THE ALGORITHM OF SOCIAL AND HUMANITARIAN EXPERTISE IN THE PREPARATION OF FUTURE ENGINEERS-TEACHERS FOR DESIGN AND CREATIVE ACTIVITIES

Khushnaev O.
Tashkent State Technical University named after Islam Karimov, Senior Lecturer,
https://doi.org/10.5281/zenodo.7559452

Abstract. *In the article, modern problems of pedagogical engineering design and ways of its improvement are considered in the context of innovative technology of the organization of socio-humanitarian expertise and pedagogical engineering design, as well as the formation of creative project activity of a modern engineer-teacher.*

Keywords: *research, professional competence, integration, design, technological, creative ability, modeling, structure, experiment, innovative, expert, expertise, concept, complex, intellectual, consultation, algorithm, axiological, method, hierarchy.*

INTRODUCTION

It should be said that the State educational standards and qualification requirements for vocational education in technical universities aim to form graduates of general cultural and professional competencies necessary at the present stage of development of society, and also provide for a qualitative change in the status of a bachelor of engineering teacher, his professional capabilities (research, production and technological, organizational and managerial, etc.). project activities) ensure its expansion and to some extent equate it with an engineer-teacher, graduated from it earlier. All this leads to the need to activate the educational process of training future engineers-teachers, to carry out significant innovative changes in the organization and content of the process of training future engineers-teachers in general and separately for each academic subject.

MATERIALS AND METHODS

The requirements for vocational education in technical universities in the curricula of the State Educational Standard create the need to expand the list of activities that most fully reflect the specifics of professional activity. The integrating core of the educational quasi-professional activity of future engineers-teachers is the project activity, which is the methodological basis of the entire system of general professional training. Educational engineering design is a quasi-professional educational activity, during which:

Unification, deepening, systematization and generalization of design skills and qualifications are carried out in relation to the main (for the specialty being prepared) production, technical, technological, organizational and economic situations;

the technology of implementing a real engineering project is being mastered from the stage of setting the task, to the stage of pre-project research, to the stage of forecasting the future consequences of the project (including social and humanitarian);

the methods of solving engineering design issues are reproduced, including tasks that do not have a standard (typical) solution and require the realization of the designer's personal potential, the use of his personal professional experience and intuition for their implementation;

professional relationships and communicative tactics are modeled in the process of discussing and making engineering and design decisions;

important personal qualities and non-productive reserves of a specialist are formed, i.e. unity of word and deed, compliance with ethical standards of professional activity, discipline and responsibility, purposefulness and mutual assistance, etc.;

the development of creative abilities, technical thinking, education of the culture of intellectual work, the desire for independent acquisition of knowledge, self-education, the formation of a positive attitude to the future specialty.

However, the pedagogical engineering design used today needs innovative approaches that can provide methodological relevance and up-to-date content that meets the existing technical reality and the requirements of a competent approach.

Currently, the educational, engineering and design problems inherent in the practice of the educational process of requirements for students in the field of vocational education in technical universities, when new requirements are presented to them, negatively affect the quality of vocational training. training of modern engineers-teachers and possible ways to solve them.

The first problem is related to the fact that engineering and design activities are focused not only on the equipment and technologies in which we believe, but also on the individual and society as a whole. In engineering, the problems of the technical, social and biological existence of society are closely related to each other. Any technical achievement has social and biological significance, since it changes society, nature and the biological state of a person (changes in human physiological characteristics, the appearance of new diseases, etc.). In the process of engineering creativity, new types of material needs appear, which change the way of life, and then the ways of communication (channels), and ultimately lead to a change in the surrounding reality [1].

Based on these arguments, the purpose of educational engineering design is not only to teach students to develop creative projects independently, to teach them how to calculate production parameters (which is also very important), but also to convey to future engineers-teachers the creative idea process as the meaning of creating ideas and materials and is to make it the personal property of the future engineer-teacher. Engineering work consists in turning the “natural” into the “artificial”, into the “non-existent”. How this “artificial” behaves in our life, how much it changes nature and the world around us, what the project is being prepared for, what its significance for society is, whether the designer corresponds to the values and ideals of humanity – these are questions that the designer should think about. Although there are automated systems for designing methods and technologies that can largely replace people, only people can find meaning in their work.

The second problem is related to the structural and substantive aspects of educational and technical design. Regardless of the training specialty (profile), the order of execution of interdisciplinary course and diploma projects that simulate the real process of engineering design of technical objects in technical universities includes the following main project actions of students:

1) obtaining the initial task (stage, node, etc.) for the design of the technological process;

2) formation of an information base on the subject of the project (study of its analogue in the industry and the method of obtaining it, familiarization with materials related to the

development and improvement of the object under study and their analysis, patent and information search, etc.);

3) analysis of the results of patent information search and structuring of information in order to determine the need and possibility of improving design objects, identifying its shortcomings and a list of new technical solutions recommended for improving the object;

4) analysis and selection of a specific technical solution for use in the project, clearly expressing the design task;

5) perform the necessary engineering (technical and technological, mathematical, graphic, etc.) calculations;

6) design of the explanatory letter and the graphic part of the project;

7) project protection.

The main element of the educational engineering and design process, bearing the main content load of this type of educational activity, is reflected in professionally defined (technical, technological, constructive, etc.) sections of the project with all the specific features. implementation of projects by students of various engineering specialties - in the project there is a stage of analysis and selection of a new technical solution for subsequent implementation.

However, in practice, we found during a survey (scientific experiment) among senior students of engineering faculties of TASHSTU with design experience (interdisciplinary course project) that the implementation of projects is not always associated with the use of new technical solutions in the project (technical university, on average, in 66% of projects). This term meant a technical solution of students' own invention or patented, but not implemented in practice, where the main principles that guided students in choosing a technical solution were the technical and economic indicators of the design object (in 44% of cases) or the decision was made similar to the decisions made earlier in similar projects (30%). Only 14% and 16% of students took into account environmental aspects and potential harm to people and society when choosing a technical solution, respectively.

In addition, the educational and methodological department of the University conducted a scientific and intellectual analysis consisting of diploma projects and final qualifying papers of 875 students who have fully mastered the full-time program. At the same time, it turned out that the original skills used in the preparation of dissertations are very briefly presented in publications and other sources of intellectual scope.

All this indicates that educational engineering projects are not sufficiently innovative and innovative, which makes it difficult for modern future engineering teachers to gain full-fledged experience in creative project activities. Thus, modern educational engineering and design processes do not fully meet modern socio-cultural requirements.

As a result, the level of creative project activity of future engineers-teachers will be low, which is represented by the division of the engineering project, outside of its relationship with the technical and social environment. The creative project activity of the future engineer-teacher is professional and personal qualities, a set of professional knowledge corresponding to the level of modern science and technology, corresponding functional skills and constructive skills, psychological readiness to show innovative approaches in practical design. finding non-standard and creative solutions to engineering and design tasks, moral and personal qualities that determine the willingness of a specialist to work in conditions of incompleteness of pre-project information and risk, to predict the consequences of the adopted design (including socio-humanitarian)

decisions, which instills in future engineers-teachers not only an understanding of the consequences of their actions, but also a willingness to bear responsibility includes.

The use of new technical solutions in the implementation of interdisciplinary course and diploma projects, the mandatory inclusion of elements of group expert work (mainly at the stage of analysis and selection of a project solution), a significant improvement in the quality of projects, practical development and updating of professional knowledge and skills of the student, the search for a project solution and allows you to form competencies related to the manifestation of creativity, disclosure of personal qualities, forecasting the impact of the results of the project on nature, society, global and local processes in the life of each person.

The third problem of educational engineering design lies in the non-project area of student education. Unfortunately, there are not enough subjects in the curricula of modern technical universities that prepare students for creative project activities. “Computer-aided design” or “Engineering Design” should come to the fore as the main subject, which in many ways will help to overcome the fragmentation of individual subjects in the preparation of future engineers-teachers for creative project activities. Its invariant core should be attributed to the following expanded didactic units:

1) the content and principles of engineering design, its levels; a systematic approach to engineering design;

2) general and special quality indicators, their models;

3) technical contradiction; ideal end result;

4) the main qualities of the design object, their analysis; terms of reference;

5) methods of searching for ideas; from an idea to specific technical objects;

6) vector optimization, decision-making;

7) system models, algorithms and programs reflecting the operation of physical objects;

8) digital methods and models for modeling tests and working conditions;

9) methods of assessing the quality and acceptability of design solutions.

Always looking closely, you can see that these disciplines do not have a deep content, there is no mention of the methodology and technology of design as a type of engineering activity.

At the same time, the most important thing in the design and creative activity of students is creative action, that is, the formation of an innovative idea with a scientific basis, the identification of problems and tasks associated with it, the analysis of the material needs of students. society and their implementation, which teaches methods of predicting the impact of projected technical objects on society and human life, educational subjects are not enough. This requires training courses of a broad methodological plan, special courses that include discussion of creative tasks and their solutions, modeling of socio-humanitarian expertise of engineering and design solutions.

The fourth problem, which is not paid much attention to, but which does not remain important, is that the pedagogical and engineering design of the teaching staff of technical universities is not ready for the new requirements of the time. The problem is not even that there is no universal textbook on the content and methodology of designing the educational process; each department publishes its own guidelines in accordance with its specialization and established traditions. Changing the algorithm of creative design, searching and testing new organizational forms of creative design, mastering a new methodology of creative design - all these are psychological stresses (not to mention physical exertion) that are often encountered in the professional life of modern professors and teachers, consciously or unconsciously. In this regard,

the problem of teacher training is of particular importance. The new design methodology is not only a change in methodology, but also, in a sense, breaking the established professional stereotypes. Therefore, first of all, the teacher should master new approaches to creative design, make them his personal property. These processes do not occur without the will of people.

Thus, it follows from the above that the formation of the general cultural and professional competence of future engineers-teachers in design and creative activities determined by new educational standards should be provided with a new technology for the preparation of educational and engineering projects that meet modern requirements technical reality.

At the same time, new requirements for engineering and design activities, features and prospects of its development at the present stage of society's development, and, first of all, expertise in its complex form, as well as socio-humanitarian, engineering and design solutions at the pre-project, design and post-project levels, it is necessary to pay attention to new manufacturing elements, the need for their organization at the state level has acquired special importance in recent years.

RESULTS

In modern conditions, the idea and concept of socio-humanitarian (humanitarian) expertise as an important mechanism for preserving a person's creative project potential have been introduced by many scientists and specialists, including H. H. Avdeev, I. I. Ashmarin, G. V. Ivanchenko, D. A. Leontiev, Petruneva P.M., Pokrovsky D.A., Safuanov F.S., Skirbekk G., Smolyan G.L., Solntseva G.N. Belongs to Stepanova, P. D. Tishchenko, G. L. Tulchinsky, B. G. Yudin and many other scientists. For example, the philosophical foundations of humanitarian expertise are analyzed [2]; Humanitarian expertise is considered as a specific form of activity, type and social technology that proactively reacts to possible negative consequences of social and technological innovations [3]; the interdisciplinary and complex nature of humanitarian expertise is noted [ibid.], the characteristic of objects and objects of expertise in the general sense, its functions and organizational support of the examination procedure are given [4, 5]; socio-humanitarian expertise is considered as a method of assessing the importance of engineering and design solutions for society and a method of training engineers [6], etc.

The analysis of the literature made it possible to determine the list of questions that the participant of the socio-humanitarian examination should answer. Here are examples of such questions.

Question 1. Did you know that engineering and design solutions can have social and humanitarian consequences for society? What do you see as the social and humanitarian consequences of implementing engineering design solutions?

Question 2. Do you consider it mandatory to take into account the socio-humanitarian aspect when choosing technical solutions for the design process? Are you ready to identify and discuss the socio-humanitarian aspect of your technical solutions in the design process? New professions will appear, traditional professions will disappear, etc.

Question 3. Do you consider it necessary to make significant changes in the design of educational equipment, organization and conduct of educational practices? What are these changes?

It is also clear that the socio-humanitarian expertise of engineering and design solutions should be comprehensive and interdisciplinary. The complexity of the object of interdisciplinary communication is manifested in the fact that it requires the involvement of specialists from

various fields of science and practice, including the humanities. The complexity of the examination is determined by the nature of technical, social, natural and biological changes that should be determined predictively.

Special requirements are imposed on the participants of a comprehensive socio-humanitarian examination. In addition to bright natural, general engineering and special training in a specific discipline, these specialists should have experience in humanitarian-oriented thinking and humanitarian-oriented engineering and design activities. Such experience is very necessary for experts, because they must not only assess the consequences of the implementation of a technical project, but also determine them first of all, which requires an appropriate intellectual and emotional potential of a person. It seems that today we do not have such specialists and they need to be specially trained.

The question of the responsibility of experts and the qualitative composition of the expert group remains open. If social and humanitarian expertise is subject to social projects or normative documents, various public organizations or professional associations and religious figures can participate in the expertise, engineering and design solutions are subject to social and humanitarian expertise only in this or similar areas, as well as as humanitarian (philosophy, law, medicine, pedagogy, psychology it is possible to attract the most influential specialists in this field.

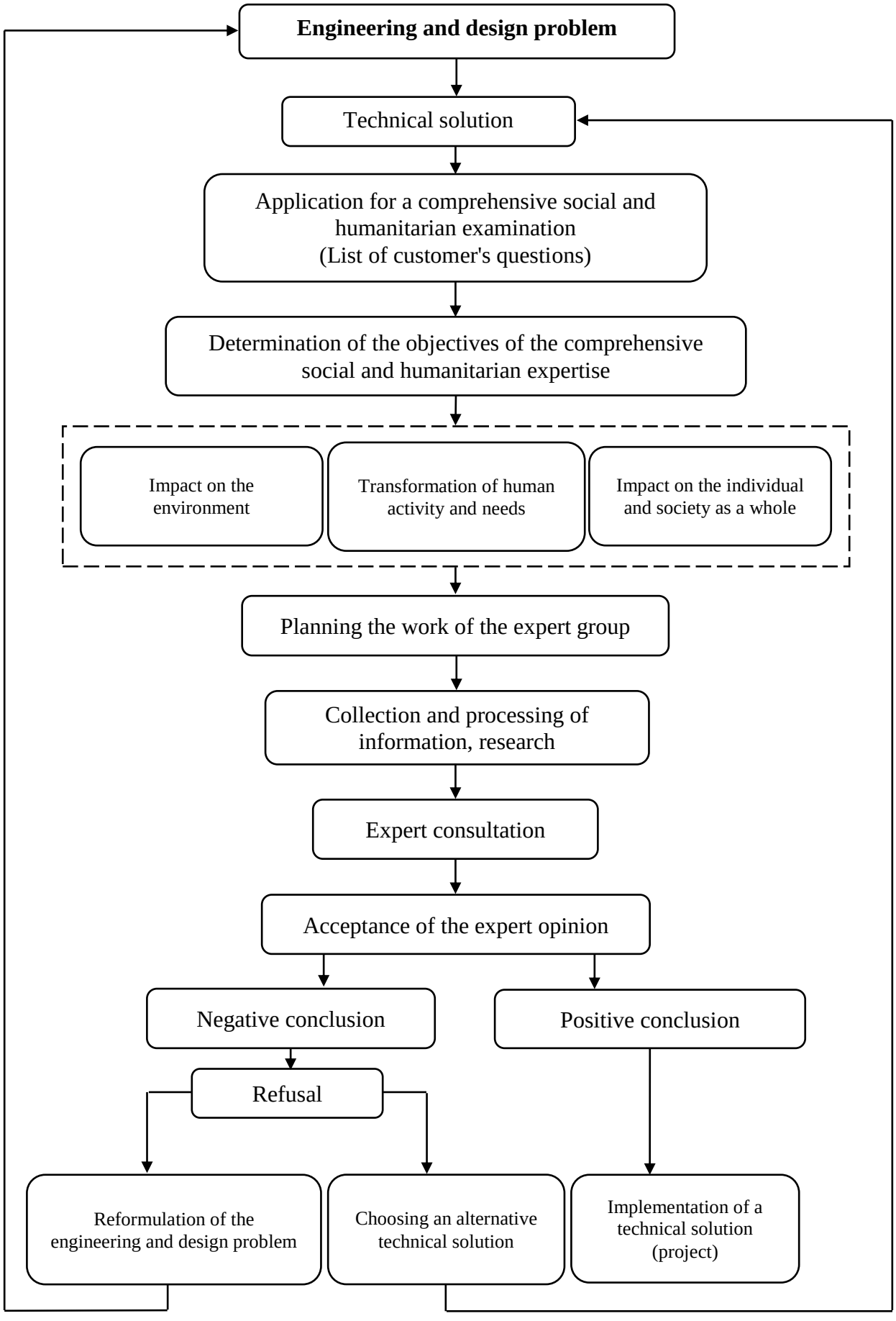
Not only professional engineers, doctors, lawyers, etc. can participate as experts, but also professional elites who are able to give a comprehensive and global vision of the problem and possible consequences of the project. Thus, an engineering project is important not only for working on technical systems, but also for carriers of specific knowledge related to their creation, the development of new phenomena and social relations. Society expects not only knowledge, but also moral integrity, responsibility in making professional decisions and their timely application from representatives of the elite [7].

Technological processing of the mechanism of socio-humanitarian expertise includes the introduction of such a concept as the socio-cultural effectiveness of the project. This concept shows the compliance of the proposed technical solution with modern socio-cultural norms and the needs of certain groups of the population and does not include an assessment of the effectiveness of the project itself. The criterion of socio-cultural effectiveness lies at the intersection of the socio-cultural necessity of the project, technological capabilities and possible consequences of its implementation, assessment of group and public morality. The category of social efficiency [8] includes the following concepts:

social utility, which is defined as the degree of impact on the quality of life, taking into account the minimization of consequences;

socio-cultural significance that determines all the qualities of a technical project, contributing to the emergence of new elements in people's relationships with the outside world.

Based on the above, a comprehensive socio-humanitarian examination of an engineering and design solution appears as a multifaceted and multilevel structure reflecting the nature of the processes affected by engineering and design activities in conditions of incomplete certainty and risk [9]. The algorithm for conducting such a check is shown in drawing 1.



Drawing 1. Algorithm of social and humanitarian expertise

DISCUSSION

A comprehensive socio-humanitarian examination of a technical solution is a multi-stage process that begins with the submission of an application from an interested person with a list of mandatory questions. At the initial stage of the work, the expert group determines the hierarchy of the objectives of the examination based on the analysis of the questions (tasks) asked by the applicant and the normative-value (axiological) complexes of the society. In this case, if the level of the basic values of the society is not taken into account by the applicant when formulating questions, additional questions may be asked by experts.

CONCLUSION

After planning and developing a strategy for the work of the expert group, including methods and methods of collecting information, processing it, determining criteria for the effectiveness of the decision, forms of presentation of the results of the examination, etc., the data are re-analyzed and processed accordingly, including mathematical processing of measurements and results.

REFERENCES

1. Stenin, V. S. The scientific picture of the world in the culture of technogenic civilization / V.S.Stepnn, L.F.Kuznetsova. - M.: Publishing House of the IF RAS, 2004.
2. Tishchenko, P.D. Philosophical foundations of humanitarian expertise / P.D.Tishchenko // Knowledge. Understanding. Ability. - 2008. -№ 3.
3. Tulchinsky, G.L. Expertise as a social technology / G.L.Tulchinsky // Expertise in the modern world: from knowledge to activity. - M.: Sense, 2006.
4. Leontiev, D.A. Complex humanitarian expertise: methodology and meaning / D.A. Leontiev, G.V. Ivanchenko. - M.: Sense, 2008.
5. Erganova, N.E. Methods of professional training: textbook. stipend. 3rd ed., ispr. and add. / N.E. Erganova. - Yekaterinburg: Publishing House of the Russian State prof.-ped. unita, 2005.
6. Petruneva, P. M. Socioengineering tasks / P. M. Petruneva // Higher education in Russia. - 2003. -№ 3.
7. Khushnaev O.A. Methods of formation of design competencies of future engineers. - Social and Humanitarian sciences in the education system, Tashkent, 2020.
8. Bagdasaryan, N.G. On the problem of social and humanitarian expertise of technologies for ensuring the safety of the population / N.G. Bagdasaryan // Expertise in the modern world: from knowledge to activity. - M.: Sense, 2006.
9. Tairova N.S. New innovative technologies in teaching subjects “Geometry of drawing” and “Engineering graphics”. “Economy and Society” No. 11 (90) 2021 www.iupr.ru.