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THE METHOD OF ORGANIZATION OF SEMINARS ON THE IMPLEMENTATION OF THE INTERDISCIPLINARY RELATIONS

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Abstract. The article deals with the method of organization of seminars on the implementation of the interdisciplinary relations for preparing math teachers in higher pedagogical institutions who meet modern requirements. Finding out logical structural schemes of relations between students' cognitive activity during student years and developing independent cognitive activity habits have been shown in the three-stage schemes. Also the table on different types of interdisciplinary relations, cognitive issues about interdisciplinary relations has been given as an example so as to use generalized interdisciplinary skills.

Keywords: professional training for math teachers, interdisciplinary relations, integration of subjects, cognitive issues, cognitive interest, learning process, implementation of interdisciplinary relations in trainings

Introduction

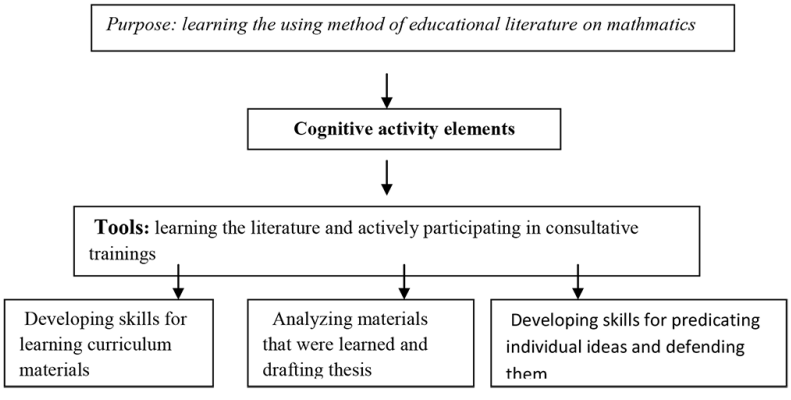
A comprehensive approach to the learning process is carried out in different ways and for different purposes. One of such approaches is trainings devoted to the interdisciplinary relations. Such trainings have a significant impact on the overall development of students: their mind becomes active, scientific outlook is broadened, knowledge about their future profession enriches, and they develop as a person.

Questions on different topics that have been come across in our work experience are handed out to students as an individual work in lectures and practical trainings on the methods of teaching math, and students enthusiastically perform the same tasks. Students willingly take plunge when it comes to the thought out tasks that will help them to become a professional specialist. This is because in this case knowledge related to the neighboring disciplines is repeated, the relation between them is determined and new results are obtained on the basis of this knowledge (Ağayev, 2006: 149).

The main objective of this work starting from the first year and implemented systematically is developing independent cognitive abilities by finding out logical structural schemes of relations between students' cognitive activity elements.

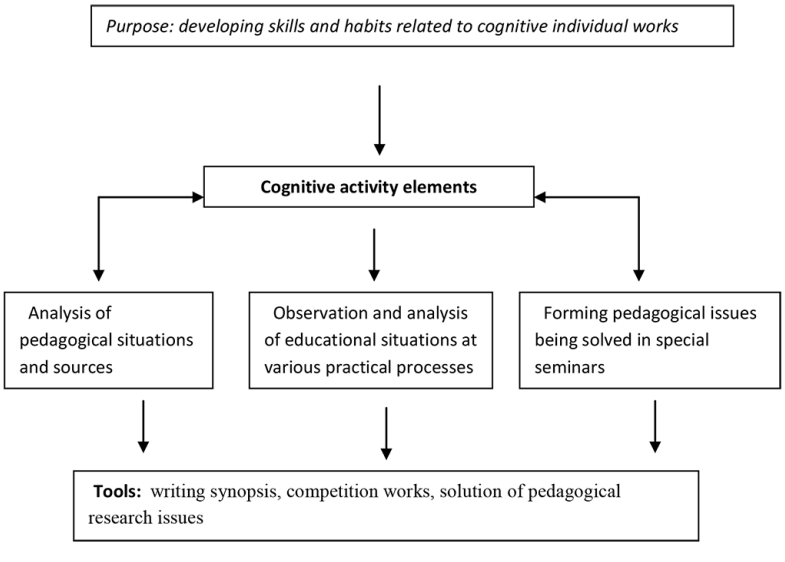
Preparation of the student is carried out according to schematic phases given in the following tables.

Logical structural schemes of relations between students' cognitive activity elements
First stage (I year)

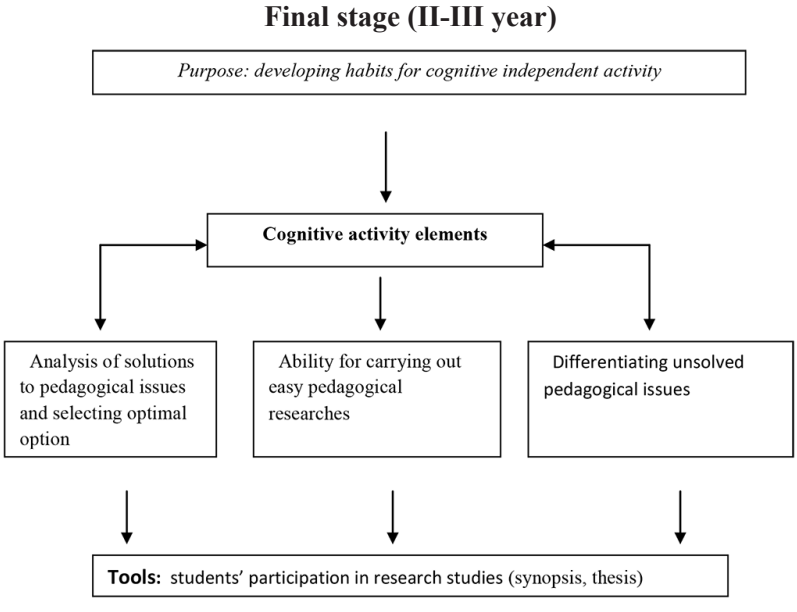


Scheme 1

Interim stage (II-III years)



Scheme 2



Scheme 3

Students get positive qualities in trainings on the implementation of interdisciplinary relations. Thus, students feel the real meaning of their profession by playing a practical game as a future teacher: learn how to use scientific and methodical literature, get an ability to choose the information that is relevant to the student's age and level of knowledge, feel proud with his scientific and methodical work and want to increase his activities in this field; learn details of classroom system. All of these activities contribute to the development of the student scientific and practical training. Information and educational material from scientific sources, which is different from methodological point of view, increases the student's cognitive interest. (Mehrabov & Abbasov, 2006: 372)

Let's classify them:

1. Understanding reality and the real world.
2. Developing practical skills and habits.
3. The formation of personality and upbringing.
4. Ensuring the overall development.
5. Increasing professional qualification.

Teachers try to increase students' cognitive abilities in the process of ensuring interdisciplinary relations in order to solve students' scientific, outlook and moral problems. For this, the teacher's motive and references should be reliable so that they can influence the student's cognitive activity.

Procedural basis, which is related to the implementation of certain transactions, is characterized by deliberately putting forward hypothesis or suggestion.

Situational basis is characterized by outside terms of the activity, and can activate different motives of a person, and can intensify procedural basis.

Collective action of students is crucial for solving the problem of interdisciplinary relations. As a result of collective effort of students coming from different scientific fields with different interests the problem is resolved more quickly. Each student contribute his "share" to the solution of the problem. Experience shows that students on the eve of the exam discuss questions on the subject and everyone explains issues that he knows well. Students learn a lot from each other. For example, each student likes different subjects, some like mathematical analysis, some algebra and number theory, others geometry, the methods of teaching mathematics. In this way the solution of interdisciplinary problem is done quickly in a collective way and is grounded. Students find out quickly where and how to apply each subject. Curriculum which includes math games, various contests is based on the implementation of the interdisciplinary relations. It is no coincidence that, while assigning individual work to students in an audience, they consult each other and "exchange" knowledge for the implementation of the task. On one hand it is not good because the teacher must determine each student's individual knowledge and skills, on the other hand this is good because the students enrich their knowledge by exchanging knowledge. (Mehrabov, 2015:288)

As long as there are students who are willing to share friendship, trust and knowledge, general scientific and methodical potential of the staff and interest will go up.

Do students prefer solving problems individually or collectively in surveys and trainings about interdisciplinary relations? Most students' answer to this question is collectively. For example, a student named Narmina K. (State Pedagogical University Faculty of Mathematics and third course, group 302) wrote: "Collective scientific activity gives an opportunity to have enough imagination about the event or object that is studied. Knowledge from different disciplines combines with each other and creates a single system: each student's moral interest is met becasue each student has at least one scientific field in which he is more interested. Everyone's independent potential is revealed."

As Maksimova V.N. said, this facts show that interdisciplinary connections has directly developmental function for the capacity of individuals develops and their self-esteem increases in the process of its implementation (Maksimova, 1998:160).

In the training process the exchange of information, consultation, learning in general, helps to increase students' cognitive activity.

As Lerner I.Y noted, increasing of cognitive interest is a tool for improve the quality of comprehend in the learning proses. Depending on the level of cognitive

interest of the student, reasoning and imaginative ability increases. The best opportunity to do so is arising problems which is cognitive in nature in trainings on the interdisciplinary relations, because such problems have both different types and solutions. Generalization of the relationship between facts and events can be carried out at different levels. Every concept can be summarized at the level of fact, theory, practical level and at the level of philosophical outlook. There is a certain type of problem on interdisciplinary relations which is relevent to these levels. The table below describes it (Lerner, 1980).

Types of interdisciplinary relations	**Cognitive problems on interdisclinary relations**	**Interdisciplinary generalized skills**
Actual relations, type relations (forming the whole picture in students about the model of the fact based on the similar facts taught in different subjects). Concept relations (the expansion and deepening of relations between concrete concepts and generalized concepts for different subjects according to phases and elements). Theoretical relations (to give students inkling about the complete theoretical system of knowledge from different disciplines).	Determination of interdisciplinary relations for the formation of new concepts, specification of learned materials, interpretation of these concepts from the viewpoint of general theory, using a fact in explaining other facts etc. Creating relations between theories of various subjects, finding their common features, establishing relations between theoretical knowledge and their understanding methods, finding practical application possibilities of theories.	Analysis, comparison, generalization of facts related to various subjects, their explanation from the perspective of scientific ideas, connecting generalized facts with the system of knowledge and being able to achieve its application etc. To determine the relationship between the concepts of different subjects, switching from specific concepts to general ones, to find type peculiarities of different subjects, to define generalized concepts, including specific concepts to general concepts, to explain general facts on the basis of common definitions, to describe interdisciplinary complex concepts etc. The ability to consider a scientific theory as a special case of a general theory, to fully coordinate structural elements of general scientific theory. To review facts, concepts, theories and laws from the perspective of laws of dialectics.

The selected problems must jibe with students' knowledge, interests and professional orientation. Of course, the implementation of interdisciplinary relations has a negative influence when it is carried out spontaneously: the student who cannot cope with the task on his own, gets mistrust in himself and

loses interest in the subject. In order to avoid these situations rules of pedagogy and methodology nust be used effectively. In order to reach the goal work must be done at certain stages:

1) in trainings on the implementation of interdisciplinary relations reproductive sessions and problematic training elements must be used;

2) in general courses as an individual work problems must be arised about interdisciplinary relations;

3) tasks about problematic issues must be assigned to students systematically in trainings about interdisciplinary relations;

4) in order to form skills about interdisciplinary relations different problems must be solved, first involving only two subjects, and then three and more;

5) work system must be created which determines trainings and their content on interdisciplinary connections or methodical system must be introduced to teachers.

Lectures and practical trainings on the implementation of interdisciplinary relations require the teacher to have broad erudition and preparation. In this case by finding out relations between fields that are connected to each other in terms of knowledge and can be applied geenral characteristics of the knowledge given to the student must be determined. (Talyzina, 1975:343)

1. Clearly expressed goal of the training on interdisciplinary relations must be set and the system of proper knowledge must be used. For example, in the course of mathematical analysis the content of the knowledge applied in “Real numbers”, “Limit”, “Functions”, “Continuity” is related to both math course in high schools and to sets (set theory), problems related to them, the expansion of the concept of numbers in “Algebra” course at universities.

In Algebra course “Vector space”, “Matrices and determinants”, “Euclidean space” sections refer and are closely connected to “Spatial vector algebra” section in Geometry.

2. High activity of students must be provided in trainings on the disciplinary relations.

To do this, you need to solve the following issues:

– Selecting problematic issues and the task that is interesting to apply;
– Preparing specific questions from related subjects;
– Determining the content of the independent work;
– Revision (through questions or comments by the teacher);
– Assigning tasks which is problematic in nature;
– Supervising over the implementation of the work and summarizing;
– Giving homework;

3. The training on the interdisciplinary relations must have a specific purpose and reveal the essence of the event, law or method that is studied. To this end, teachers must select relevant questions about related subjects and they must be goal-oriented. For example, in the course of the methods of teaching mathematics

while learning features of the teaching method of "geometric transformations" the teacher must ask questions as the following ones:

– what is geometric transformation?

– which geometric transformation is an action?

– what are the types of geometric transformation?

– what is the difference between homothecy and similarity?

– what is affine transformation?

– which transformations are taught at high schools?

– application of similar transformations in problem solutions.

As can be seen in order to prepare future math teachers in the course of math teaching alongside with pedagogical aspects revision of scientific basis of high school math, restoring forgetten knowledge and ensuring its connection with university courses must be provided.

4. Results drawn in the trainings must be concrete, but also generel in nature and must refer to the knowledge in different subjects. In the process of interpretation of materials or problem solution concrete application of the knowledge of other subjects must be shown.

5. Tranings on the interdiscplinary relations must raise interest in students for revealing connections between different subjects and applying knowledge. To this end, teachers should take the following measures:

– cognitive tasks must have a concrete application and be related to the real life;

– selected issues must be about proof or calculation;

– application of practical, laboratory and individual works assigned to students must be based on the knowledge of interdisciplinary relations;

– solution of non-standard issues must be given broad space.

6. Training on interdisciplinary relations can be for the revision of a certain section, or summarizing acquired knowledge.

To do this, you need to make certain changes in the organization of trainings. For example, trainings that provide generalized function of interdisciplinary relations can be organized for revision and discussion.

Complex issues can also be included to the individual work.

Taking into consideration the above-mentioned didactic requirements let us review the essence, structure and organization of seminar workshop.

Participation of related subject teachers in such seminars has a good impact. Such training form is an event that directs students to work indepentently, gives them a chance to get knowledge about various subjects. To organize such a training teachers review beforehand its content, questions and issues to be solved. Students are given questions to get preapared for 1-2 weeks in advance. Teachers somehow draft the plot of the seminar.

Seminar can be organzied as follows:

I. Introduction by teacher.

II. Information by students is listened.

III. Problem is discussed.

IV. Seminar wrap up. Students' knowledge is evaluated.

Topics "Solution methodology for searching given set of points" and "Solution methodology for finding maximum and minimum values in geometric problems" from mathematics teaching method can be used as an assignment. For preparing these two topics students must revise "basic theories of differential association and their application" from math analysis course, "definition of geometric figures with a set of points" and "method of geometric places and its application" from elementary geometry course. They must also learn some parts of "geometry teaching methods" from mathematics teaching method. The following plan can be used for the first topic:

1. Geometric problems and their structure.
2. Types of geometric problems according to the solution.
3. Planimetrics problems about given set of points (geometric places) or problems-theories.
4. Problems-theories about set of points given in Solid geometry.
5. Preparation of illustration of figures and relevent models in the solution of problems about given set of points.
6. To draft a broad plan of a lesson.
7. Literature

The following plan can be used for the second topic of the seminar:

1. Features of the increasing and decreasing intervals of the function. Maximum and minimum.
2. A necessary condition for extreme values. Finding maximum and minimum values.
3. Relation between finding maximum and minimum values with the optimal solution method.
4. Features of geometric problems on finding maximum and minimum values.
5. Problems in algebra course at high schools about finding maximum and minimum values and their solution methods.
6. Literature

Two students can be assigned with the task " Division with remainder and its application" by working together for an individual work on the basis of the theory of numbers and calculation materials at high school:

1. Division. Its features.
2. Theory on division with remainder.

Requirements for the allocation of sets into subsets that do not intersect with each other. Classification of natural numbers according to the number of its divisors.

3. Notion of comparison. Classification of integers according to the given module. The principle of making up the calendar.

4. Literature

The most important factor for the implementation of interdisciplinary relations is the logical connection between educational material and the student's cognitive activity in the system of trainings about different subjects. On this basis, to organize the training process, we consider it necessary to take into account the following:

– to use a combination of interdisciplinary relations and problematic approach so as to form searching cognitive ability, that is forming complex skills by gradually increasing the volume and the content of interdisciplinary relations, and problematic trainings;

– a systematic approach to the problem and interdisciplinary relations in learning process;

– solving together methodology problems of various subject teachers concerning interdisciplinary relations.

Because the teaching process is connected to the exact functional structural relations, a change in one of them brings about a change in other relations.

Interdisciplinary relations influence the form of the curriculum and teaching methods.

In order to provide vocational training of future teachers at the high level and to use interdisciplinary relations in the curriculum in the faculty of mathematics of higher educational institutions collective work of teachers at departments (teachers that teach different subjects) and establishing relationship between them must be taken seriously.

REFERENCES

Ağayev, A.A. (2006). *Training process: tradition and modernity*. Baku. Adiloqlu.

Mehrabov, A.O. (2015). *Modern problems of education in Azerbaijan*. Baku: Science and Education.

Mehrabov, A.O. & Abbasov, A.M. (2006). *Pedagogical technologies*. Baku: Mutarcim.

Karimov, Y.S. (2009). *Pedagogical research methods*. Baku, Azernesr.

Reform program on the education system of the Republic of Azerbaijan. Baku, 1999, "Chashioglu".

Talyzina, N.F. (1975). *Upravleniye protsessom usvoyeniya znaniy*. Moskva: Izd. MGU [Талызина, Н.Ф. (1975). *Управление процессом усвоения знаний*. Москва: Изд. МГУ].

Maksimova, V.N. (1998). *Mezhpredmetnyye svyazi v obucheniya*. Moskva: "Prosveshcheniye" [Максимова, В.Н. (1998). *Межпредметные связи в обучения.* Москва: „Просвещение"]

Fedogovoyq V.N. M. (1980). *Mezhpredmetnaye svyazi estestvenno-matematicheskih distsiplin* / Pod. red. "Prosveshtenie". [Федоговой, В.Н.

M. (1980): *Межпредметные связи естественно-математических дисциплин /* Под. ред. „Просвещение“].
Lerner, I.Ya. (1980). *Protsess obucheniya i yego zakonomernosti.* Moskva: “Znaniye”. [Лернер, И.Я. (1980). *Процесс обучения и его закономерности.* Москва: „Знание“].

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