



**International Conference on Modern Science and Scientific Studies**

Hosted online from Madrid, Spain

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20<sup>th</sup> August 2025

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## **MODERN TECHNOLOGIES FOR ASSESSING STUDENTS' SKILLS IN INTEGRATING CHEMICAL KNOWLEDGE WITH LIFE EXPERIENCE**

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### **Abstract**

In this article, it is noted that the development of adaptive synchronized criteria for assessing students' skills in integrating chemical knowledge with life experience into the application of modern technologies is one of the important directions of modern education and upbringing. Providing students with chemical knowledge and skills necessary for practical use in life situations based on a scientific and pedagogical approach is one of the main criteria for training personnel who meet the requirements of today.

**Keywords:** Interactive, criterion, principle, differential, creative, theoretical, practical, creative, integrated knowledge, diagnostic, summative, formative.

### **Introduction:**

Scientific research on this topic shows that by connecting the theoretical aspects of chemistry with life experience, students develop critical thinking, problem-solving skills, a creative approach, and practical skills. From this point of view, there is a need to develop special criteria for assessing students' skills in integrating chemical knowledge with life experience.

### **Main section:**

These criteria should be based primarily on the following pedagogical and didactic principles:

The principle of knowledge orientation towards practice. An approach aimed at developing students' skills in applying the acquired knowledge in real-life situations.



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For example, adherence to safety regulations when working with chemicals, understanding of chemical processes used in everyday life, and skills in using them are assessed.

Principle of interactive approach. Assessment of students' abilities to work together, communicate, and think critically through the use of interactive methods in the educational process. At the same time, it is important to interpret and analyze the content of information obtained by students through life experience.

The principle of multidimensional assessment. When assessing students' chemical knowledge, not only theoretical knowledge is taken into account, but also the ability to perform practical tasks and demonstrate skills acquired through laboratory experiments. By applying their life experience in explaining chemical knowledge, performing practical exercises, and carrying out production processes, their level of understanding of chemical processes is determined.

The principle of differential assessment. An assessment system will be developed, taking into account the personal characteristics, interests, and level of knowledge of each student. In this case, special attention is paid to the assessment of students' creative approach, independent thinking ability, and innovative ideas in performing practical work.

Evaluation criteria, developed on the basis of these principles, should consist of the following components:

Determining the level of theoretical knowledge. Students' knowledge of basic chemical concepts and their ability to apply them correctly are assessed.

Assessment of practical skills. The ability to conduct experiments in laboratory conditions, use chemical agents, and independently manage processes is assessed.

Assessment of creative activity. The ability of students to apply acquired knowledge in new, unusual situations, to propose innovative methods for solving problems is assessed.

Assessment of integrated knowledge and skills. Students' ability to independently form (synthesize) new knowledge by combining theoretical knowledge and life experience is assessed.

It is also necessary to develop special methodological guidelines and curricula for assessing the skills of integrating chemical knowledge with life experience. In this



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process, it is necessary to increase the role of teachers, strengthen their scientific and methodological training, and use modern educational technologies to involve students in active learning processes. The development of criteria for assessing students' skills in integrating chemical knowledge with life experience is one of the urgent problems of the education system today. The effective implementation of these criteria is important not only for increasing students' interest in chemistry, but also for developing their practical knowledge.

The topic of the theory of assessment criteria, the purpose and principles of assessment is one of the most important areas aimed at increasing the effectiveness of the educational process. The assessment process is the main tool for determining students' knowledge, monitoring the dynamics of their development, and monitoring the quality of education.

According to the theory of assessment criteria, assessment is carried out on the basis of several interconnected principles, among which the principles of objectivity, transparency, systematicity, and individual approach are distinguished. The principle of objectivity implies ensuring the reliability and objectivity of the assessment results, which requires clear and understandable assessment criteria. In accordance with the principle of transparency, assessment criteria should be communicated to students in advance, and students should know the steps necessary to improve their level of knowledge. The principle of systematicity requires consistency, continuity, and clarity of the assessment process for all participants in the educational process. At the same time, the principle of an individual approach ensures the consideration of the individual characteristics of each student and the application of an appropriate approach to them. The purpose of assessment is to control the quality of education, determine the knowledge, skills, and abilities of students, as well as to assess the level of their development. To achieve this goal, various assessment methods and tools are used, including diagnostic assessment, formative assessment, and summative assessment methods.

While diagnostic assessment is aimed at determining the initial level of knowledge and preparation of students, the process of formative assessment allows for regular monitoring of student development throughout the learning process. Summative assessment is used to assess the final results of the educational program.



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When developing assessment criteria, it is necessary to take into account the goals of education, the requirements of curricula, and the individual needs of students. This process requires teachers to have a high level of methodological training, the ability to analyze the level of student development, and the ability to apply modern assessment technologies. The scientific validity of the principles of assessment and their successful implementation in practice increase the effectiveness of the educational process, since assessment serves not only as a means of monitoring the results, but also as an important motivational factor aimed at the development of students. Therefore, the pedagogical functions of assessment, along with determining students' knowledge, should be aimed at stimulating their learning activity, developing self-assessment skills, and qualitatively improving the educational process.

Analysis of the types of criteria for assessing the skills of using life experience in chemistry education based on cognitive, practical, and reflexive approaches plays an important role in increasing the effectiveness of the educational process. These criteria are implemented in harmony through various methodological directions and assessment tools, since each of them covers different aspects of chemistry education. Cognitive criteria are used to measure students' theoretical knowledge, ability to form concepts, and the level of assimilation of facts related to chemistry. For example, students are assessed for such abilities as understanding the concepts and laws of chemistry, identifying the relationship between them, and using relevant knowledge to solve problems. At the same time, cognitive criteria are aimed at developing students' analytical and critical thinking skills in the educational process, which ensures the effectiveness of education.

Practical criteria are aimed at assessing students' laboratory experiments, skills in conducting experiments, skills in working with equipment, as well as their ability to analyze practical results and draw conclusions from them. For example, students should have practical skills such as preparing chemical solutions, analyzing the physical and chemical properties of substances, conducting reactions, and correctly interpreting their results. Practical criteria play a significant role, especially in demonstrating the importance of chemistry in solving life problems and developing students' independent work skills.



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Reflective criteria provide for the development of students' ability to evaluate the results of their own learning activities, work on themselves, and develop critical approaches in the educational process. For example, students should have the necessary reflexive skills to evaluate the results of their practice, analyze their mistakes, and plan their future activities. This criterion stimulates the personal development of students and encourages them to think creatively.

### Summary:

If cognitive criteria are used to measure theoretical knowledge in the learning process, practical criteria serve to determine the level of practical application of knowledge by students, and reflexive criteria play a key role in assessing students' self-analysis skills in the learning process. When these three approaches are applied together, it increases the chances of achieving the expected results in the educational process.

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