

**ALGORITHMIC APPROACH TO RESEARCH DIAGNOSTIC ACTIVITY PROBLEMS OF FUTURE  
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**Abstract.** The article raises the problem of the diagnostic activity of a future class teacher. The problem field of the research object is shown. Based on the experience of psychological and pedagogical literature, they studied the algorithmic approach to the diagnostic activity of a teacher, and the concept of "diagnostic activity algorithm" was considered. It is proved that, despite the existing theoretical reserve, it is necessary to study the diagnostic activity of a future class teacher in connection with the specificity of his future educational activity. Based on the analysis of the ascertaining experiment results, a conclusion is drawn about the need to develop diagnostic tasks that are necessary in the educational activity of future class leaders. Also, the authors see the need for the algorithmization of diagnostic tasks, the purpose of which is to train future educators to reflect on their diagnostic activity, its timely correction, and further planning.

**Keywords:** algorithm, algorithmic approach, diagnostics, diagnostic activity, future class teacher, the training of future teacher-educators.

**1.Introduction.** At the present stage of the education system development, a special attention is paid to qualitatively new requirements for the organization and the content of future teacher professional training at higher educational institutions of a pedagogical orientation. Thus, according to the federal documents of recent years (the "National Strategy of Actions for Children in 2012-2017", "The Strategy for the Development of Education in the Russian Federation until 2025", "The Professional Standard of a Teacher", etc.), the diagnostic activity of future teachers-educators is one of the main trends of their educational activities. In this regard, the diagnostic activity of a future teacher-educator should be aimed at a pedagogical task solution, and its implementation is possible in accordance with some algorithm [1]. All of the mentioned above makes it possible to formulate the goal and the objectives of the study: the theoretical justification of the diagnostic activity algorithm for a future class teacher, the study of the diagnostic activity algorithm for a future class teacher on the basis of the Pedagogical Institute of the SRU "BelSU".

**2.Material and Methods.** The solution of the problem is provided by the use of a set of methods: theoretical analysis, observation of the interrelated activities of teachers and students in the course of training, questioning, the analysis of training sessions, testing, experiment, the methods of mathematical statistics.

The algorithmic approach is a systematic way of organizing students' cognitive activity, characterized by the use of the algorithmic method during the operation with various types of algorithms used to solve educational and pedagogical problems, as well as an important way of knowledge development within the framework of creative thinking development, the core concept of which is the concept of "algorithm" [2]. The algorithm of diagnostic activity is a sequence of a set of diagnostic procedures, steps, operations, cycles and stages of pedagogical object and phenomenon diagnosing (from the setting of diagnostic tasks to the development of diagnostic predictions, correcting measures and subsequent monitoring of this object and phenomenon development). A necessary condition for its application is the presence of a diagnostic situation and a diagnostic level of information [3].

The teaching of algorithms to solve educational problems for students is carried out through a controlled implementation of training assignments [4]. It should be emphasized that the use of an algorithmic approach is carried out in the diagnostic activity of a future class teacher. The implementation of this approach to the study of diagnostic activity problems among the future teacher-educator makes it possible to fulfill the following tasks: to create a clear idea of each element of diagnostic activity for a the future class teacher; to teach to allocate a specific element of diagnostic activity in any pedagogical situation; to provide students with the opportunity to apply the basic elements of activity in diagnostic problem solution; to teach to use some standard algorithms and the ability to compile algorithm independently in diagnostic activity, the application of which is possible in different pedagogical situations.

The algorithm of a teacher diagnostic activity is presented in sufficient detail by the thesis from A.V. Senichkina, who singles out the following stages: the formulation of the problem; the definition of goals, objectives, diagnostic objects; the definition of criteria, diagnostic object indicators; the selection of methods to solve tasks; the

collection of information using diagnostic techniques; the quantitative and the qualitative processing of the results; the development and the formulation of pedagogical diagnosis; the development and the formulation of a pedagogical forecast for an object development; the development of corrective measures [5].

The actions and the operations of an educator performing diagnostic activities consist in relevant diagnostic tool selection preceded by a thorough analysis of a pedagogical situation and a problem formulation, in the phenomenology of a problem, a diagnostic study conduct, the analysis of obtained results, the interpreting and the comparing of existing information about a child, comparison and conclusions [6].

Taking into account the specifics of class teacher activities, we believe that the algorithm for the diagnostic activity of a future teacher-educator can be represented using the following logic of operations (actions): 1) the determination of diagnosis object and subject; 2) the setting of diagnosis purpose in the activities of a class teacher; 3) the definition of criteria and indicators of a diagnostic subject; 4) the selection of methods, a system of diagnostic methods (a diagnostic program development) for the implementation of diagnosis purposes; 5) the implementation of diagnostic methods in direct pedagogical interaction (the implementation of a diagnostic program); 6) the interpretation (the analysis) of diagnostic results; 7) the allocation of diagnostic object development levels; 8) accounting and the record of diagnostic results; 9) further development of educational activity on the basis of pedagogical diagnostics. Such an algorithm is the most optimal one, because it gives an idea of the integrity and a systemic diagnostic activity of a teacher-educator [1].

**3.Results and Discussion.** After the ascertaining experiment, we studied the opinion of future educators-educators about the need to carry out diagnostic activities and the knowing of diagnostic activity algorithm. For example, the question "What, in your opinion, can optimize the diagnostic activity of a teacher?" was answered in the following ways: a) the availability of developed diagnostic tools - 38%; b) the availability of an electronic diagnostic complex - 28%; c) timely interaction with the subjects of the educational process -27%; other answers - 7%. In the course of the conversation, we found out that under diagnostic tools respondents understand valid, proven diagnostic methods, the programs and the complexes for the implementation of diagnostic activities. Among "other" answers, the answers "quality training in the process of study at a university," "good preparation of university teachers," "a high level of the general culture in the children's collective," etc. To the question "Do you know the algorithm of a teacher-educator diagnostic activity?", only 28% of respondents answered "yes", 16% of students have difficulties in this matter, the remaining 56% of students do not know the algorithm of diagnostic activities for a class teacher.

So, in the process of the developing experiment, students performed the assignments to study the children's collective and individual students. Let's give an example of assignments: 1. Using the descriptions below of the possible level of social qualities among the students of the classes V-VI, determine the level of social development among the students of one of the classes. 2. Study the professional inclination of students. 3. Study the level of the children's collective upbringing. 4. Study the level of moral development of your class using the test "Reflecting on life experience", etc. It should be noted that the fulfillment of the presented tasks required, first of all, a well thought-out algorithm of diagnostic activity from students, the analysis of their educational and diagnostic activities, its timely correction, and further planning. The main function of the algorithm in pedagogical activity is to reveal the direction of future teacher actions. The following is necessary for this: to collect the most complete information, but limited to diagnostic problems; classify it according to the degree of diagnostic significance; to choose the most rational ways of its processing; to correlate diagnostic results with the pedagogical goals and a specific system of pedagogical measures of a tactical and strategic nature. An algorithmized method of pedagogical diagnostics is characterized by a number of features, among which the most significant are the following ones: determinism, i.e. all instructions included in the algorithm must accurately determine the nature and the conditions of a future teacher each action, exclude the randomness of choice; mass nature, i.e. any given phenomenon, process, event pertaining to a certain class can act as initial data; effectiveness, i.e. after a search, if all the conditions of the algorithmic prescription are met, a desired result must be obtained [2]. Besides, it is necessary to take into account the presence of two factors, without which the diagnostic algorithm can not be developed: the presence of a diagnostic situation and a diagnostic level of information [7]. A diagnostic situation is a set of conditions when there are the manifestations of educational activities that have diagnostic significance. It is important to separate random facts from regular ones, most typical for educational activity [8]. The diagnostic level of information arises when its volume and qualitative structure make it possible to carry out quantitative and qualitative analysis. The algorithm of pedagogical diagnostics as a series of successive actions can be presented as follows: a frontal study of an object with the formulation of specific diagnostic problems; primary, purposeful, systematic accumulation of information on activities, relationships and links for this object; the classification of the data obtained in order to prepare to solve diagnostic problems; the determination of the diagnostic level of information; accounting and evaluation of the external features of a phenomenon; the analysis of factors that determine external manifestations; the determination of their stability, periodicity; the interpretation of the information obtained and the hypothesis putting forward about the possible connection of external manifestations with the internal content of a phenomenon; the verification of completeness and the accuracy of information received, the correction of preliminary information; the determination of their stability, periodicity; the coding of information, providing its use for

diagnostic purposes; the forecasting of further development trends; prospective and current planning of pedagogical activity for the implementation of diagnostic data [9, 10, 11].

Let's give the examples of algorithms for the diagnostic work of a future teacher-educator. It is necessary to indicate the following for the algorithm of a diagnostic map: the number of students who have improved their academic performance, the number of students who have decreased their academic performance, the possible reasons for the decline in academic performance (missed lessons, insufficient work at home, weak abilities, unwillingness to learn a subject, insufficient work at a lesson, a large amount of homework, an insufficient teacher's attention, complicated material) [1]. And, for example, according to the algorithm of the diagnostic map of pedagogical skill growth, it is important to note the following stages of pedagogical activity: open lessons, innovative work, non-standard lessons, olympiads, contests, competitions, self-education, micro-research, participation in a scientific-practical conference, subject weeks, courses, the participation in expert commissions, the participation in the contests of methodical materials, experimental work, the work with students, dissemination of experience.

Figure 1 shows the final results of the experimental work.

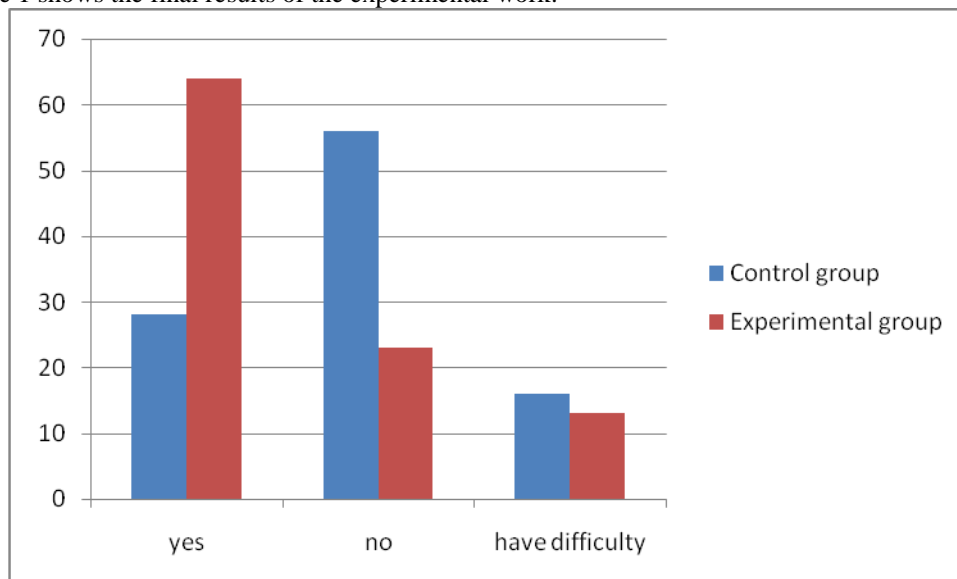


Figure 1. Algorithm of diagnostic activity of the future form masters

The results of the experimental work testify to the mastery of diagnostic activity algorithm by future educators.

It is revealed that the increase of the average score in the sample is not accidental, but is highly likely to be natural. Due to the fact that the sample size is more than 30, then, according to the central limit theorem, the average sample has a normal distribution. A zero and alternative hypothesis was formulated:

$$H_0: \mu = 55.49 \quad (1)$$

$$H_A: \mu > 55.49 \quad (2)$$

Let's calculate test statistics:

$$z = \frac{\bar{X} - \mu_0}{S_1 / \sqrt{n}} = \frac{64.99 - 55.49}{17.01 / \sqrt{86}} = 5.19(3)$$

From the tables of the normal distribution, let's find  $Z_{0.01} = 2.33$ . Therefore, we reject the null hypothesis at the significance level of 1%. This indicates that the increase of the average score is naturally more than 99%.

Let us prove that our sample is representative, i.e. the sample is not much different from the population. In a representative sample, the mean should not differ much from the average by population. The average by population makes 55.4, the average for the sample makes 55.49. Using the formula of the confidence interval width, let us find out how much such a coincidence is significant. In order to find the width of the confidence interval, let's use the standard deviation by the population  $\sigma$ . The width of 95% of the confidence interval is calculated by the following formula:

$$h = 3.92 \frac{\sigma}{\sqrt{86}} = 3.92 \frac{19.1}{\sqrt{86}} = 8.08 \quad (4)$$

Since the width of 95% of the confidence interval is greater than the difference of the average by population and the average by sample, we conclude from this that our sample is representative.

Let us examine the control and the experimental groups for homogeneity. To do this, let's use the Fisher criterion. Let us find the dispersions of the control (5) and the experimental (6) group:

$$d_1 = s_1^2 = (20.33)^2 = 413.3 \quad (5)$$

$$d_2 = s_2^2 = (17.01)^2 = 289.34(6)$$

$$F = \frac{d_1}{d_2} = \frac{413.3}{289.34} = 1.428(7)$$

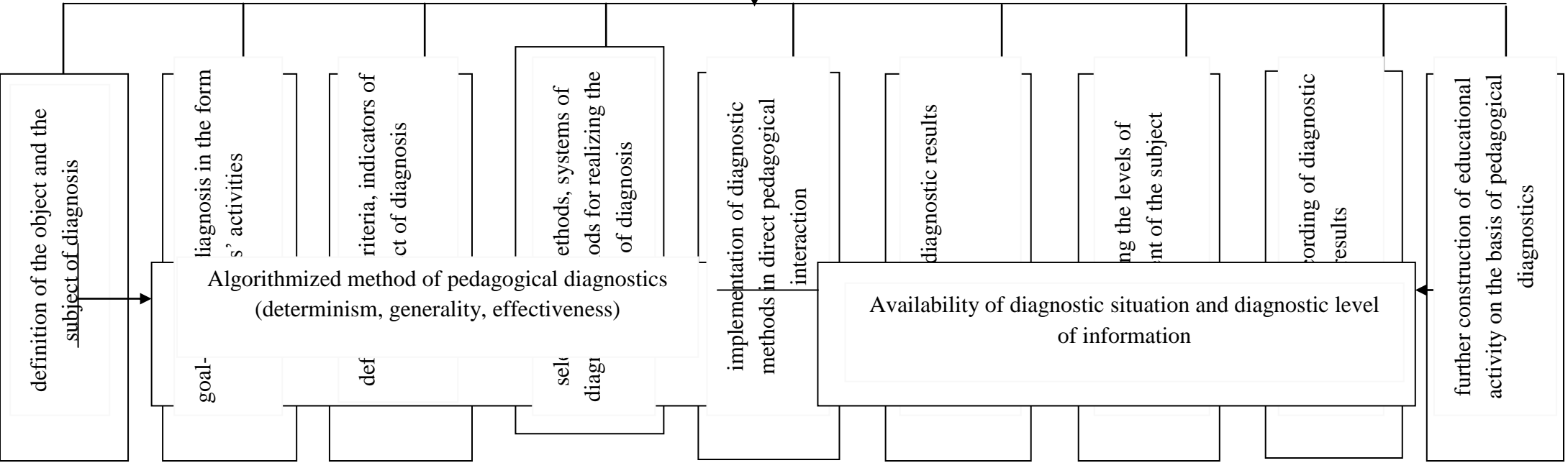
From the table with 152 degrees of freedom for both dispersions at the significance level of  $\alpha = 0.05$ , we find  $F_{0.05} = 1.3$ . Since  $F > F_{0.05}$  we can state that at the significance level of 0.05 there are the differences between control and experimental groups.

As the result of experimental work, it is established that the application of the algorithmic approach in the diagnostic activity of a future class teacher is not only an effective means of knowledge quality improvement and professional and pedagogical culture development, but it also contributes to the solution of diagnostic problems in non-standard situations.

**4. Conclusion.** Describing the algorithms of diagnostic activity, they offer a different number of its stages: the content of its diagnostic activity; the choice of a range of targeted research tasks; the criteria and the indicators of adequacy for the solution of the targets set in their work; diagnostic tools; the compliance with the subject of diagnosis, the goals and objectives put forward; methodical conclusions for the future. In the aggregate of the entire sequence of these stages, this diagnostic algorithm is a complete diagnostic cycle. The fall of any stage violates it, which leads to the distortion of the information received and, accordingly, to its incorrect interpretation with all the ensuing consequences.

**5. Summary.** Thus, taking into account the peculiarities of educational activity and the algorithm of a class teacher diagnostic activity, one can single out the following algorithm for the diagnostic activity of a future class teacher (Fig. 2).

# ALGORITHM OF THE FUTURE FORM MASTERS' DIAGNOSTIC ACTIVITY



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