STUDENTS - FUTURE TEACHERS DEVELOPMENT OF ABILITIES TO FORMULATE A PROBLEM ON THE BASIS OF CRITICAL THINKING TECHNOLOGY

Rimma Akhmadullina[1], Nelly Valiakhmetova[2*], Rezeda Khurmatullina[3]

[1]Assoc. Prof. Dr. Kazan Federal University, RUSSIAN FEDERATION,
akhrimma@mail.ru
[2]Assoc. Prof. Dr. Kazan Federal University, RUSSIAN FEDERATION,
nellyv1975@mail.ru
[3]Assoc. Prof. Dr. Kazan Federal University, RUSSIAN FEDERATION,
rezeda-xurma@yandex.ru
*Corresponding author

Abstract

Modern trends in the development of domestic education are expressed in new approaches to the content, organization and evaluation of the educational process. Its innovative nature is a prerequisite for the need for a new understanding of the content of educational activities. Его инновационный характер выступает предпосылкой для необходимости нового осмысления содержания педагогической деятельности. The practice of training future teachers to perform professional tasks should change.

The article reveals the characteristic of the teacher's ability to see and formulate the problem from the point of view of the integral property that characterizes human thinking, and at the same time as a stage of problem learning. The potential of critical thinking technology in the development of the necessary skill is theoretically substantiated. Theoretically, the potential of critical thinking technology in the development of the necessary skills is justified; attention is paid to the methods of teaching problem-setting as well.

Representations of undergraduate students about the problems (difficulties in solving professional problems) that arise in teachers in connection with the innovative nature of modern teaching activities were studied in the practical part of the study at the first stage by content analysis.

The unit of analysis was semantic units, namely, the mention of specific problems relevant to educational activities. The method of application of critical thinking techniques for conscious analysis and design of students ' problems arising in teachers in solving professional problems in terms of innovative education was developed at the second stage.

The article describes the application of this technique in the study of the discipline "Modern problems and innovations in education". The systematization of the topics studied in the framework of this discipline, the relevant techniques of critical thinking for the interpretation of information and reflexive analysis of the students of these problems.

The study proved the effectiveness of the proposed method in the context of the formation of students ' skills to formulate the problem in the analysis of situations and solving professional problems of pedagogical activity. The following methods were used in the research: content analysis of theoretical sources, content analysis, generalization, systematization, pedagogical experiment.

Keywords: training teachers, the ability to formulate problems, pedagogical activities, innovations, technology of critical thinking.

1 INTRODUCTION

Modern education is focused on developing students ' ability to solve a variety of problems, deepen and expand understanding, bring innovative ideas, make decisions and communicate effectively. For achievement such a goal is necessary to create an environment that would facilitate the process of thinking, encourage meaningful discussions, exchange of ideas, points of view. Schools should become centers of thinking and intellectual stimulation, where information becomes a catalyst for thinking, not the end result.

The new content of school education, its organization, as well as the evaluation system significantly change the practice of professional and pedagogical activity of teachers and impose higher requirements to the level of his competence.

The content of the draft Professional standard of the teacher defines the basic competence of the teacher, among which there is the ability to make decisions in various pedagogical situations – - how to establish discipline, - how to motivate academic activity, - how to arouse interest in a particular student, - how to provide understanding, etc. Resolution of pedagogical problems is the essence of pedagogical activity [Savelyeva, 2013].

The development of skills to set goals, to see and formulate the problem, to choose the means of its solution and to be responsible for their implementation is a necessary component of the content of the training of the future teacher for the upcoming professional activities.

The presented competences are formed in the process of application of problem training. The presented competencies are formed in the process of applying problem-based learning, which creates a basis for the development of skills in the use of this technology and in teaching students.

The development of the ability to see and formulate the problem is the first stage of the technology of problem learning. A problem is usually understood as one or more explicitly formulated questions arising in the course of cognition. A problem is any theoretical or practical situation in which there is no appropriate solution to the circumstances, which is an incentive for reflection. The problem is difficulty, uncertainty. Actions, primarily aimed at the study of all that is associated with this problem situation are required to address it. A distinctive feature of the problem situation is that the problem cannot be put in front of a person; a person enters the problem state on their own. Unlike tasks, in a problem situation, the goal to be achieved is unknown or very poorly defined, and therefore it is much more difficult to solve. Einstein wrote that the formulation of a problem is often much more important than its solution, which may simply be a matter of mathematical or research skills. To raise new questions, identify new opportunities, address old problems from a new perspective requires creative imagination and means real progress in science" larger areas of the brain are involved in identifying the problem and formulating it than in solving it. This requires a high degree of generalization of the vision of reality, the ability to abstract from minor details, the ability to see the roots of the problem.

The basis of the considered skill and at the same time its manifestation is the verbalization of the problem statement, its pronunciation. When training in problem statement, it is important to determine: its essence or content; organizational and physical location; "ownership of the problem" (who is affected by the problem and most interested in solving it?); absolute and relative value; time perspective (since when does this problem exist? has the problem stabilized, increased or decreased? What are the predictions about its future evolution?). The main task is to identify the forces and factors that cause the problem. Available some preliminary informative information or assumptions about its possible causes help to put forward hypotheses. A conscious and formulated problem implies the emergence of a series of problematic questions. These problematic questions transform the problem into a model of finding a solution, where different ways, means and methods of solution are considered.

The following teaching methods formulation of the problem: lead-in to the theme of the dialogue; challenging problematic situation from the dialogue; the message of the topic with a motivating technique, became widespread in the practice of problem-based learning. Simultaneous presentation of contradictory facts, theories, opinions; collision of different opinions of students with a question or a practical task; tasks with a trap; exposure of everyday ideas with a question or a practical task "for an error"; presentation of a scientific fact by a message, experiment or visualization are effective in the development of problem thinking. These methods and techniques are directly related to the technology of critical thinking that allows us to make an assumption about its effectiveness in the development of the skills of future teachers to see and formulate the problem.

The purpose of this study is to justify the effectiveness of the developed methods of development of students

- Future teachers of the ability to formulate a problem based on the technology of critical thinking.

2 METHODOLOGY

The methodological basis of the research is based on the competence and system-activity approaches that focus on achieving the results of education – competencies acquired on the basis of practical experience; the concept of professional and pedagogical activity [Auhadeeva and et al., 2017]; modern theories of professional education and training of teaching staff.

Russian psychologists A.Bayramov, N. Menchinskaya, S. Rubinstein, B. Teplov, S. Veksler, A. Brushlinskii consider criticality as one of the qualities of thinking or personal property, influencing the course of mental processes. Criticality as the quality of thinking is determined by them from the position of productivity of thinking, as an element of the thinking process that occurs in a problem situation and is the trigger of thinking.

O. Tikhomirov, M. Makhmutov defines critical thinking as "sensitivity to problems» [Vostrikova, 2012].

A. Beadle, D. Clark under critical thinking understands the process by which the mind processes information to understand established ideas, create new ones or solve problems".

More detailed critical thinking is defined as critical analysis, the ability to interpret, explain, and draw conclusions, conclusions, in order to make an objective reasoned judgment.

According to the pedagogical literature, "critical thinking is" the ability to analyse information from the standpoint of logic and personal understanding in order to make informed decisions and apply the results to both standard and non-standard situations, issues and problems» [Vostrikova, 2012; Sjunina and et al., 2017]. The authors identify the following features: critical evaluation and understanding of information, all that is happening around; development of their point of view; awareness and comparison of a variety of points of view; the nomination of the thesis and its argumentation. D. Kluster considers independence; information as a starting point of critical thinking; formulation and understanding of problems; broad argumentation; sociality to the main components of critical thinking.

"The mechanism of critical thinking includes mental operations that determine the process of reasoning and argumentation: setting goals, identifying problems, hypotheses, arguments, and their justification, prediction of consequences, acceptance or rejection of alternative points of view. It includes the ability to apply basic intellectual skills (knowledge and understanding) to synthesize, analyse, and evaluate complex and ambiguous situations and problems. Skills to identify the problem, clarify the situation, analysis of arguments, a comprehensive study of the issue, the development of criteria for assessing solutions and reliability of information sources, avoiding generalizations can be attributed here» [Fedorov, 2007].

3 MATERIALS AND METHODS

We conducted an experimental study among undergraduates of the 1st course in the number of 73 people studying at the Kazan Federal University in the direction of «Pedagogical education». The experiment was held in the course of studying the discipline "Modern problems and innovations in education" for one semester.

We considered the ability of students to formulate the problem as an integrative skill in the universal competence «the Ability to carry out critical analysis of problem situations on the basis of a systematic approach, to develop a strategy of action." This competence is included in the group of universal competencies "System and critical thinking", which are noted in the Federal state educational standard of higher education-master's degree in the direction of training 44.04.01 «Pedagogical education» (approved by the order of the Ministry of education and science of the Russian Federation of February 22, 2018 № 126. [Federal educational standard of the Russian Federation of higher education in the field of training 44.04.01 teacher education (master) (2018)].

The study was carried out in 4 stages. The first stage-aerobatic-was devoted to the study of students ' ideas about the problems (non-standard situations and tasks) arising from teachers in connection with the innovative nature of professional activity in modern education. Essay on «working in innovative education-is it difficult?" it was proposed to write to students. Processing of empirical material was carried out using content analysis.

Four categories of analysis were chosen: changes in the requirements for the competencies of a modern teacher, changes in the requirements for personal qualities, changes in professional positions and attitudes, changes in functions and labor actions. The semantic units were the specific problems included in these four

categories. The number of mentions of a certain semantic unit in each work was counted. The unit of measurement was the percentage of references to the total number of essays studied. Registration of the presence of these units of analysis in the responses of students was carried out using the coding matrix.

The analysis showed that students have an idea of the problems and difficulties that arise in the modern teacher in the transition to innovative education. 74% were problems related to information competence; 56% - problems associated with changes in functions (mainly with the replacement of the function of presentation of information on the design of independent activity of students); only 5% of the problems related to changes in professional positions and 2% - personal qualities.

These results indicate the incomplete representation of students about the complexity and problematic nature of professional pedagogical tasks in the conditions of innovative education.

At the second, ascertaining stage, diagnostics of skills to formulate a problem on the basis of the decision of students of pedagogical cases was carried out. Each of the cases contained 4 typical professional situations-tasks developed by us on the basis of contextual approach. Such situations-tasks as: to design and implement professional self-education, to work with information, to manage the educational process and professional activities, to establish interaction with other subjects of the educational process. All cases on the content and organization illustrated a specific problem or concept as a whole. The task of the teacher was to activate the students to search for different truths and approaches and to help them navigate the problem field. Each student received a separate case with a set of situations. The solution of the case and assessment of skills were also carried out individually. The ability to formulate problems in the analysis of pedagogical situations were evaluated by the following criteria: 1) the depth of the problem (the ability to formulate contradictions between the real and the desired state of pedagogical reality, the allocation of the main and related contradictions); 2) the completeness of the problem: the ability to reveal the conditions of the situation, especially students, especially the relationship of teachers and students, the personality of the teacher [Kashapov, 2000]; as well as another criterion defined by us: the ability to formulate the goal of the forthcoming pedagogical activity to resolve the problem situation.

Each of the criteria was evaluated in 1 point. Thus, the student could gain from 0 to 3 points in the analysis of one pedagogical situation. The maximum number of points for completing the tasks of the case was 12. If the student scored 0-4 points, it corresponded to the low level of ability to formulate the problem in the analysis of the pedagogical situation, the range of 5-8 points corresponded to the average level, and the range of 9-12 points-to the high level.

The next stage of the research was the development and testing of methods of critical thinking for the conscious formulation and construction of students ' problems arising in the analysis of pedagogical situations.

The method included the following stages: 1) analysis of the content of educational information by the teacher in terms of the problems that may arise in teaching activities in connection with the innovative nature of modern education; 2) the distribution of problem situations and issues in accordance with the studied topics; 3) selection of techniques of critical thinking technology for the analysis of situations, awareness of students of the problem field and the formulation of specific problems; 4) design of the content and technology of the organization of classes (lectures, seminars, workshops). The main methods were: situational analysis, including the analysis of specific situations (situational tasks, situational exercises); the method of "incident". The task of the students was to get acquainted with the description of the situation, self-analysis, and formulation of the problem, goal setting and suggestions of solutions. Then the discussion of these aspects in the process of discussion or brainstorming took place in a group with other students. These methods were used at all stages of the lesson: at the stage of challenge, semantic, at the stage of reflection.

Table 1 shows examples of the use of the "Four Box Synectics" reception at the stage of the call when conducting classes on various topics within the discipline "Modern problems and innovations in education".

Table 1. Examples of the use of the reception «Four Box Synectic» at the stage of the call during the lessons on the discipline «Modern problems and innovations in education»

The theme of the lesson	The concept discussed on the topic	Analogies proposed by students in the framework of the "Four Box Synectics" reception»	Problems arising in the process of innovative pedagogical activity, formulated by students, based on the proposed analogies
Subjectivity of the position of the student in traditional and innovative education	Student in traditional education	**Symbolic** A student in traditional education is like a pawn, as his activities are directed and strictly controlled.	What are the signs of subjectivity of the student in innovative education compared to traditional education?
Requirements for the personality of a modern teacher-innovator	Teacher-innovator	**Personal** As an innovative teacher, I am like a permanent marker, because everything I say and do stays in the minds and souls of children.	How do the goals of education and personal development in innovative education change? What is the professional position of the teacher in relation to the student in terms of innovative education?
Basic concepts of pedagogical innovation	Pedagogical innovation	**Symbolic** Pedagogical innovation is similar to mutation in the process of evolution, because it can occur spontaneously and radically change the course of events.	Are all innovations useful? How to predict the result of innovation, how to calculate all the risks in innovation processes?
Формирование Formation of teacher's readiness for innovative activity	Innovative activity	**Fantastic** Being innovative is like holding the planet Earth in your arms, it seems that you can do anything.	What are the problems related to the education and formation of personality will help to solve pedagogical innovation?
		Symbolic Innovative activity is similar to the path through the tunnel, only at the end of it you can see the light. The tunnel is a long way to test innovations.	Do all teachers have the right to innovate? Should this activity be mandatory for everyone, or is it the destiny of the elected?

The method is based on the idea of direct, personal, fantastic and symbolic analogies and suggests that the discussion begins not with the problem itself, but with the analysis of some common features that seem to introduce the problem into the situation, repeatedly clarifying its meaning. Purpose of reception there is a statement and solution to the problem. At the final control stage of the study, each student was again offered cases containing four situations on topics related to the problems of pedagogical activity in the conditions of innovative education.

4 RESULTS

The study showed that at the ascertaining stage the majority of students, namely 75.3% (55 people) of the total sample were at the medium level of development of the ability to formulate a problem, based on the analysis of the pedagogical situation. They scored from 5 to 8 points on the three above criteria for the decision of the pedagogical case. 17, 8 % (13 people) of the total number of students were at a high level of development and 6.9% of the subjects (5 people) – at a low level.

The final-control stage of the study showed an increase in the proportion of students who are at a high level of development of the ability to formulate a problem to 28.7% (21 people) compared with the ascertaining stage. The number of students at the low level decreased to 1.4% (1 person), and at the medium level their number also decreased to 69.9 % (51 people) due to the transition of the students to a high level of development of skills.

Fig. 1 shows the number of students at each level of development of skills to formulate the problem at the control and ascertaining stages of the experiment.
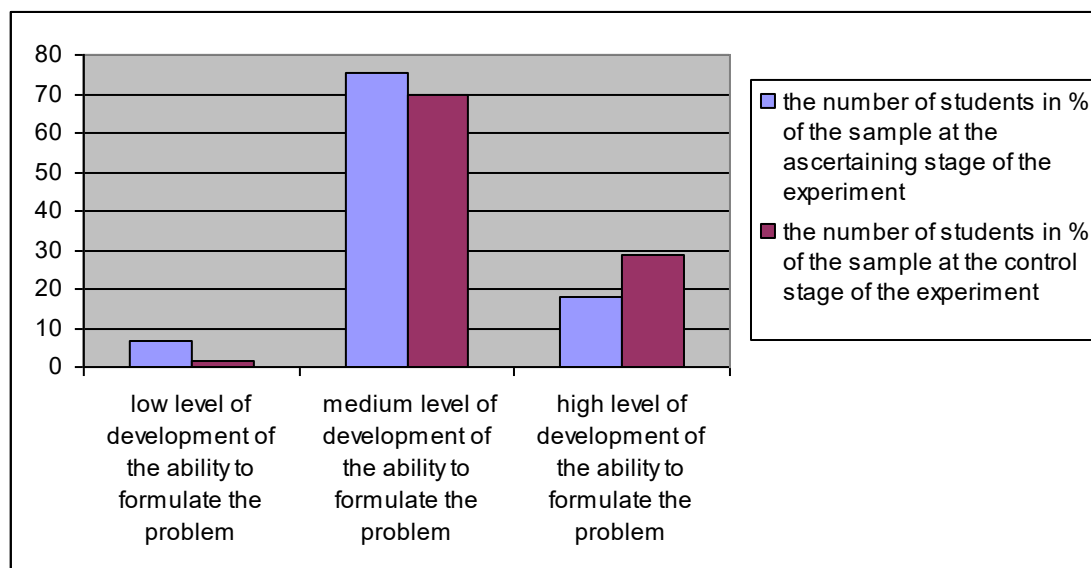

Fig.1 The number of students at low, medium and high levels of development of the ability to formulate a problem in the analysis of the pedagogical situation at the control and ascertaining stages of the experiment

5 CONCLUSION

The aim of the study was to substantiate the effectiveness of the developed methods of development of students – future teachers of the ability to formulate a problem in the analysis of pedagogical situations on the basis of critical thinking technology.

The key value for our study was the thesis that the basis for solving the pedagogical problem situation is the formulation of the problem. The criteria for achieving the result were: the depth, completeness of the problem and the ability to formulate the purpose of the upcoming activities.

Assessment of the formation of these skills was carried out by the case method. The results show that the developed by the authors technique based on the technology of critical thinking can be an effective tool for the formation of students ' ability to formulate a problem in the analysis of pedagogical situations and solving professional problems.

The data can be used by teachers of universities and colleges in solving the problems of training future teachers.

6 DISCUSSIONS

On the one hand, knowledge of operational mechanisms of thinking allows us to consider pedagogical thinking as the highest cognitive process of search, detection and resolution of problems in the course of professional pedagogical activity. As a result of the actualization of pedagogical thinking, new intellectual neoplasms appear in the form of methods of solving the pedagogical problem situation discovered by the teacher [Kashapov, 2000].

On the other hand, it is necessary to change approaches to professional training, to use the developing technologies stimulating active cognitive activity of students, their creative thinking. Creative thinking involves the flexibility of thinking, the ability to predict, generate ideas, reflection, and the desire to improve. The experience of solving pedagogical cases will help to enrich the student with the skills of professional activity at the stage of University training [Savelieva, 2013].

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