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THE FORMATION OF THE INFO-COMMUNICATIVE COMPETENCE OF TECHNICAL UNIVERSITY STUDENTS*

SUMMARY. The article covers methodical peculiarities of organizing the educational process in a technical college in the conditions of a new information society. The psychology-pedagogical mechanism and the technology of informationcommunicative competence formation on the basis of ideas of semantics, hermeneutics and a text activity are shown. The examples of the tasks realized in practice for the information-communicative competence formation of students of a technical college are given. The author presents the ways of modeling educational environment based on the integration of traditional teaching methods and the information-communication technologies (virtual laboratories, podcasts, audio-forums, concordance technology, clouds of words, a social network group, the course of moodle), providing the best conditions for the information and communication competence formation. To diagnose the level of information and communication competence (low, average, above average, high) four criteria were developed: cognitive, communicative and activity, values and semantics, reflexive and assessment.

KEY WORDS. Information-communicative competence, engineering education, understanding, semantics, dialogue, text activity.

At present higher education is on the threshold of major changes so far as the decisive role in improving the quality of life in a new information society, its social and economic development belongs to information [1] and the ability to use it effectively in communication and different fields of activity. It is directly stated in the new requirements of FSES (Federal State Educational Standards) of HPE (Higher Professional Education) of the third generation. In this regard, a competent specialist of the new age has to be capable to perceive a great amount of information, to identify key meanings, to interpret texts of global information space according to personal and valuable gidelines, to regulate his life and professional activity according to the mastered contents, to be able to communicate freely in interaction of different cultures and nations.

Following V.P. Zinchenko and E.B. Morgunov [2], we consider this task necessary for humanitarization of education in the technical university. It can mean that the formation of the information and communicative competence, understood as the ability to work conscientiously with the information, both in the native language, and in the language of cross-cultural communication, might become a part of students' training in a technical university that would contribute to the integration of scientific-technical and humanitarian aspects in a personality; overcoming technocracy; increasing the importance of culture. Its solution prepares one to participate in a productive dialogue, and also to use mastered information efficiently, in a professional field as well.

The concept of information-communicative competence (further – ICC) isn't new in the scientific and pedagogical literature; however, in the researches available today only certain aspects of interaction of a person with information (A.V. Vishnyakova, O. A. Zakharov, E.S. Koroleva, V.A. Kunichkina, etc.) are designated by this term. We understand ICC as a complex phenomenon of perception, comprehension, interpretation, enrichment and use of information in different fields of activity.

The psychological pedagogical mechanism of the ICC formation of students assumes the inclusion of an educational text in the interpersonal communication. In our opinion, it should take place in the process of the text activity organization in a dialogue. We are developing an approach based on the ideas of the intentionality of the text activity in communication (T.M. Dridze), hermeneutical creation of a dialogue (A.F. Zakirova), creative composition of the texts in the process of communication (F.T. Mikhaylov), discourse reconstruction in the process of texts verbalization (G. M. Andreyeva), and others. Such an approach will help humanitarize the process of students interaction with information, overcome difficulties of its understanding, stimulate students' thinking processes, actualize their personal functions and their involvement into the creation of meanings, as well as help students create multidimensional vision of a subject in a dialogue, prove and develop their own valuable and semantic point of view in questions that seem to be solved only "technologically".

The formation of ICC is performed through the stage-by-stage organization of a text activity and the expansion of "horizons" of information comprehension, including the involvement of technical university students in the professional context. The stages of the ICC formation are singled out according to A.A.Verbitsky's semantic-context approach [3] and they take into account regularities of information comprehension in the meaning-making process [4]. In this case the information is perceived "in a spiral" when subject meanings are sated by personal meanings, and personal experience is expanded due to the decoding of subject meanings. In the course of training students pass all the stages of the information perception. First they update personal meanings – micro-meanings, then interpret, analyze and enrich subject meanings of educational texts with personal experience – mezo-meanings. Further, they start using additional comprehension contexts forming macro-meanings, and as a result it helps transform the meanings of mastered information to the personal and valuable position regulated

by meta-meanings. Four stages of the ICC formation (directionally-motivational, orientational-pragmatist, communicative-pragmatist, professional-practical) are realized at lessons systematically throughout the whole educational course.

The contents of these stages will be considered using the example of the students of a technical university, the department of "Applied Geology", foreign language classes. It should be noted that using the subject "foreign language" in the process of the ICC formation plays a special role because it broadens the worldview, provides multidimensionality of the experience development of professional activity, preserves an important role of a personality, communication and society since it is a means to enter a different culture, provides students with new contents and new interpretations of some themes.

At the **first** *directionally-motivational* stage, the subjective experience of the students necessary for the subsequent learning is livened up. The associations are being made, the forthcoming theme is being interpreted, i.e. "micro-meanings" are being formed. At this stage positive motivation and interest encouragement are emphasized. It can be done with the help of personally-focused open questions, for example, "What components of the hydrosphere and in what forms can you see on the way from home to the university?", interactive material (audio-, video, multimedia technologies, illustrations), maintaining a student's feeling of "success", defining the problematic professional situations (a set of professional roles depending on students' specialization and areas of their interests – for example, an imaginable organization "Rosgeo" modelled by geologists students where there are a gemmologist, a hydro geologist, an oil geologist, a geological engineer, a surveyor, a soil engineer on the staff).

At the **second** *orientational-pragmatist* stage, new information that contributes to students' orientation in their future professional activity is comprehended. The students are offered a thematic text. After they have read it, they perform the tasks in order to understand the main idea of the text, and on the interpretation of its contents in the form of a discussion, an exchange of opinions (for example, geologist students presented and discussed different aspects of studying ground waters and problems of their use in the framework of technology cooperation). Students' dialogue is based on the contents of this text. Subject meanings of the new information are connected with personal meanings (experience) of a student; therefore, "mezo-meanings" are formed.

In the engineering education "technical" texts, being certainly an object of culture, are mostly written in a "language" of the exact sciences and have a more formal and schematic structure unlike "humanitarian" texts. However, it becomes necessary to read them in a humanitarian way, to interpret them in a dialogue for getting information, understanding the meanings used in the text. There are a number of requirements to "technical" texts. Their contents have to have: a) the professional bias corresponding to a special training; b) interdisciplinary links; c) problem tasks stimulating reflection; d) everyday examples of commonly used everyday vocabulary to facilitate understanding; e) both domestic and foreign experience within the chosen subject for deepening the knowledge. When these requirements are met, technical texts become humanitarian. They direct students' reflection activity to the creation of stable semantic

links, enrich their professional life experience; motivate students' interest and aspiration for mastering new knowledge.

At the **third** *communicative-pragmatist* stage, tasks are not aimed at comprehension of the specific text, but at the creation of interaction between the participants of the educational process based on the learned contents of a topic. The purpose of tasks is to broaden the understanding, while new contexts and additional sources of information within the given subject are being involved. It means that «macro-meanings" are formed. At this stage, educational technologies that allow students to resolve problematic situations connected with cooperation and interpersonal interaction, to use the information perceived earlier, to develop it, to expand and enrich it in a dialogue will be effective. For example, the project method can be applied. It specifies the purpose of students' search, stimulates their need for unassisted understanding of text information, teaches them to separate the major information from the minor, involves students in the collective task management, teaches them to achieve common results in the process of communication. In our research, for example, the geologist students, while working at the project "The role of water resources study of in the life of a modern person", mulled over the given problem, discussed the ways of its solution, looked for new information, found new meanings, and arrived at the common understanding. Different groups of students presented their projects in the form of presentations, videos, collages.

At the **fourth** *professional-practical* stage, semantic generalization of the mastered material in the context of the students' professional self-determination takes place. The learners' dialogue includes the questions of self-determination, moral choice, career guidance, professional ethics, business communication, task management and so on. At this stage "meta-meanings" are formed. Personal meanings underlie inter- personal interaction. They are realized in the form of a definite value position, some personal attitude, a new quality of the identity of a person, a crucial decision stipulated by the context. Semantic generalization, for example, can be done with the help of a virtual message, an essay, and a composition. It is advisable to use "business correspondence" between participants to overcome a monologue-type speech, to include the interpreted information in a dialogue while interacting with others. Thus, a traditional "business correspondence" essay becomes addressed, gets the features of real interpersonal communication that pre-supposes asking questions and a joint search for answers. The subject matter of "business correspondence" must have some connection to the worldview. In written communication students reveal skills of using professional terminology and new research abilities combined with humanitarian understanding of the perceived information. For example, as homework, the geologist students prepared a joint analytical report about the studied material and at the same time made their own assumptions and generalizations on the topic "How will you influence the life of the society, being a hydro geologist?" They presented their "business correspondence" on the Internet in the form of a Wiki-page (creating a uniform content on the Internet when each participant can edit, add and update information).

We distinguish a number of means of information and communication technologies (ICT) which, being combined with traditional methods of education, provide a creation

of the favourable information and communicative educational environment of a technical college. Such environment is isomorphic to a real global information space that is the most effective condition of the ICC formation. The positive experience of ICT integration in the educational space of a higher education institution was taken into consideration [5], and as the result it was concluded that the combination of healthy conservatism with the desire to preserve the achievements of creative thought and historical experience for new generations, and searching for new requirements and conditions [6; 83], as well as the use of the ICT will help to expand communication borders, to enrich a subjective experience of a personality, to transform meanings into an axiological position. We will consider some of the Internet services in the aspect of their developing opportunities for the ICC formation.

a) Virtual laboratories (remote labs, virtual labs, online labs) [7], [8] represent an educational interactive environment that allows a student to study a research area of interest (for example, the online laboratories collected on the portal for geologists [9] help change the amplitude of earthquakes, study properties of minerals). This service awakens students' interest, increases motivation to the study of their future profession, develops aspiration to mastering of new knowledge that is essential and paramount in the ICC formation.

b) Podcasts are audio or video messages in the form of a radio or TV program [10]. The set of podcasts posted on the Internet by people of different cultures and nations creates the space for a virtual dialogue, comprehension and analysis of different points of view. The podcast can be used for the didactic purposes as an educational text (video lecture) to understand new information, as a video message to create positive motivation and interest to the forthcoming topic, or if it is made by the students, as an outcome of their developed project.

c) The audioforum is the Internet space where people create topics and discuss them by means of oral, not written, messages [11]. It helps keep up conversation with other people from all over the world, develop tolerance to a different point of view, develop the ability to express thoughts concisely and precisely, avoid being afraid to express one's own attitude to any information. It can be a form of students' "business correspondence", as a means of semantic generalization at the last stage of the ICC formation.

d) The concordance technology [12] allows comprising a terminological glossary necessary at the stage of comprehension of new text information, creation of meaningful links between new meanings and students' developed experience, mastering professional content and formation of the business communication basis. Students complete their glossaries while doing the exercises on synonyms and antonyms matching, finding examples in the text, writing definitions of the chosen term and giving their own examples.

e) Word cloud is an Internet service [13] which allows changing a text form (for example, shape it in the form of a diamond) and highlights the most frequent words using different font sizes. It allows students to make assumptions about a theme of the forthcoming lesson or the text, and is aimed at the actualization of associations on the given theme, inspiring students' interest.

f) Groups in a social network (for example, Vkontakte.ru group "The English language" [14]) guarantee that students can get teacher's help. Besides, it is a means to combine study and leisure activities, and also a tool to provide the stages of the ICC formation. An Internet group becomes a form of continuous interpersonal communication. It brings together all the information exchanges of the participants of the educational process. In the group the interest is aroused, new information is studied; different opinions\ are discussed using references, pictures, multimedia, and websites. The process of understanding the information is parallel to studies and becomes more effective because it is aroused and developed in a dialogue based on the students' own initiative.

g) The moodle course [15] is an effective way to maintain the informational and communicative educational environment. The educational course represents texts, tasks, additional resources, video and audio materials, tests, students' works that are selected from the web space for a definite group of learners. The contents of the online courses comply with the syllabus. All the materials of a course are in free access. It allows a student to repeatedly refer to the information studied in the class if it is necessary. Students begin to understand that in order to master a great amount of information it is necessary to establish strong semantic links between the new and previously learnt material. In the future the understanding of texts in the process of students' interaction plays an important role (even on the Internet).

To assess the ICC formation we have developed four criteria: *cognitive* (the ability to perform various cogitative operations with information, to make one's oral and written speech logical and well-reasoned), *communicative-pragmatist* (skills to make an interpersonal dialogue (polylogue) in the native and foreign languages while perceiving new information, including the use of global computer networks; team work skills), *value-semantic* (the ability to understand the information and to realize its importance, to be able to use common cultural values and be tolerant in the multicultural society) *and reflexive-evaluative* (high motivation for self-development and professional self-improvement, the use of a creative approach in the task management, self-criticism, responsibility).

According to the intensity of the criteria signs (high, above average, average or low), the following levels of the ICC formation are singled out:

1) informational-reproductive level (low) is expressed in a student's ability to freely discuss personal topics. However, the subject meanings of new information are isolated in his understanding from the previously mastered abilities;

2) productive level (average) characterizes the ability of students to perceive and comprehend new information while saturating it with some personal meanings and constructing an interpersonal dialogue on this basis;

3) creative level (above average) is defined when a student is able to comprehend and systematize additional contexts of information without assistance according to his\ her own purposes, and also to communicate freely within certain professional areas;

4) innovative level (high) is presented when a student is able to actively use the meanings of inter-profile contexts in the interpersonal and cross-cultural communication, and implement the mastered skills at the level of professional and personal activities.

To find out the level of the formation of the information-communicative competence we can use: the formative analysis of the practical works, expert assessment of teachers of different subjects, students' self-assessment while filling questionnaires, examinations and semester results, anonymous peer assessment of the process and the result of the activity.

In the basic research we estimated the degree of the ICC formation of the students of the technical university (146 second-year students of the Tyumen State Oil and Gas University took part in the research). It appeared that according to the established criteria the second-year students already have some elements of ICC: they understand their future profession, have a quite high level of motivation and can speak fluently about their personal experience. But still, their ICC is far from being completely formed. As far as ICC is understood as a common cultural competence, and is important for the technical university students' comprehension of information, it is possible to claim that the ICC formation should be carried out from the very beginning of the university studies, within humanitarian, social - economic, natural-science and professional majors.

Conclusions:

1. The society has entered a new information space; thus, modern engineering education should be focused on the high importance of culture, values, information, and human communication. Technical texts must be humanitarized, i.e. they should have elements of reasoning, touch upon issues that are significant for students and society. The process of technical texts interpretation should be organized as humanitarian in which mastering of information takes place in a dialogue enriching meanings of the text, and in interpersonal interaction. It makes professional training close to a real business communication, to the solution of real industrial tasks, to the necessity to constantly master new information for personal development in the real professional activity.

2. The function of humanitarization of engineering education can be performed by the formation of students' information-communicative competence seen as the ability to comprehensively work with information, understand it in the personal aspect, in a dialogue, and use it in some professional activities. In order a modern specialist could effectively fulfil his professional activity using cultural values, important role of personality and communication, the ICC formation must become an integral part of an educational process of a technical university.

3. The ICC formation is organized through the stage-by-stage organization of the text activity in a dialogue. With the help of the customized tasks students master the ways of comprehension of new information, advancing in the process of interpersonal communication from the actualization of micro-meanings (personal meanings), the formations of mezo - meanings (new meanings of a text connected with an experience), to their expansion to macro -meanings (meanings of many texts corresponding to the context) and further on to the regulation of their professional activity with the help of meta - meanings (valuable preferences, personal attitude).

5. An important condition of the effective ICC formation is modelling of a special developing environment. It is possible due to the integration of traditional methods

of training and possibilities of new information and communication technologies (didactic possibilities of word cloud Wordle, personal Concordance glossary, creating a group in a social network, development of the online course Moodle, etc.).

4. The criteria of the formation of the information and communicative competence are: cognitive, communicative-pragmatist, value-semantic, reflexive-evaluative. These criteria made it possible to distinguish its levels: *informational- reproductive,* that is the ability to keep up conversation about personal and significant subjects, *productive,* the ability to enrich a dialogue with new information, *heuristic,* the ability to build and direct the interaction independently on the basis of different contexts of comprehended information and *innovative,* the ability to realize one's own active valuable position while dealing with various professional and every day life tasks.

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