# SCIENTIFIC AND METHODOLOGICAL CONDITIONS FOR DEVELOPING INFORMATION COMPETENCY IN HIGHER EDUCATIONAL INSTITUTION STUDENTS

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Abstract: The paper highlights the relevance of finding out and fulfilling the scientific and methodological conditions for developing the information competency in higher educational institution students in the era of digital transformation. The authors describe approaches to the understanding of the "digital transformation" phenomenon which is studied at the level of state education policy. Attention is paid to developing the information competency of the future teachers, their individual and professional establishment in the era of digital transformation. The materials of the paper are of practical interest for master-degree students, postgraduate students, teachers of higher educational institutions and teachers of other educational institutions doing research in this domain.

Keywords: digital transformation, information competency of students, scientific and methodological conditions, information competency development concept.

## 1 Introduction

Currently, new national projects, programs, standards and guidelines are approved and fulfilled in the field of education. The development of national projects and programs such as "Education" (Passport of the national project "Education", 2018), "Science" (Passport of the national project "Science", 2018), "Digital economy of the Russian Federation" (Passport of the national program "Digital economy of the Russian Federation", 2018), "Open education" ("Open education"), "The contemporary digital educational environment in the RF" ("The contemporary digital educational environment in the RF"), the development of the WorldSkills high professional standards concerning competencies (WorldSkills Russia), the creation of the "ICT competency framework for teachers" guidelines by UNESCO ("ICT competency framework for teachers". UNESCO guidelines, 2019) and the professional standard of a teacher (On approval of professional standard "Teacher (pedagogical activity in preschool, general primary, general main, and general secondary education) (educator, teacher)", 2013) influence the change and upgrade of the Federal state educational standards of higher education for training of students – the future teachers. The basis of the contemporary Federal state educational standards of higher education (FSES HE) is made up by the competency-based approach. In the era of digital transformation and orientation to the competency-based approach, it is the development of information competency of higher educational institution students that goes to the foreground.

Digital transformation generates a new level for achievement of opportunities granted by digital educational technologies in education which is aimed at creating an anthropo-oriented digital educational space as an ecosystem of interaction geared to learners' individual educational paths. In taking a quantum leap, it is to developing the information competency in higher educational institution students that an important role is assigned as to one of the universal and meta-subject competencies revealing new aspects of self-fulfillment and self-development, and new abilities of interaction within the digital educational environment of higher educational institutions.

With regard to this, at the contemporary stage of fulfillment of the Federal state educational standards of higher education, it is essential to identify and achieve the scientific and methodological conditions for developing the information competency in higher educational institution students in the era of digital transformation.

This research considers a variant of description of the scientific and methodological conditions for developing the students' – future teachers' – information competency, with the said conditions making up the concept of developing this competency in the era of digital transformation.

## 2 Literature Review

Many contemporary studies in education deal with digital transformation influencing identification and fulfillment of scientific and methodological conditions for developing the information competency in higher educational institution students.

Various aspects of digital transformation of the society and education are studied by S. D. Karakozov (Karakozov & Uvarov, 2016), A. Yu. Uvarov (2018), G. L. Tulchinskiy (2017), L. Yu. Ovsyanitskaya (2018), N. L. Smakotina (2017), L. S. Shulghina (2015), O. I. Popova (2018), W. Strielkowski, O. Chigisheva (2019) et al. According to their studies, digital transformation covers all spheres of the human life, that of education included, and it is associated with maintaining the anthropo-oriented digital educational space and using digital technologies for fulfillment academic and professional tasks more extensively.

The research by scientists A. I. Agheev, M. A. Averyanov, S. N. Evtushenko, and E. Yu. Kochetova (2017) identify a new level of digital transformation ensuring the creation of a high-tech infrastructure (digital space) and the rise of digital society.

The questions of digitization of education associated with developing and implementing digital information technologies into the academic process are considered by the representatives of I. V. Robert's scientific school (2010). These studies prompted the authors to outlining the problem of their research, namely, to identifying the scientific and methodological conditions for developing the information competency of higher educational institution students.

For this research, the approach of S. D. Karakozov and A. Yu. Uvarov (2016; Uvarov, 2018) to studying the phenomenon of digital transformation of education is of interest; they argue this is a synergetic update of the required educational results in the rapidly developing digital environment. They emphasize that digital transformation of education is inconceivable without achieving a high information competency development level by both learners and the teaching ones.

The contemporary problems of development of personal information competency, in particular, those associated with digital transformation and digitization of education, are detailed in studies of the Russian and foreign scientists (Tabachuk, 2017, 2019a, 2019b; Turusheva, 2009; Luchaninov, Bazhenov & Bazhenova, 2017; Sarzhanova, Alimbekovab, Slambekovab, Albytovab & Salykzhanova, 2016; Pinto Maria et al., 2016).

A number of studies in this field have been conducted by the authors of this paper and their colleagues (Tabachuk, 2016, 2017, 2019a, 2019b; Tabachuk et al., 2018a; Tabachuk et al., 2018b; Polichka et al., 2019); they detail various aspects of the development of information competency in higher educational institution students, the interrelation of its manifestation with individuals' creative initiative, the causes of the Internet activity turning into the Internet addiction, the transformation of views on personal information, digital and smart-competencies, and the

role of information competency in the professional establishment of a teacher.

In the era of digital transformation of education, it is the contemporary concepts of the anthropo-oriented trend, human-dimension education, described by scientific schools of L. A. Stepashko (1999), M. N. Nevzorov, and M. A. Nevzorova (2013) and oriented to building the learners' individual educational paths, searching for and fulfilling the scientific and methodological conditions for developing the students' information competency at this vector, that go to the foreground.

The main provisions of these concepts are taken into consideration by the authors; they argue that the impact of digital transformation on the development of information competency of higher educational institution students has to generate anthropo-oriented "living" in the digital educational environment of higher educational institutions.

**3 Research Methodological Framework**

The subject matter of the research is the scientific and methodological conditions for developing the information competency in higher educational institution students.

The objective of the research consists in describing the scientific and methodological conditions for developing the information competency in students – the future teachers – which are the driver for creating contemporary concepts of development of the information competency oriented to the fulfillment of anthropological approach in the era of digital transformation and implementing them into the sphere of education.

According to the subject and the objective of the research, the following tasks were performed:

1. Finding out and describing the national projects, programs, standards and guidelines for justifying the relevance of the research problem;
2. Identifying the essence of the phenomenon of "digital transformation" affecting the building of the process of development of the information competency in higher educational institution students.
3. Analyzing the FSES HE competencies aimed at developing the information competency in students – the future teachers, with the analysis to emphasize this necessity.
4. Determining the notion of "scientific and methodological conditions" and the necessary conditions ensuring the development of the students' – future teachers' – information competency.

In order to achieve the objective of the research and complete the tasks set, the complex of mutually complementing methods was used: analysis of the FSES HE competencies aimed at developing the future teachers' information competency; summarizing the conceptual provisions of scientific pedagogical schools in the focus area under study; summarizing the pedagogical experience of organizing the process of developing the information competency in higher educational institution students in the form of scientific and methodological conditions. The methods applied were relevant to the set tasks, which has enabled the authors to register the results when analyzing the subject of the research.

**4 Results and Discussion**

**4.1 Digital Transformation of Education Learning**

This research relies on considering the essence of notions associated with the development of students' information competency: "digital transformation", "digitization of education", "anthropo-oriented digital educational space", and "the information competency of students".

Digital transformation of education influences the rise of digital society and generates a new variant of information interaction carried out on the subject – subject basis via digital technologies

(digital educational environment). It also brings about creation of conditions for fulfilling the anthropo-oriented approach within a high-tech infrastructure (digital space as an ecosystem of interaction oriented to learners' individual educational paths) and achievement of opportunities granted by digital educational technologies at a new level for automating the processes of working with information performed by subjects (digitization of education).

It should be noted that the outlined contemporary trends of digital transformation affect the process of development of professional competencies in higher educational institution students, the information one included.

The professional standard of a teacher specifies professional competencies and draws the attention to maintaining a high information competency development level both in relation to the general user one, general pedagogical one, and the subject-specific pedagogical information competency (On approval of professional standard "Teacher (pedagogical activity in preschool, general primary, general main, and general secondary education) (educator, teacher)", 2013).

The "ICT competency framework for teachers" guidelines by UNESCO emphasize the importance of developing individuals who possess the skills of using the ICT, who are capable of absorbing large volumes of information and operating them in order to make informed decisions, to efficiently manage their own lives and to fulfill their potentials ("ICT competency framework for teachers". UNESCO guidelines).

The professional standard of a teacher and UNESCO guidelines are the reference points for describing and implementing the scientific and methodological conditions of developing the information competency in students – the future teachers.

The authors focus the attention on the fact that the information competency of higher educational institution students is one of the universal and meta-subject competencies revealing new aspects of self-knowledge and self-improvement in the professional activity, and new abilities of interaction within the anthropo-oriented digital educational space.

**4.2 Analysis of the FSES HE Competencies Aimed at Developing the Information Competency in Students – the Future Teachers**

It should be noted that information competency being one of educational competencies ensuring the students' adaptation in the era of digital transformation plays an important part for the efficient integration of the ICT into the students' academic and professional activity and for the development of new abilities to exist in the anthropo-oriented digital educational space.

Let the relevance of developing the students' information competency be emphasized on the basis of analyzing the Federal state educational standards of higher education of various generations that cover professional training of students in field "Pedagogical education" (Tables 1, 2, 3). In the tables, groups of competencies are going to be singled out that are oriented to professional establishment and self-development of students – the future teachers, as well as to the development of their information competency.

Using the third generation FSES HPE in field of training 050100 Pedagogical education (qualification (degree) "bachelor") (FSES HPE of the third generation in field of training 050100 Pedagogical education (qualification (degree) "bachelor"), 2011) the authors of the research have compiled Table 1.

Table 1 Analysis of the Third Generation FSES HPE Competencies Aimed at Developing the Information Competency of Higher Educational Institution Students

| Group of competencies | Competency name | Content of the competency |
|---|---|---|
| Overall cultural | OC-8 | The readiness for using the main methods, ways and means for obtaining, storing, processing the information; the readiness for operating |

| Group of competencies | Competency name | Content of the competency |
|---|---|---|
| | | the computer as an information management tool |
| | OC-9 | The ability to work with information in global computer networks |
| Overall professional | OPC-3 | The knowledge of fundamentals of the professional speech culture |
| Professional | PC-3 | The readiness for using the contemporary techniques and technologies, methods for diagnosing the learners' progress in order to ensure the quality of the learning and upbringing process |

*Source: the authors of the paper using the third generation FSES HPE in field of training 050100 Pedagogical education (qualification (degree) "bachelor", 2011)*

Based on the analysis of the FSES HE (3+) in field of training 44.03.05 "Pedagogical education" (with two training profiles) (bachelor studies level) (FSES HE (3+) in field of training 44.03.05 "Pedagogical education" (with two training profiles) (bachelor studies level), 2016) the authors of the research have identified groups of competencies aimed at developing the information competency in higher educational institution students; the groups are given in Table 2.

Table 2 Analysis of the FSES HE (3+) Competencies Aimed at Developing the Information Competency of Higher Educational Institution Students

| Group of competencies | Competency name | Content of the competency |
|---|---|---|
| Overall cultural | OC-3 | The ability to use the knowledge of natural sciences and mathematics for finding one's bearings in the contemporary information space |
| | OC-6 | The ability to self-organize and self-educate |
| Professional | PC-2 | The ability to use the contemporary learning and diagnosing methods and technologies |
| | PC-6 | The readiness for interacting with participants of the educational process |
| | PC-10 | The ability to design paths of one's professional growth and personal development |

*Source: the authors of the paper using the FSES HE (3+) in field of training 44.03.05 "Pedagogical education" (with two training profiles) (bachelor studies level), 2016*

In compiling Table 3, the FSES HE (3++) (FSES HE (3++) in field of training 44.03.05 "Pedagogical education" (with two training profiles), 2018) was used for identifying the universal and overall professional competencies, and UNESCO guidelines ("ICT competency framework for teachers". UNESCO guidelines, 2019) were used for identifying the compulsory and recommended professional competencies aimed at developing the information competency.

Table 3 Analysis of the FSES HE (3++) Competencies Aimed at Developing the Information Competency of Higher Educational Institution Students

| Group of competencies | Competency name | Content of the competency |
|---|---|---|
| Universal | UC-1 | The ability to perform search, critical analysis and synthesis of information, use the systemic approach for solving the problems set |
| | UC-6 | The ability to fulfill one's self-development path based on the lifelong education principles |
| Overall professional | OPC-2 | The ability to participate in developing the main and additional educational programs, develop individual components thereof (using information and communication technologies inter alia) |
| Compulsory professional | PC-1 | The ability to create and apply the contemporary educational technologies, including the information ones, as well as digital educational resources |

| Group of competencies | Competency name | Content of the competency |
|---|---|---|
| | PC-2 | The ability to apply the information and communication technology means for solving problems wherever this is expedient |
| | PC-3 | The ability to professionally create and use the information educational environment of an educational institution |
| Recommended professional | PC-4 | The ability to create and use the contemporary ways of assessment in conditions of information and communication technologies (keeping digital record forms, digital class books and students' diaries included) |

*Source: the authors of the paper using the FSES HE (3++) in field of training 44.03.05 "Pedagogical education" (with two training profiles), 2018*

This analysis shows a change of milestones in the development of students' information competency: from "acquiring the knowledge" – via "mastering the knowledge" – to "creating the knowledge " ("ICT competency framework for teachers". UNESCO guidelines).

Thus, focusing the attention on the development of students' information competency as one of the tasks of educational systems in the era of digital transformation, it should be noted that educational standards and pedagogical methods get transformed, new concepts and pedagogical technologies are created promoting the students' – future teachers' – mastering the skills of using ICT for pedagogical purposes and contributing to the development of their information competency. With regard to this, the scientific and methodological conditions providing for this process have to be identified.

**4.3 Scientific and Methodological Conditions of Developing the Information Competency in Higher Educational Institution Students**

By scientific and methodological conditions, the components of pedagogical system are going to be meant which reflect the total of the internal and external elements ensuring an efficient development of the information competency in higher educational institution students based on the contemporary concepts of the anthropo-oriented trend, structuring the content, searching for new methods, forms and means.

The scientific and methodological conditions for unfolding this process at higher educational institutions are as follows:

- interaction of higher educational institution teachers on the basis of the shared understanding of the pedagogical essence of the "information competency of students" phenomenon;
- creation of an anthropo-oriented digital educational space as ecosystems for interaction oriented to individual educational paths of development of personal information competency;
- inclusion of digital information technologies developing the students' value-based attitude to the selected profession into the educational process of higher educational institutions;
- the use of various forms of speech activity, digital educational resources, information problems for the students to manifest individual meanings, understanding, and translating their own reflexive experience;
- the use of self-construction, self-control and self-assessment methods as applied to one's own information competency development level;
- implementation of new organizational forms of the anthropo-oriented focus: press conference-lecture, the ETRU technology (Experience – Tactics – Reflection – Use) (the author is L. M. Semenova (2013)), panel discussion, the basket method, the diary as a self-knowing method;
- the use of state-of-the-art means of informational support and digitization of the learning process (Robert, 2010; Polichka, 2017, 2018) (digital educational environment of higher educational institutions, computers, local and global networks, as well as study and methodological materials hosted by the educational institution websites in the Internet).

This approach to creating the scientific and methodological conditions for developing the information competency of higher educational institution students can be used in the activity of pedagogical workers of higher education when developing the main professional educational programs and methodological systems of teaching academic subjects as an important means for fulfilling them.

**5 Conclusion**

In conclusion it should be noted that the relevance of research in this focus area is justified not only by new projects, programs, standards and guidelines introduced but also by digital transformation of both the society and education.

Based on the analysis of studies in the field of digital transformation of education, approaches to organizing the anthropo-oriented digital educational space at higher educational institutions, the scientific and methodological conditions have been outlined that can become the basis for contemporary concepts of development of the information competency in higher educational institution students.

In order to find out the tasks of educational systems in the era of digital transformation, the authors have conducted the analysis of competencies specified in FSES HE of various generations aimed at developing the information competency of higher educational institution students.

Proceeding from the analysis of pedagogical literature and the study of conceptual provisions of scientific pedagogical schools in the focus area of the research, the notion of "scientific and methodological conditions" has been made more precise.

The scientific and methodological conditions presented in the paper are created and fulfilled by the authors of the research. As for studies of building the concept of developing the information competency in higher educational institution students in the era of digital transformation, these may be continued.

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**Primary Paper Section:** A

**Secondary Paper Section:** AM, IN