

Technological Support for the Cultural Training System for Students at Technical Universities

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The paper studies the trends of higher technical education development and establishes the relationship between education and culture as one of the conditions for solving the problems of modern society. The authors determine that one of the main problems that hinder the formation of the culture of the future engineer is the lack of a reasonable selection of cultural elements. The presence of such elements ensures the full development of the specialist. The most generalized socio-cultural components of culture are (1) the sphere of material production, (2) the cultural sphere, and (3) the sphere of communication. The authors determine the components of the culturological training content as the implementation of the support system of the integrated professional, universal cultural, and moral cultural development of technical university students. It is experimentally proved that the implementation of a cultural training system of a future engineer leads to statistically significant changes in the levels of knowledge acquisition, the formation of skills and qualities of a future specialist.

Keywords: future engineer, humanization, culture, cultural training, technology

INTRODUCTION

An important element of higher engineering education is the general culture of a future specialist, who must be a comprehensively intelligent person capable of continuous development and self-improvement in the conditions of rapid scientific and technological progress. Such a professional should be able to navigate a wide range of issues of the society's life since the realities of socio-economic life today are that not every university graduate will find a job related to their degree. Therefore, it is difficult to predict what kind of knowledge, skills, and qualities they will need in their professional activities and in which particular area they will work.

On top of that, the crisis phenomena of technogenic civilization and the destructive use of some current scientific research results indicate that the task of higher technical education should be to overcome its pragmatism and to form the professional ethics of an engineer who is capable of responding to the consequences of using the technologies they developed. It means that with the acceleration of scientific-technical progress, the importance of ethical education of the individual increases.

The entire world education of recent decades is characterized by a rise of interest in cultural issues and regulation of the public and personal life, which is associated with numerous historical and socio-cultural reasons, the establishment of a multicultural post-industrial civilization, and the search for means of “cultural adaptation” (Flier, 2002) of a person to the achievements of the technogenic world and information civilization.

The research aims to develop and substantiate the mechanisms for implementing culturological training of students of technical universities to ensure their professional, universal cultural, and moral cultural development as an integral process.

According to the aim, we identified the following *tasks*:

- To reveal the features of a culturological approach to training students of higher technical educational institutions in current socio-cultural conditions;
- To characterize the technologies for the implementation of culturological training of students of technical specialties and experimentally prove their effectiveness;
- To determine the criteria and indicators of the cultural readiness of future engineers for professional activities.

MATERIALS AND METHODS

The contemporary post-industrial society differs from the previous ones by the rapid development of science and technology, which many see as a hidden danger. Scientists V. G. Gorokhov and V. M. Rozin are considering the condition to overcome the crisis phenomena of human transfiguration, which will entail the transformation of society (1998). At the beginning of the third millennium, the quality of human personality becomes the main and highest goal in the national interests of many countries. Therefore, a human’s task is the “humanistic reorientation of society” (Fromm, 1990), and the qualitative transfiguration of the person himself through the development of education.

To meet this challenge, most countries are looking for ways to reform education. The reforms provide the restructuring of the education system, the modernization of the content and methods of teaching and educational work, the establishment of new forms of communication between education and culture. This is one of the main trends in the development of modern society.

Culture is recognized as a “criterion for the quality of social development” (Kitaev, 1990). This fact encourages a reinterpretation and concretization of concepts that today claim to reflect the unity of its infinitely diverse forms and phenomena.

The question arises whether we need a deep understanding of the essence of the education cultural paradigm. Its transforming function is expressed in the shift of emphasis on the need for the purposeful formation of the individual’s humanistic consciousness and the creation of a “global pedagogical therapy” system (Vulfson, 2011), which can be carried out due to the connection between education and culture.

V. N. Rudenko emphasizes the need for the unity of natural science and humanitarian cultures and their interpenetration; this creates a holistic view of nature, society, and human about different ways of perceiving reality (rational-naturalistic and intuitive-figurative) (2003).

The culturological approach to selecting the content of education corresponds the most to the attitudes of humanistic thinking. This approach combines the professional and personal components of students’ development and contrasts with the excessive technocratization and pragmatization of higher technical education. It contributes to the extension of the culturological orientation of the entire educational process, considering the interconnection of its components – professional, universal cultural, and moral cultural.

Among the priorities of engineering education (scientific and technical, universal cultural, and moral cultural), the implementation of the latter two can mainly be provided by the disciplines of the humanitarian

and socio-economic cycle. However, the current training state cannot solve the proposed tasks because the list of normative disciplines of humanitarian and socio-economic training in most universities is limited. An indicative list of the so-called elective disciplines from this cycle includes disciplines that can provide only one-sided preparation of a student limited to the sphere of their particular interests. This means that an engineer's training with the current content of education requires a search for specific ways to create a broad culture of professionals since the existing programs cannot ensure their full cultural development. The authors believe that one of the main problems that hinder an individual's integrated cultural development is the lack of a selected minimum of culture knowledge, which would have reflected the culture in all its structural completeness as much as possible.

Relying on the analysis of the culturological literature by O. Dema, A. K. Moeller (2012), and S. Razi (2012), the authors selected the following components of culture which created the base for the cultural training of future engineers and mastered by students during classroom and extracurricular activities: (1) the sphere of material production, (2) the cultural sphere, and (3) the sphere of communication. The sphere of material production at a technical university is closely related to science, engineering, and technology. It is at the heart of professional training. The cultural sphere forms ethical and aesthetic ideals, moral principles, value orientations, and worldview of a young adult. The sphere of communication forms a communicative culture, which provides knowledge, skills, and proficiency in communication subject interaction. It allows establishing psychological contacts with other people to achieve an understanding of the process of communication. The sphere of communication also includes intercultural communication. The knowledge about the cultural diversity of the surrounding world as well as the formation of skills to interact with representatives of different cultures are extremely relevant in the current conditions of globalization (Adler, 2007).

Cultural training provides the integrated development of technical university students and includes two components – motivational-targeted and cognitive-procedural.

The purpose of the motivational-targeted component is to create an attitude of the future engineer to professional, universal cultural, and moral cultural development, an awareness of the importance of raising their own cultural level. Creating such an attitude is ensured by considering the problem situations in teaching, specific processing of the educational material content, considering novelty, historicism, and its significance for practical activity; a variety of forms and methods of studying the material by attracting students to research work.

The cognitive-procedural component provides the digestion of cultural knowledge and skills by students to form universal cultural and moral cultural values and a culture of communication and create conditions for self-education.

The directions of technological support for cultural training are implemented in the process of (1) study of normative disciplines and optional disciplines; (2) mastering a specifically developed integrated course "World Culture," which includes sections that are not provided for by regulatory disciplines (namely: world history, religion, literature, music, painting, education, traditions, cinema, theater, history of inventions and biographies of inventors, fashion, sports, features of intercultural communication, etc.); (3) organization of extracurricular activities; (4) students stimulation to self-education.

The traditional "lecture-seminar-credit" system mainly provides the research of normative and optional disciplines. During a special course and in extracurricular activities, the universities actively use the following technologies: (1) technologies based on a humane and personal orientation (Tuna & Razi, 2016); (2) technologies based on the revitalization and intensification of students' activities (active teaching methods, game technologies, case studies, etc.); (3) interactive technologies (discussions, debates, and training); (4) technologies of communication learning (Moore, 2006); (5) technology of activating the reserve capabilities of an individual and a group in the course of mastering a foreign language; (6) technologies of problem-based, project-based and developmental learning aimed to develop the creative qualities of a person (Tang, 2006; Kubrushko & Kozlenkova, 2019; Lysenko & Nazarova, 2019).

To stimulate students' independent culturological activity, the universities use technologies of individual learning and self-education (drawing up a "portfolio," selecting rational forms and means of

assimilating information, mastering research methods, and developing skills to work with literary sources, etc.).

In implementing the technological component of culturological training, the authors use both general forms and methods of the formation of competencies in all socio-cultural spheres as well as specific ones related, particularly to language training, creation of intercultural competence, and development of the cultural sphere. The authors refer to the following general forms and methods: educational dialogue, problematization, comparativization, the method of “political portrait” as an analysis of the creation process of a public leader personality, the method of “personification of ideas” as a statement of the philosophical and scientific views of one or another figure against the background of his biography, the project method, “round table,” conference, a competition of student works, presentation lecture, political training, “Department Day” in the dormitory, thematic curatorial hours, etc.

The specific methods include:

1. Methods of intensive teaching of foreign languages;
2. Methods of forming intercultural competence:
 - Factological – the study of regional studies;
 - Analytical – case studies, the formation of students’ flexibility in situations of intercultural interaction;
 - Empirical – modeling situations of real communication, gaining practical experience through the regular invitation of foreign citizens – representatives of other cultures – for conversations, participation in round tables, discussions, and amateur concerts (Alipichev, Galushkin, Dronova & Panfilova, 2017).

Methods and techniques that ensure the development of the moral cultural sphere of the future engineer are used to create the moral ideal of a young adult, emotional experiences of moral and cultural values and their evaluation, interiorization of moral and cultural values resulting from participation in cultural practices. They include specifically organized acquaintance with individuals who could become ideal for young adults; pedagogical “metamorphoses”; awakening of aesthetic and ethical emotions; emotional-value accentuation and comparisons; emotional contrasts and “contamination.”

To evaluate the effectiveness of these technologies, the authors use a system of scientific and pedagogical research methods of cultural training issues: (1) pedagogical experiments; (2) testing; (3) sociological methods; and (4) quantitative methods.

To examine the research hypothesis, the authors conducted a pedagogical experiment at Kharkiv National Automobile and Road University. In the experimental group [EG] (167 participants), culturological training was purposefully carried out, and the control group [CG] (165 participants) did not use the developed system of cultural training.

Additionally, the authors studied and compared the achievements of students from other universities of Ukraine and Russia. They actively participated in cultural events (student works, competitions, presentations at conferences, round tables, cultural and educational lectures, presentations, literary and musical evenings, etc.).

The authors determined the criteria (motivational, personal, cognitive, communicative, and reflexive) and indicators of the culturological readiness of a future engineer for professional activity.

The motivational criterion reflected the presence of incentives among students for culturological education, their interest in culturological knowledge. The personal criterion reflected the formation of the totality of the personal qualities of the future engineer, considering the psychological and individual characteristics of the student and creating the prerequisites for their self-realization. The cognitive criterion reflected the quality of cultural knowledge; the communicative criterion revealed the ability to convince, build evidence, process, and transmit information. The reflexive criterion was focused on self-correction of the ability to regulate one’s own activities and the development level.

The dynamics of the results of culturological training is shown in Table 1. The authors of certain methods are named in brackets.

TABLE 1
RESULTS OF THE EXPERIMENT (GAIN IN %)

Criteria and indicators (levels and nature of manifestation) of the cultural readiness of the future engineer to perform professional activities	Groups	
	EG (167 students)	CG (165 students)
<i>Motivational criterion</i>		
Maturity of educational motivation for cultural education (Krylova & Mamicheva, 2001)		
Students show a desire to study culture, the personality's own activity dominates in the cognitive process	+29.8	+5.4
Students do not show a systematic interest in cultural education	-29.8	-5.4
<i>Personal criterion</i>		
Activity in cultural actions (Panfilova, 2001)		
Entrepreneurial spirit, energy, sociability, dedication	+38.7	+11.5
Restrictions on activity by material considerations, indifference, inertia, inactivity	-38.7	-11.5
Learning independence (Rean, Bordovskaya & Rozum, 2002)		
<i>Self-dependence</i> : focus on self-education, developed self-control	+31.9	+12.7
<i>Dependence</i> : learning activity depends on external pressure,	-24.3	-13.1
<i>Uncertainty</i> : features of the first and second types are equally expressed	-4.6	+0.4
<i>Cognitive criterion</i>		
Completeness of cultural knowledge (Khoruzhenko, 2003)	+62.8	+17.1
<i>Communicative criterion</i>		
Ability to establish and maintain contact (Ratanova & Shlyakhta, 2003)		
a clear idea of the communication activities purpose, activity in interaction with subjects of communication	+30.6	+6.7
partial possession of communication skills	-19	-0.7
insufficient verbal and non-verbal communication skills	-11.6	-6
<i>Reflexive criterion</i>		
Self-actualization of personality (Panfilova, 2001)		
independence, self-sufficiency	+32.1	+8.1
lack of self-confidence, lack of focus on self-improvement	-32.1	-8.1

RESULTS

The research emphasizes the need for the unity of the natural-scientific and humanitarian cultures of the future engineer, which creates the holistic idea of nature, society, and human, about different ways of perceiving reality (rational naturalistic and intuitive-figurative).

The main condition and means of humanizing education are humanization, which, like the tendency of the education system, highlights the humanitarian component in any professional activity and builds an education system based on a humanitarian foundation.

The authors consider liberal education as an essential condition for the development of a future engineer, which opens the opportunity to get acquainted with samples of the cultural sphere, expand their horizons, enrich a social experience, develop aesthetic taste, study the cultures and languages of other countries, and be tolerant towards representatives of other nations.

Humanization of technical education is also closely related to engineering ethics, which considers the issues of social evaluation of technics and increases the social responsibility of a scientist for the consequences of using the technologies they developed.

The culturological as a factor of the engineering education integrity that unites the professional and personal components of students' development approach corresponds the most to the settings of

humanization of the process of training an engineer. The creation of young adults' cultural sphere, which is the fundamental basis of education, is an important value in the cultural approach. Its content elements are ideals, values, ethical and legal norms, and traditions. The culturological approach to student training at technical universities is considered as opposition to the excessive technocratization of modern engineering education.

The main idea of the culturological approach in a technical university is the generalization and systematization of all disciplines' cultural content, deepening the culturological orientation of the entire educational process in the correlation of its components-professional, universal cultural, and moral cultural.

The authors believe that one of the main problems on the way to the individual's integrated cultural development is that there is no minimum knowledge about a culture that would ensure the formation of the mentioned components of the culture of the future engineer personality. In other words, we need to select such elements of culture that would reflect all of its structural completeness.

The authors identify the most generalized structural components of culture that a future engineer should know: (1) the sphere of material production, (2) the cultural sphere, and (3) the sphere of communication. Each sphere has a specific culture element, and its' assimilation ensures the full development of a specialist.

The authors developed directions of technological support for cultural training, which implemented in the process of the following activities: (1) studying normative disciplines and optional disciplines; (2) mastering a specifically developed integrated course "World Culture"; (3) organizing extracurricular activities; and (4) in the process of encouraging students to educate themselves.

Relying on the analysis of the pedagogical experiment results, the authors proved the effectiveness of training based on the culturological approach considering the selected criteria and indicators of the culturological readiness of a future engineer for professional activity. Efficiency is seen in significant changes in the level of assimilation of knowledge, the formation of skills, and personal qualities.

DISCUSSION

One of the main trends of modern society development is the education content modernization by establishing new communication forms between education and culture.

The authors believe that today's higher technical education is gradually losing its focus on forming such a type of personality culture as an engineer-intellectual, which is considered the norm for training a specialist in an educational institution of a technical profile. Therefore, the authors consider the revival of technical intellectuals that embodies professionalism, full education, and the desire for constant self-improvement to be a priority in reforming higher technical education. This revival can be realized using a cultural approach for specialist training.

An important condition for the development of a future engineer is a liberal arts education. It allows him to get acquainted with samples of the cultural sphere, expand their horizons, enrich a social experience, develop aesthetic taste, study the cultures and languages of other countries, and be tolerant towards representatives of other nations.

Among the priorities of engineering education that contribute to the individual's integrated development are scientific and technical, universal cultural, and moral cultural development. However, the question of what components of the culture a student should master to implement these priorities arises.

Researchers propose different approaches to the classification of cultural elements (Dema & Moeller, 2012; Flier, 2002; Razi, 2012; Tuna & Razi, 2016), summarizing which, we have selected those that create the basis for the cultural training of a future engineer: the sphere of material production, the cultural sphere, and the sphere of communication.

Specifically developed for the technological support of cultural training "World Culture" course includes sections that are not provided by regulatory disciplines (music, painting, literature, theater, cinema, etc.) and stimulates students' perceptive interest and contributes to their general cultural development.

The research does not settle all aspects of the cultural training problem. The authors consider developing a comprehensive socio-political and humanitarian course as promising areas, which integrates the content of several humanitarian disciplines. We need to improve the forms and methods of

extracurricular activities as an inexhaustible cultural knowledge source and skills. Special approaches are necessary to create a positive motivation of students to increase their own general cultural level and organization of conditions for their independent activity in cultural self-education.

CONCLUSIONS

The paper outlines the main ideas of a cultural approach to training a future engineer: (1) the priority of the moral culture of future specialists, (2) avoiding excessive technocratization of modern engineering education, (3) the unity of the professional and personal components of education, (4) the generalization and systematization of all disciplines' cultural content in a technical university, (5) deepening the culturological orientation of the educational process at the university.

The authors describe the technologies that were used to provide culturological training in the following areas: (1) study of normative disciplines and optional disciplines; (2) mastering the specifically developed integrated course "World Culture"; (3) organization of extracurricular activities; (4) student stimulation to self-education. The authors also define the general methods that create specialist competencies in all the selected socio-cultural areas and specific methods used in teaching languages, intercultural communication, and cultural and moral education.

Considering the selected criteria and indicators of the culturological readiness of future engineers for professional activity and the comparison of their quantitative and qualitative analysis results, it was revealed that the implementation of the cultural training system and its scientific and methodological support led to significant changes in the level of assimilation of knowledge, the formation of skills, and personal qualities of a future engineer.

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