Zibaldone. Estudios Italianos - Vol. X, Issue 2 (2023): 235-238

ISSN: 2255-3576

FORMATION OF NON-STANDARD THINKING OF STUDENTS IN THE PROCESS OF STUDYING PHYSICS

Matjanov N.S.

Doctor of Pedagogical Sciences (DSc), Associate Professor of the Department of "Methods of Teaching Physics". Nukus State Pedagogical Institute named after Ajiniyaz, Nukus, Uzbekistan

Karlibaeva G.E.

Doctor of Pedagogical Sciences (DSc), Professor of the Department of "Methods of Teaching Physics". Nukus State Pedagogical Institute named after Ajiniyaz, Nukus, Uzbekistan

Abstract: Physics is the scientific basis of modern technology. Therefore, by studying physics, students get acquainted with a number of natural phenomena and their scientific explanation. This article examines the possibilities of forming non-standard thinking among students and the application of these skills in the learning process. The issues of activating students' non-standard thinking, improving the effectiveness of the lesson are also considered, which are necessary in the future and in the future professional activities of students.

Keywords: students, non-standard thinking, physics, problem, thinking, preparation, situational tasks, information, phenomena, process.

Introduction. The dynamic progression of novel technologies and the global economy necessitates that the higher education system cultivate a novel breed of professionals capable of adapting and thriving in the swiftly evolving technological landscape of contemporary society. These individuals must possess the capacity for creative and expansive thinking, as well as the aptitude for generating groundbreaking ideas. To teach cognitively advanced specialists with non-standard thinking, it is necessary to organize targeted efforts to build non-standard thinking skills. E. de Bono, the proponent of non-standard thinking theory, suggests that it is useful to conceptualize our thinking process as an "intelligent machine" akin to a computer. This machine possesses the ability to self-organize and generate a specific repertoire of models for processing novel information and the stereotypes employed by our everyday thinking. Nevertheless, in challenging scenarios that require unconventional judgment, stereotypes impede our cognitive processes as they embody conventional, rational, and analytical thinking. Unconventional thinking typically arises from an incomplete understanding of the entire situation at once and does not necessarily include sequential mental processes. Once a solution to the problem has been

Recibido: 27 October 2023 / aceptado: 23 November 2023 / publicado: 08 December 2023

discovered through unconventional thinking, it can be rationalized and put to practical use. Nevertheless, it is unattainable to elucidate the means by which it was acquired or replicate the process of obtaining it. Non-standard thinking, characterized by its improbability and roundabout nature, complements logical-rational thinking, which is known for its high probability and straightforwardness. The primary objective of contemporary higher education is to cultivate these two forms of thinking in harmony [1, p. 174]. An examination of the subject matter in physics disciplines reveals that the most significant impact on the development of unconventional thinking occurs through physical education. This is because contemporary approaches to teaching physics collectively shape what is commonly referred to as classical and modern science. These approaches primarily emphasize that: a) the acquisition of physics knowledge and the progress of scientific understanding are characterized by sudden advancements; and b) there can be multiple alternative theories pertaining to the same scientific domain. The nature of scientific knowledge is subjective, as cognitive conditions exert a major influence on the outcome and cannot be entirely eliminated. The behavior of any physical system is inherently probabilistic.

The universe consists of multilevel, organized systems, which frequently involve a person as a crucial element or subsystem. When explaining the motion and interaction of objects in nature, it is essential to employ nonlinear equations and consider resonant connections between the items. The principle of evolution is applicable to all things; the primary objective of global evolutionism is to determine the direction of self-organization and development processes. Advancements in contemporary society occur at the intersection of the physical sciences and involve multiple disciplines. The emerging framework of modern society revolves around the validation and widespread adoption of nonlinear thinking in scientific endeavors, which emphasizes the significant influence of chance in natural phenomena [6. P. 99]. Hence, the study of physics serves as a method for cultivating students' conventional cognitive abilities and enables them to demonstrate the primary approaches and strategies for fostering unconventional thinking.

Through analyzing the literature on the subject, we were able to determine the primary areas of non-standard thinking development for physical education students studying contemporary teaching concepts in physics. Teaching physics using visuals, looking at natural events and phenomena from different points of view, showing different ways to solve scientific problems through analogy, idealization, and modeling, using technology to look at specific situations that show non-standard ways of solving scientific physical problems, and using interactive teaching methods are all important parts of physical education. For instance, let us examine the interactive technology known as "Analysis of Specific Situations" in greater detail. Students apply this technology in the field of physics through various methods: solving practical and theoretical tasks related to physical materials and studying them in a professional context; analyzing real-life cases that involve modern scientific concepts as well as moral, ethical, and social issues related to physics discoveries; engaging in simulation and role-playing games that enhance the ability to evaluate situations with physical content; utilizing computer models that simulate actual physical processes and situations to identify the factors influencing natural phenomena.[3,p.28]

Let us examine the situational tasks that have been created in the physical substance in greater detail. Every situational physical job comprises the subsequent components: An intellectually relevant cognitive inquiry; diverse presentations of facts regarding this matter; exercises to engage with this knowledge that will ultimately result in their resolution. The teacher's role in the creation of situational physical tasks encompasses the following actions: The creation of a task that can be presented as either a task or a problem, with the problem being able to be either stated or concealed, Subsequently, students independently generate difficulties that require resolution. The collection of physics texts contains information that is presented in both explicit and implicit forms. However, this information may be inadequate or excessive. The process involves formulating challenging tasks and questions for physical texts that require information processing, generalization, and evaluation, with a focus on achieving specific outcomes. Additionally, tasks are prepared to facilitate reflective assessment of situational tasks, and the context of the proposed task in real life is described.

The approach to tackling a practical assignment in a given setting is contingent upon the amount of task content, the intricacy of the challenge, and the level of students' familiarity with this information. The available options for structuring students' work with situational physical duties, which are based on the technology of certain scenarios, are as follows: 1. Before beginning the assignment, students familiarize themselves only with the assigned materials and read any additional scientific and methodological literature that the teacher suggests. The tasks for this assignment are completed during a hands-on or experimental class; it is recommended to work in a group. This option is ideal for jobs that include huge quantities of physics-related informational materials. Typically, these tasks are grounded in functional or strategic scenarios. 2. Students familiarize themselves with the task materials beforehand, and each individual completes these assignments independently at home. These tasks rely on normative physical scenarios. 3. Students are assigned the job during the lecture sessions. Both solo and group work can be utilized. This choice is appropriate for projects of a smaller scale that serve to exemplify theories, laws, and concepts. The foundation of these tasks is a concrete physical scenario [4, p. 250]. A specific instance of a difficulty that arises in physics is the "Paradoxes of the Theory of Relativity" problem inside the educational module "Space and Time." This problem, titled "The Riddle of Einstein," consists of a series of assignments. The situational problem is addressed by providing a structural and logical framework for the topic "Special and general theory of relativity." The information is provided in an implicit manner and is inadequate. To supplement pupils' learning, you can include excerpts from the book "Physics of Space-Time," authored by E. Taylor and J. Keeler. In order to resolve this issue, students must enhance and augment the suggested structural and logical frameworks with relevant information, essentially "deploying" educational data. This activity entails the cognitive processes of digesting, generalizing, and evaluating information, which can be conveyed through a synopsis that provides an overview of the topic's substance.

During the process of problem-solving, one must comprehend established notions and actively explore and create novel, unfamiliar ones. The outcome of resolving this issue will be the composition of a letter addressed to an enthusiastic pupil. Upon reviewing all the questions,

students are encouraged to perform a self-evaluation of the given situational assignment utilizing the interactive method known as "Six Hats" [5. P. 96]. The utilization of interactive technology for the "Analysis of Specific Situations" in physics education has proven to be highly effective in various aspects. It enhances students' non-conventional thinking, fosters their ability to identify and organize problems, cultivates skills in decision-making and critical evaluation of physics-related information, develops their capacity to seek innovative ideas and rational solutions to emerging physical challenges, and stimulates the acquisition of new theoretical knowledge in physics through a synergistic effect.

References:

1. Bono E. Nestandartnoe mıshlenie. –Minsk: OOO «Popurri», 2006. -272 s.
2. Karlibayeva G.E. Forschungskompetenzen in zukünftigen physiklehrern bilden // Berlin Studies Transnational Journal of Science and Humanities ISSN 2749 -0866 Vol.1 Issue 1.5 Pedagogical sciences http://berlinstudies.de/10.5281/zenodo.5221422 126
3. Karlıbaeva G.E., Seytimbetova G.A. Ispol'zovanie interaktivnıx metodov obucheniya dlya realizacii kompetentnostnogo podxoda v podgotovke studentov (na primere bakalavriata nefizicheskoy special'nosti) // «Innovacionnaya nauka» Mejdunarodnıy nauchnıy jurnal. –Ufa, №2-2/2021. –S. 27-31
4. Karlıbaeva G. E. Sistemnıy podxod v podgotovke budushix uchiteley fiziki na osnove innovacionnıx texnologiy obucheniya //World science: problems and innovations. – 2018. – S. 249-252.
5. Karlıbaeva G.E. Aktivizaciya poznavatel'noy deyatel'nosti budushix uchiteley fiziki // (ISSN 2311-2158) The Way of Science. – Volgograd, 2018. – №4(50). – rr. 95–97.
6. Filosofiya sovremennogo estestvoznaniya: Uchebnoe posobie dlya vuzov / Pod.obsh.red.prof. S.A.Lebedeva. –M.: FAIR-PROGRESS, 2004. -304 s.