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FORMATION OF BASIC AND SUBJECT-SPECIFIC COMPETENCIES IN SPECIALIZED SCHOOL STUDENTS THROUGH EXPERIMENTAL AND LABORATORY WORKS

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Abstract
This article discusses the formation of basic and subject-specific competencies in specialized school students through physics experiments. The concepts of "competence" and "competency," as well as pedagogical approaches related to them, are examined based on a systematic approach. As an example, the laboratory work to determine the acceleration due to gravity is analyzed. This work aims to deepen students' theoretical knowledge and develop their practical skills.

Keywords: Experimental activity, physical pendulum, acceleration due to gravity, laboratory experiment, analytical thinking, educational process.

Introduction

Problem and Relevance: In the process of physics education, the role of experimental activity is crucial. Students must not only acquire theoretical knowledge but also develop the skills to carry out practical tasks. Especially in specialized schools, learning fundamental physics laws through experiments enhances students' analytical thinking and problem-solving abilities.

Research Objective: This article focuses on investigating methods for developing basic and subject-specific competencies through experimental activities. The laboratory work to determine the acceleration due to gravity serves as an example to highlight the importance of experiments in the educational process.

Methodology

Theoretical Basis of the Experiment: The primary object of the experiment is the physical pendulum. The movement of the pendulum and its main laws are explained theoretically. The pendulum obeys the laws of gravitational force and rotational motion. Its oscillations are harmonic, which is mathematically explained using differential equations.

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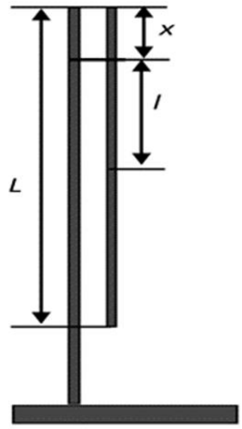

Equipment and Materials for the Experiment:

- A uniform steel rod (pendulum);
- A stopwatch (for measuring the oscillation time);
- Recording tables (for noting the results).

Experiment Phases:

1. Install the pendulum on the support and measure its length.
2. Set the pendulum into oscillation at a specific angle and measure the time for 25 oscillations.
3. Repeat measurements for pendulums of different lengths.
4. Use a special formula to determine the acceleration due to gravity.

$$g = \frac{4\pi^2 I}{mIT^2}$$

Results

Measurement Results: During the experiment, students measured the oscillation time for pendulums of different lengths. The following table presents the measurement results:

№	Length (L)	Time for 25 oscillations (T)	Gravitational Acceleration (g)
1	0.5 m	12.6 s	9.8 m/s²
2	0.7 m	14.8 s	9.81 m/s²
3	0.9 m	16.9 s	9.79 m/s²

Graphical Analysis: Based on the measurement results, a graph was drawn to show the relationship between the "oscillation period" and the "length." The graph revealed the closeness of theoretical and experimental values.

Error Analysis: Errors related to friction and measurement accuracy were identified. It was confirmed that these errors were within acceptable limits.

Discussion

Interpretation of Results: The main result of the experiment is the experimental confirmation that the oscillations of a physical pendulum are indeed harmonic. Through this method, students had the opportunity to test their theoretical knowledge practically.

Impact on the Educational Process: The application of the experiment was effective in shaping students' practical skills. They gained experience in working with laboratory equipment, recording results, and conducting mathematical analysis.

Suggestions:

- Broader inclusion of experimental methods in educational curricula;
- Use of modern technologies to organize more complex physics experiments.

Conclusion

Physics experiments play an important role in reinforcing students' theoretical knowledge and developing their practical skills. According to the results of this study, laboratory works not only simplify the learning of physical laws but also enhance analytical thinking. Such an approach contributes to making the educational process more effective.

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