



Application of the method of the "Assessment" technique when studying the topic "Schrödinger Equation" of the course of atomic physics

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Annotation: This article is devoted to the methodology of applying the method of the "Assessment" technique when studying the topic "Schrödinger Equation" of the course of atomic physics, at universities and higher pedagogical educational institutions.

Keywords: Schrödinger, Schrödinger equation, technique, assessment, method of technique "Assessment", handouts, professor-teacher, educational institutions.

Introduction

Quantum mechanics is a system of concepts, ideas, and formulas that describe and explain the observable properties of quantum objects. Quantum objects appear in classical physics as particles or waves, depending on the conditions under which they are considered. At the same time, they partially lose their properties. Therefore, classical images, concepts, spatio-temporal relations, and so on, lose their meaning in relation to quantum objects. Because classical images, concepts, spatio-temporal relations, and so on, must be applied to quantum objects in their proper sense. In addition, images, concepts, spatio-temporal relations, etc., are used in the microcosm, capable of explaining the observed laws without visual imagination and having no classical analogues.

A plane de Broglie wave of a particle is a special wave structure of a free particle moving uniformly in a certain direction in space. However, the particle performs motions characterized by complex wave functions when moving in free space and in a field. The main problem of wave mechanics is to find the occurrence of these wave functions and the physical implications associated with them under various conditions. This problem can be solved using the wave equation discovered by Schrödinger in 1926. This equation is called the basic equation of quantum mechanics, and it is valid for non-relativistic quantum mechanics, that is, for the case when a particle moves at a speed much less than the speed of light.

In order for knowledge, skills and abilities to appear, as well as the development of creative thinking among students of the physical specialty of universities and higher pedagogical educational institutions on the topic "Schrödinger Equation" of the course of atomic physics, it is necessary to improve the teaching methodology for this topic. One way to improve this topic is to apply the method of the "Assessment" technique of interactive technology. Therefore, this article is devoted to the methodology of applying the method of the "Assessment" technique when teaching the topic "Schrödinger Equation" of the course of atomic physics at universities and higher pedagogical educational institutions.

Methods

This technique is used as a method within the estimation method. The word technique means skill, mastery. This implies, students can skillfully test their knowledge, skills, abilities, conduct self-assessment, pass the test. The word assessment (English - assessment - appraisal) means self-presentation, as well as passing a certain test.

The essence of the method is as follows. This method is subject to passing memorization by students, task given by the trainer-professor on this topic, tasks independently expressing attitudes,



acquired knowledge, skills, provide them with an opportunity to test and evaluate their skills and the professor-teacher was instructed to evaluate all the knowledge and skills of students in a short time, both from a scientific-theoretical and practical point of view.

The purpose of the method is as follows. Determine the level of students' mastery of the topic taught in the lesson and mastery of the basic concepts of this topic, be able to independently assess the level of their knowledge, and also teach them to systematize their knowledge.

The application of this method can be described as follows. In all types of learning activities (at the beginning or at the end of the lesson) to assess the level of knowledge of the topic, for repetition, consolidation or intermediate and final control, as well as knowledge of students before starting a new topic. It is also intended to determine the knowledge, skills and abilities of students studying this topic. This method can be applied in the course of the whole lesson or its separate part in an individual way. This method is also used for homework.

Necessary tools for learning include: handouts (perhaps regardless of whether students draw a table in notebooks, after listening to the tasks and instructions given by the professor-teacher, they must fill in their answers in the cells of the table); tasks for the table.

Note: handouts are prepared on the basis of a given topic according to the plan and in accordance with the goal set by the professor-teacher (verification, consolidation, assessment).

The order of the training will be as follows: familiarization of students with the order of work, with the goal, as well as the requirements and rules;

- 1) handouts are distributed or dictated by the professor-teacher, students mark them in their notebooks;
- 2) students, individually familiarize themselves with the tasks given in the handout (tasks and tasks are displayed on the screen as a slide, and students must write their answers in their notebook or on the back of the handout paper, and the professor-teacher will work in the best way for himself and students, depending on the circumstances and situation);
- 3) students perform the task given on the topic in the handout, individually based on their knowledge;
- 4) the professor-teacher shows the correct answers to the tasks, tasks, data on the topic in the handout, if possible, on the screen or speaking them orally, and will acquaint you with the evaluation criteria for each completed task;
- 5) each student with the correct answer from the answers he marked, they identify their differences, check and evaluate themselves. They also once again consolidate their knowledge;
- 6) the professor-teacher collects the work done by the students, writes down their scores or grades in a group journal and ends the lesson.

Note: the number of cells in the table depends on the goal set by the professor-teacher and information about the topic covered. In the table, of course, there should be a corresponding task or task on the topic covered, which is aimed at testing and evaluating both the scientific-theoretical and practical skills of students.

Results and Discussion

Below are the requirements for tasks and assignments on the educational topic (Table 1).



Table 1 *Based on the passage of a topic or section of a subject*

Subject:

<p>TEST 1-2 tests will be given on the topic covered</p>	<p>PROBLEM SITUATION The problem on the topic covered, related to with a life situation and an event, as a future specialist, the student must find a solution to this problem. Your action...</p>
<p>SYMPTOM It is given on the basis of an unfinished idea, scientific and theoretical thoughts, ideas, definitions on the topic covered, for example: ... give definitions, ... scientifically substantiate ..., illuminate ... and then others.</p>	<p>PRACTICAL SKILL A task is given on the application of skills developed by the application of the content of the topic covered in life and work, for example: draw, count, fill, find, compare..</p>

A table indicating the requirements for tasks and assignments on the topic "Schrödinger Equation" is as follows (Table 2):

Table 2 *Based on the passage of a topic or section of a subject*

Subject: Schrödinger Equation

<p>TEST The Schrödinger equation is... A) Wave equation. B) Quantum Physics Equation. C) The equation of quantum mechanics. D) The basic equation of quantum mechanics.</p>	<p>PROBLEM SITUATION While the topic "Schrödinger Equation" was being presented by the professor-teacher, one of the students sitting in the audience distracted the lecturer's attention with the following question: "We don't need the Schrödinger equation. First, it is very difficult to understand. Secondly, the laws of classical physics can fully explain the kind of particle motion that explains the Schrödinger equation." With this idea, he broke the imagination of some of the students and began to spread his idea among them. As a result, the students took his side. Your actions at this time...</p>
<p>SYMPTOM Give a physical definition of quantum mechanical operators</p>	<p>PRACTICAL SKILL List the various forms of the Schrödinger equation</p>

Note: when preparing this exercise, its form or number of cells more or less depends on the nature and content of the educational topic and the goal that the professor-teacher sets for himself, that is, what the professor-teacher wants to learn from students, that is, theoretical knowledge or practical knowledge, skills, abilities, and qualifications. Accordingly, the contents of tasks in cells can also change, but regardless of the number of cells or tasks. However, in all such tables it is necessary to save the sections "Test", "Symptom".

The importance of this method lies in the fact that the professor-teacher can test the knowledge of all students both theoretically and practically in a short period of time. Gives them the opportunity to evaluate themselves.



The lesson will be interesting, the interests and responsibilities of students, which are necessary to gain knowledge on the topic covered, increase. You can apply the method of "Assessment" technology at the beginning and end of the lesson to repeat, consolidate a passed or a new topic. At the beginning of the lesson is used for what students' prior knowledge of the topic, what concepts they have acquired at the end of this lesson, what they have learned about this topic, and what knowledge and skills they will master at the end of the lesson on this topic. This method is also used in determining or accruing points in the intermediate, current, final control.

Conclusion

It should be especially noted that the undoubted advantage of this method is not only the acquisition of knowledge and the formation of practical skills, but also the development of the system of values of students, life attitudes.

Acknowledgement

The advantage of a creative lesson on this topic is that a student in the lessons of atomic physics can apply the knowledge gained not only when solving abstract problems from a textbook, but also solve a real problem from life, which he, in general, will solve after graduation. The analysis of this lesson contributes to the active assimilation of knowledge and the accumulation of a certain baggage of practical information, which may be more useful in life than theoretical knowledge. Also, in the process of parsing this lesson, the analytical, creative and communication skills necessary in the modern world are developed.

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