

9. Korobova, I., Korobov, V., Baysha, K., Goncharenko, T., Yermakova-Cherchenko, N. The case-method application in professional training of natural sciences teachers 2019 International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM P.301-308. 2019 | conference-paper DOI: [10.5593/sgem2019/5.4/S22.041](https://doi.org/10.5593/sgem2019/5.4/S22.041) EID: 2-s2.0-85073379737

THE CASE-METHOD APPLICATION IN PROFESSIONAL TRAINING OF NATURAL SCIENCES TEACHERS

Assoc. Prof. DSc. Irina Korobova¹

Assoc. Prof., PhD Vladimir Korobov¹

Assoc. Prof., PhD Kira Baysha²

Assoc. Prof., PhD Tetiana Goncharenko¹

Assoc. Prof., PhD Nataliia Yermakova-Cherchenko¹

¹Kherson State University, **Ukraine**

²Kherson National Technical University, **Ukraine**

ABSTRACT

The introduction of competence-based approach in higher education intended to increase the practical orientation of the training process, its connection with the life and future professional activity. To reach this traditional teaching methods are complemented by innovative ones creating conditions for student activity putting him in a free choice and decision making situation. The article is devoted to the case methods use in the educational process as an active tool of professional training of natural sciences teachers. It examines the essence of the case study method, its features in comparison with traditional teaching methods, case-tasks classification. The structure of the training case is described, as well as examples of case-tasks of different types developed by the authors. A model of interaction between a teacher and students in the process of organizing a discussion on identifying, discussing and solving a case study formulated problem, the case technology framework is proposed as a method of Regional Studies' practical training conducting. The results of the pedagogical experiment on the case method application carried out in the process of future geography teachers' practical training, and its effectiveness is concluded.

Keywords: professional training of natural sciences teachers, competence, case method, regional studies.

INTRODUCTION

The common lack of academic higher education which consists in separating theoretical knowledge and the practical application of them. The introduction of a competent approach in education involves the professional training of such a specialist who is able to use the acquired knowledge in practice in his profession. This can be realized through the introduction of a case-method, which enables students to be taught on the actual

material of life, to involve them in solving problems associated with life and future professional activities.

The aim of the article is to highlight the experience of developing and implementing of case-method as an active methods of professional training of natural sciences teachers (on example of studying the discipline "Regional Studies").

SUBJECT & METHODS OF RESEARCH

The subject of the study is the case-method peculiarities, the method of its application in the process of natural sciences teachers' training. In the process of research, the following methods were used: theoretical - analysis, synthesis, comparison; empirical - observation, conversation, testing; the mathematical processing of the research results is carried out using the Rosenbaum Q-criterion.

MAIN TEXT

Interactive teaching methods have gained popularity last years. This is due to their usage and better results than using traditional teaching methods. Interactive learning refers to pedagogical technologies based on the effectiveness of managing and organizing of studying. Its classification parameters are : by level of application - general pedagogical; by orientation towards personal structures - informational and operational; by the nature of the content - general educating; by organizational forms - alternative to the class-and-lesson system; by the predominant method - dialogic; by the category of tutors - mass [1].

“Case-method” is an interactive method of training, which makes it possible to bring the learning process closer to the practical work of the specialists. It promotes the development of ingenuity, the ability to solve problems, develops the ability to analyse and diagnose problems [3]. The essence of the case-method consists of the specially designed problem-cases (case-tasks) analysis on the tutorials and ways of their solution; evaluation and forecasting the consequences of the decision-making. This method allows to change the student's position from passive to active. The teacher also has a direct feedback and can immediately respond to misconceptions of students [4], [5].

The research of the case-tasks types known in the scientific methodological literature allowed to identify the following: by discussion form - collective, group, individual; by size - mini-cases, medium-sized, volumetric; by type of control-methodical part - questionable, case-tasks, mixed type; by the presence of the plot - storyline, storyless; by source of the case – practical (describe the real life situation), educational (see and analyse the problem, find the optimal solution), research (focus on research activities) [2]. There are three main parts in the case structure: storyline, informational, control and methodical.

According to the classification by the source of the case and the proposals of scientists on its structure, the authors developed a series of case-tasks designed for the discipline "Regional Studies".

In particular, the case "Construction of the Kakhovka HPP-2" is practical. It addresses the main practical problem - how to minimize the negative consequences (environmental, cultural) of implementation adopted for the project implementation; how to attract new investments, public, local self-government; to develop creative ideas, implementation of which will allow to mitigate the consequences of construction. The

objective is achieved on the basis of an analysis of the current situation (negative consequences, conflicts of interest, etc.).

Case "Construction of Sivash wind park" - educational. The main problem formulated in case - the study of the structure and capabilities of innovative projects that are already implemented in the region - will be solved through student analysis of the following aspects:

- what newest technologies are used;
- what funds for which construction is underway, what are the sources of investment;
- what countries provide assistance to Ukraine (technological, investment, educational) in the implementation of this and similar projects;
- what personnel are involved in the project implementation (local, requested); their education, specialization, personal qualities;
- what are the likely consequences of project implementation for the region (positive, negative);
- what is perception of the project by the local population.

Case "The transformation of Kherson region into an attractive modern Ukrainian and international healthresort" - research. The main case problem - the study of the regional economy modernization based on efficient use of its tourist and recreational potential. Methods of situation studying are sociological, economic, general, fine methods of mathematical analysis (factor analysis, cluster analysis), etc.

The aspects which are investigated:

- ideas that will enable such upgrading (for example, to extend the holiday season due to the flowering of medical and therapeutic, cultural and entertainment component resort);
- social and economic situation in the region (natural and geographical conditions, the state of society, population and economy, factors of modernization, regional policy);
- international experience of the region modernization through the development of its tourist and recreational potential;
- researches of Ukrainian scientists on the topic (interdisciplinary communications - economics, regionalistics, sociology, public administration, etc.).

Below, as an example, the methodical development of this case is given.

Case name: "The transformation of Kherson region into an attractive modern Ukrainian and international healthresort"

The plot. Imagine you take part in the working-team meeting on the Implementation of the Concept Development of the Kherson Region Azov-Black Sea Coast," created by the head of the Kherson Regional State Administration order on July 26, 2016. You act as a civil servant (public figure, deputy a local council, some of whom are former teachers of geography) discussing the development of the resort and recreation industry, make the proposals and express creative ideas. You are invited to discuss the issue of modernizing the resort and recreational industry and development of the Kherson region Azov-Black Sea coast in order to transform it into a modern Ukrainian and international healthresort.

Information section. During the Russian Empire and Stalin totalitarianism the Kherson region was the site of the exile of opposition and repressed persons. Kherson region was also an industrial and agrarian region in which the major source of the gross regional product (GRP) were large industrial enterprises dominated by such industries as shipbuilding, agricultural machinery, instrument making in the Soviet era. During the independence period the deindustrialization took place: the region became an agrarian and industrial. The main source of GRP is agriculture; the region supplies grain, oil, other agricultural raw materials and products of its processing. But in the days of independent Ukraine residents of other regions perceive Kherson region as Ukrainian health resort and visit it mostly in the warm season just for rest purposes. Significant recreational and tourist potential of the Kherson region makes to suggest that the tourism and recreation sector can become a highlight of the Kherson region in the future and can change the specialization of the region from the raw materials (grain, oil, melons) to a modern health resort of state and international significance. The context of the problem is prevent various revival reasons of the old large industrial enterprises in the region and the development of powerful high-tech enterprises based on IT technologies.

The problem formulation. The developed Strategy of Kherson Regional Development up to 2020 includes the strategic regional mission: Kherson region is a solar treasury, an inexhaustible source of renewable resources of national and world significance. There are all opportunities for the transformation of Kherson region into the territory of ecological rest of state and international significance. Unfortunately, to this time, the growth and development of the tourist and recreational industry still do not meet the modern requirements, needs of tourists and international standards. The region craves an intellectual breakthrough in this direction, rethinking of the mission, tasks, methods of their implementation and achievement. What do to do to turn Kherson region into a powerful Ukrainian resort? What ideas, which projects should be used at first? How to make Kherson resort villages attractive for tourists, and the tourist and recreational branch as the engine of economic growth?

Case text (shortened version - authors.). First of all, it is necessary to rethink existing resources and capabilities effectively.

Significant tourist and recreational potential. Kherson Region has significant development opportunities of tourism potential. The combination of the Azov-Black Sea Coast recreational zones possibilities with the using of national parks, green tourism and eco-friendly food capabilities creates a comparative list for both the development of agro-industrial complex and tourism industry.

Tourist and recreational complex. Kherson Region occupies one of the leading places in Ukraine in terms of the availability of valuable natural and historical and cultural resources that can generate significant interest from domestic and foreign tourists. The main purpose of citizens to travel to the region by type of tourism is: recreation and recreation at the sea (75%), rural green tourism (19%), historical and cultural and other types of tourism (6%).

The most visited resort resorts – Henichesk, Gola Pristan, Skadovsk and their cities, Nova Kakhovka and Kherson. More than 90 tourist routes were developed on the territory of the Kherson region of different directions and for different age categories. A single register of domestic tourism routes was created and distributed, the most popular

of which are: scientific and cognitive routes along the Askaniya-Nova Biosphere Reserve, hiking trails on Oleshky Sands - the only wild in Europe, visiting the Ukrainian Cossacks' shrine, a monument of the national significance of Kamensk Sich, ecological routes along the Byriuchy and Dzharylgach islands; excursions on objects of wine and rural green tourism, objects of historical and cultural heritage of the regional center and other historical places. This year, the certification of tourist objects of the region was completed, a register was created, which included 346 tourist objects.

Tourism, rest, treatment and rehabilitation are becoming more and more significant in the socio-economic development of Kherson region. However, much of the natural areas, objects of cultural heritage and tourist infrastructure do not meet the international requirements for tourist visits, and tourist services in all sectors of the tourism industry in most do not meet the requirements for quality of service.

The natural limitation is the short duration of the holiday season on the coast of Kherson region. It is necessary to rethink the limitations and opportunities for development in this direction. What could be changed and improved? Tourism and resorts needs to attract significant investment in the development of tourist and recreational infrastructure of the region and bring it into line with international standards, to increase the attention to the development of domestic, inbound and ecological tourism.

Kherson Region has a great transit potential, which has considerably improved as a result of the Antonovka bridge construction across the Dnieper. It is just through this bridge a powerful flow of tourists from Russia and Belarus went to the Crimea. Events of 2014, the annexation of the Crimea by Russia, are one of the side effects of the growing popularity of Kherson resorts. According to the Kherson regional state administration 3.5 million tourists visited Kherson region to rest in the 2016-2017 [7]....

There are several points of view how to solve the problem of resort and recreation industry of Kherson region modernization: 1) to compensate natural, climatic, and terminal limitations of the resort season by the development of medical and health services in coastal resorts; 2) to develop tourist-entertaining services in the coastal resorts for this purpose.

Argue the expediency and effectiveness of these strategies and suggest your ideas and justify them.

Information resources: 1) Topchiev O., Malchykova D., Yavorska V. Regional Studies: Geographical Foundations of Regional Development and Regional Policy. Taching manual. Kherson, 372p. 2015 (in Ukrainian) [6].

2) The case text. (Additional case literature and electronic resources are added to the case.)

Control and methodical part. From the position of your chosen role ("position"), consider the problem and answer the questions.

Case question:

1. What is the problem?
2. Identify the circle of interested participants (players) who are in the field of the problem. Interests of what communities and social groups are meet in the situation of tourist and recreational industry modernizing in the Kherson region on your opinion?

3. What can you say about the tourism and Kherson region recreation industry?
4. How should state authorities, local government bodies, social organizations act to solve this problem?
5. What do you propose for a radical and rapid solution of this problem?
6. What are the proposing alternatives to solve the problem of yours? What are the criteria for evaluating these alternatives?

Teacher's note. This case is expedient to use after studying the following topics of the training course "Regional Studies": "Functional Structure of the Regional Economy", "Economy Specialization", " Regional Features by the Structure and Specialization of Economic Sets", "Strategy of Regional Development".

The purpose of the case is to provide students' ability to analyse the recreational potential of the Kherson region, natural and geographical, climatic conditions, state of infrastructure on the Kherson region seacoast; to express creative ideas aimed to develop the resort and recreation industry; to develop projects aimed to realize these ideas; to determine the priority of the proposed projects implementation. Cases-tasks should be given to students in advance (at the beginning of the specified topics study), the term of the tasks is stipulated. The points received by students in the process of working on case-tasks should be considered as a creative component of the final evaluation of the discipline "Regional Studies".

Teacher - students interaction model. During the pre-period, the individual approach is suggested by tutor, distributing students to "positions". It takes into account their propensities and wishes, the opportunity of "free choice" is given.

At first class devoted to the presentation of case-tasks making, the teacher organizes a projects discussion, performing the following roles: facilitator - helps to create a positive microclimate in the group; coach - asks guiding questions, "pushes" on the correct decision; expert - evaluates the proposed solutions to the problem, chooses the most optimal ones.

Usually, the discussion begins with a statement of stimulating questions by the teacher, prepared in advance. The instructor should foresee the possible reaction of the audience to the questions posed by directing discussion on the achievement of educational goals. When discussing cases, the teacher formulates four main questions:

1. Why does the situation look like a dilemma?
2. Who made the decision?
3. What solutions did the decision maker have?
4. What did he need to do?

Giving the answers, the teacher should predict the development of the discussion and adjust its course, asking questions and highlighting those points for which he would like to direct the discussion. In doing so, one must be prepared to ensure that students can express views and views that are not foreseen in advance [2]. In foreign practice, tutors from among the students are involved in organizing the "promotion" of the case situation [9].

The effectiveness of case-method usage in professional education was tested by its introduction into the educational process of the Kherson State University for first year master students of the specialty "103. Earth science. 8.04010401. Geography*". The total number of students involved in the pedagogical experiment is 29 persons: 15 persons - control group, 14 persons - experimental group. The level of student achievement was chosen as an indicator of the case-method effectiveness. Students results are shown in Fig. 1.

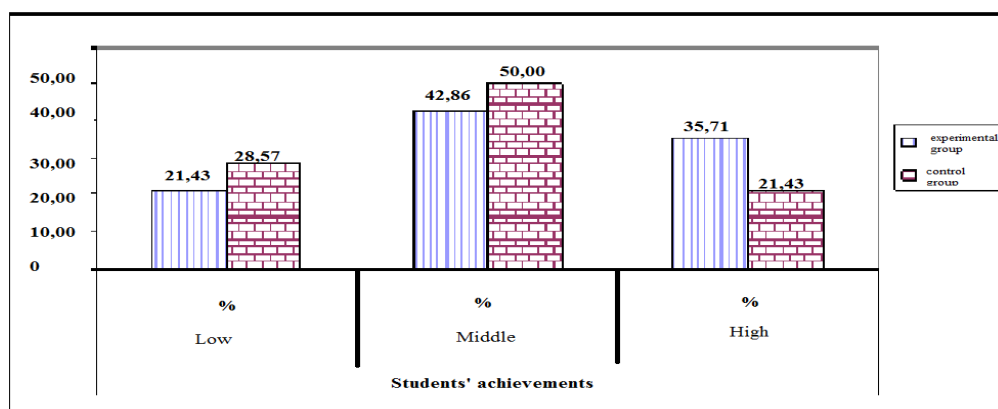


Fig. 1. Students' academic achievement by levels

The results analysis showed that there were positive changes in the experimental group compared with the control group. So, in the experimental group, the number of students with a low level of academic achievement is 7,14% less than in the control group; the number of students with a high level of educational achievements is 14.28% more than in the control group. The statistical justification of the discrepancy degree in the results obtained with the implementation of developed case-tasks was carried out using the Rosenbaum Q-criterion [8]. The results of the calculations that $Q_{emp} = 11$, and $Q_{cnt} = 9$. Constructing "significance axis" (Figure 2), we saw that $Q_{emp} \geq Q_{cnt}$ when $p \leq 0,01$.



Fig. 2. The significance axis of the shifts in raising the level of students' academic achievement

Analysis of pedagogical experiment gives reason to believe that the findings are statistically significant.

CONCLUSION

Case-method application as one of the interactive methods of natural sciences teachers professional training creates a positive motivation for the students' training and future professional activities, contributes to raising the level of mastering the educational material; teaches to see, analyze and offer creative solutions to life and production problems; allows students to immerse themselves in the profession even while studying.

Addressing students of the case-tasks promotes skills to explore the prospects for Kherson regional development adjust regional development strategy, understand trends and changes of our region in the national division of labor, to construct an distribution optimal model of productive forces in the Kherson region, develop forecasts of regional development of Kherson - economic, social, demographic and cultural. This is what leads to the formation of a competent specialist.

The results of the pedagogical experiment on the implementation of case-method in the natural sciences teachers professional training during the study of the discipline "Regional Studies" have shown its effectiveness. The research should be continued in the direction of developing case-tasks and method of implementation of the case-method in teaching other academic disciplines.

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