Mikhail Geraskov (1874-1957) Methodological Concepts of Learning Physics.

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* This article is made with the financial support of the European Social Fund, project № BG051PO001-3.3.06/0026. Mariyana Ilieva has the sole responsibility for the content of the article and it cannot be considered as an official statement of the European Union or of Sofia University "St. Kliment Ohridski", Faculty of Education

Abstract

Mikhail Geraskov is a distinguished Bulgarian educator from the first half of the twentieth century, who developed the scientific foundations of didactics and methodology of training. His work contributed a lot to the development of the Bulgarian pedagogy. The subject of scientific research is didactical conceptions and methodological conceptions of learning. The aim of the research paper is to presents his ideas about particular methods of teaching Physics for high school. Geraskov assumes direct correlation between didactics and methodology. This paper focuses on his ideas about design, technology and methodological requirements for lessons of Physics. He believes that the appropriate methods are determined by the curriculum, set of educational goals and age characteristics, and capabilities of adolescents. In his methodical recommendations he focuses on teaching methods and forms that provoke students' activity. Comparative analysis with publications on the issues set for development of the Bulgarian pedagogic science and the actuality in the modern education system.

Keywords: Education; Design lesson; Methods of teaching; Classroom practice; Historical pedagogy.

Introduction

Mikhail Geraskov is a distinguished Bulgarian teacher from the first half of the twentieth century, who developed the scientific foundations of didactics and methodology of training. In the period 1923 – 1940 he was a lecturer at Sofia University. The period was characterized by the development and influence of the Herbartianism and the Alternative education. During this period at the University taught some of the distinguished Bulgarian educators - professors Dimitar Katzarov (1881-1960), Petko Tzonev (1875-1950), Hristo Negentzov (1881-1956). In the 1920s at the University were formed two major departments the Department of Pedagogy, (1924) it was led by professor Katzarov and the Department of Didactics and methodology, in 1924 headed by Professor Tsonev who attracts Geraskov of academic activity. The period 1921-1950 was characterized by the launch of the development of university courses in methods of teaching various subjects. Geraskov is one of the erudite Bulgarian teachers.

Mikhail Geraskov (1874-1957)

Mikhail Geraskov with colleagues and students at the University, Sofia 1939

The scientific production of Mikhail Geraskov is voluminous and of a varied content. The scientific areas contain Pedagogy, Theory of education, Philosophy of education, Didactics, Methodology of training, Educational psychology, School law, History of international and Bulgarian education.

Despite all these facts in contemporary Bulgarian historiography scientific publications include separate studies of his ideas. The reason for this is the change of political ideology in Bulgaria. In September 1944 a communist regime was imposed in Bulgaria and the country's political, social and cultural structures were radically changed by the ideology of this regime. Thinking people are a barrier before any dictatorship, therefore the first task of usurpers is terror and genocide on a mass scale against the intellectual class. Some of the books by Geraskov have been on the list of books banned by the government. The Bulgarian cultural life was dominated by the communist ideas for 45 years.

The research paper is part of a scientific study, which explores and analyzes the scientific production of Mikhail Geraskov in the field of didactics and methodology of training. The scientific study investigates and presents the didactical and methodological conceptions developed by Mikhail Geraskov. In the context of this research paper contribution is related to the development of this issue in its entirety. The aim of the research paper is to present his ideas on methods of teaching Physics. The following tasks are:

- to present his views on the scientific status of the teaching methodology
- to analyze Geraskov's basic methodological views for teaching Physics
- to define and show their importance and relevance in modern methods in the Bulgarian education

The research is built on the scientific production of Geraskov's work on methods of teaching particular subjects and interpretation of key publications on the topic.

Literature review

The Bulgarian educational history includes separate studies of his pedagogical conceptions. While many studies have been done since then, few of them includes Geraskov's philosophy of methods of teaching particular subjects in school.

Radev (1988, 1999, 2002) developed the theme of pedagogical thought in Bulgaria in the first half of the twentieth century. He presented basic facts about ideas of Geraskov. Radev described his contribution to the development of the Bulgarian pedagogy, especially of the didactics and methodology of training.

In the some research about the history of the methodology of teaching the authors very briefly wrote for Geraskov. Radeva (2009) presented information about his methodological concept of learning History. Antonova (1983) wrote about his methodological concept of learning Chemistry. Each of the authors briefly presented his contribution to the development of the methodology of training.

Yordanova (2005) examined the methodological views of Geraskov for learning Pronunciation in the elementary school. In conclusion the author expressed position that he is one of the most important educators of scientific thought and his methodological concept of learning Bulgarian language has actual dimensions and value.

Petrova (2005) presented in detail information about his methodological concept of learning Bulgarian language. In summary the author wrote that the methodological heritage of Geraskov is valuable. She defined him as a progressive scholar who put rational requirements about the design and the technology for lessons of Bulgarian language. Gulabova had such task of her article (2005). She briefly described the ideas of Geraskov about the methodological concept of learning Particular subject.

Ilieva (2012) described in detail Geraskov's basic methodological views for teaching Bulgarian language and Mathematics. In summary the author indicated that he has important contributions to the development of methods of teaching Bulgarian language and mathematics. In conclusion she maintained that in the middle of the twentieth century his ideas are highly appreciated and influenced to the other scholars in this area.

In conclusion, each of the authors strongly pointed his contributed to the development of the teaching methodology and the relevance of his ideas. But the studies are not enough to bring out the Geraskov's fundamental ideas about design, technology and methodological requirements for lessons of particular subjects. The aim of the research paper is to presents his ideas about particular methods of teaching Physics. The research should show another aspect of his pedagogical heritage and should enrich the Bulgarian historiography. Comparative analysis with publications on the issues set for development of the Bulgarian pedagogic science and the actuality in the modern education system.

Scientific status of the teaching methodology by Mikhail Geraskov

Geraskov distinguishes didactics and methodology. He believes that didactics contains theory and principles of teaching methods. Teaching methodology contains theory and technique of teaching particular subjects. He assumes that between didactics and methodology there is a direct correlation. Teaching methodology has a specific task - to examine and specify the use of didactic and pedagogical training rules in order to achieve the best educational outcomes. He defines methodology as a special didactics (Geraskov, 1922, p. 3). His view is different from the modern educational theory (Radev, 2005). However his idea about the correlation theory – practice is important. This shows that his idea is still relevant today.

In his view, didactics modify the content according to the development of students. He argues that it is impossible training to be tailored to the individuality of each student. However, it is necessary to develop problems, according to the characteristics of the age groups. He makes the division according to the development of students and determines - Didactics of primary school, Didactics of secondary school and Didactics of high school. Each of them has special task-driven objectives. Compliance with the psychophysiological opportunities for students of different age groups is important and necessary for the education. The author claims that pointing out that in

developing the science standards should specify the individuality of students (Geraskov, 1921, pp. 17-20).

This division can certainly be extrapolated as a correlation between didactics and methodology. The following table (Table 1) represents the correlation theory – practice and the didactics modify the content. Didactics of primary, secondary and high school in content are actually modern subject theory. Although Geraskov puts them only according to age groups, he does not give a prescription on curriculum. He recommends specific tasks to involve the organization, compliance with laws and application of specific methods. Such view is close to the modern understanding of the relationship of the individual school didactics and methodologies. In first half of the twentieth century the school levels of Bulgarian education were primary school, secondary school and high school. In his scientific concept Geraskov covers the entire education system. In the modern concept of school didactics there is no such division, but similar differentiation will contribute to improving the quality of education. His idea is modern. The sciences principles should be according to the characteristics of the age groups. Dividing a system into its separate parts is considered support to the proper organization of training and the use of appropriate methods. In practice, each of the steps in education should be to promote the development of students. The educational goal is possible when educational system is consistent with psychology of students. These conditions influence the quality of education.

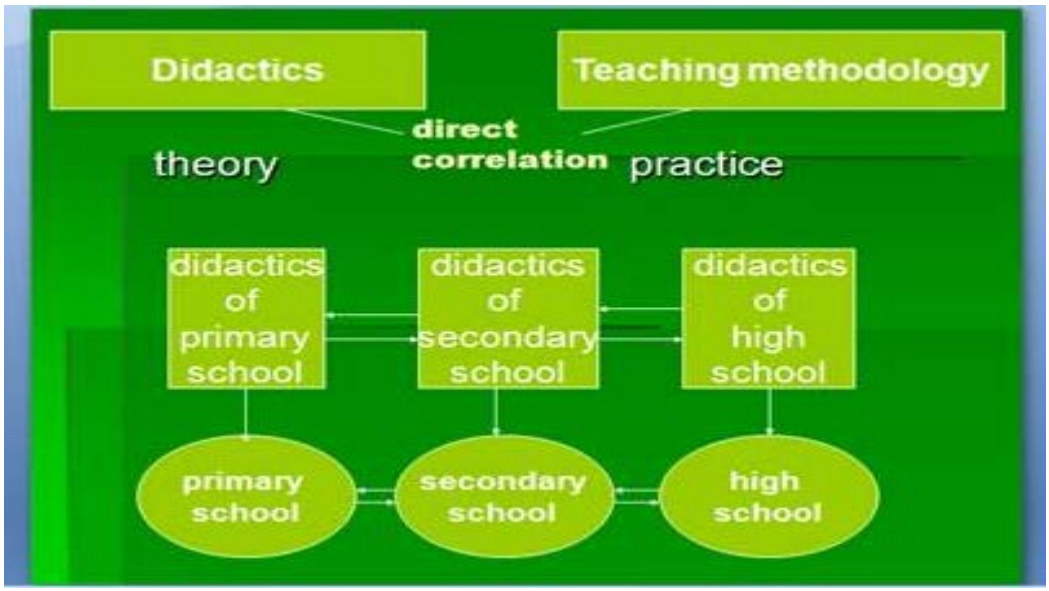

Table 1. The correlation between didactics and methodology

Characteristic of the scientific publication of Mikhail Geraskov in teaching methodology

In 1922 the first edition of the book of Mikhail Geraskov *Methodology for primary and secondary education* which is a guide for students in Teachers' institutes, schools, teachers and self-improvement was released. It is dedicated to the methodology of the particular subjects. The book was reprinted four times consecutively, the second edition was in 1924, the third in 1928 and the fourth - in 1942. This shows the best estimate, which is given to the work of Geraskov. Each edition is tailored to the school curriculum of the Bulgarian educational system and changes in it. In 1946 the book was published under the title *Methods of subjects in school.*

The period was characterized by the development and influence of Herbartianism and European reforming education. In the first half of the twentieth century in the pedagogical literature was using the methodologies of Stephan Basarichek (1848-1918) and Todor Benev (1861 -?). Basarichek was a Croatian educator, lecturer in a teaching school in Zagreb, where he trained many Bulgarians, who would later work in the field of education. He was a follower of Herbartianism. His views had a strong influence on the Bulgarian educational thought and practice to the spread of Herbartianism immediately after the Liberation. His scientific

publication was translated into Bulgarian. During this period, many pedagogical literature and books of Basarichek were used for pedagogical disciplines teaching future teachers. In period 1903-1906 were published three volumes of the book by Todor Benev, Sava Velev (1869-1913) and Vasil Nikolchov (1873 -?). They are dedicated to pedagogy, didactics, teaching methodology and history of education. The second volume is *Methodology*. Benev is entirely in the spirit of Herbartianism specific instructions and followed the instructional models of education. During this period, only individual articles existed in Bulgaria, many of which were devoted to the methodology in the primary school. This is inherently Geraskov's great contribution to the development not only of the methodology, but also of the didactics and pedagogy in general. He presents his personal position depending on the Bulgarian reality and educational system.

In the preface to the first edition, Geraskov (1922, pp. 1-2) points out the reasons which prompted him to write this paper. The Bulgarian educational print often considered questions of methodology in different subjects, but they were isolated and represented separate and distinct concepts. The purpose of his work is to give a global and contemporary view, which serves to prepare future teachers and those who seek to enhance their pedagogical training - for self-education of teachers.

In considering methodological issues in individual subjects Geraskov adopts an idea about the subject of the special methodology. In characteristic style Geraskov presents the development of ideas and confirmation of each subject in historical aspect. He points out specific objectives and tasks of the subjects, starting from general educational purposes, the place they occupy in the curriculum and requirements for the selection and order of the material. To achieve his intention Geraskov presents views on the conduct of individual units' methodological subjects and recommends concrete implementation of teaching methods and forms. He emphasizes the relationship with psychology, while examining the methodology and presentation of various subjects puts particular emphasis on the psychophysiological basis of the student. To achieve

educational goals and the examination of theory and Geraskov shows that a good methodology and application of each method is in direct correlation with the knowledge of the field of psychology. He focuses on the educational and practical importance of each subject. He presents in detail the particular methodological design of a learning unit.

The historical context of the relationship between didactics and methodology is amended in the process of building a system of pedagogical sciences. This is indicated by modern scholars of Bulgarian pedagogy for example Petar Petrov. In the first half of the twentieth century and before that, methodology is accepted as a normative part of the pedagogical theory and its content presents primarily the specific guidance for teaching (Petrov, 1998, pp. 16-17). This aspect shows the idea about the subject and tasks of the special methodology. The structure is consistent of the presentation and the importance of the subject key concepts associated with it and its development as a science.

Geraskov briefly presents the evolution of ideas and presentation of each subject in historical aspect which is a characteristic of his style of writing. He points out specific objectives and tasks of subjects determined by the total educational purposes. He presents his position about the curriculum and requirements for the selection and order of the knowledge. Geraskov expresses views on the conduct of teaching particular subjects and recommends specific application of teaching methods. This is determined by the compliance and implementation of the principles of education. He emphasizes the relationship with psychology and methodology in addressing the various subjects and puts particular emphasis on the psychophysiological progress of students. He thinks that the best methodology and application of each method is in a direct correlation with the knowledge of psychology. It is important for the educational purpose. He also focuses on the educational and practical significance of each school subject (Geraskov, 1946).

The meaningful analysis of his scientific publication focuses to this problem, in conclusion to that the author consistently adopts his instructional model of education with the four steps in teaching. They are:

- definition of the aim of the lesson
- preparation for teaching the new curriculum material
- teaching new knowledge
- practice knowledge

He adopts a direct relationship between school levels. This is clearly expressed in the setting of individual goals and objectives of training in each subject. He focuses on the methodology of primary school, as it laid the foundations of the education of young people, particularly in reading, writing and arithmetic, which are not only skills necessary for personal and social development of adolescents, but also a prerequisite for higher knowledge scientific fields. Geraskov puts to correlation emphasizes theory – practice (Geraskov, 1921, p. 177).

His instructional model of education should not be directly related to the model of Herbartianism (see Table 2). He takes only a few aspects of this model. The direct correlation between school levels is pronounced by placing individual goals and objectives in teaching various subjects. The three school levels of Bulgarian education, in this period, are primary school, secondary school and high school. Each of them has specificity determined by the psychophysiological progress of the students. This determines differences in recommended methods. Also each subject area requires the use of certain methods. This is especially true for the Natural Sciences of subjects in which Geraskov considered the most appropriate the use of the inductive method. In the methodological views of Geraskov thoroughly is presented the idea of the need to implement a variety of methods. For each school grade in different subjects, he indicates which methods and forms of training are best suited for use (Geraskov, 1944).

THE INSTRUCTIONAL MODEL OF MIKHAIL GERASKOV	THE INSTRUCTIONAL MODEL OF HERBARTIANISM
1. Definition of the aim of the lesson	1. Preparation
2. Preparation for teaching the new curriculum material	2. Presentation
3. Teaching new knowledge	3. Association
4. Practice knowledge	4. Generalization
	5. Application

Table 2. Similarities and differences between the two instructional models of education

Teaching methodology of Physics

Geraskov's ideas support the development of Bulgarian pedagogical thought; more specifically, he develops methods of teaching particular subjects for high school. It is because in the first half of the twentieth century different scientific publications focus on the methodology for primary school. Contrary to Geraskov in their issues on the methods of teaching particular subjects including the three school levels which are primary school, secondary school and high school. In his methodical recommendations on particular subjects, briefly, specifying certain teaching methods and forms suitable for use in the high school. He believes that the appropriate methods are determined by the curriculum, set of educational goals and age characteristics, and capabilities of adolescents. In his methodical recommendations he focuses on teaching methods and forms that provoke students' activity. This implies to a greater degree the use of heuristic learning and development. Along with the induction for this school degree he recommends more frequent use of deductive method. He emphasizes the need for the exercise of inductive reasoning. Educational content and underlying educational purpose suggested enriching student's awareness through presenting a clear realistic picture and knowledge in various scientific fields in a systematic form. The knowledge must be practical and focused. Geraskov (1946, p. 84) stated

that, “Methods of teaching must influence the feelings of the students and their critical attitude towards things in public life”.

The educational aim of Physics in high schools is to acquire knowledge of science, scientific methods of observation and study. Physics is an inductive science. This science is the result of inductive reasoning. Thus, according to Geraskov teaching Physics must be based on the experiment. The main method of teaching Physics is induction and parallel with it is the analytical method. Geraskov determines the methods of teaching. They are direct instructional method, induction and deduction. In that process, experience is not mere observation, susceptible to the tricks of our perception, but is based on systematic observation, comparison and verification. The experiments should be conducted exclusively for the purpose of observation and information gathering, followed by the formalization of knowledge (Geraskov, 1928, p. 173).

Geraskov believes in the importance of achieving greater connection between educational purpose, theories and practices on Physics education. He focuses on laboratory activities. The teacher’s guidance and instruction have ranged from highly structured to open inquiry. Laboratory activities’ goal is to promote central science education goals including: understanding of scientific consepts, development of scientific practical skills and problem – solving abilities, and interest and motivation. Scholarly efforts have identified serious mismatches between goals for science education and learning outcomes visible in school graduates (Geraskov, 1928, pp. 175-177).

The way people learn and process new information that they are taught is one of the many factors that makes each individual person unique. While some people learn quickly by actually performing a task for themselves, others learn better by watching someone doing the task or by simply hearing the task explained. The methods that each prefers for learning is known as their own unique learning style. Geraskov believes for teachers’ understanding of their student’s

learning style can be the key to unlocking their full potential and making difficult concepts seem as easy as they can be. This methodological assumptions of Geraskov is determined by his ideas of significance of psychophysiological progress of students. The teacher must know their students (Geraskov, 1923).

In Physics education Geraskov stresses the value of laboratory experiment and activities, demonstration and models. Therefore, graphic organizers are visual representations of knowledge that can support theoretical knowledge. They provide a frame for teachers and students to visually identify important facts, organize information, and record relationships between facts and ideas. These tools help students to practice higher level thinking skills and apply these skills to real world situations. Different demonstrations, models and experiments help students to remember information, understand how pieces of information are related, better understand the learning material and engagement of multiple intelligences. They are especially effective in explaining and illustrating abstract concepts (Geraskov, 1928, pp. 178-179). Geraskov creates the lesson plan for forming knowledge of Physics with the four steps in teaching. They are:

- introduction
- engagement in physical experience
- performance characteristics make the phenomenon
- defined as the Physical law
- exercises

In his ideas about structure, technology and methodological requirements of lesson Geraskov firstly sets teachers' preparation and design of Physics lessons. It includes theoretical, practical and methodological aspects. He pays particular attention to the methodology of the teacher about the students' understanding of physical truths and the causal relationships between them. The second condition are teaching aids which are very important. Equipment is needed to produce natural experiments. The experiments in the classrooms must be under school time. He

recommends selecting those that require less time and which are most accessible. In the statement of the new knowlegde the teacher makes first physical experience. The experiments are made most often by the teacher, but where possible and appropriate to engage students. This is important for the active participation of the students in training. After performance the teacher points characteristics the phenomenon and the comparison with other similar events. He specifies the relationship and defines the physical law. In drawing a few truths in attempts to observe the sequence. Geraskov writes that the lessons of Physics cannot give an overall scheme, but the statement should follow the main points. The practice knowledge is best if you allow students to perform exercises alone. This can be carried out through experiments with a total exposure to the material or items with practical significance. In this part of lesson, the teacher and the students can make various experimentals. Thus Geraskov puts the emphasis on students' activity. He recommends that outside school hours are appropriate for students to visit places in which to see the practical application of Physics. Practical exercises in physics are important for education. Unfortunately, Geraskov says, most schools do not have the necessary facilities. It is important that these exercises allow students to make at least the most important attempts. Empirical knowledge is very important in learning of Physics (Geraskov, 1928, p. 177). These ideas are close to modern methodology. This highlights the principle of transparency, which is expressed by Geraskov. His ideas are interesting and contemporary. They may support improving the quality of education.

The hygienic working conditions that adversely affect the physiological status of students are very important (Geraskov, 1928, p. 188). In education these subjects presented the idea of environmental and health education, which requires pupils to form a conscious and caring attitude towards their own health and the environment with all its components - physical, chemical, biological, cultural, historical and others. It puts the other cross-curricular education, which as mentioned is expressed as an idea by Geraskov. The idea that physics is an inductive

science and focus on the physical experiment in education is in modern pedagogical science (Raykova, 2008). This implies respect for visual principle. M. Geraskov requirements on teacher's education for the learning process have now become outdated. However, the planning and execution of specific physical experiments for achieve clear and thorough knowledge of the students are important points. The idea of Geraskov for activity in the training of students is still current today. Their participation in the conduct of specific experiments, either alone or with the teacher is important.

Methodological concepts and requirements that are present in modern methods show that the ideas of Mikhail Geraskov in this aspect are still relevant. Today it is recognized that the practical experience requirement is related to the logical structure of the curriculum and meets the purpose of the experiment. Proper organization of supervision during the event is important to direct properly the attention of the students. Emphasis is placed and the optimum number of experiments and preliminary preparation of teachers for the experimental part of a lesson. It helps to perform successful and safe experiments. This is connected with the right technique. Clearly expressed is the idea of teaching students to independence of thought and action, giving them the opportunity to perform experiments under the instructions of the teacher. The training presentation of the material should be presented according to age groups - in a narrative or a lecture form, which is preferred in the high school, in parallel with the discussions it is important to combine demonstration of experiments and other visual aids.

In general, these requirements are expressed today in the methods of teaching Physics; they are similar to those posed for the Bulgarian teachers from the first half of the twentieth century when the importance of educational resources was also stressed. Although Geraskov defines them as high school requirements. The model of learning in modern education is different in degree from that of Geraskov's. However his idea of the place of experiment in the exhibition of new teaching

material is preserved today. The methodology of training as the most effective approach is considered a removal of physical laws and rules of the experiment.

The Physics classroom in the 1930s

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Scientific production of Mikhail Geraskov

Photo by: M. Ilieva

Conclusion

The contribution of Mikhail Geraskov in the methods of teaching particular subjects can be seen in several aspects. In the time in which he lived and worked, the Bulgarian pedagogical thought experienced a deficit in its methodological developments. Geraskov fills this gap and it worked very well. His *Methodology* was reprinted several times and is one of the main guidelines for schools to prepare teaching staff. His ideas were highly appreciated and influenced other researchers in this field. He makes a significant contribution to the development of teaching methodology of the high school. He believes in basic principle which emphasize that the school organization must be determined by the specifics of the students' specifics. He presents his personal position. He does not fully accept the ideas of Herbartianism. He wishes the methodological recommendations are guiding thought for teachers in organizing and

implementing their practical work, as well as an objective criterion for discussion of issues in this area. One of the major achievements of Mikhail Geraskov is improvement of methodology for Bulgarian school. He made valuable contributions to science. Before 1950's he was the mentor for scholars who worked on this topic.

The educational politics in Bulgaria for the past 20 years has been focused on improving the quality of education, in particular through increasing the capacity for teaching. One of the strategies to improve the quality of Bulgarian education is to establish teaching practices that allow a greater interaction between the teacher and the student, so as to assure a constant monitoring of the teaching and learning process in order to quickly identify problems and to support students that may face difficulties. The others strategies are to focus on the learning process of each and every student and to establish mechanisms for the participation of the students in the education. The History can teach us. Geraskov's views of methodology in the high school are actuality in the modern educational system. There is a significant similarity with the ideas in modern education. In conclusion his ideas are relevant to contemporary educational practice. The model of learning in modern education is different in a degree from that of Geraskov's. However his idea of the place of experiment in the exhibition of new teaching material is preserved (today). His methodological recommendations are relevant for the contemporary Bulgarian education.

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