Organization of Extracurricular Activities in Chemistry: Problems and Solutions

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Abstract

The article deals with the modernization of education, new approaches to teaching chemistry, the organization of extracurricular work during the study of chemistry, research results, problems and solutions, the relationship and success of the university and the school, the student and the student, digital skills and individual proposals in this regard. The impact of extracurricular work on the research abilities of students and their competences, which are planned to be formed and developed in them, is considered. The relationship between the influence of students' participation in extracurricular activities on their academic performance is investigated. The integration of STEAM and 3D technologies in extracurricular activities and the most common forms of teaching chemistry - lessons, optional exercises, and other extracurricular activities - are considered.

Charts for measuring competences and interest in physiologically active substances are given. The article also presents the product obtained as a result of an extracurricular exercise related to the integration of chemistry with 3D technologies at M. Rahim secondary school No. 7 of the Sabail district of Baku during the presentation of the Azerbaijani flag. Examples of the important role of extracurricular work in the formation of students' educational knowledge and skills are shown. For example, students at the Pedagogical University completed the "Mysterious Paint" project during practice with students of the 6th grade of secondary school No. 7. 2 main areas of application of extracurricular activities of researchers in the modern academic sphere are discussed: academic perspectives and development perspectives.

Keywords: extracurricular activities, research, digital technologies, competences, project, academic prospects, development prospects

Організація позакласної роботи з хімії: проблеми та рішення

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Анотація

У статті йдеться про модернізацію освіти, нові підходи до викладання хімії, організацію позакласної роботи під час навчання хімії, результати досліджень, проблеми та шляхи вирішення, стосунки та успіхи університету та школи, студента та учня, цифрові навички та окремі пропозиції щодо цього. Розглядається вплив позакласної роботи на дослідницькі здібності студентів, та їх компетентності, які в них планується формувати та розвивати. Досліджується взаємозв'язок між впливом участі студентів у позакласній діяльності на їхню успішність. Розглянуто інтеграцію STEAM та 3D-технологій у позакласній діяльності та найпоширеніші форми навчання хімії – уроки, факультативні вправи та інші позакласні заходи.

Наведено діаграми вимірювання компетентностей та інтересу до фізіологічно активних речовин. Також у статті представлено продукт, отриманий в результаті виконання позакласної вправи, пов'язаної з інтеграцією хімії з 3D-технологіями в середній школі № 7 імені М. Рахіма Сабаїльського району м. Баку при презентації азербайджанського прапора. Показано приклади важливої ролі позакласної роботи у формуванні навчальних знань та навичок учнів. Наприклад, студенти педагогічного університету під час практики з учнями 6 класу ЗОШ No7 виконали проект «Загадкова фарба». Обговорено 2 основні напрями застосування позакласної діяльності дослідників у сучасній академічній сфері: академічні перспективи та перспективи розвитку.

Ключові слова: позакласна діяльність, дослідження, цифрові технології, компетентності, проект, академічний перспективи, перспективи розвитку

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Introduction.

In a modern school where education is modernized and digital technologies are widespread, the organization of students' extracurricular activities plays an important role. These measures strongly influence students' research skills, academic performance, social and emotional level. Extracurricular activities include facultative activities, clubs, unities, quizzes, music, athletics, publications, student administration, fine arts, academics, internet clubs, service organizations, and special interest areas. It is known that lately the extracurricular activities of students are mostly focused on tutors and the formation of their ICT-digital skills (State standards, 2020). Especially during the pandemic, the process of transition to distance learning has created a demand for digital skills. Therefore, the study of the relationship between students' participation in extracurricular activities and their impact on academic performance is focused, especially in the teaching of chemistry, this problem is more prominent. In modern secondary schools, 3 most common forms of chemistry teaching are used: lecture, facultative exercises and other extracurricular activities.

The lesson is an in-class process, and the teacher's goal here is to teach topics and implement standards according to a single program. However, extracurricular activities have organizational and managerial advantages compared to other fields. Optional activities are carried out in accordance with the interests and individual abilities of students, but they are also scheduled and organized on a voluntary basis, consisting of regular students. In the teaching of chemistry, the organization and conduct of facultative exercises, the application of chemical concepts, terms and laws is a consistent process of significant importance in the formation of a scientific outlook, assimilation and strengthening of knowledge on chemistry, and the integration of scientific theories with practice and experiment (Aliyev, & Azizov, 2006), in order to improve the teaching process in chemistry with experimental and practical value, proper organization of facultative exercises is one of the integral attributes of modern teaching in chemistry. At present, in all secondary schools of our country, extensive measures are being taken in the sphere of education in order to establish modern chemistry extracurricular activities, especially elective courses, at the level of the requirements of the time.

Recently, the emergence of the new COVID-19 virus, which occurred all over the world, demanded a new approach to chemistry under the current conditions, and revealed that the role of extracurricular activities in solving these problems is an urgent issue. In the ever-changing world, people's increasing consumption of household, food, clothing, cosmetics, perfumes, medicines, pharmaceuticals, technical, and other abundant scope of chemicals produced to meet their many needs arouses a special interest in the study of chemistry in students, and by encouraging the active participation of students in the processes of organizing and conducting chemical experiments included in the school program, they show interest in chemistry and realize their desire to become experts in this field. It enables them to make important decisions in this direction, and it is also considered a fundamental guarantee of the formation of the future generation of chemists in the formation of the scientific views and interests of the young generation.

Thanks to the teaching of chemistry, students get information about medicinal substances and aromatic substances that they often encounter in everyday life. However, the learning process alone cannot answer all questions. It is in extra-curricular activities, facultative exercises, chemistry nights, and clubs that they are motivated to get more detailed and extensive information about these substances and join the discussions with more enthusiasm and interest. In the future, in order to obtain detailed information in this field, they turn to various literatures, internet information and find interesting information, conduct research in virtual laboratories and acquire digital skills at the same time. This leads to the formation of research skills in students, the realization of the principle "from knowledge to life, from life to knowledge".

Experiments show that providing the necessary knowledge in the form of skills during the course of facultative training increases students' interest in chemistry. Let's focus on an example.

1. In what form can food supplements be present in the body? (Plant extracts, proteins, amino acids, various minerals, vitamins, etc.)

2. What types of effects do food supplements have on the body? (Pharmacological, immunological, metabolic.)

3. "Ensure food waste management" - how do you do it? (Putting bags, sorting, hanging posters)

4. What innovative project proposal can be made regarding food safety? (Healthy food - My magical food)

In this direction, it would be appropriate to present the result through the following diagram. As can be seen from the diagram, the demand for imparting competency-based knowledge to students is more dominant. Academic and memory-oriented knowledge reflects the demand of students as only 4-5%. (Diagram 1).

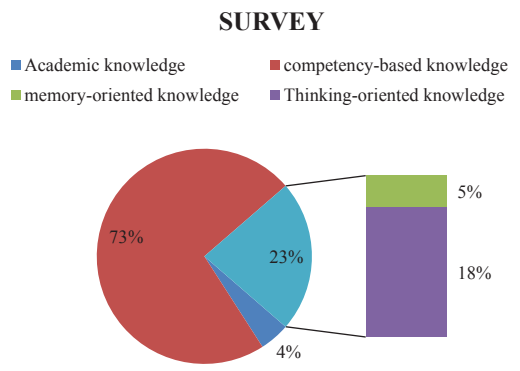

Diagram 1. Competence measuring Chart

Chemistry night is also an important element of extracurricular activities. By using the "Talk-show" method, teachers have achieved more effective results. The discussion was held in 2 groups. The groups prepared answers to the following questions:

Group I. Do we need perfume?

Group II. Are food supplements important for humans?

Then the experts continued the discussion and reached a common opinion: Man needs food supplements more than perfume. 20 people participated in the discussion. 12 people mentioned the importance of food additives and 8 people mentioned the importance of fragrance. (Diagram 2).

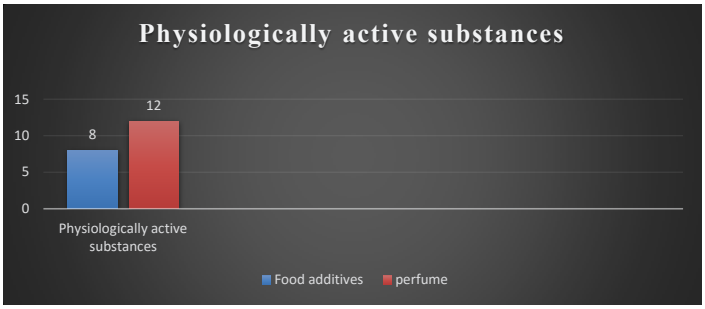

Diagram 2. Reflection of interest in physiologically active substances

As can be seen from the diagram, the demand for imparting competency-based knowledge to students is more dominant. Academic and memory-oriented knowledge reflects the demand of students as only 4-5%. A chemistry night to develop skills is also an important element of extracurricular activities, and teachers have achieved more effective results using the Talk Show. The discussion was held in 2 groups. The groups prepared answers to the following questions: Group I - Do we need perfume? and group II- Are food supplements important for humans? Then the experts continued the discussion and reached a common opinion: Man needs food supplements more than perfume. 20 people participated in the discussion. 12 people mentioned the importance of food additives, 8 people mentioned the importance of perfume.

Although the results are positive in the direction of students' functional literacy, it is undeniable that the need for extracurricular activities is mainly related to tutoring. It is well known that most students involved in extracurricular activities benefit from tutoring and succeed, and extracurricular activities have many benefits for students, such as higher standardized test scores and higher grades, academic success, more regular school attendance, and higher self-esteem. However, the tendency to tutoring only leads to an increase in the level of academic knowledge in students, and other skills - social and emotional level - are neglected, the research process that forms skills such as discovery and contribution is limited (Aliyev, & Azizov, 2006, p.293) , causes them to complain that their communication with the family is not normal, that their work skills decrease, and that they do not have problem-solving and decision-making skills. Therefore, it is undeniable that students acquire these skills through more extracurricular activities and are guided to discoveries through research. It is through joint work, corporate teamwork and research activities that it becomes possible to develop skills such as teamwork and leadership, the most global problem of the time, negative and harmful habits - alcohol and drug use and related problem behaviors - decreases, increases the tendency to build more careers, respect for one's own personality is formed. Let's admit that in recent years, too many extracurricular activities in schools and the participation of the most successful students in these activities have been taken into account with their benefits as well as their side effects.

Sometimes the same class, the same student is involved in more activities, very active students get tired, get traumatized, are subjected to the pressure of others - bullying, are oppressed, need rest and recovery. Here the parental reaction also has an effect. The main reason is due to fees and time loss. Complaints and problems grow when some parents are unable to support their children due to economic difficulties. Today, although there is no tuition fee in general education schools in Azerbaijan, it is not a secret that extracurricular activities and tutoring require funding, and some families cannot afford it economically. Cooperative action research methodologies are characterized by periods of planning, action, observation, and review by those directly involved in implementing change. It is clear that cooperative work is both more ethical and has greater effectiveness and wider value in our shared research environment. (Brewster et al, 2023).

An out-of-class exercise related to the integration of chemistry with 3D technologies was carried out at secondary school No. 7 named after M. Rahim, in Sabail district, Baku, and the resulting product - the Azerbaijani flag - was presented for the opening of the school's Shusha corridor. A QR code is placed on the product in order to learn the technology of making the flag.

Photo.

Large-scale 3D printing using 3D technologies (ie, photocuring) has traditionally been dominated by engineering disciplines (Dowon et al, 2020). Curiosity is a feeling of an individual's attention to an object, event or process. The concept of curiosity has been linked to other concepts such as interest, attraction and surprise. Some psychologists describe interest as an attitude or certain tendency to pay selective or particular attention to something. Studying promotes comprehension and retention because it forces people to process any text more deeply. Curiosity also involves good metacognitive strategies (Silvia, 2007).

Although summer schools have been included in recent years as a partial solution to the problem, this does not meet the full demand, gaps continue and the direction of equal opportunities in the organization of training remains incomplete. There is a need to re-address these issues, to offer a holistic program to help students develop extracurricular activities such as team building, corporate culture skills, participation in healthy after-school opportunities to develop social-emotional skills and leadership, and to overcome financial barriers. This requirement indicates the need for relevant groups to consider working together. In the modern academic sphere, researchers consider 2 directions of application of extracurricular activities. (Figure 1).

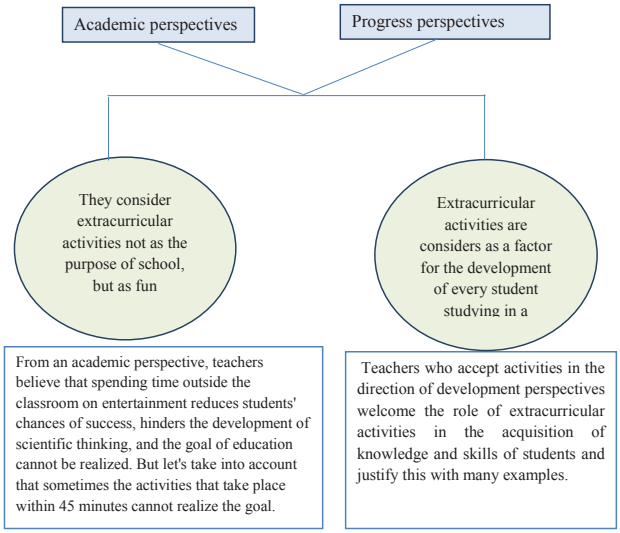

Figure 1. Application of extracurricular activities

In both directions, the main problems are related, at least in part, to the financing of the organization of extracurricular activities, and this problem involves the examination of financial possibilities by the relevant groups. Today, even in the developed countries of the world, there are difficulties in financing, and in the case of economic crisis, the expenditure on education is also in jeopardy. However, taking into account the role of extracurricular activities in the formation of students' personalities, supporting ways are also offered:

• Support groups: The supportive environment of the school - teachers, Stakeholders - municipalities, executive offices, Parents - guardians, guardians, NGOs - grants, gifts, donations

• Preparation of the School Development Plan

Conclusions and recommendations.

Currently, such a plan has been developed and put into use as a pilot in some schools of the republic. Analyzing this plan, the study provides the following recommendations:

• Voluntary participation in extracurricular activities
• Lack of evaluation
• Uncovering talents
• Preparation of startup projects: idea formation, planning, experimenting
• Involvement in voluntary activities
• Preparing a business plan
• Analysis of results
• Certification

Many examples of the important role of extracurricular activities in the formation of students' academic knowledge and skills can be drawn from chemistry. During the internship, the students of ADPU carried out the "Mysterious paint" project by conducting experiments together with the 6th grade students of school No. 7, taking the 3rd place and obtaining a certificate. This will lead to their continued research and contribution to education in the future.

Conducting associations is also considered useful by using different types of tasks that ensure the independence of students. At this time, it is possible to achieve the formation of research skills in students by applying interesting methods (Aliyev, & Azizov, 2006, p.293)

1) Preparation of reports;
2) To carry out practical work of a research nature;
3) Spending chemistry evenings;
4) Quizzes;
5) Organizing Olympics, etc.

Among the research activities outside the classroom, the involvement of students in virtual laboratories in accordance with the requirements of the modern era is also among the successful results. Extracurricular work can be imagined as a whole system consisting of individual components. Both in the teaching of chemistry and in extracurricular activities, the content is determined and freely chosen, so its subject matter is varied. Nevertheless, the following strict requirements are imposed on the content of extracurricular activities in chemistry:

Academicity - scientificity. Adhering to the principle of scientificity in the implementation of extracurricular activities also creates conditions for the systematization of the knowledge acquired by students in the classroom, and for increasing research activities.

Compatibility - expediency. Actuality, practical importance. Topics discussed in the implementation of extracurricular activities should be devoted to actual, practical, life-related issues of chemistry.

Entertainment. In addition to strict requirements for the content of extracurricular activities, it is also

important that the proposed problems are fun, interesting, and motivating for students (Mammadova, Bayramova, Mehdiyeva, & Shadlinskaya, 2015).

The number of these principles can be theoretically and practically increased according to the goal we set.

* principle of consciousness and activity
* principle of visuality
* principle of systematicity and consistency
* principle of strengthening knowledge
* principle of connecting theory with practice
* principle of individual approach-differentiation
* principle of connecting training with life and constructive work
* principle of optimality
* principle of creating suitable conditions and design
* principle of education, education, development

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