

Situational context of environmental university education

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Abstract. The scientific interest in improving the environmental training of university students emphasizes the training technology associated with the disclosure of their personal and professional potential through inclusion in the joint solution of environmental problems not in abstract but in real life situations. The use of situationality for educational purposes creates an internal unity of the learning process and facilitates the professional socialization of graduates. The aim of the study was to develop a model of environmental education for future ecologists based on situational analysis technology. Theoretical and practical methods of system generalization, comparative analogy, questionnaires, pedagogical evaluation, and modelling were used in the development of the model, which provided objectivity and heuristic conclusions. The model created and tested in the system of higher professional education is based on the ideas of ecohumanism, coevolution and sustainable development, cultural-competence orientation of higher education; principles of subjectivity, value-sense saturation, communicativeness, problematization, events, local history orientation. The key concepts of "situation" and "analysis" are defined and disclosed in the context of the work, and their types are identified and justified. The developed model includes target, content, procedural, technological and reflexive-evaluation components. The tasks, activity content and characteristic for each stage of the educational process, environmental cases and types of analysis are considered. The obtained results in the form of basic research bases and the model of environmental education of future ecologists in situational context testify to the promising application of this technology to improve the quality of professional training.

1 Introduction

The problem of environmental education development in pedagogical universities in the context of situational analysis technology has a number of undoubted prospects and pedagogical merits (Cameron A., Trudel M., Titah R., Leger P., Blakey P.) [1]. Situational analysis makes it possible to consider the issues of environmental education in the modern logic of postnonclassical science and higher pedagogical education [2-4]. The process of

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training a future teacher, acquiring a humanistic orientation and culturologicality, realizes the ideas of:

a) environmental approach, providing understanding of the inseparable relationship between man and the world around him as a single environmental integrity, which determines the co-evolutionary values of ecological culture - the goals of environmental education of future teachers [5, 6];

b) harmony of socio-natural interaction associated with the formation of subjectivity, which means not only active perception and cognition of ecological reality, but also its creative transformation [7];

c) situationality, which allows considering real-life socially and personally significant environmental problems that take the form of a concrete situation "here and now" [8];

d) eventfulness.

In this paper, the situational context is considered in scientific-ecological and pedagogical aspects. In the first case, we are talking about the ecological situation, understood as a combination of natural conditions in a certain territory, which creates an ecological environment for a person of different degrees of well-being. In the second case, attention is focused on the pedagogical model of an ecological situation - a case - reflecting real natural conditions of life and providing the process of their independent analysis, evaluation, search for ways to solve the identified problem [9]. Pedagogical technology of situational analysis, according to scientific data, is a type of research technology. It is focused on the creative independence of students and includes a variety of methods and search and research procedures. At the same time, having interactivity, it provides for various communications that ensure the exchange of ideas, information, pedagogical experience, and the effect of insight [10]. The above allows us to consider the technology of situational analysis as a promising means for future teachers to master new actual environmental and pedagogical competencies. It should be noted that this technology is complementary to the existing forms of training, expanding and enriching the possibilities of professional and pedagogical formation of a teacher. In environmental education of teachers this technology is highly appreciated by specialists [11, 12], but its application is fragmentary due to the lack of methodological developments and large time expenditures in the preparation of life situations that set the subject and professional context of learning activities. This paper presents a variant of the model of environmental education based on the solution of specific environmental tasks-cases.

2 Methods and materials

The purpose of the study is to develop a model of environmental education at the pedagogical university based on the technology of situational analysis.

The object of the study is the process of training bachelors of education at the Faculty of Natural Geography of the Minin University.

The subject of the study is scientific substantiation and design of the model of environmental education of future teachers based on the technology of situational analysis.

The set goal determined the necessity of using the methods of theoretical analysis, ideas of post non-classical science and innovations of higher pedagogical education, the system of worldview ideas reflecting the logic of sustainable development; scientific principles of pedagogical evaluation and modeling of teaching technologies. The construction of the model of environmental education in the pedagogical university, based on the technology of situational analysis, was carried out with the help of theoretical methods of analysis, generalization, systematization, modeling; empirical - observation, testing, questionnaires, study of pedagogical experience.

3 Results

The development of environmental education in the situational context has actualized the categories of "situation" and "analysis", which have multiple meanings, without understanding of which it is difficult to assess their role in the formation of environmental culture of a teacher. In general, the category of situation is interpreted as a certain set of conditions or circumstances that determine the peculiarity of relations, situation, provisions. The essence of the situation is characterized by its features: concreteness, repeatability, spatial and temporal parameters. The ecological situation in the socio-natural space is considered and evaluated by students in order to optimize it. In this case, on the basis of motivation, a kind of "intellectual tension" is created, subjective experience is actualized, there is an active information search, proposals are put forward and openly discussed. The openness, creativity, discussion, connection of the discussed problems with specific environmental conditions existing in real life lay the basic foundations of environmental culture of the future teacher characteristic of the situational analysis technology [13]. Teaching on the basis of solving environmental situations acts as a specific mechanism of personal self-development and professional development of a future teacher. Its implementation required theoretical understanding and development of an appropriate model of environmental education of students, taking into account the features of the selected technology, and manifested in the conceptual apparatus, methods, structure, organizational forms of training [14]. The key concept is a pedagogical model of a situation - a case, the work with which develops the ability to develop environmental and pedagogical problems and make consolidated decisions, moving from typical cases of environmental destabilization to non-standard events and creative activity.

Structurally, the pedagogical model of the situation (a case) includes problematic environmental content and methodological apparatus in the form of questions and tasks for its analysis. It is noteworthy that cases are constructed in a special way and are perceived by students as an event, the social importance and personal significance of which is obvious. Its plot intersects spatial and temporal aspects of regional and global; present, past and future. The package of environmental cases we created on the basis of environmental situations includes real environmental problems of natural-landscape (reduction of forest areas, preservation of biodiversity, raising the level of the Cheboksary reservoir to 68 meters), resource-economic (environmental pollution, waste problems, cleaning of rivers and lakes), anthropoecological (health preservation) content. Depending on the planned dominant activity of students, four groups of environmental cases are identified: 1) demonstration cases illustrating environmental patterns, manifestations, consequences of environmental problems aimed at the formation of visual real, graphic and cartographic representations; 2) training cases, including exercises aimed at practicing the skills of information search, mastering empirical and theoretical methods of analysis, problem-ecological thinking; 3) problem cases, covering the following topics.

The solution of environmental cases does not provide for simple assimilation and reproduction of ready-made information, it is aimed at discovering new knowledge with the help of various types of analysis. In our work we have identified and justified axiological, problem, pragmatic, and prognostic types of analysis that characterize the developmental essence of the applied technology. The role of axiological analysis is to define the ecological case in a value-meaning, personally and socially significant system. Future educators form a personal attitude to the events and their significance presented in the case on the basis of using emotional and sensual methods, figurative means and metaphors, and free discussions. Different, including alternative positions on the same situation (construction of hydroelectric power plants on flat rivers) arouse interest. In this case, conflicts may arise, in which there is a need to solve the problem of harmonizing different

views, creating conditions for value partnership and consolidation. The role of problem analysis is to establish the causes and factors of the environmental situation, its essence, consequences, and ways of resolution. Being the core of a specific situation, the environmental problem is perceived by the individual and the public as a rather acute contradiction between society and the natural environment, leading to the violation of the natural environment and deterioration of human health. It is investigated within the framework of spatial and temporal development, system parameters and main regularities, clear realization of a possible solution while assessing the necessary resource base and developing the right strategies. The role of pragmatic analysis is to study the environmental problem from an applied point of view, meaning the assessment of the possibilities of the most effective use of available resources and means to solve the issues of environmental optimization. The main attention is paid to the search for a positive result obtained with minimum costs, attracting unused reserves. The role of prognostic analysis is to develop possible scenarios for the development of environmental problems in the future. Each type includes structural-logical, aspectual, comparative analytical techniques.

Work with environmental cases is carried out sequentially with the use of methods: logical (comparison, generalization, systematization), problematic (problematization, hypotheses), situational (game, communicative, reflexive). The technology of situational analysis has four stages. The purpose of activity at the first stage is individual study of the proposed environmental case by means of general review and identification of typical and specific features of the situation; at the second stage - individual and group definition and formulation of the key environmental problem or group of problems; at the third stage - brainstorming with proposals for the resolution of the environmental problem and discussion of possible consequences. Among the proposals, methodological tasks on the development of educational measures for schoolchildren are of special importance for the future teacher: social-ecological movements and actions to preserve forests, urban parks, specially protected natural areas; to reduce pollution of the human living environment, to improve their health. Innovative forms attractive to schoolchildren are welcome: inspiring local environmental volunteer initiatives, environmental flash mobs ("Bound by One Chain", "Clean Shores"), game projects, creative competitions. The final stage is the selection of the most acceptable solution, its convincing justification and presentation.

The model of environmental education of future teachers on the basis of situational analysis technology is designed on the basis of the ideas of ecumanism, coevolution and sustainable development [13]; cultural and competence orientation of higher pedagogical education, which formed its conceptual foundation (Table 1). The ideological platform of the model is disclosed in the personal-activity, situational, culture-building environment approaches, reflecting the specificity of the developed model. The selected ideas and approaches are implemented through the leading principles: subjectivity, value-sense saturation, communicativeness, problematization, eventuality, local history orientation. Within the framework of situativity and eventuality, the local history orientation of the content acquires special importance. The use of regional environmental materials significantly activates the learning process, contributes to the formation of a personally significant system of environmental knowledge and ways of activity. The organization of the process of solving environmental situations "from close to distant" allows to realize "rootedness of teaching methods in the mentality of the environment" (S.N. Rubinstein). The local history principle has a high moral and ethical, artistic and aesthetic, cognitive and creative potential and is revealed through a specific model of spatially and historically interdependent relationship between man and his natural environment. Local ecological situations reflect general ecological problems, so they serve as their visual demonstration, the subject of cognitive study and creative activity.

Proceeding from the put forward theoretical and methodological bases the methodical level of the model of ecological education of future teachers on the basis of situational analysis technology, which combines interrelated target, content, procedural, technological, reflexive and evaluative components, is developed.

Table 1. Environmental education model in pedagogical university based on situational analysis technology.

THEORETICAL AND METHODOLOGICAL LEVEL		
<i>Ideas</i>		
environmental humanism	co-evolution and sustainable development	cultural-competence orientation of higher pedagogical education
<i>Approaches</i>		
personal-activity	situational	culture-building educational environment
<i>Principles</i>		
subjectivity, value and meaning saturation, communicativeness, problematization, eventuality, local history orientation		
METHODOLOGICAL LEVEL		
Target component		
<i>Goal - ideal - formation of ecological culture on the basis of solving ecological situations</i>		
<i>Goal - tool - planned learning outcomes</i>		
<i>Goal - subject - development of ecological and pedagogical competence</i>		
Substantive component		
value and meaning aspect	cognitive aspect	performance aspect
Organizational and procedural component		
motivational and target phase	informational and analytical phase	creative phase
Technological component		
<i>Types of predominant environmental cases and predominant analysis</i>		
Demonstration cases <i>axiological analysis</i>	Training cases Problem cases <i>Problematic and predictive types of analysis</i>	Problem cases Evaluative cases <i>Problematic and pragmatic types of analysis</i>
Reflexive and evaluative component		
<i>Level of environmental culture awareness</i>		
Spontaneous-empirical	Heuristic	Creative

The target component was built on the basis of ideas about the three-component model of goals: goal-ideal - environmental culture formed in the process of solving environmental situations; goal-means - planned learning outcomes and goal-subject - environmental and pedagogical competence, meaning environmental culture in activity. As a strategic goal, the goal of the ideal, the ecological culture of the future teacher is put forward, representing a

special quality of personality as a subject of culture. It is manifested in his worldview and real activity; it is based on the realization of himself as an integral part of the socio-natural environment and on a deep inner need to preserve and improve it; acceptance of the universal value of nature and the absolute value of life, moral responsibility to himself, society and nature. The multifaceted nature of ecological culture determines its structural heterogeneity represented by axiological, cognitive, activity-behavioral, communicative-reflexive components. Goal-tool reflects a set of planned results of environmental education, affecting all spheres of the student's consciousness: emotional-sensual (motivational), rational-logical, volitional. Goal-subject forms the ecological-pedagogical competence of the graduate's personality, meaning the readiness and ability to realize his/her ecocultural potential in the practice of pedagogical work.

The content component of the model is formed in the structural logic of the future teacher's ecological culture and ecological-pedagogical competence corresponding to it, therefore, it describes it in the following aspects: value-meaning - ecological-pedagogical values, meanings, motives; cognitive - ecological-pedagogical knowledge, thinking style; praxiological - ecological-pedagogical ways of activity and behavior. It is considered in relation to environmental situations of natural-landscape (key concepts: natural landscape, anthropogenic transformation of natural landscape, biodiversity, specially protected natural areas), resource-economic (key concepts: pollution of air, water, soil, depletion of natural resources, waste), anthropoecological (individual and population health) character.

The procedural component includes three stages: 1) motivational-purposeful; 2) informational-analytical; 3) creative-creative. At each of these stages, appropriate environmental cases are solved and a type of analysis adequate to the tasks of the stage is applied. Achievement of the planned results is possible only under the condition of active, conscious, emotionally colored activity of students, in which their creative abilities are realized, they express themselves as a person capable of solving professional problems in the field of environmental education. Activity in solving ecological cases allows to master scientific bases, social experience faster and more successfully, provides emotional improvement, intellectual development, forms activity-creative attitude to the surrounding world. At the reflexive-evaluative stage, the levels of environmental culture formation of a future teacher were determined on the basis of generalization of the results of assimilation of value-sense, cognitive, praxiological components of the content. We diagnosed the formation of ecological culture based on the development of the following levels:

1) spontaneous-empirical (weak manifestation of interest in environmental issues, low level of knowledge and skills in the field of analyzing environmental cases, external insignificant motivation for collective discussion of professionally oriented topical issues),

2) heuristic (expressed but unstable interest in environmental issues, sufficient level of knowledge and skills to solve most problem cases, external and internal motivation for collective professionally oriented communication),

3) creative (high and stable interest in environmental issues, high level of knowledge and skills allowing to solve independently environmental cases of any complexity, constant internal motivation for professionally oriented communicative activity, free command of verbal and non-verbal means of communication).

4 Discussion

The use of situational analysis technology in environmental education of pedagogical university students determines the need for a more detailed substantiation of the technological component of the model, the structure of which is conditioned by the tasks of the stage educational process. The implementation process of situational analysis

technology is carried out sequentially through the following stages: motivational and goal-oriented, informational and analytical, creative and creative.

The leading tasks of the motivational and goal-oriented stage are related to the development of students' motivation to study environmental situations, realization of the personal meaning of the forthcoming activity, and goal-setting. During the use of demonstration situations, students are "immersed" in a specific environmental problem, which is consonant with their personal needs and demands and has social significance. Emphasis on emotional and visual perception forms in the student's mind a holistic image of the environmental situation, understanding the significance of its study for optimizing the situation in the direction of preserving the natural environment and human health. Meaning formation is connected with the students' internalization of eco-humanistic and co-evolutionary values of sustainable development, considered as vital and meaningful components of their own worldview platform and serving as a basis for future professional activity and environmentally appropriate behavior. Developed spiritual and moral qualities of the relationship between man and the natural environment are manifested in the categories of mentality, natural and cultural heritage, empathy, beauty, harmony, cooperation. The dominant methods of axiological analysis in solving environmental situations allow transforming general ecocultural meanings into personal values. The procedure of goal setting includes general justification and nomination of goals, identification of common ways to achieve them, forecasting of the result. Thus, the formed motivation provides understanding of the meaning and purpose of the activity, as well as leads to the assessment of one's own capabilities for successful work. Personal reflexion reveals the readiness of future teachers to answer the question: I know why it is necessary to develop real environmental problems embedded in environmental situations.

The leading tasks of the problem and information stage consist in mastering the scientific content by means of solving training and problem situations aimed mainly at mastering the cognitive component of ecological culture. In the course of problem and prognostic analysis, an active information search for the causes and essence of the environmental problem, its possible manifestations in the future, comparison of various scientific views on the ways of resolution, modeling of pedagogical scenarios, group discussion of the completeness and reliability of information resources is carried out. It should be noted that problem solving provides high activity of students aimed at independent creativity in the study of environmental cases, which, as a rule, do not have an unambiguous solution. This circumstance determines the multidirectional non-linearity of the search activity, which, in addition, can be associated with errors, therefore, has significant heuristic possibilities. Problem-situation analysis is associated with a high information capacity of resources, which are comprehended in the process of selection, generalization, systematization, graphic processing, which develops logical and critical thinking. Collective discussion of the identified causes and factors of environmental situations, their specifics and opportunities for resolution involve extensive communication in the form of brainstorming sessions, round tables, and open discussions. Personal reflection reveals the readiness of future teachers to answer the question: do I know what is necessary and how should I act when solving environmental cases?

The leading tasks of the creative-creative stage emphasize the praxiological component of environmental culture in the process of solving problem and evaluation cases. The problem and pragmatic analyses used draw attention to the application of environmental and pedagogical knowledge and ways of activity in solving typical and non-standard environmental situations. Their solution is accompanied by conscious and voluntary activity, manifestation of initiative and high civil and pedagogical responsibility, flexibility and creativity of thinking, both in the performance of scientific-ecological, practical-creative, and methodological developments aimed at the organization of environmental

activities in the future profession. Evaluative analysis, which determines the degree of impact on the natural environment and its changes, has a constructive character. Evaluative analysis in ecological theory and practice is based on the principle of preventiveness and should be carried out during prognostic works in order to reduce negative effects. The main thing in evaluation is the ratio of merits and risks. In our case it finds application in case studies, where planned or already implemented optimization projects, which are not universally approved, are presented. The discussion character of the collective discussion allows us to consider alternative approaches to the assessment of environmental situations of the past and present on a democratic basis, in dialog, to analyze situations of historical choice, and to make a responsible moral assessment of events. Personal reflexion reveals the readiness of future educators not only to answer the question: I know why, what and how to act when dealing with environmental situations, but also the ability to teach others. Environmental and pedagogical competence means successful application of the acquired experience in professional activity. The highlighted stage of training serves as a kind of a program of environmental education of future teachers in the format of situational analysis technology.

5 Conclusions

Improvement of environmental education, in many respects, is determined by the use of innovative approaches; in this regard, the problem of applying the technology of situational analysis in the training the bachelors of education is actualized. The identified conceptual provisions of situational analysis technology are associated with the ideas about the environmental education of the future teacher as education for sustainable socio-natural development. On their basis, the model of higher education in the pedagogical university is developed and implemented, the main purpose of which is to form future teachers' ecological culture on the basis of solving ecological cases. The integrity of the developed model of environmental education in the situational context is determined by the unity of its theoretical-methodological and methodological levels; integration of target, content, procedural and reflexive-evaluation components; interrelation of training stages with types of cases and peculiarities of analysis. The integration of search-research, prognostic, communicative-presentational, reflective-evaluative types of activity in solving case situations realizes eco-humanistic and cultural ideas of development of modern higher pedagogical education aimed at the realization of potential abilities of future teachers and their professional successful formation in the school of the future.

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