STRUCTURAL AND CONTENT MODEL OF THE DESIGN AND CREATIVE ACTIVITY OF THE FUTURE ENGINEER-TEACHER

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Abstract. *This model is based on the dominance of the target characteristics of the process and the subordination of all structural components of this process to them. At the same time, the target component is the design and creative activity of a modern engineer-teacher in the form of a set of design competencies of a specialist.*

Keywords: *Future engineer-teacher, modeling method, results of a pedagogical experiment, design efficiency, formation of project creative activity, structural-content model.*

INTRODUCTION

Regarding the modeling of the process of preparing a future engineer-teacher for design activities as one of the scientific and pedagogical methods, it is necessary to determine how the essence of modeling can be understood as the basis for describing and building the desired model. The modeling method was fully developed in the works of Yu.K. Babansky, S.I. Arkhangelsky, V.V. Kraevsky, N.F. Talyzina, G.P. , Methodists, op. [1, 2,3,4].

Speaking about the modeling process, academician V.S. Stepin said that “this process is the process of creating special schemes (models) of the objective side of practice, in which stable connections of objective relations and interactions are established that describe a potentially given class of practical situations recorded” [5].

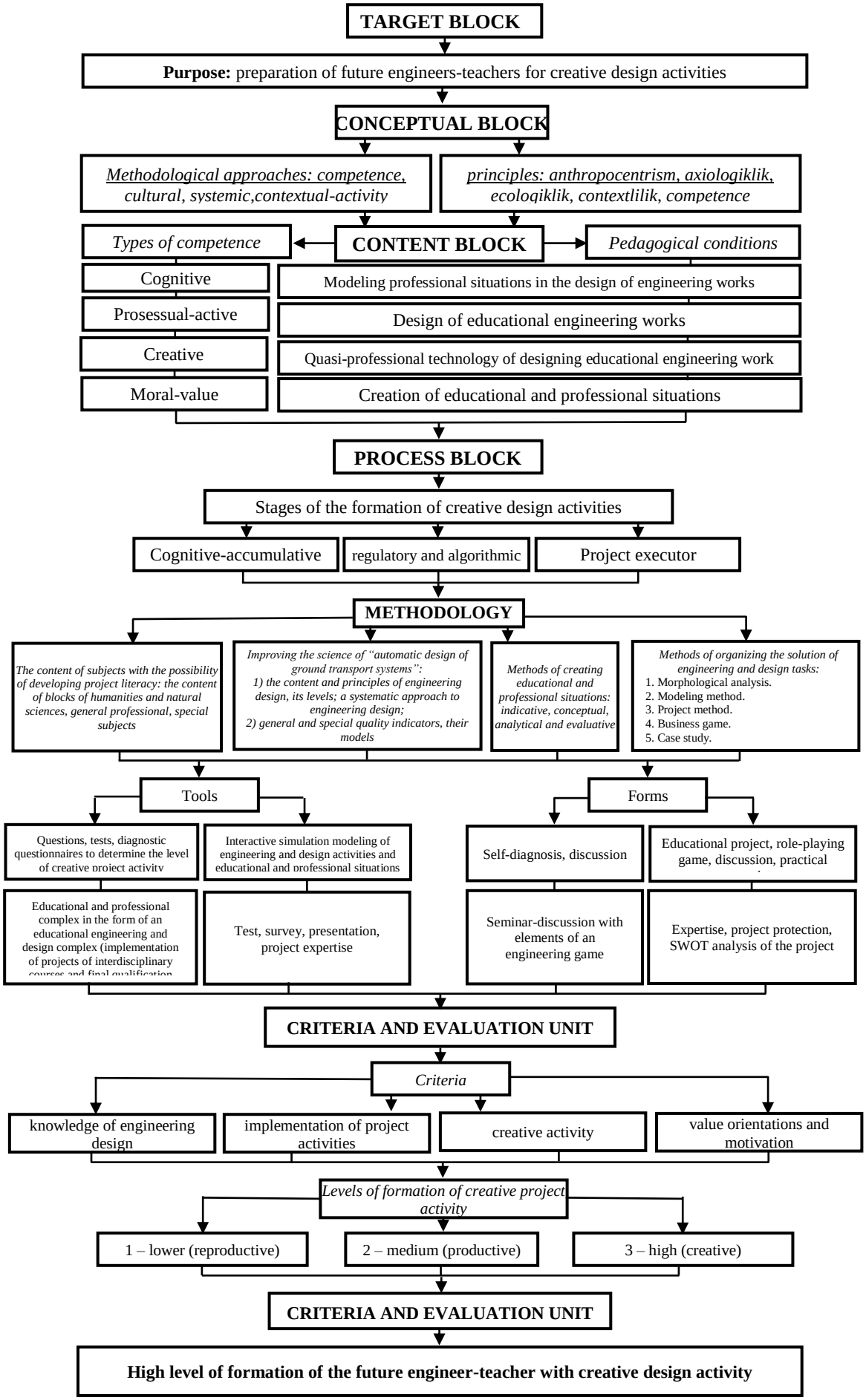
The term “model” has many meanings. In science, there are many definitions of this concept. In our work, we use the definition of V. A. Shtoff, who considers a model as “a system, imaginary or materially realizable, which can replace the object of study by describing or repeating the study to the extent that it can give us new information about the object” [6]. Bu is defined by bazlanib, the model is bu bir-Bir bilan buzaro buzaro, known as structuraciga iga bulgan tizimdir. The model strives for an idealized image of berylgan berylgan, a training model, case studies, task organization and advanced parameters to obtain the maximum possible information.

In the conditions of the information and educational environment presented in the research of this dissertation, the theoretical model of the formation of the qualifications of the future engineer-teacher and the ideas of a competency-modular organization of teaching as the basis for creating an internal structure of the model reflect and consist of targeted, conceptual, meaningful, procedural, methodological, criterion-evaluative and effective blocks. One of the most important components of the concept is a structural-meaningful model that fully reflects the studied pedagogical process, its intermediate and final goals, and also serves as a theoretical and practical basis for the implementation of the developed concept.

RESULTS

The Model is a praxiological projection of the concept developed for the educational process in higher educational institutions, carried out in an integral unity of the rules that

determine the theories, approaches, principles, meaningful-organizational and normative regulations that define it.


TARGET BLOCK
Purpose: preparation of future engineers-teachers for creative design activities
CONCEPTUAL BLOCK
Methodological approaches: competence, cultural, systemic,contextual-activity
principles: anthropocentrism, axiologiklik, ecologiklik, contextlilik, competence
Types of competence
CONTENT BLOCK
Pedagogical conditions
Cognitive
Prosessual-active
Creative
Moral-value
Modeling professional situations in the design of engineering works
Design of educational engineering works
Quasi-professional technology of designing educational engineering work
Creation of educational and professional situations
PROCESS BLOCK
Stages of the formation of creative design activities
Cognitive-accumulative
regulatory and algorithmic
Project executor
METHODOLOGY
The content of subjects with the possibility of developing project literacy: the content of blocks of humanities and natural sciences, general professional, special subjects
Improving the science of "automatic design of ground transport systems": 1) the content and principles of engineering design, its levels; a systematic approach to engineering design; 2) general and special quality indicators, their models
Methods of creating educational and professional situations: indicative, conceptual, analytical and evaluative
Methods of organizing the solution of engineering and design tasks: 1. Morphological analysis. 2. Modeling method. 3. Project method. 4. Business game. 5. Case study.
Tools
Forms
Questions, tests, diagnostic questionnaires to determine the level of creative project activity
Interactive simulation modeling of engineering and design activities and educational and professional situations
Self-diagnosis, discussion
Educational project, role-playing game, discussion, practical
Educational and professional complex in the form of an educational engineering and design complex (implementation of projects of interdisciplinary courses and final qualification
Test, survey, presentation, project expertise
Seminar-discussion with elements of an engineering game
Expertise, project protection, SWOT analysis of the project
CRITERIA AND EVALUATION UNIT
Criteria
knowledge of engineering design
implementation of project activities
creative activity
value orientations and motivation
Levels of formation of creative project activity
1 – lower (reproductive)
2 – medium (productive)
3 – high (creative)
CRITERIA AND EVALUATION UNIT
High level of formation of the future engineer-teacher with creative design activity

The text of a scientific paper on the topic “Structural and content model of training a future engineer-teacher for creative project activity”

The effectiveness of the presented model and the author's project developed on its basis is confirmed by the results of the pedagogical experiment [7].

Taking into account these considerations, it is a set of theoretical rules that reveal the pedagogical (structural and substantive) model of the formation of design and creative activity of future engineers-teachers in the educational environment of a technical university in accordance with the accepted methodological guidelines. The goals, content and procedural characteristics of the process of forming the design and creative activity of future engineers-teachers are interrelated. The creative idea of future engineers-teachers can be presented in a hypothetical form in the form of process attributes, such as the formation of pedagogical models of activity, elements of unique activity, experience of professional behavior in the field of integrated competence engineering. the phenomenon.

The model presents a structural-content model of the formation of the design and creative activity of future engineers-teachers, which is based on the dominance of the goal of the process and the subordination of all components of this process to it. The result of the work of the system in the presented model is the creative project activity of the future engineer-teacher in the form of a newly formed student personality, including a formed natural science worldview, value directions of the subject, professionally oriented knowledge, knowledge of methods of engineering and design activities and professional knowledge and skills formed on this basis. The interdependence of the components of the model and the integrity of the pedagogical process of forming the design and creative activity of future engineers-teachers are ensured on the basis of the basic theoretical and methodological principles and rules. They are the starting point of the design process along with the goals. We reveal the essence of the presented concept.

The presented model consists of a target block, which defines the purpose of the study; from the conceptual block, where the following methodological approaches are presented: systemic, which consists in considering design and creative activity from the point of view of an integral system of its components, from the point of view of the diversity of their connections and relationships; competent, determines the goals and results of the educational process in the form of competencies of the future specialist; substantiates the content of cultural studies, engineering education as a set of types of socio-cultural experience, the mastery of which ensures the student's readiness to enter the world of modern culture and society; contextual activity, integration of education, science and production as a result of a combination of activity and contextual approaches that reflect the activity nature of learning and the tendency to combine learning with future professional activities.

On the basis of the adopted methodological approaches, specific principles for constructing the pedagogical system were determined, their sum served as a guideline in creating the concept of forming the design and creative activity of students. These include the following principles: anthropocentrism, axiological, ecological, contextual, competence.

The content block included types of competencies that form the design and creative activity of the future engineer-teacher: cognitive (intuition, feeling, perception, understanding, a measure of possession of a complex of knowledge on the design of engineering work up to reading, theory (this is self-development, assessment of one’s knowledge and skills perform various types of cognitive activity based on the possibilities of their application, solve various

everyday and professional tasks)); procedural and activity (a measure of possession of tools and productive methods of engineering and design activities, methods of scientific knowledge); creative (the level of development of a person's creative potential); moral and value (a measure of the presence of moral and value qualities in the performance of professional activities).

The content block also included pedagogical conditions that improve the preparation of the future engineer-teacher for creative project activities. These include the modeling of professional situations in the design of engineering work, the design of educational engineering work, the organization of the creation of educational and professional situations based on quasi-professional technology for the design of educational engineering work.

In the procedural block, we have identified the stages of the formation of the design and creative activity of future engineer-teachers [8]:

1) is characterized by the mastery of fundamental knowledge by students in the cognitive-collective, humanitarian, natural, mathematical, economic and general technical sciences, as well as the skills and abilities to perform special procedural design and design operations within the framework of the subject studied science. At the first stage, the motivational and purposeful component of design and creative activity is actualized, the awareness of the social significance of engineering and design activity begins, the formation of the ethical component of engineering and design activity.

2) norm-algorithmic, mastering the methodology, modern methods, norms (rules) and algorithms for designing new equipment and technologies by students, acquiring quasi-professional experience in designing individual elements (stages) of structures and technologies of vehicles (upon completion of an interdisciplinary course project), characterized by. At the same time, at the second stage of the formation of design and creative activity, the technical solutions adopted in the project should be formed in the process of implementing an interdisciplinary course project with elements of socio-humanitarian expertise, engineering design, which is a sustainable system of social and humanitarian significance. Students should have primary experience in predicting the consequences of technical decisions made at the level of individual structural elements and technologies of vehicles. As a result, students will acquire design competencies that will enable them to successfully perform simple design activities in a team of creative design engineers-teachers.

3) project implementation is understood as the stage of conscious application of knowledge, a set of skills, a system of professional values acquired in the creative design of innovative technical objects based on quasi-professional experience in designing complex technical objects (course projects, graduation qualification works). This stage is the leading component of ethics - anticipatory self-awareness of design, understanding of the need to limit one's own needs, co-evolutionary impact on the biosphere, experience in anthropocentric engineering and design activities, socio-humanitarian expertise of all new technical solutions adopted at all levels of the designed technical system, characterized by the decisive task of this stage is the formation of a holistic creative project activity of the future engineer-teacher.

Table 1 presents the content of the phased process of the formation of the design and creative activity of the future engineer-teacher during the period of study at technical universities.

The transition from one stage to another does not mean a dialectical negation of the previous one. Thus, the knowledge gained at the cognitive-accumulative stage of the formation of project activity is reviewed, based on new elements in the process of further project activity, and

thus there is a transition to a qualitatively new stage of project preparation. At the same time, psychological mechanisms for the exteriorization of knowledge and skills of the previous level into practical activities are realized, new abilities and opportunities are formed in professional activities.

Table 1.

Creative design activity of future engineers-teachers step-by-step formation of content

Stages of formation	Step content
Step content	Formation of creative design literacy through general and special knowledge: knowledge of natural sciences, mathematics, worldview.
normative-algorithmic	In the process of designing an interdisciplinary term paper, including a socio-humanitarian examination of technical solutions, the formation of project competence.
Project executor	Formation of creative project activity as a result of the creation of technological projects, including socio-humanitarian expertise of technical solutions

In the future, the synthesis of practical skills and deep theoretical knowledge will lead to the internalization of the newly learned ways of working and their transformation into qualitatively more advanced structures of consciousness, which will become the basis for the creative, systematic application of engineering knowledge. in project activities.

The competencies that make up design and creative activity are fully formed in the process of working on a project, and the structure becomes more complicated and is formed in interdependence with the skills and abilities at different stages of the formation of design and creative activity, and the same competence can be formed at different stages of project activity.

CONCLUSION

In conclusion, it should be said that when implementing the model of creative project activity of future engineers-teachers, it was assumed that the accuracy inherent in the technological process is impossible in pedagogical design; the design process is dynamic and iterative; the design of the formation system ensures not only its acquisition, but also its development during operation; requires the experience of a designer-teacher to simplify the model without losing important properties of the real system.

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