Differentiated Training as a Form of Organization of Educational and Cognitive Activity of Future Masters of Pedagogical Education

ABSTRACT

The purpose of this article is to study the problem associated with improving the quality of training of masters of pedagogical education for professional activities in the profile "Second language education". Because almost all bachelors with higher education are allowed to study in the master's program in this profile, this problem becomes very important. As you know, in order to teach English in General education institutions, there is not enough knowledge that is reflected only in school textbooks. We need a system of knowledge, skills and abilities that can be formed only if you study sufficiently broad and deep sections and courses of higher English. The article uses such research methods as observation, analysis and synthesis, generalization and concretization. It is shown quite convincingly that these methods lead to a higher level of knowledge acquisition by future undergraduates. The necessity of revealing the historical and theoretical significance and role of the great discoveries of famous mathematicians, such as the discovery of Lobachevsky geometry, is justified. It is shown that differentiated training is the most effective form of organizing educational and cognitive activities of future masters. Systems of geometric problems have been developed that have a sufficiently high potential, which leads to a better assimilation of the theoretical foundations of projective geometry.

Keyword: Differentiated learning, types of differentiation, cognitive activity, Future Masters, English language

Introduction

The current stage in the development of the educational space, more than ever, demands from the modern teacher the maximum manifestation of his creative readiness for professional activity. A significant role in this is played by the process of his education on the Master's program of pedagogical education profile "Second language Education". We will dwell in more detail on the preparation of masters of English education for professional activities in the course "Modern problems of science and education." As you know, this course is focused on familiarizing students with problems both in English itself and in the methods of teaching English, both permitted at a given time and unresolved, to study those methods, methods and techniques that determined their resolution. In this regard, when studying the axiomatic approach to the construction of second language theories, we pay special attention to the condition of independence and consistency of the system of axioms. It was the long efforts connected with the proof of the independence of the fifth postulate from the other axioms that led the famous Russian mathematician Nikolai Ivanovich Lobachevsky to the great discovery - non-Euclidean geometries.
NI Lobachevsky's discovery was based on the well-known method of proving "by contradiction", using this method Nikolai Ivanovich rightly assumed that if the axiom of parallel Euclidean geometry is replaced by a statement opposite to it, then this statement was called Lobachevsky's axiom, then at some stage the use of this statement will result in a contradiction. However, as we now know, the great scientist did not receive any contradiction in the new theory he developed. Moreover, he axiomatically constructed a new type of geometries - non-Euclidean geometries. Currently, the significance of this discovery has been proven not only from the point of view of English, but also from the point of view of methodology and philosophy. Thus, for example, emphasizing the methodological significance of these discoveries, the famous Swiss mathematician and teacher A. Bernhardt wrote in his book "Projective Geometry": "... that sensory observation does not yet give full understanding and does not prove anything. However, it gives impetus to the activity of thinking. Thanks to the latter, we find concepts for which perceived objects are a kind of external signs. The concepts obtained by themselves already reveal to us a certain internal regularity. The experience of these regularities is the experience of insight" (Bernhard, 2003).

There is no doubt that a English teacher must be prepared so that at any stage of a English lesson or extracurricular activity in order to achieve a positive effect, he can give a convincing example of an educational or educational nature. For this purpose, we consider it necessary to include in the curriculum of the course "Modern problems of science and education" of various approaches to the construction of second language theories.

At present, in the construction of second language theories, as we have already noted, axiomatic and group-theoretical approaches are widely used. The main ideas that make up the fundamental basis of these approaches can be found in the works (Arnold, 2009; Atanasyan, 2014). The effectiveness of using these approaches in the development of second language theories is beyond doubt. This approach to the preparation of masters of pedagogical education will greatly facilitate the process of preparing them for both classroom and extracurricular activities (Dorofeev, 2000). Lobachevsky's discovery led to the discovery of a whole series of non-Euclidean geometries, including the projective one, in which any two straight lines intersect. With the discovery of projective geometry, many theorems of Euclidean geometry received a significant development.

We will dwell in more detail on the theorem of the famous French architect and philosopher of the 17th century Girard Desargues (Denisova, 2016; Glagolev, 1963; Dorofeev, 2000). The discovery of this theorem was due to the solution of many problems associated with the study of the properties of perspective and perspective figures. In the original version, this theorem, from the modern point of view, was naturally incomplete. Formulated in terms of projective geometry, it began to possess a certain beauty, integrity and completeness. In current textbooks on projective geometry, this theorem can be found in various formulations. Let us dwell on a more accessible option for our students: If the lines connecting the corresponding vertices of two three-vertices on the projective plane pass through one point, then the intersection points of the corresponding sides and, and, and these three-vertices lie on the same straight line. The remarkableness of the projective plane also lies in the fact that the duality principle is fulfilled on it, asserting that from the truth of the statement, which speaks of points, lines and their mutual arrangement, the truth of the statement follows, which is obtained from the statement by replacing the words "point" with "straight", "straight" to "point", "lies on" to the phrase "passes through", the phrase "passes through" to the phrase "lies on". Thus, according to the duality principle, we obtain that on the projective plane, along with the Desargues theorem, the inverse to it is also fulfilled, in which it is asserted that if the intersection points of the corresponding sides and, and, and two three-vertices on the projective plane lie on one straight line, then the lines connecting the corresponding vertices of these three vertices pass through one point.

As our observations show, most of the future masters of pedagogical education in the specialty "Second language Education" are sufficiently motivated. They have a specific goal, try to acquire the ability to work with literature and lecture notes, find or independently compose and solve creative problems, separate the main from the secondary in the material being studied, strive to successfully master the skills and abilities that allow them to transfer knowledge from one problem situation to another, try to analyze each specific task situation and find possible ways and means of its generalization. As a rule, these students, with a little help from the teacher, cope with many tasks for independent work. Therefore, for them, we try to select tasks that would contribute to the formation of their ability to highlight the main thing in the material being studied, to establish a connection between the parts of the whole, and would contribute to a deeper assimilation of theoretical material (Kudryavtsev, 2016).

**Methodology**

Thus, our own observations, analysis of scientific publications of recent years and generalization of its results allowed us to single out both methods of more effective preparation of future bachelors for pedagogical activity, and methods of conducting scientific research related to improving the methodological component of their training. Among the methods that determine the effectiveness of training future masters for pedagogical activity, we single out differentiated teaching as a form of organizing educational and cognitive activity. Russian literature describes various approaches to the organization of differentiated education of schoolchildren. In the 19th century, a gender approach was actively used in the field of education, when schools, colleges, gymnasiums and classes were divided
into male and female. The positive effects of such an organization of educational and cognitive activity can be considered in men's educational institutions the orientation of programs to strengthen physical and natural science training, while in women's educational institutions the programs were focused on strengthening the humanitarian component. In fact, female representatives were deprived of the opportunity to receive higher education in science or technology. In post-revolutionary Russia in 1917, a radical reform was carried out in the field of education; firstly, gender differentiation was abolished. All students, regardless of gender, received the same education in all subjects, in the same programs and textbooks. In Russian schools of this period, cruel rules were in force, the teacher was obliged to present all the material strictly according to the recommended textbooks. Of course, there could not be any talk of any kind of differentiation of schoolchildren according to any criterion at that time. Only, starting from the 60s of the 20th century, in the field of education, they again began to talk about the advantages of profile and level differentiation. The era of the polytechnicization of education began in Soviet schools. A graduate of the Soviet school of this period, along with a certificate of secondary education, received a certificate attesting to the mastery of a working profession. This certificate greatly influenced the choice of a future profession. The polytechnization of school education has revealed quite a few reasons indicating the need to introduce level differentiation into the sphere of subject education. It should be noted that over the past 50 years this problem has been one of the most urgent. The urgency of the problem is constantly aggravated because programs and textbooks change quite often in educational institutions of the school type. Now in the Russian educational space, work is actively underway to improve the techniques and methods of both level and profile differentiation. It should be noted that the scientific literature has studied and is studying the foundations of the organization of profile and level differentiation, based on the levels of development of students' second language abilities, and only in some cases it is explained that this level largely depends on his personal qualities, for example, temperament (Uteeva, 1998)...

In our work, we are of the opinion that it is advisable to put the method of problem situations as the basis for the differentiation of educational and cognitive activities of future masters. Each problematic situation created in English and the methods of teaching it is naturally associated with various second language problems and has a high potential for the development of personal qualities and mental abilities of students. The method of problem situations was fruitfully used in Russian schools in the 19th century. A vivid evidence of this fact is the picture of the famous Russian artist NP Bogdanov-Belsky "Oral count", written in 1895. In the picture, the artist described the problematic situation posed by the teacher S.A. Rachinsky in a rural school. The painting is valuable not only as a work of art, but also as a fact of importance in psychology and teaching methods of English. The importance of problem-based learning in education has been emphasized and substantiated in many scientific studies and dissertations, primarily in the works of famous Russian scientists, for example, Arkhangelsky, (1980), Zankov, (1999), Zagvyazinsky, (2001), Sarantsev, (2015), Slastenin, (2006), Stolyarenko, (2003), Uteeva, 1998.

An analysis of scientific research in recent decades (Dorofeev, (2016); Koshechko et al, (2018); Erdniev, (1992)) indicates that, along with the problem situations created in the lesson, enlarged problem situations organized by the method of consolidating didactic units (UDE). In our work, along with problem situations, we also use enlarged problem situations. We have already spoken about the importance, effectiveness and significance of UDE in the process of preparing future teachers of English in our article (Dorofeev, (2013)).

Results

Important tasks that contribute to an increase in the level of formation of the operational-content component are tasks for the preparation of cycles of interrelated tasks according to the UDE principle and the search for their optimal solutions. In this regard, future masters with a sufficiently high level of formation of the operational-content component can be offered a task: a point A and a pair of straight lines p and q are given on a drawing of limited dimensions, intersecting outside the drawing at an inaccessible point B. Using the Desargues theorem, construct an accessible part of a straight line AB. Consider possible generalizations of this problem and ways to solve them. The closest generalization of this problem is as follows: on the drawing of limited dimensions, two pairs of straight lines are given: p and q, intersecting at an inaccessible point A, and lines u, v, intersecting at an inaccessible point B. Construct the accessible part of the line AB. These tasks are related to each other by general requirements, but different conditions. An integrative generalization of these two problems is the following: on a drawing of limited dimensions, two pairs of straight lines are given: p and q, intersecting at an inaccessible point A and lines u, v, intersecting at an inaccessible point B; direct AB is not available. Construct the point of intersection of the inaccessible straight line AB with the accessible straight-line m.

The ability of students to solve creative problems and compose new problems on their basis not only increases the level of formation of the operational-content component, but also contributes to the development of creative activity, the formation of interest in the application of university second language knowledge to finding rational solutions to creative problems of the school type.

However, recently, among some of the future masters, there are students who have difficulty in separating the main from the secondary, in establishing connections between the main and secondary parts of the theoretical
material, in formulating a problem and finding ways to solve it, do not have the ability to conduct a sufficiently complete analysis of a specific task situation. From the students of this subgroup one can sometimes hear: "Why study something that is not used in school?" Therefore, in this group, the formation of a motivational component, focus on enhanced study of theoretical material and the development of skills in its application, it is advisable to begin with a consideration of those tasks that are contained directly in school textbooks and school textbooks on geometry. In this regard, we consider it appropriate to give such tasks to this subgroup of students, for example, using Desargues's theorem to prove that the middle perpendiculars to the sides of any triangle intersect at one point; or, using Desargues's theorem, prove that the medians of a triangle intersect at one point; or, using Desargues's theorem, prove that the heights of a triangle intersect at one point. Consider possible generalizations of these tasks and ways to solve them. One of the ways to solve these problems involves the use of the inverse Desargues theorem and consists in constructing two desarguesian three-vertices on the extended Euclidean plane, the corresponding sides of which intersect at improper points lying on an improper straight line. Let us examine in more detail the solution of the first problem. Midpoints P, Q, R of sides AB, BC, AC define a triangle with sides, respectively, parallel to the sides of this triangle. On one of the straight lines that are mid-perpendiculars to the sides of the triangle ABC, for example, the mid-perpendicular to the side AC, we arbitrarily take the point R*. Through this point, we draw a straight line parallel to the straight line AB. Let Q* denote the point of its intersection with the perpendicular to the BC side. Through this point, we draw a straight line parallel to the AC line. Let us denote by P* the point of its intersection with the perpendicular to the AB side. On the extended Euclidean plane, the triangles PQR and P*Q*R* define two desarguesian three-vertices, the respective sides of which intersect at improper points. Whence, according to the converse theorem of Desargues, the lines PP*, QQ*, RR* intersect at one point.

Related tasks can be tasks that have the same condition but different requirements. These problems include the following: A triangle ABC is given on the extended Euclidean plane. Lines AD, BE and CP pass through one point, with D BC, E AC, P AB. Prove that lines AB and DE, BC and EP, AC and PD meet at points lying on the same line.

If the previous three tasks have a common requirement, then this task in relation to the previous ones acts as an inverse. In this task, the requirement of the previous ones became a condition. The inverse problem method is a characteristic feature of the enlargement of didactic units. The essence of the "method of inverse problems" consists in the compilation of a new problem by the method of inversion, which makes it possible to extract additional information about the connections between the concepts of the original problem. When solving the inverse problem, students acquire the ability to rebuild the judgments and inferences used in solving the direct problem. The technique of composing inverse problems leads students to formulate new problems. The ability to compose and solve inverse problems can be considered as one of the fairly simple and convenient criteria for the development of creative abilities, the formation of cognitive independence. An integrative generalization of the tasks listed above is as follows: Medians CM3 and BM2, heights AH1 and BH2, median perpendiculars M1P1 and M3P3 are drawn in a non-sided triangle. Let CM3AH1 = S, AH1M3P3 = T, BH2P1M1 = P, BM2P1M1 = Q. Prove that lines TP, SB, QM3 belong to the same sheaf. The triangle is non-sided, therefore, the center of gravity of the triangle, its orthocenter and the center of the circumscribed circle are different. It can be shown that these three points are collinear. Thus, a hypothesis arises: these lines TP, SB, QM3 connect the vertices of desarguesian three-vertices on the extended Euclidean plane. It is important to single out the necessary ones in the whole variety of three-vertices defined by the elements of the ABC triangle. The methodological value of this task also lies in the fact that it contributes to the improvement of the ability to separate the main elements from the secondary ones in the drawing. Since the center of gravity of the triangle ABC, its orthocenter R and the center O of the circumscribed circle lie on one straight line, Desarguesian three-vertices must be sought among all those triangles whose sides belong to straight lines containing either the perpendiculars, or the medians, or the heights of the triangle ABC. Ultimately, we can distinguish two three-peaks BPQ and STM3, the corresponding sides of which intersect at points O, M, R, i.e. are desarguesian, so the lines SB, TP, M3Q, connecting their respective vertices, pass through one point.
The ability of students to compose cycles of interrelated tasks turns a seemingly simple task into a research task that allows optimal solutions in various ways. With the help of this assignment, students not only in-depth assimilate the second language material of the master's program, but also acquire the ability to comprehend the essence of school problems in a new way. For future English teachers, these tasks increase their interest in studying theoretical material that is not directly related to the school curriculum.

The next group of students has a certain interest in studying for a master's degree, who want to acquire the profession of a teacher of English according to their inner conviction, but who feel insecure in their knowledge, as a rule, they are bachelors or specialists who do not have a basic second language education. Many of them dreamed of becoming a teacher during their studies at school, but then some circumstances developed that did not entirely depend on them, as a result of which a person dreaming of becoming a teacher ended up within the walls of another university, possibly more prestigious. These can be people who have received the education of an economist, engineer, architect, etc., but have not found themselves in the relevant field of professional activity. They make mistakes when presenting difficult questions of theoretical material or doubt the correctness of their reasoning, although these reasoning may be correct, they confuse the main parts of the material with secondary ones, experience difficulties in organizing the search for solutions to specific problems; in predicting the result of a particular way of reasoning. However, students of this subgroup are very fond of children; they willingly go with them to theaters, cinema, and conduct additional classes in English. In the future, many of them become good teachers. For this subgroup, it is necessary to select such a complex of tasks that would focus the attention of students on the essence of the theoretical material, would contribute to the formation of confidence in their second language knowledge and skills; independence in organizing the search for solutions to emerging problems; decisiveness in applying the knowledge of higher English to solving specific problems of the school type; persistence in overcoming difficulties arising in the course of solving the problem. In our opinion, these tasks include the following:

1. Prove that if the straight lines AA', BB' CC' connecting the vertices of two triangles ABC and A'B'C' are parallel and points AB A' B', AC A' C', BC B' C' exist, then these points are collinear. If AB || A'B', BC B' C' = M, AC A' C' = N, then MN || AB. If AB || A'B', BC || B'C', then AC || A'C'.

2. Prove that if triangles ABC and DBC are intersected by three parallel lines p, q, and r = AD; such that p AB = M, p DB = P, q AC = N, q DC = Q, then the lines MN, PQ, BC belong to the same sheaf.

3. Prove that if a trapezoid ABCD is intersected by lines p and q parallel to the base AB and p AD = M, p AC = P, q BD = N, q BC = Q, then the intersection point of lines MN and PQ lies on line AB.

4. Prove that if in trapezoid ABCD point E is the midpoint of the base BC and point F is the midpoint of the base AD, and P is the intersection point of segments BF and AE and Q is the intersection point of segments ED and CF, then the segment PQ is parallel to the bases of the trapezoid.

Discussion

In the direction of the implementation of a differentiated approach to the preparation of future masters of second language education, fundamental foundations are proposed, based on the levels of formation of the operational-content, motivational and volitional components. In our study, through questioning and observation, we identified groups of students with a sufficiently high level of formation of the operational-content component, a group of students with a high level of formation of the motivational component and a low level of formation of the volitional component. A sufficiently high level of formation of the operational-content component is characterized by the fact that the students of this group have the ability to reformulate the problem of Euclidean geometry in terms of projective geometry, but have difficulty in reformulating a fact from projective geometry in terms of Euclidean geometry; know the basic concepts and facts of projective geometry, but have difficulty in applying them to solving problems of projective planimetry; know how to separate the main from the secondary. A high level of formulation of the motivational component is characterized by the fact that students of this group strive to understand and realize the basic facts of projective geometry, to learn how to apply them to solving problems of Euclidean planimetry; strive to understand what is the main thing in a given problem situation and what is secondary. As a rule, in the future, representatives of this group achieve high indicators both in terms of preparation for future professional activity and in actual activity itself. A low level of formation of the volitional component is characterized by the fact that the students of this group experience difficulties in understanding the essence of the basic concepts and basic facts of projective geometry; find it difficult to separate the main ideas of projective concepts from secondary ones; find it difficult to reformulate the problem of Euclidean geometry in terms of projective geometry and vice versa. It should be noted that in our situation we are dealing with students characterized by a high level of formation of the motivational component or a sufficiently high level of formation of the operational-content or a sufficient level of formation of volitional components. This determines the distinctive features of the implementation of a differentiated approach to the training of masters in the field of "Second language education". The developed system of geometric
exercises using the UDE method or problem situations greatly contributes to an increase in the level of second language knowledge of future masters, conditions their preparation for mastering the techniques and methods of creative activity. In the process of working on enlarged assignments according to the UDE principle, future English teachers master the methods of assessing school geometric problems from the standpoint of not only projective geometry, but also the standpoint of higher geometry in general.

**Conclusion**

The differentiated form of training future masters for pedagogical activity made it possible to reveal its prospects in terms of implementation based on taking into account the personal qualities of each student. In our situation, sometimes, we worked, relatively speaking, with a subgroup consisting of one student with a sufficient level of formation of the volitional component. The subgroup worked as part of the entire group, but in the course of working with this subgroup, we naturally took into account some of the student's personal qualities. This allowed us to reveal further prospects for the development of differentiated education, as a personality-oriented one. Recently, much has been said about the problems of the student-centered form of learning and ways of solving them in the domestic scientific literature, especially within the framework of inclusive education (Vaganova et al., (2020); Dorofeev, (2013); Klinkov et al., (2020); Yakimanskaya (2000)).

The method of problem situations, used by us in a differentiated form of training future masters, made it possible to reveal its effectiveness in the construction of enlarged problem situations on the principles and foundations of UDE. Each enlarged problematic situation is designed in such a way that it contributes to the formation of an incentive for future masters of pedagogical education to truly understand the theoretical material; determines the achievement of the goals set in this article, for example, for students with a sufficient level of formation of the volitional component of the ability to focus attention in each problem situation on its key points; to separate the main from the secondary, the whole from the part, independence and perseverance in a deeper assimilation of knowledge, abilities and skills; students with a sufficiently high level of formation of the operational and content component of the ability to find optimal ways to solve problematic situations of a creative nature, interest in applying the foundations of projective geometry, in particular Desargues' theorem, to finding optimal ways to solve creative problems of the school type, among students with a high level of formation of motivational a component of confidence in the assimilation of knowledge of projective geometry, the ability to apply this knowledge to solving problems of both projective geometry itself and school-type problems.

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