Journal of Academic Research and Trends in Educational Sciences
Journal home page:
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FORMS AND METHODS OF INDEPENDENT STUDY IN INORGANIC CHEMISTRY

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KEYWORDS

inorganic chemistry, method, independent work, technology, teaching

ABSTRACT

In this article, forms and methods of independent study of inorganic chemistry are studied. The article examines the opinions of scientists and analyzes the optimal methodical set.

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DOI: **10.5281/zenodo.10729782**

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iJOURNAL Journal of Academic Research and Trends in Educational Sciences (JARTES)
VOLUME 3, ISSUE 1 / ISSN 2181-2675

NOORGANIK KIMYO FANIDAN MUSTAQIL TADQIQOTLAR SHAKLLARI VA METODLARI

KALIT SO‘ZLAR/
КЛЮЧЕВЫЕ СЛОВА:

noorganik kimyo, metod, mustaqil ish, texnologiya, o`qitish

ANNOTATSIYA/ АННОТАЦИЯ

Ushbu maqolada noorganik kimyoni mustaqil o'rganish shakllari va usullari ko'rib chiqiladi. Maqolada olimlarning fikrlari muhokama qilinadi va optimal uslubiy kompleks tahlil qilinadi.

INTRODUCTION

The current modernization of the vocational education system requires the activation and intensification of the educational process - the creation of a number of didactic conditions leading to intensive assimilation of the concepts, laws and theories of chemistry with the active participation of individuals. Forms of educational organization play an important role in creating such didactic conditions. Through the form of organization, “the main pedagogical impact on students is carried out, their involvement in educational activities is achieved, and a pedagogical result is achieved” [4]. In pedagogy, there are different definitions of the concept “form of educational organization”. We understand the form of organization of training according to the definition of M. I. Makhmutov - as any type of lesson [5].

MATERIALS AND METHODS

In the process of its development, the forms of organization of chemistry teaching went through five stages.

The first stage - the stage of formation and development of the lecture as the main form of organization of education in higher education - lasted until the beginning of the 19th century. The stage was accompanied by the definition of requirements for the lecturer, for visual aids, for a demonstration experiment, the beginning of lecturing in Russian and the requirement of scientific character for the material presented.

The second stage - the formation of laboratory and practical classes - is associated primarily with the formation in Russia in the second half of the 19th century of a number of industrial schools (prototypes of modern chemical-technological universities), in which, due to the specialization of students, classes in chemical laboratories come to the fore. Practical classes and practice at workplaces of enterprises were aimed at providing skills for practical work in production; they were supposed to help increase interest in theoretical knowledge and a conscious attitude towards learning. The stage is characterized by a detailed development of laboratory and practical classes on the topics of the course, highlighting the study of the properties, methods of obtaining and processing industrially important compounds.

The third stage—the stage of revising the role of forms of organization of chemistry teaching in the educational process—is associated with the reform of higher education in the 20s and lasted until the 50s of the 20th century. The stage was accompanied by an increase in the importance of laboratory practical classes, the emergence of new types of practices (including continuous ones) and was a reflection of the complex method and project method in higher education. During this period, lectures are canceled in many educational institutions. In a fairly short time, the negative role of continuous practice (which was often replaced by the implementation of the industrial and financial plan of enterprises) and the cancellation of lectures is realized.

At the end of the period, lectures "return" to universities, and elements of seminar classes are introduced. During this period, the main forms of organizing chemistry teaching are determined: lectures, seminars, laboratory and practical classes.

The fourth period—the introduction of basic university forms of organizing chemistry teaching at school—lasted until the mid-70s of the 20th century. During the period under study, seminars and lectures were introduced at the school. Laboratory and practical exercises in the study of chemistry at school by this time are well developed. The system of independent work on individual topics of the course is also studied.

The fifth stage - consideration of forms of organization of learning from the standpoint of pedagogical developments - is due to the development of the activity approach, the theory of the gradual formation of mental actions, problem-based learning, pedagogical technologies, and a systematic approach. Forms of organization of training are considered as a system; systems of lectures, seminars and laboratory classes are developed.

RESULTS AND DISCUSSION

The current situation requires consideration of all forms of organization of chemistry teaching through the prism of students' independent work in its triune function. In this situation, the need objectively arises:

— development of extracurricular independent work for students - a system of tasks and organized activities of students (oriented towards the professional activity of a specialist - a graduate of a chemical engineering university), aimed at the formation of concepts, laws and patterns of chemistry;

— analysis of existing forms of organization of chemistry teaching;

— correction of forms of organization of teaching chemistry based on the relationship of lectures, practical classes and laboratory classes with independent work of students (independent student activities organized by the teacher in the process of lectures, practical and laboratory classes).

The methodology of teaching chemistry has accumulated considerable experience in organizing independent work [4], which primarily affects the level of school chemical education.

The greatest interest when designing independent work in the process of studying chemistry at a university is the work of R. G. Ivanova [6]. The author believes that when

teaching chemistry, there should be a gradual complication of the forms of students' work, determined by the logic of the formation of knowledge and skills: copying work - partial search - research [7].

Analysis of the proposed scheme shows that there is no fundamental difference between classroom and extracurricular independent work from the point of view of the student's activities.

Next, we identified generalized types of actions in the process of students' independent work in lectures, practical and laboratory classes (Table 1).

Table 1

Generalized types of actions of students in the process of independent work

Lecture	Practical exercises (seminars and workshops on problem solving)	Laboratory exercises
1. Awareness of the problem discussed in the lecture 2. Analysis and structuring of the lecture material (highlighting essential connections) 3. Recording lecture notes	Seminars 1. Reading educational (scientific) new) text 2. Text analysis (highlighted essential connections) 3. Making a response plan 4. Making a summary of the speech	1. Reading guidelines 2. Task analysis 3. Drawing up a work plan 4. Execution of work according to the drawn up plan 5. Analysis of the results obtained
Lecture	Practical exercises (seminars and workshops on problem solving)	Laboratory exercises
	5. The actual presentation Workshop on problem solving Reading the problem conditions and writing the initial data Analysis of the problem and drawing up a scheme for solving the problem	6. Interpretation of the results obtained - writing down equations of chemical reactions, drawing up diagrams, drawing graphs 7. Conclusion of the work - generalization of the results obtained

	Solving the problem according to the drawn up diagram	

Long-term practice shows that in the process of performing these types of actions, students have difficulties already at the second point according to the presented gradation. Consequently, the organization of independent work as an independent activity of students should be aimed at resolving the contradiction between the need for independent work (professionally oriented independent activity of students) and the inability to carry out independent educational activities to master the concepts, laws and laws of chemistry.

Analysis of lecture material, scientific text, and laboratory assignments for a student causes significant difficulties for the student. They arise as a result of a violation of the principle of continuity between school and university general chemical training: a sharp difference in the content of education, in its structure, in the level of theoretical generalization, in the density of information that must be learned, in the degree of "scientific" level of teaching, in the volume the material being studied, in the forms of organization of training (still the main form of organization in school is the lesson), in the different levels of training and qualifications of teachers and university professors [7].

In psychology, analysis is classified as one of the main mental operations, the structure of which must be purposefully taught [8]. For a specialist - a graduate of a chemical engineering university, analysis is the basis of professional activity (chemical production - for a process engineer and equipment and his working conditions for a mechanical engineer) [7].

Resolving difficulties in the field of analysis is associated with the formation of both new knowledge of general and inorganic chemistry, and new methods of action. We consider this process on the basis of developments in problem-based learning [7], which are based on the emergence and resolution of problem situations and the gradual complication of the forms of students' work. The formulation of educational problems—problem situations—is carried out on the basis of an analysis of a chemical phenomenon.

In each discipline studied, there are two groups of problems: aspectual, or cross-cutting, i.e. those that are solved in connection with almost any phenomenon, and specific, specific to a given area of scientific knowledge [9]. The specificity of chemical knowledge consists of the features of a chemical phenomenon, which are considered on the basis of interrelated concepts of chemistry, characterizing the two main objects of chemistry - substance and chemical process - with the involvement of facts, concepts, laws and laws of chemistry, taking into account the features of the atomic, molecular and macroorganization of matter.

CONCLUSION

In connection with the previously noted, the following requirements for laboratory classes are highlighted:

1) the nature of the research is problematic;

2) the regulated orientation is given;

3) relevant scientific and reference literature is provided. Problem situations in a laboratory workshop with regulatory

Bathroom orientation in general and inorganic chemistry is aimed at explaining the observed phenomenon, at identifying general patterns and is described by the following general scheme of the student's activity:

— reading the task;

— task analysis with regulated orientation;

— execution of a task according to a given scheme;

—verification) of known patterns;

— recording equations of chemical reactions;

— formulation of a conclusion based on the completed task, including consideration of this phenomenon as a particular part of the general laws and regularities of chemistry.

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