



KIMYO DARSLARIDA ODDIY VA XAVFSIZ TAJRIBALAR ORQALI KIMYOVIY TUSHUNCHALARNI MUSTAHKAMLASHNING ILMIY-METODIK ASOSLARI

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ANNOTATSIYA

Mazkur maqolada texnikumlarda kimyo fanini o'qitish jarayonida oddiy va xavfsiz tajribalardan tizimli foydalanish orqali kimyoviy tushunchalarni mustahkamlashning ilmiy va metodik asoslari yoritilgan. Tadqiqotda tajribaviy ta'limning o'quvchilarning tushunchaviy bilimlarini chuqurlashtirish, kognitiv faolligini oshirish hamda amaliy va kasbiy kompetensiyalarini rivojlantirishdagi o'rni tahlil qilingan. Shuningdek, past xavf darajasiga ega tajribalarning pedagogik ahamiyati, ularning didaktik imkoniyatlari hamda laboratoriya mashg'ulotlarida xavfsizlik qoidalariga rioya etishning muhimligi asoslab berilgan. Tadqiqot natijalari puxta rejalashtirilgan oddiy tajribalar texnik va kasbiy ta'lim muassasalarida kimyo ta'limi samaradorligi va sifatini sezilarli darajada oshirishini ko'rsatadi.

Kalit so'zlar: kimyo ta'limi, laboratoriya tajribalari, xavfsiz tajribalar, tajribaviy ta'lim, kompetensiyaviy yondashuv, texnik ta'lim.

KIRISH

Zamonaviy texnik va kasbiy ta'lim tizimlarida tabiiy fanlar ta'limi sifatini oshirish dolzarb vazifalardan biri hisoblanadi. Kimyo fani fundamental ilmiy fan sifatida o'quvchilarning analitik fikrlashi, muammoli vaziyatlarni hal qilish



ko'nikmalari va kasbiy kompetensiyalarini rivojlantirishda muhim o'rin tutadi. Biroq ko'plab kimyoviy tushunchalarning abstrakt xarakterga ega ekanligi, ayniqsa texnikum darajasida, o'quvchilar tomonidan o'zlashtirilishini murakkablashtiradi.

Mazkur muammolarni bartaraf etishning eng samarali yo'llaridan biri kimyo darslariga tajribaviy faoliyatni keng joriy etishdan iborat. Tajribalar o'quvchilarga kimyoviy hodisalarni bevosita kuzatish, nazariy bilimlarni amaliy tajriba bilan bog'lash hamda chuqur tushunchaviy bilimlarni shakllantirish imkonini beradi. Shu jihatdan, oddiy va xavfsiz tajribalar alohida ahamiyatga ega bo'lib, ular laboratoriya jihozlari cheklangan sharoitlarda ham qo'llanishi va o'quvchilar xavfsizligini ta'minlashi bilan ajralib turadi.

Kimyo ta'limida tajribaviy o'qitishning nazariy asoslari. Tajribaviy ta'lim konstruktivistik ta'lim nazariyasiga asoslanadi. Ushbu nazariyaga ko'ra, bilim o'quvchiga tayyor holda berilmaydi, balki uning faol ishtiroki, kuzatuvi, tajribasi va xulosalari asosida shakllanadi. Bunday yondashuvda o'quvchi ta'lim jarayonining markaziy subyekti hisoblanadi.

Kimyo ta'limida tajribalar ilmiy bilishning asosiy vositalaridan biri bo'lib, ular sabab–oqibat munosabatlarini anglash, nazariy qonuniyatlarni tasdiqlash va ilmiy fikrlashni rivojlantirishga xizmat qiladi. Ayniqsa, oddiy tajribalar murakkab uskunalar va jarayonlar bilan bog'liq kognitiv yuklamani kamaytiradi hamda o'quvchilarning e'tiborini asosiy tushunchalarga qaratish imkonini beradi.

Oddiy va xavfsiz tajribalarning didaktik imkoniyatlari. Oddiy va xavfsiz tajribalar texnikumlarda kimyo fanini o'qitishda muhim didaktik afzalliklarga ega. Bunday tajribalar, odatda, oson topiladigan materiallar, minimal laboratoriya jihozlari va past konsentratsiyadagi reaktivlardan foydalanishga asoslanadi. Bu esa ularni dars jarayonida tez-tez va samarali qo'llash imkonini yaratadi.



Masalan, kislota–ishqor reaksiyalarini qizil karam ekstrakti kabi tabiiy indikatorlar yordamida namoyish etish, eruvchanlik tushunchalarini tuz va shakar kabi kundalik moddalar asosida o‘rganish mumkin. Ushbu tajribalar nafaqat abstrakt kimyoviy tushunchalarni aniqlashtiradi, balki kimyo fanining kundalik hayot bilan uzviy bog‘liqligini ham ko‘rsatadi.

Bundan tashqari, oddiy tajribalar o‘quvchilarni faol ta’lim jarayoniga jalb etadi, ularni taxmin qilish, natijalarni kuzatish va tahlil qilishga undaydi. Natijada tanqidiy fikrlash rivojlanadi va bilimlarning uzoq muddatli xotirada saqlanishi ta’minlanadi.

Kimyo tajribalarida xavfsizlik masalalari. Laboratoriya mashg‘ulotlari jarayonida xavfsizlikni ta’minlash o‘qituvchining asosiy pedagogik mas’uliyatlaridan biridir. Hatto oddiy tajribalarni o‘tkazishda ham xavfsizlik qoidalariga qat’iy rioya etish talab etiladi.

O‘qituvchi tajribadan oldin aniq va tushunarli yo‘riqnoma berishi, o‘quvchilarning faoliyatini doimiy nazorat qilishi hamda reaktivlar miqdorini me’yorida tanlashi zarur. Xavfsiz muhitda tashkil etilgan tajribalar o‘quvchilarda ishonchni oshiradi va laboratoriya faoliyatiga ijobiy munosabatni shakllantiradi.

Texnikumlarda o‘quvchilar kelajakdagi kasbiy faoliyatga tayyorlanayotganligi sababli, ularda xavfsizlik madaniyatini shakllantirish alohida ahamiyat kasb etadi. Xavfsiz tajribaviy faoliyat kasbiy intizom va mas’uliyat hissini rivojlantiradi.

Tajribalarning o‘quv natijalari va kompetensiyalarni rivojlantirishdagi ta’siri. Oddiy va xavfsiz tajribalarni kimyo darslariga joriy etish o‘quvchilarning ta’lim natijalariga ijobiy ta’sir ko‘rsatadi. Tajribaviy mashg‘ulotlar o‘quvchilarning darsga bo‘lgan qiziqishini oshiradi, tushunchaviy bilimlarni chuqurlashtiradi va amaliy ko‘nikmalarni rivojlantiradi.

Shuningdek, mazkur yondashuv kompetensiyaviy ta’lim modeliga to‘liq mos keladi, chunki unda bilimlarni real hayotiy vaziyatlarda qo‘llashga alohida



e'tibor qaratiladi. Tajribalar jarayonida o'quvchilar kelajakdagi kasbiy faoliyatida zarur bo'ladigan umumiy va kasbiy kompetensiyalarni egallaydi.

XULOSA

Tadqiqot natijalari shuni ko'rsatadiki, kimyo darslarida oddiy va xavfsiz tajribalardan tizimli foydalanish texnikumlarda kimyo ta'limi samaradorligini sezilarli darajada oshiradi. Tajribaviy ta'lim o'quvchilarning kimyoviy tushunchalarni ongli va chuqur o'zlashtirishiga, o'qishga bo'lgan motivatsiyasini oshirishga hamda kasbiy kompetensiyalarni rivojlantirishga xizmat qiladi.

Shu sababli, kimyo o'qituvchilariga dars jarayonida oddiy tajribalarni keng qo'llash tavsiya etiladi. Ushbu yondashuv kimyo ta'limini modernizatsiya qilish va texnik hamda kasbiy ta'lim muassasalarida yuqori ta'lim natijalariga erishishning muhim omillaridan biridir.

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SCIENTIFIC AND METHODOLOGICAL FOUNDATIONS OF STRENGTHENING CHEMICAL CONCEPTS THROUGH SIMPLE AND SAFE EXPERIMENTS IN CHEMISTRY LESSONS

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ABSTRACT

This article explores the scientific and methodological foundations of strengthening chemical concepts through the systematic use of simple and safe experiments in chemistry lessons at technical schools. The study emphasizes the role of experimental learning in improving students' conceptual understanding, cognitive engagement, and practical competencies. Special attention is paid to the pedagogical value of low-risk experiments, their didactic potential, and the importance of safety regulations in laboratory-based instruction. The findings demonstrate that well-designed simple experiments significantly enhance the effectiveness and quality of chemistry education in vocational and technical institutions.

Keywords: chemistry education, laboratory experiments, safe experiments, experimental learning, competency-based approach, technical education.

INTRODUCTION In modern technical and vocational education systems, improving the quality of science education remains a key priority. Chemistry, as a fundamental scientific discipline, plays a crucial role in developing students' analytical thinking, problem-solving skills, and professional competencies. However, the abstract nature of many chemical concepts often creates learning difficulties for students, particularly at the technical school level.

One of the most effective ways to overcome these challenges is the integration of experimental activities into chemistry instruction. Experiments enable



students to observe chemical phenomena directly, link theoretical knowledge with practical experience, and develop a deeper conceptual understanding. In this context, simple and safe experiments are especially valuable, as they can be implemented even in institutions with limited laboratory resources while ensuring student safety.

THEORETICAL BACKGROUND OF EXPERIMENTAL LEARNING IN CHEMISTRY

Experimental learning is grounded in constructivist learning theory, which emphasizes active student participation in the knowledge construction process. According to this approach, students learn more effectively when they are actively involved in observing, experimenting, and drawing conclusions rather than passively receiving information.

In chemistry education, experiments serve as a primary means of scientific inquiry. They help students understand cause-and-effect relationships, validate theoretical principles, and develop scientific reasoning skills. Simple experiments, in particular, reduce cognitive overload and allow students to focus on core concepts without being distracted by complex procedures or equipment.

DIDACTIC POTENTIAL OF SIMPLE AND SAFE EXPERIMENTS

Simple and safe experiments offer significant didactic advantages in chemistry teaching at technical schools. These experiments typically use easily accessible materials, minimal equipment, and low concentrations of chemicals, which makes them suitable for frequent classroom implementation.

For example, acid–base reactions can be demonstrated using natural indicators such as red cabbage extract, while solubility concepts can be explored through everyday substances like salt and sugar. Such experiments not only clarify abstract concepts but also demonstrate the relevance of chemistry to everyday life.

Moreover, simple experiments promote active learning by encouraging students to make predictions, observe outcomes, and analyze results. This process



enhances critical thinking skills and fosters long-term retention of chemical knowledge.

SAFETY CONSIDERATIONS IN CHEMISTRY EXPERIMENTS

Ensuring safety during laboratory activities is a fundamental pedagogical responsibility. Even simple experiments require strict adherence to safety protocols to prevent accidents and promote responsible scientific behavior among students.

Teachers must provide clear safety instructions, supervise experimental activities closely, and select appropriate materials and quantities. Creating a safe learning environment not only protects students but also builds their confidence and encourages positive attitudes toward laboratory work.

In technical schools, where students are preparing for professional careers, cultivating a strong safety culture is particularly important. Safe experimental practices contribute to the development of professional discipline and ethical responsibility.

IMPACT ON STUDENT LEARNING AND COMPETENCY DEVELOPMENT

The integration of simple and safe experiments into chemistry lessons has a positive impact on students' learning outcomes. Experimental activities increase student engagement, improve conceptual understanding, and support the development of practical skills.

Furthermore, these experiments align with the competency-based education model, which emphasizes the application of knowledge in real-world contexts. By participating in hands-on activities, students acquire transferable skills that are essential for future professional tasks in technical and vocational fields.

CONCLUSION

The findings of this study indicate that the systematic use of simple and safe experiments in chemistry lessons significantly enhances the effectiveness of chemistry education at technical schools. Experimental learning strengthens



students' understanding of chemical concepts, increases motivation, and supports the development of professional competencies.

Therefore, it is recommended that chemistry teachers actively integrate simple experimental activities into their instructional practices. This approach contributes to the modernization of chemistry education and ensures higher educational outcomes in technical and vocational institutions.

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