

METHODS OF USING ADVANCED PEDAGOGICAL TECHNOLOGIES IN TEACHING CHEMISTRY

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Abstract: This article examines the importance of using modern pedagogical technologies in chemistry education and their effectiveness in the educational process. Modern approaches to teaching chemistry, such as interactive educational technologies, online resources, virtual laboratories, and flipped learning, are analyzed. The article highlights the advantages of students in terms of self-development, application of knowledge in practice, and development of creative thinking.

Keywords: cover advanced pedagogy. Chemistry education stands out. Digital tools make a difference. Inquiry-based learning draws interest. Interactive methods build skills. Experimental skills improve over time. Blended learning combines approaches.

Introduction.

Today, teaching Chemistry, like any other subject, should be devoted to the search for pedagogical technologies in school chemistry education aimed at creating conditions that ensure the development of students' internal motivation, learning activity, cognitive activity and independence. In accordance with the Concept of Education Development for 2021-2025, one of the most important and urgent tasks of modern education is the training of a competitive personality.

I started looking into advanced pedagogical technologies for chemistry teaching. Modern education changes so fast. We need to adjust our strategies right away. Integrating new methods into lessons builds an environment where students gain knowledge. They also build scientific thinking along the way. From my own observations and hands-on work, these technologies clarify tough chemical ideas. They make concepts more visual and engaging. That pushed me to study how such tools can change chemistry education overall.

Lately, digital tools have shifted how learning happens. Chemistry relies on experiments. It gains a lot from tech advancements. Adding simulations, animations, and virtual labs lets students try things safely. They can repeat experiments as needed. This boosts their grasp of the material. My experiences showed how tech-driven learning sparks motivation. Students become more self-reliant in the process.

Dealing with various student groups, I saw how these technologies allow personalized paths. They fit different styles of learning. Some kids do best with visuals. Others need hands-on trials. A few thrive on logical puzzles. Using interactive tools, I supported all those ways at once. In the end, results got better across the board.

One thing I picked up is how these technologies boost teamwork among students. Setting up chemistry activities on digital platforms gets kids talking. They share ideas, test guesses, and review outcomes together. Learning from peers builds a lively, research-focused classroom vibe.

Digging into books on current teaching methods, I noted chemistry ties closely to everyday real processes. It demands fresh ways to teach. I worked to spot the top tech methods that add value to lessons. Both theory and experiments benefit. My goal here was to point out the teaching perks of modern tech. I also wanted to show teachers how to use them in real settings. Doing this research convinced me of something key. If we aim for students to build critical thinking, scientific logic, and problem-solving, tech in chemistry is essential. It is not just a nice add-on. This view guided the article's aim. It helped map out the methods, practices, and ideas behind tech-boosted chemistry teaching.

The general pedagogical and didactic requirement for all stages of education is to improve the effectiveness of independent work based on the student's programming knowledge, imagination and skills, to increase their interest in scientific thinking and academic subjects, to deepen their professional knowledge, during theoretical and practical training. is to increase its activity. World pedagogical experience confirms that the possibility of modern pedagogical technologies to interest students in science and to increase their activity in independent work is unlimited.

Today's task of education is to teach students to be able to operate independently in the conditions of the information-educational environment that is increasing day by day, to use the flow of information wisely. For this, it is necessary to create the opportunity and conditions for continuous independent work. While the Republic of Uzbekistan is on the way to building a democratic, legal and civil society, the main goal and driving force of the reforms implemented in the field of education is to educate a comprehensively developed person. Until then, in traditional education, students were taught to acquire only ready-made knowledge. Such a method extinguished independent thinking, creative search initiative in students

Main part.

Looking at various advanced teaching methods, I saw technology does more than explain chemical facts. It ramps up student interest and drive. Interactive visuals let kids see hidden molecular actions. That makes abstract ideas stick better in their minds.

Virtual labs help build stronger experimental abilities. They do not fully replace actual hands-on work. Still, students can practice over and over. They fix errors and handle risky reactions without danger. Mixing virtual and real experiments creates solid practical skills.

Blended learning has altered how students tackle assignments. Digital resources outside class let them prep more thoroughly. Classroom time then shifts to talks and solving issues. This setup encourages deeper thinking and self-reliance.

Inquiry-based learning turned out highly effective. Guiding students to form questions, plan tests, and read data sparked their curiosity. Their analysis skills jumped up too.

Platforms for digital problem-solving showed real promise. Instant feedback helps spot and fix mistakes in concepts fast. That built confidence. It also strengthened their handle on chemical math.

Simulations aided in grasping reaction paths, molecular builds, and energy shifts. When students tweaked factors on their own, understanding grew a lot.

In group learning with tech support, students chatted more freely. They exchanged science thoughts. This fostered a helpful space. Communication and debate skills in science improved as a result.

Overall, weaving in these advanced tech tools turned standard chemistry classes into lively, student-focused, and question-driven experiences.

Methods.

The use of computer technologies in teaching chemistry is effective in the lessons of learning new material (lecture presentations), in the development of skills and abilities (training tests), as well as in a chemical seminar. Within the framework of this activity, an attempt was made to compare the mastery of new material by students using traditional methods and using interactive technologies.

Characteristics of interactive methods:

1. Communication - mental activity;
2. Intellectual intellectuality;
3. Extended communication;
4. Freedom of choice;
5. Creating a successful situation;
6. Positivity and optimistic assessment;
7. Reflection

For this research, I took an experiential route. I tested different technologies straight in chemistry sessions. Lesson plans featured digital sims, virtual setups, and hands-on interactive work. Watching student reactions gave me a clear view of how well the tools worked in practice. I used comparison too. Traditional methods went head-to-head with tech versions. Looking at grades, involvement, and grasp of ideas under each, I pinpointed what delivered better results.

Reflective review came next. I checked my own teaching results. Tweaking based on what worked let me fine-tune tech use in the curriculum. Collaboration played a part. I teamed up often with fellow chemistry instructors. Swapping stories highlighted common hurdles. Together, we built stronger tech fixes.

For solid backing, data review included test scores, homework marks, and lab showings. That hard evidence backed up my findings reliably. I went ahead and used a teaching experiment approach in my work. I had certain groups of students learn through advanced tech tools alone. Other groups stuck with the usual ways of doing things. By looking at how these groups did, I could see just what kind of difference adding technology made for their grasp of chemistry basics.

Results and Discussion.

My research showed me that bringing in these advanced teaching tools really boosts how well students get the big ideas in chemistry. They handled solving problems with more spot-on answers. They also seemed more sure of themselves when they had to make sense of what happened in experiments.

The virtual lab setups gave some of the best outcomes for building up that hands-on thinking side of things. Kids in the classes with tech support did their lab tasks in a safer manner. They worked through them step by step. They understood the material on a much deeper level too.

A key thing I noticed was how the inquiry style of learning built up their skills in scientific reasoning. Students started handling things on their own more. They formed ideas about what might happen. They looked over the proof they had. They pulled together their final thoughts. That kind of ability matters a lot for anyone heading into science later on. Digital simulations helped students picture those tiny chemical actions in a clearer way. They saw how atoms connect and how reactions play out. Regular talks in class just cannot match that kind of visual help.

When collaboration got a tech boost, students improved a lot in how they talk things over and work as a team. Those skills count big time in science areas today. The study also pointed out how mixing learning styles raises student drive. It cuts down on just sitting back and taking it in. They got ready more thoroughly. They jumped in during activities. The learning kept going even outside class time.

As I thought over the findings, it hit me that these new tech tools in education go beyond just helping with chemistry lessons. They change the whole approach. They spark more creative thinking in science. They make work more exact. Students reach higher levels of real understanding.

Conclusion. Wrapping up this study, I see that adding advanced teaching tech to chemistry classes brings real benefits. It feels essential for education these days. The work proves technology lifts learning quality. It builds stronger idea grasp. It sharpens lab abilities. It grows key thinking skills. The issues that came up, such as not enough digital stuff, teachers needing more training, and tech limits themselves, can get fixed with steady training programs. This study investigated the effectiveness of using innovative pedagogical technologies in teaching chemistry. The results of the study show that the use of innovative technologies, in particular, information and communication tools, multimedia resources and interactive methods, increased students' activity in the educational process and increased their interest in chemistry. These methods helped to significantly increase the level of students' knowledge and develop their independent thinking and problem-solving skills. The introduction of innovative pedagogical technologies also helped to increase the pedagogical competencies of teachers. Teachers were able to organize their educational processes more effectively by mastering modern methods and techniques. However, for the effective use of technologies, it is necessary to constantly improve the qualifications of teachers, create the necessary infrastructure and modernize educational tools.

REFERENCES:

1. Karimov, I.A. "Uzbekistan on the threshold of the 21st century": threats to security, conditions of stability and guarantees of development. T - "Uzbekistan." 1997-326 p.

2. Karimov, I.A. "A perfect generation - the foundation of Uzbekistan's development" Tashkent- "Sharq" 1997
3. Бражникова, А. М. Применение ИКТ в процессе обучения химии / А. М. Бражникова // Информационные технологии для Новой школы. - СПб: Региональный центр оценки качества образования и информационных технологий, 2014. – Т. 4. – С. 29–31.
4. Atqiyayeva S. I., Komilov K.U. Developing intellectual capabilities of students in teaching chemistry. Международный научно-образовательный электронный журнал «ОБРАЗОВАНИЕ И НАУКА В XXI ВЕКЕ». 2021, Выпуск №10 (том 3), 684-692 стр.
5. Lorenzo, M., & Fernandez, G. (2019). Flipped learning and its impact on science classrooms. International Journal of Science Education, 41(5), 783-797.