

PEDAGOGY AND EDUCATION

Beyond traditional education: the use of video and online resources in studying physicochemical and medical chemistry among medical students enrolled in higher education

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The importance of acquiring knowledge through the latest online tools, simulations, and videos has been evident, especially during the past decade. Nowadays, more and more educational institutions, from schools to research institutes, are using modern tools and platforms. This can't be considered a replacement for traditional methods, but rather as a tool for improvement of the educational process.

Medical education is a fast-growing industry that requires the latest technologies. It is challenging to get medical education without the opportunity to observe certain chemical and biological processes, so the task of higher education institutions is to provide students with interesting practical laboratory research even when it seems impossible.

Traditional teaching methods are based on the information

PEDAGOGY AND EDUCATION

and explanatory activities of the teacher, such as storytelling, demonstrations, and lectures, as well as on the reproductive activities of higher education students. In this approach, knowledge is transmitted in a structured, "constructed" form, which contributes to the development of predominantly associative memory in students, whether it's secondary or higher education. This way of learning is focused on memorizing information and reproducing existing knowledge.

However, according to psychologists, there are procedural features of creative activity that cannot be learned through the simple transfer of ready-to-use knowledge or demonstrations of traditional actions. Such traits include the ability to analyze, think critically, solve problems, and generate new ideas. Mastery of these skills requires direct implementation of activities that allow students to actively participate in the learning process, experiment, and apply their knowledge in new contexts. This approach is the basis of problem-based learning, where students are involved in real-life situations, which require them to actively research, analyze and solve problems.

Considering this, it can be argued that while traditional teaching methods have their place in the development of basic knowledge and skills, they should be complemented by strategies that stimulate the creativity and critical thinking of higher education students. This is necessary to develop competencies that are important in today's dynamic and changing world.

Today, informational technologies make it possible to add visual elements to almost any communication tool or service, which is very important and useful when studying such disciplines as Medical Chemistry, Bioorganic Chemistry, Physical and Colloidal Chemistry, and other chemical and natural sciences in general.

In contrast to traditional teaching methods, video lectures provide variety and vibrancy. Currently, due to the phenomenon of "clip thinking," students often get bored in regular classes, and adding music, pictures, and experiments to lectures can increase motivation and engage them.

It is better if video lectures, interesting experiments, and elements of virtual laboratories can be reasonably combined. This is exactly what laboratory work in video format is.

For example, work on determining the heat of formation of a crystalline hydrate. To understand such a topic, it is

PEDAGOGY AND EDUCATION

necessary to get acquainted with the "traditional" literature on this topic because it is impossible to perform practical tasks without an understanding of theory.

That is why visual online and video formats of laboratory work come to the rescue. For example, you can use convenient services such as ChemCollective and PraxiLabs, as well as other resources that offer virtual laboratory classes and experiments. In addition, you can use videos with experiments developed directly at the Department, which allows you to adapt the educational material to the specific needs of the course for higher education students.

Online laboratories and videos allow students to visually observe processes and phenomena that may not be available in real life due to limited resources or potential danger. Thus, learners can observe complex chemical reactions, and biological experiments, analyze the results, and even model their experiments in a safe and controlled environment.

These tools also promote self-directed learning, allowing higher education students to work through materials at their own pace, revise difficult aspects, and gain a better understanding of the material. This is essential, especially in terms of distance learning where students need more self-discipline and independence.

Another important aspect is the ability to use multimedia elements, such as animations, graphs, and interactive models, which help to understand complex scientific concepts better. They make the learning process more interesting and engaging, which contributes to a deeper acquisition of knowledge and maintains the motivation of higher education students.

Furthermore, the development of the Department's videos with experiments can be an important part of the pedagogical process. This not only allows teachers to adapt the material to a specific course but also to include students in the process of creating such materials, which is an effective method of active learning. Students who are involved in the creation of educational materials better absorb information and develop important skills.

So, we can conclude that the use of advanced technologies is already having a positive impact on the quality of knowledge of higher education students, and will have an even better impact if they are encouraged to work independently and provide them with good materials.