0"(2018).

Conceptual grounds of competence approach in training tutors (higher education level) is manifested through the focus within the educational process on the achievements and educational outcomes, which are hierarchically and structurally determined universal, general professional (pedagogical) and professional (tutoring) competences.

Based on the theoretical and methodological foundations of the competence-based approach, taking into account the specific features of tutoring the following components in the structure of ICT competence were identified: motivational-targeted, cognitive, communicative, operational activity-based, reflexive and assessment, and personal creative (Figure 01).

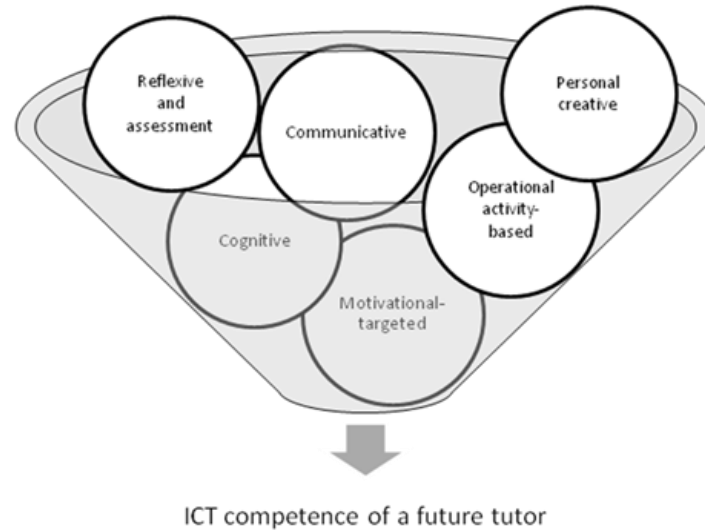


Figure 01. Structural components of ICT competence of a future tutor

The research included a comparative analysis of Russian regulatory documents defining key terms for a general understanding of ICT competence in the field of professional training of tutors and a comparative analysis of data from foreign researchers. The European Centre for Development and Vocational Training (CEDEFOP) (2014) presented the definitions of “competence” and “ICT competence” in the form of a European multilingual terminological glossary. In this document the term “competence” is defined as “the proven ability to apply knowledge, skills, personal, social and/or methodological abilities, in work or study situations and for professional and personal development.”

The analyzed standards of pedagogical ICT competence of teachers (UNESCO ICT-CFT and ISTE Standards * T) include two groups of competences – those related to the development of knowledge and skills in the field of ICT, as well as those that teachers need to prepare students to life in the information society (in a knowledge-based economy) (Avdeeva, Nikulicheva, Khapaeva, & Zaichkina, 2016). Another UNESCO standard we analyzed presents several levels of teachers’ ICT competencies, as well as the requirements for the educational organization as a whole. The analysis of the listed components of the programs did not identify elements that allow teachers to independently study and develop their ICT competence in accordance with the development of the information educational environment.

In accordance with the professional teachers’ standard professional pedagogical ICT competence includes: general user ICT competence, general pedagogical ICT competence, subject-related pedagogical ICT competence (Order of the Ministry of Labor of Russia of October 18, 2013 No. 544n).

The assessment of teachers’ ability to apply ICT competence should occur within their activities and be recorded in the information environment (Order of the Ministry of Labor of Russia of October 18, 2013 No. 544n). In addition to that, the professional standard of a teacher in the conditions of informatization of education implies qualitative changes of continuing education of a teacher at all levels.

ISTE (International Society for Technology in Education) approach is used to describe indicators of information and communication competences. ISTE standards are structured in such a way that we can see how their key components (continuous development, pedagogical design, learning through collaboration, leadership, digital “citizenship”) manifest themselves in teachers’ activities in the context

of various subjects, and are further implemented in the students' learning activity. The role of technology is to open up new opportunities for students, to help a teacher create a personalized development environment (ISTE Standards for Students, Educators, Computer Scientists, Technology Coaches and Administrators by ISTE® (International Society for Technology in Education), 2017). The latter characteristic is directly related to the profession of a tutor. ISTE standards distinguish six levels of the ICT teachers' competence.

In the European project DigComp 2.0: The Digital Competence Framework for Citizens (2018) ICT competence is included in the definition of Digital Competence and is interpreted as a proficient, critical and creative use of ICT tools to achieve goals related to work, employment, training, recreation, inclusion and/or participation in society. Researchers define digital competence as a universal key competence that allows mastering other key competencies (for example, language, mathematics, learning and creative skills); it is not limited to the list of ICT functional skills.

The concept model published in DigComp 2.0 is the basis for the eight levels of digital competence (supported with examples of their use applicable in the field of education and employment). The eight levels of proficiency for each competency were determined on the bases of the expected educational outcomes using action verbs in accordance with the Bloom taxonomy, as well as the content and structure of the European Qualifications Framework (EQF) (EQF, 2010). The selected levels are described in accordance with the 5 characteristics: 1. information and operational literacy; 2. communication and collaboration; 3. creating digital content; 4. security; 5. problem solving.

The content of the experimental work of the research was the search for methodological solutions most effective for shaping ICT competence by means of electronic portfolio within the process of training future tutors. The results of the study demonstrated that one of the organizational and pedagogical conditions for the effective development of ICT competence of future tutors was the methodology of teaching a course in E-portfolio in Personal and Professional Development. It was probated in training future tutors. The following significant functional and informative characteristic features of a course in E-portfolio in Personal and Professional Development were identified:

within the period of study the course has a prolonged and distributed character;

it is the backbone discipline in the block of information cycle disciplines that form ICT competence of future tutors;

it is implemented in compliance with didactic principles (continuity, interactivity, practical orientation, visibility, accessibility and openness, system and systematic character, feedback and variability);

it is supported by an e-learning course based on a blended learning model;

it offers dynamically updated modules (basic, practical, personal-professional).

The assessment and diagnostic tools include a number of valid methods that make it possible to assess the level of ICT competence (Table 3).

Table 03. Diagnostic tools for assessing components of ICT competence of a future tutor

ICT competence component	Assessment methodology
Cognitive, operational activity-based	Modified Digital Literacy Assessment Method "Microsoft Digital Literacy Test"

Communicative	“Diagnostics of communicative skills” by L. Michelson (in the adaptation of Y.Z. Gilbukh)
Motivation and objective-related	Method for assessing students' learning motivation (A. A. Rean and V. A. Yakunin), modified by M.T. Badmaeva
Reflexive and assessment	Modified questionnaire by A.V. Karpov for assessing reflexive personality; self-assessment of the preparedness to use e-portfolio tools for developing ICT competence
Personal and creative	Personal creativity assessing method by E. E. Tunik

The results of assessment carried out in the Control Group CG1 and Experimental Group EG1 before the experiment was started are presented below in Figure 02. They prove the absence of significant differences at the initial level of the experiment in the level of ICT competence in the both groups.

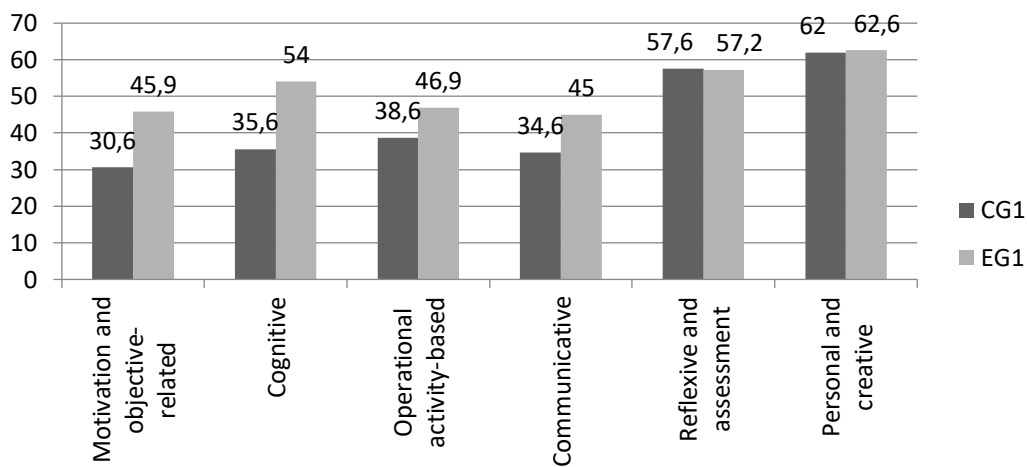


Figure 02. Components of ICT competence at the initial stage of the experiment

The results of the assessment carried out after completion of the experiment in the Control and Experimental groups are presented in Figure 03.

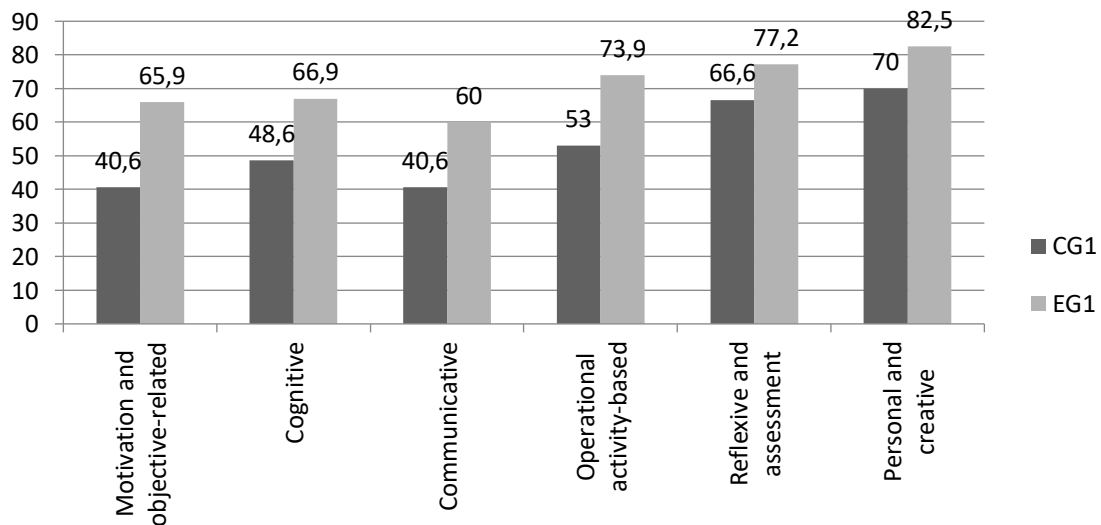


Figure 03. Components of ICT competence after completion of the experiment

The assessment results of the ICT competence level of future tutors in the experimental (75 people) and control (74 people) groups of students showed a significant positive dynamics in the experimental group (see Figure 04).

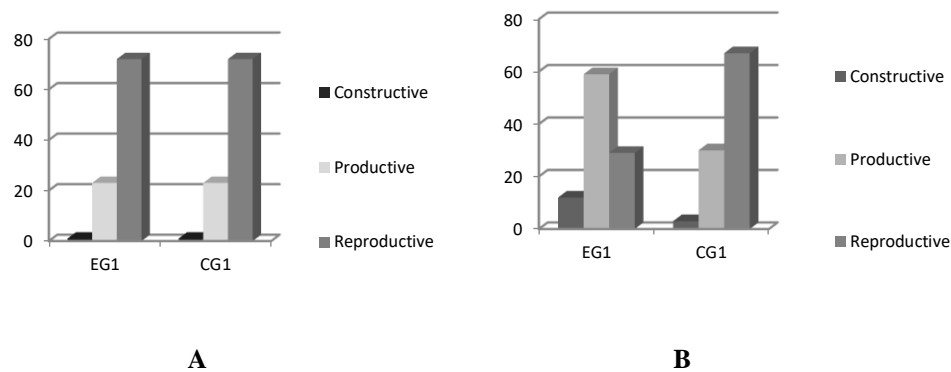


Figure 04. The level of ICT competence of future tutors in the Experimental and Control groups at the beginning (A) and on completion (B) of the experiment

The results of experimental work confirmed the effectiveness of the developed methodology for the formation of ICT competence of future tutors within the process of mastering a course in E-portfolio in Personal and Professional Development.

7. Conclusion

As part of the research the essence of ICT competence of future tutors and its important components necessary for realization of effective professional activity in a modern digital society were examined. The analysis of the academic international standards of ICT competence and Russian professional standards of future tutors was carried out. It allows determining the necessary functions and activities taking into account the development of the electronic information and educational environment. ICT tools for their effective implementation were identified, one of which is e-portfolio. The research carried out resulted in the methodological solution aimed at implementing organizational and pedagogical conditions for the effective development of ICT competence of future tutors. The solution implies using the developed methodology for mastering the modular course in E-portfolio in Personal and Professional Development within the entire period of study. The results of the experimental work confirmed the effectiveness of the developed methodology. Most future tutors demonstrated productive and constructive levels of ICT competence.

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