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Questions of the Methodology of Knowledge in Text books Physics of the New Generation

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Abstract: The article is crucial for the development of physical education in the near future is the development and assignment in different forms of new standards of educational activity for schools and universities. But only in some topics more or less the distribution of content corresponds to the principle of cyclicality.

Keywords: interaction, electromagnetic waves, concepts, model, phenomena, textbook, knowledge, physical quantities, observation, methodology of cognition, hypothesis, thought experiments, material point, experience, modeling, facts.

Introduction

From our point of view, it is crucial for the development of physical education in the near future to develop and set in various forms (and media, from paper to human) new standards of educational activity for schools and universities. This work was clearly realized and started about fifteen years ago under the guidance of Professor V. G. Razumovsky, a little later V. G. Razumovsky and D. sh. Shodiev built the concept of new-generation physics textbooks for secondary schools. A number of well-known Methodists took part in its implementation (N. M. Shakhmaev, V. G. Razumovsky, D. sh.Shodiev, Yu. I.Dik, and V. V. Mayer). as a result, textbooks for the basic school and the tenth grade of high school were published. (In General, setting new standards of activity in methodological science is akin to building a pattern.) [1,2,3].

In these textbooks, the norm of scientific knowledge is directly set, which is known as the "principle of Cycling"in the method of teaching physics It is represented by the following logic of cognitive activity: facts, problem-hypothesis, model-consequences-experiment, practice (V. G. Razumovsky). In these textbooks, the General scientific norm of knowledge is specified in explicit and implicit forms, primarily for the two leading activities in physics–experimentation and modeling.

2. the Main part. Let's turn to some questions about the reflection of the methodology of cognitive activ

1. in the texts of textbooks there is a reference point for setting the norms of all elements of the cycle of knowledge. From our point of view, this should be understood as follows.

What should be considered facts?ity in these textbooks.

- Knowledge (properties of the phenomenon, physical quantities as characteristics, laws, etc.) about the physical phenomenon, process.
- Results of research of phenomena, including observations: historical data as knowledge, Protocol facts, results of systematization, model assumptions, etc. For example, the phenomenon of electrification is the interaction of bodies worn apart at a distance.
- Conditions, circumstances, results of an experiment with a moving object or observation of a phenomenon. For example, the observation of the phenomenon of direct electric current in a liquid or gas.
- Stable knowledge that is confirmed by observing a phenomenon or experimenting with it. For example, in well-known experiments (Coulomb, Cavendish, etc.), the used model of the body – the material point-is confirmed.
- Recognized facts from the history of physics. For example: in Ancient Greece, it was noticed that small objects (dust particles, hairs...) are attracted to the amber spindles. (In a broad sense, a fact is something that is consistently confirmed by activity…)

- Previously known, accepted, stable theoretical positions, knowledge. For example: to study the nature of current in metals, we use the fact that all bodies are made up of atoms. (In each particular case, what to relate to the fact is decided specifically.)
- What should be attributed to the model?
- A model of the phenomenon initially formulated as a hypothesis, it can be classified as an iconic image, formula graphics, layouts, etc.
- The model of a phenomenon can be represented in the form of a law, equation, principle, graph, image, etc. For example, the second law of dynamics is a symbolic description of the action of one body on another.
- What should be attributed to the consequences?
- The results, i.e. the knowledge derived from the basic law. For example: the laws of serial and parallel connection are consequences of the Ohm's law for the circuit section, the law of conservation of charge and energy. For example, the Clapeyron-Mendeleev equation follows from the basic MKT equation of an ideal gas.
-Explanations or solutions of problems based on a model of similar phenomena. For example, the phenomenon of self-induction is explained on the basis of the laws put forward for the phenomenon of electromagnetic induction.
- Solving any problems.
- Identification of the limits of applicability of the phenomenon model. For example, Coulomb's law is valid for point stationary charges located at a distance of at least m.

What should be considered an experiment (in the broad sense of practice)?
- Application of the acquired knowledge in practice. For example, Ohm's law is used to calculate the current strength in a specific DC electrical circuit.
- Measurement of physical quantities.
- Setting up experiments with different goals: checking the validity of the theory, finding out the limits of applicability of the theoretical model, identifying new properties of the phenomenon, etc.
- Calculation of physical quantities based on connection formulas and equations of laws, other measured physical quantities. For example, the definition of density from the measured weight and volume.
- Development of devices, mechanisms, devices based on the theory of the phenomenon. For example: creating a transistor as an experimental proof of the validity of the laws of conduction of semiconductors.

2. Features of the content of physics textbooks [4,5,6,7,8,9]. In about half of the chapters, the material begins with a physical phenomenon, i.e. in our interpretation with facts (mechanical movement, mechanical vibrations, magnetic field, electromagnetic induction phenomenon, etc.). But only in some topics does the distribution of content correspond more or less to the principle of Cycling. This is better seen in the case of electromagnetic induction, partly in mechanical vibrations, the interaction of charges, and electromagnetic vibrations. But the concept of "model" is not in any of the paragraph titles. From our point of view, it is not necessary to run away from a direct statement of the question – "the model of the phenomenon". We see difficulties only in one thing: there are no clear (worked out and accepted) decisions about models of phenomena yet. And this is the problem of physics methodology.

Nevertheless, the methodological analysis of content reveals a tendency to increase the" pressure " of the cyclic model of knowledge on the elements of content. First of all, in the chapters the presentation of the material goes "from the abstract to the concrete", to the application of knowledge, to research, etc. This is true. Secondly, phenomena are more clearly separated from the means of description. For example, two formulations of Newton's second law are given, i.e. it is emphasized that the same phenomenon can be described in different ways. Stands out: a liquid and its model, a solid and its model. But this is not always done so firmly. Another example: the topic is called "Ray optics", but the beam as a model (which is important, and this is emphasized by the title of the topic), is not included in the title of the paragraphs The concept is well defined: "A light beam is a simplified model of a narrow beam of light." An object is highlighted here-a beam of light, which is rarely done. But why, simplified? The model reveals the essence of an object or phenomenon, and this is a deepening, not a simplification. Hence, for example, how to solve the problem: can free vibrations be damped? And if by definition it is not, then it means that it is a model, not a phenomenon. What kind of phenomenon do we observe then?.

Researches. The new and fundamental solution of the textbook is experimental and theoretical research. Ther This is fundamental and revolutionary for a textbook. In some cases, the goal is directly set as follows: "test the hypothesis of Galileo", "study the laws of free oscillations of a thread pendulum experimentally", "using a mechanical model to find out how the volume of" gas "depends on pressure", "check

the laws of Brownian motion on its mechanical model", "test the hypothesis that the rate of ink diffusion in water increases with temperature", " invent a mechanical model of a liquid», "construct a model of the interaction of two molecules and use it to explain the occurrence of elastic forces during compression and stretching of bodies", " to make sure that the relations are correct...", "to predict which methods of changing the magnetic flux through a closed conductor, an induction current occurs in it, and experimentally test your assumptions", " to find out which of the three hypotheses is realized in reality...".e are many of them, perhaps even unnecessarily, but they set the process, set the method of knowledge through activity.

Exercises. In the current mode of learning, questions are asked by the norms of the scientific method of knowledge. This is why their content and form are so important.

Here are some interesting questions from the point of view of the methodology of knowledge and typical for the textbook: What hypotheses were put forward by Galileo when studying the movement of a body under the action of a constant force? What are the features of thought experiments? Under what conditions can a body be considered a material point? (The body and model are not always rigidly separated yet!) does Pascal's law apply to solids? Give examples from your own experience that indicate the existence of a repulsive force. (The force is metaphysical, it exists objectively.) If you use the flow of liquid in communicating vessels to simulate heat exchange, which model from the tutorial figure 3.9, a, b, C, corresponds to the following situations...? What features of Brownian motion allow us to say that this phenomenon indirectly confirms the hypothesis of a discrete structure of matter? What experimental facts can serve as a basis for the assumption that there is a relationship between the temperature and pressure of a certain mass of gas at a constant volume? What experimental facts can serve as a basis for the assumption that there is a relationship between the temperature and pressure of a certain mass of gas at a constant volume? Name the main characteristics of the solid state model. The student proposed a hydrodynamic model of a closed electrical circuit. Is such a model applicable to explain phenomena in a closed circuit? What facts indicate that alternating electric and magnetic fields form a single electromagnetic field? What hypothesis was put forward by M. Planck to explain the results of experimental research of black body radiation? (Question: is this a body or a model? What was Avogadro's hypothesis? Describe the model of the atom proposed by Thomson. Compare the nuclear models of Rutherford and Thomson atoms. What in the planetary model are reliably established facts, and what are hypothetical representations? (By the way, a model is a model…)

3. Teaching methods. Generalization (generalization of knowledge and actions). For the method of constructing the textbook test, methods of direct acquaintance of students with the features of the scientific method of knowledge are very characteristic. Here are some examples of solutions.

1). At the beginning of the course, a special paragraph "Method of scientific knowledge" is constructed, which explicitly sets the stages of the cycle of scientific knowledge. In the 10th grade, an entire Chapter is given "Physics as a science. Scientific method of knowledge". The following questions give an idea of the content: what are the main stages of the method of scientific knowledge? What is a hypothesis? What is the role of observations in setting a problem for research? What should be the requirements of a scientific hypothesis? What is the value of the hypothesis? What is a hypothesis? What is the role of observations in setting a problem for research? What should be the requirements of a scientific hypothesis? What is the value of the hypothesis?

2). At the end of the course, the achievements of physics, the scientific picture are associated with the power of the method of scientific knowledge. The stages are explicitly named, and the scheme of the modern method of cognition according to A. Einstein is given. The authors, summing up the generalization, write: "you used this method, conducting research of natural phenomena in this sequence:

- observed physical phenomena, measured physical quantities, systematized them and found a natural connection between them;
- put forward hypotheses in the form of formulas and figurative models that Express the dependence of quantities and the causal relationship of the selected group of phenomena;
- deduced from the hypothesis, as from an axiom in geometry, logical consequences that explain the connection of phenomena or predict new phenomena;
- experimentally tested theoretical conclusions and applied the theory in practice to solve problems and explain natural phenomena" [4,5].

Hence the control: What ensures the reliability of scientific knowledge: facts, laws, hypotheses, scientific explanations and predictions? Prove that the motion of bodies around a circle can be explained as a consequence of Newton's laws.

3). In the texts of paragraphs, research that they include, quite often discuss certain aspects of the cycle of knowledge.

Examples: "we Should not think that the power line really exists... "(grade 8, p. 230); "Corpuscular and wave hypotheses about the nature of light" (grade 8, separate paragraph); Planck's hypothesis is considered quite fully (grade 9, p. 196, etc.); "At the same time, by this time a sufficient number of experimental facts had accumulated that made the hypothesis about the complex internal structure of the atom more reasonable" (class 9, p. 214); In the study, it turns out: "Individual experiments cannot serve as a basis for the claim that a fundamental law of nature has been discovered. But there is a sufficient basis for hypotheses. Of course, these hypotheses require verification..." (grade 7, p. 164). And then we offer a new experience [4,5,6,7,8,9]. Here are a number of fundamental provisions of the methodology for organizing educational activities in the classroo:

1). First of all, the methods Orient the teacher on the organization of experimentation and modeling activities. For this purpose, quite a large number of studies are provided directly in the text of textbooks, some of them highlighting actions and solutions, and some of them are for independent implementation. These texts of the textbook are considered as norms of the corresponding activity.

2). When studying each topic, it is expected to require students to answer such questions: What facts are the hypotheses based on? What experiments should be made to test this hypothesis? Based on the study of what phenomena is this dependence obtained? What conclusions do you draw from this? What conclusions can be tested experimentally? Where are these conclusions applied in practice? (Note, however, that the interpretation of the authors ' ideological position on a specific material is clearly insufficient: few facts are highlighted, and the direct use of hypotheses and models is rare. Where can the teacher get these samples?)

3). The methods specify certain methodological aspects of knowledge of phenomena. Thus, the problem of errors is taken into account when proving hypotheses. The authors write: "Within the random error of the marker (10%), the hypothesis is confirmed" (7 CL., p. 139). In addition, attention is drawn to the fact that "fundamental laws are confirmed not so much by individual experiments, but by the whole set of practical applications..." (ibid, p. 144) [4,5,6,7,8,9].

4. Conclusion. First, in high school textbooks, questions of the methodology of cognition are expressed more consistently and in depth. Secondly, in General, we are talking about the construction and implementation of a program for the formation of a methodological culture of educational subjects. At the same time, the task is not only to build a new generation of textbooks based on modern methodology, but also to change the activity of teaching. Processes, procedures, rules and regulations of this activity should be developed and replicated. Only then will we move forward in the development of physical education.

Literature

[1]. Razumovsky V. G. Scientific method of cognition and personal orientation of education. //Pedagogy. - 2004. - № 6. - P. 3-10.

[2]. Razumovsky V. G., Orlov V. A., Saurov Yu. a., Mayer V. V. Technology for developing the abilities of schoolchildren to learn independently, think and act creatively. // Physics at school. -2007. - № 6. - P. 50-55.

[3]. Shakhmaev N. M., Shodiev D. Sh. Physics: textbook for teachers of 10 classes of General types. institutions. - Tashkent, Uzbekistan, 2005. -267 p.

[4]. Shakhmaev N. M., Turdiev N. Physics: textbook for teachers of 9 classes of General types. institutions. - Tashkent, Uzbekistan, 2009. -172 p.

[5]. Tursunov K.Sh., Eshmirzaeva M.A. The role of the Analogy Method in the formation of a personality-oriented approach in teaching physics in universities Moscow, 2020.-№4 (52) -85-88 pp.

[6]. М.А.Эшмирзаева.Personality-oriented approach to education and modern pedagogical technologies. European Journal of Research and Reflekction in Educational Sciences [EJRRES] Volume 8 Number 8, 2020 Part II ISSN 2056-5852. Progressive Academic Publishing, UK.

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ВОПРОСЫ МЕТОДОЛОГИИ ПОЗНАНИЯ В УЧЕБНИКАХ ФИЗИКИ НОВОГО ПОКОЛЕНИЯ

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Abstract: В статья судьбоносным для развития физического образования ближайшего будущего является выработка и задание в разных формах новых норм учебной деятельности для школы и вуза. Но только в некоторых темах более или менее распределение содержания соответствует принципу цикличности.

Keywords: взаимодействии, электромагнитных колебании, понятия, модель, явлений, учебник, знания, физические величины, наблюдения, методологии познания, гипотезы, мысленных экспериментов, материальной точкой, опыта, моделирования, факты.

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