

THE IMPACT OF PSYCHOLOGICAL READINESS ON LEARNING PHYSICS

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Abstract

Physics plays a critical role in medical education by providing foundational knowledge, enhancing analytical and problem-solving skills, and supporting the effective use of medical technologies. For medical students, a strong understanding of physics is not merely an academic requirement but a practical necessity for clinical competence and scientific literacy. Integrating physics into medical curricula is therefore essential for preparing well-rounded and capable healthcare professionals. The article examines the necessity of considering students' psychological readiness in the process of teaching physics. Since physics is a subject that requires abstract thinking and logical reasoning, students' cognitive, emotional, and motivational characteristics play an important role in the teaching process. The article explains the concept of psychological readiness, analyzes the psychological difficulties encountered in physics lessons, and substantiates the role of the teacher in this process.

Keywords: *physics education, psychological readiness, motivation, student-centered learning, cognitive activity*

INTRODUCTION

The rapid development of science and technology has made the emergence of interdisciplinary interactions among various fields of science inevitable. Although physics and psychology may appear to be distinct disciplines at first glance, their research directions intersect at many points. While physics studies material and energy-based processes occurring in the universe, psychology investigates the laws governing human consciousness, behavior, and mental activity. Human beings are both a part of the physical environment and carriers of mental activity. Physics plays an important role in understanding how humans perceive the surrounding environment. For instance, physical concepts such as light, sound, motion, and time are closely related to psychological processes of perception. Visual and auditory sensations are formed as a result of the processing of physical stimuli (light waves and sound waves) in the brain through the nervous system. From this perspective, the field of psychophysics studies the relationship between physical stimuli and psychological sensations. Psychology plays a significant role in the perception and acquisition of knowledge in physics. Psychological processes such as attention, memory, thinking, and motivation have a direct impact on the effectiveness of physics education. The abstract nature of physics, which is rich in conceptual content, requires a high level of cognitive activity from learners. Individuals with insufficient psychological readiness experience difficulties in understanding physical laws, which in turn reduces the effectiveness of the learning process[4, s 22].

In the modern education system, teaching subjects not only in terms of content but also by taking into account students' psychological characteristics is of great importance. Especially in teaching a subject such as physics, which is rich in abstract concepts, the level of students' psychological readiness has a direct impact on their understanding of the lesson, interest in the subject, and academic

achievement. From this perspective, students' age characteristics, cognitive level, motivation, and emotional state should be kept at the center of attention during the teaching of physics. Psychological readiness refers to a student's preparedness to accept, assimilate, and apply new knowledge. This readiness consists of several components: cognitive (attention, memory, thinking), emotional (interest, fear, anxiety), volitional (patience, goal orientation), and motivational components. Since physics requires a high level of logical thinking, mathematical skills, and the establishment of cause-and-effect relationships, the role of psychological readiness becomes even more significant. Many students consider physics to be a difficult, complex, and "incomprehensible" subject. This perception is sometimes associated with previous unsuccessful learning experiences, difficulties in mathematics, or the teacher's instructional methods. As a result, students develop fear of the subject, lack of self-confidence, and passivity. When such psychological barriers are not taken into account, students' activity during lessons decreases and the teaching process becomes ineffective.

Experience shows that many students evaluate physics as a "difficult" and "complex" subject. The reasons for this approach include the abundance of abstract concepts, the dominance of mathematical calculations, and sometimes the failure to adapt teaching to students' age and cognitive levels. Consequently, the following are formed among students: [1].

1. fear of the subject,
2. passivity during lessons,
3. lack of self-confidence.

If these psychological barriers are not eliminated, the quality of physics education declines. The Role of the Teacher: A physics teacher is not only a transmitter of knowledge but also a person who guides students' psychological state. The teacher should:

1. take into account students' age and individual characteristics;
2. apply the principle of explanation from simple to complex;
3. relate topics to examples from everyday life;
4. encourage students not to be afraid of making mistakes.

Creating a positive psychological environment, respecting students' opinions, and applying interactive methods that actively involve students in the lesson increase interest in physics. In the modern education system, fostering students' interest in academic subjects is one of the main objectives of the teaching process. Although physics plays a crucial role in explaining natural phenomena, it is often perceived by students as difficult and incomprehensible. This situation is influenced not only by the content of the subject but also by the organization of the teaching process and the teacher's approach. Therefore, one of the primary responsibilities of a physics teacher is to stimulate interest in the subject and to develop a positive attitude toward learning physics. Students' attitudes toward physics are closely related to their psychological characteristics. Motivation, self-confidence, interest, and emotional comfort are key psychological factors that influence the effectiveness of the learning process. During lessons, the teacher should take into account students' age and cognitive levels and encourage them not to be afraid of making mistakes. When a positive psychological environment is created, students' engagement in lessons increases, and physics becomes more appealing to them. One of the most effective ways to make students interested in physics is to demonstrate its connection with everyday life[5, s 8]. Explaining physical phenomena that occur in daily activities, technology, and nature helps students answer the question, "Why do I need this knowledge?". Real-life examples, interesting facts, and contemporary problems make physics lessons more understandable and engaging. Laboratory work, experiments, models, and simulations play a

significant role in teaching physics. These methods ensure active student participation and help concretize abstract concepts. Teachers who use interactive teaching methods foster students' interest in research activities and contribute to the development of their independent thinking skills. The physics teacher's enthusiasm for the subject and their ability to transmit this enthusiasm to students are of great importance. The teacher's energy, communication skills, and fair and objective attitude have a direct impact on students' perceptions of the subject. Continuous professional development, the adoption of new teaching technologies, and innovative approaches enhance the effectiveness of the teacher's pedagogical activity. Making students interested in physics requires not only strong subject knowledge but also pedagogical and psychological competence on the part of the teacher. A teacher who considers students' psychological characteristics, connects physics with everyday life, and applies interactive teaching methods can foster a positive attitude toward the subject. In this regard, the teacher's role is a decisive factor in improving the quality of physics education. In modern education, the effectiveness of teaching physics is not determined solely by the content but also by the alignment of instructional methods with students' age and psychological development. Physics often involves abstract concepts and complex reasoning, which can be challenging for students at different developmental stages. Understanding students' cognitive abilities, emotional state, and motivational levels is therefore crucial for effective teaching. Psychological readiness refers to a student's preparedness to acquire, process, and apply new knowledge. It encompasses cognitive components (attention, memory, reasoning), emotional factors (interest, anxiety, curiosity), volitional aspects (patience, persistence), and motivation. Physics requires high levels of logical thinking and problem-solving skills, making psychological readiness a key factor in successful learning. Students with insufficient readiness may struggle to grasp physical laws and abstract concepts, reducing learning efficiency. Adapting physics instruction to the age of students is essential for meaningful learning:

□ Primary School (Ages 6–10): Lessons should rely on concrete examples, visual aids, and hands-on experiments. Simplified explanations and interactive activities help young learners develop basic physical intuition.

□ Middle School (Ages 11–14): Students can handle more abstract concepts, mathematical representations, and experimental reasoning. Connecting physics concepts to everyday life and technology increases engagement.

□ High School (Ages 15–18): Students are capable of understanding complex theoretical concepts, derivations, and problem-solving. At this stage, laboratory experiments, modeling, and inquiry-based learning become crucial [1].

Teachers can enhance physics learning by integrating psychological principles:

1. Motivation: Demonstrating the relevance of physics to real life, technology, and future careers stimulates students' intrinsic interest.

2. Emotional Support: Creating a positive learning environment reduces anxiety and fear of failure.

3. Cognitive Scaffolding: Explaining concepts from simple to complex and using step-by-step reasoning helps students process information efficiently.

4. Interactive Learning: Laboratory experiments, simulations, and problem-solving activities actively engage students and consolidate learning.

Physics is often perceived as a highly theoretical and abstract subject, which may seem unrelated to the medical profession. However, many medical fields, such as radiology, cardiology, and medical technology, rely heavily on principles of physics. Understanding concepts such as mechanics,

electricity, magnetism, and waves enables medical students to comprehend the functioning of the human body and the operation of diagnostic tools. Furthermore, physics education develops analytical thinking and quantitative reasoning skills that are essential for clinical decision-making. Studying physics develops several cognitive and professional skills in medical students:

- Analytical Thinking: Physics problems require structured reasoning and the ability to analyze complex systems.

- Problem-Solving Skills: Applying physics to real-world medical situations enhances diagnostic and clinical reasoning abilities.

- Quantitative Competence: Medical professionals often rely on measurements, calculations, and data interpretation, all of which require a foundation in physics.

- Scientific Literacy: Understanding the physical basis of medical technology

Conclusion: Physics and psychology are disciplines that complement and mutually enrich one another. The psychological perception of physical phenomena, as well as the physical foundations of psychological processes, demonstrate the close interconnection between these two fields. Particularly in the field of education, the integrated study of physics and psychology contributes to enhancing the quality of the teaching and learning process. Therefore, the application of an interdisciplinary approach should be regarded as one of the fundamental requirements of modern scientific and pedagogical practice. Motivation plays a key role in students' psychological readiness. Demonstrating the connection of physics with technology, medicine, engineering, and everyday life provides students with an answer to the question "Why do I need this knowledge?". Experiments, laboratory work, models, and simulations help make lessons more engaging and understandable.

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