PLANTA+

НАУКА, ПРАКТИКА ТА ОСВІТА

SCIENCE, PRACTICE AND EDUCATION

28–29 січня 2025 р.
м. Київ, Україна

January 28–29, 2025
Kyiv, Ukraine

Том 2
Volume 2

2025

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
НАЦІОНАЛЬНА АКАДЕМІЯ НАУК УКРАЇНИ
НАЦІОНАЛЬНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ ІМЕНІ О.О. БОГОМОЛЬЦЯ
ІНСТИТУТ БОТАНІКИ ІМ. М.Г. ХОЛОДНОГО НАН УКРАЇНИ
НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

«PLANTA+. НАУКА, ПРАКТИКА ТА ОСВІТА»

Матеріали
V Науково-практичної конференції з міжнародною участю, присвяченої пам'яті доктора хімічних наук, професорки Ніни Павлівни Максютіної (до 100-річчя від дня народження)

Том 2

28-29 січня 2025 року
м. Київ

Оптимізація навчального процесу у закладах освіти фармацевтичного, медичного та біологічного профілю у зв'язку з впровадженням дистанційної, змішаної, дуальної форми навчання та воєнним станом

Optimization of the educational process in educational institutions for pharmacy, medicine, and biology with focus on distance, hybrid, dual learning and martial law

OPTIMIZATION OF THE EDUCATIONAL PROCESS IN CONNECTION WITH THE EXPANSION OF DISTANCE AND BLENDED FORMS OF LEARNING ON THE EXAMPLE OF TEACHING CHEMISTRY AND BIOLOGY IN THE PRIVATE INSTITUTION OF GENERAL SECONDARY EDUCATION "KYIV LYCEUM "DEMOCRATIC SCHOOL "ALTERRA SCHOOL"

Momotova O.[1], Kustovska A.[1,2], Paientko V.[1,3]

[1]Private institution of general secondary education "Kyiv lyceum "Democratic school "Alterra school"

[2]Dragomanov Ukrainian State University, Kyiv, Ukraine

[3]Chuiko Institute of Surface Chemistry, NAS of Ukraine, Kyiv, Ukraine

Key words: home experiments, laboratory research, accessibility of education, personalized consultations, "Alterra School", research activities modern teaching methods.

Introduction. Ensuring effective teaching of chemistry and biology in the face of modern challenges is a task that requires innovative approaches and the use of modern tools. The online school "Alterra" offers the integration of online, offline and home learning formats with an emphasis on the practical component. Thanks to virtual laboratories, personalized consultations and the availability of experiments, even in a distance format, the school creates an environment for high-quality mastery of natural sciences. In traditional schools, a number of experiments can also be implemented, but most often their implementation is limited by a lack of resources or technical capabilities.

In traditional schools, a number of experiments can also be implemented, but most often their implementation is limited by a lack of resources or technical capabilities“. Alterra School” makes them accessible to everyone, regardless of location. This opens up new horizons for students to learn science and stimulates interest in studying it.

Conducting experiments in chemistry and biology: online and offline

Online school "Alterra School"

Online experiments

1. Virtual laboratories:

Using platforms such as Labster and BioDigital Human allows you to conduct complex experiments without physical equipment:

- Modeling the synthesis of simple compounds or decomposition processes.
- Studying human anatomy, modeling physiological processes.
- Analyzing ecosystems, modeling food chains or the influence of environmental factors.

2. Home experiments:

Students perform accessible practical tasks:

o Biology: growing plants in different conditions (lighting, humidity), studying the action of enzymes, for example, amylase (using a starch solution).

o Chemistry: analysis of pH of solutions using indicators (vinegar, soda, cabbage), study of chemical reactions between available substances.

3. Video lessons:

The teacher demonstrates experiments in real time, allowing students to observe details or repeat the tasks at home.

Offline experiments

1. Laboratory research:

Studies in small groups using laboratory equipment, for example:

o Study of plant tissues under a microscope.

o Conducting chromatography to separate food dyes.

o Analysis of the acidity of various solutions in laboratory conditions.

2. Features of "Alterra Schools":

A flexible schedule of classes allows you to adapt laboratory practice to the capabilities of students, providing an individual approach.

Traditional schools

1. Experiments in traditional schools:

o Laboratory classes are also conducted, but are often limited to basic research due to:

a)Lack of modern equipment, in particular microscopes or chemical reagents.

b) Lack of interactive platforms for virtual simulations.

o Home experiments are mostly not practiced due to the lack of methodological recommendations or support.

2. Opportunities:

Some traditional schools with proper funding and resources can implement the same research as in "Alterra Schools". However, most schools do not have access to virtual laboratories or a modern approach to organizing learning.

Advantages of "Alterra Schools"

1. Integration of formats:

Combination of online and offline classes with the ability to perform experiments at home.

2. Individual approach:

The "Prosto" learning center and consultations allow students to receive support on specific topics or experiments.

3. Accessibility:

Thanks to virtual laboratories, the experimental component is accessible even to students from remote regions or those outside the country.

4. Implementation of experiments:

Research is carried out at "Alterra Schools" such as:

o Chromatography: Separation of pigments and dyes.

o Distillation: Obtaining citrus oils.

o Microscopy: Studying plant cells and tissues.

o Enzymatic studies: Analysis of the action of amylase on starch.

o Environmental studies: Analysis of soil or water.

Integrated (Chemistry + Biology):

Investigating Tooth Enamel Degradation:

Using an egg as a model of tooth enamel to study the effects of different drinks or acids on its structure. This allows students to understand how certain foods or liquids can affect teeth, which is an important aspect of oral hygiene.

Fermenting Milk:

The conversion of milk into yogurt using bacteria. Investigating this process allows students to become familiar with the biological processes of fermentation and learn how microorganisms can change the composition of products and how this is used in the food industry.

Testing Antibacterial Properties:

Investigating the effects of garlic or honey on bacterial growth. This experiment allows students to study the natural antibacterial properties of some plant products and understand their importance for human health, as well as to study how biologically active substances can be used to fight infections.

Investigating Photosynthesis:

Using algae or plants to observe the process of photosynthesis. This can be done by measuring oxygen production, which gives students an idea of how plants use sunlight to create energy and how this process is important to the ecosystem.

Studying Acid-Base Balance in the Body:

Using an indicator solution to determine the pH level of various body fluids (saliva, urine). This allows students to understand how the body maintains a stable pH balance for normal functioning and how effective the role of acid-base balance is.

Studying Plant Respiration:

Using indicators to study the changes in carbon dioxide concentration during plant respiration. This experiment helps to show the importance of respiration to living organisms and the relationship between photosynthesis and respiration.

Studying Osmosis:

Using semi-permeable membranes to observe the movement of water through cells under conditions of different concentrations of solutions. This gives students an understanding of how cells regulate metabolism and water, which is an important aspect of biology.

Investigating the Effect of Salt:

Concentration on Osmotic Pressure: Using plant or vegetable cells to demonstrate how different salt concentrations affect osmotic pressure, students can gain a better understanding of the principles that govern water balance in living organisms.

Conclusions

The online school "Alterra School" offers a flexible and affordable approach to teaching chemistry and biology, combining innovative technologies and classical methods. Although traditional schools can also implement similar practices, most of them are limited to the offline format due to insufficient resources and technical base. At "Alterra School", students have the opportunity to conduct experiments in various formats: virtually, offline, or at home, which ensures better assimilation of knowledge and development of practical skills.

PLANTA+

НАУКА, ПРАКТИКА ТА ОСВІТА

SCIENCE, PRACTICE AND EDUCATION