

## REVIEW

of dissertation and materials of Maya Ivanova Gacheva, PhD student at the Department of Methodology of Biology Education, Faculty of Biology, Sofia University "St. Kliment Ohridski Doctoral Program Methodology of Biology Education for the award of the educational and scientific degree "Doctor" on the topic: "CONTENTS OF BIOLOGICAL EDUCATION IN BULGARIAN AND CALIFORNIA EDUCATIONAL SYSTEMS - A COMPARATIVE ANALYSIS".  
by Prof. Dr. Natasha Valcheva Tsanova, Methodology of Biology Education  
Scientific supervisors: Assoc. prof. Nadezhda Raycheva, Assoc. prof. Iliana Petkova

### **1. General presentation of the materials, biographical data, structure, and outline of the thesis**

The candidate Maya Gacheva has submitted the necessary materials duly prepared and covering all the requirements for the dissertation defense. Since 2015 she has been a teacher of science and health education at the American English Academy, Sofia, "Abraham Lincoln". Her training and professional skills in the field of biology are the result of graduating from the Faculty of Biology, undergraduate program (specialty in molecular biology) and graduate program in plant physiology, and the subject area of pedagogy - Master of Education (modern educational technologies). In addition to her basic training in biology and pedagogy, Mrs. Gacheva has practical experience as a teacher in the field of research. All this inevitably reflects and contributes to the good quality of the dissertation.

The structure of the dissertation is in line with a precisely outlined methodological framework for conducting a comparative pedagogical study. The total length of the thesis is 176 pages in which 16 tables and 37 figures are integrated. The content is structured in an introduction, four chapters (research methodology, competency approach - theoretical foundations and practical dimensions, theoretical analysis of teaching documentation related to the implementation of the content concept in the teaching process, analysis of student assessment results), conclusions, contributions, recommendations, conclusion, and appendix. The literature used includes 77 sources and 50 archival documents and internet sources. Results of the theoretical analysis in the field of study have been published in three articles, making them available for analysis and follow-up by interested users in the field of comparative education. From the content of the doctoral thesis, the generalizations drawn and the published results, it can be assumed that the doctoral student has a good knowledge of the research field and has produced a result with broad possibilities for transferring generalizations to pedagogical research on the problem.

### **2. Relevance of the research topic and appropriateness of the objectives, tasks, and methods of the research**

The relevance of the research topic for me is indisputable. The basis for this statement is in the context of the idea of an integrated European educational area. It is well known that the educational systems of individual countries are a direct reflection of their economic, political, and social situation and cultural and historical traditions, which brings to the fore the question of how a given system fits into the general concepts of contemporary education in European countries. This poses the problem of developing research in comparative education to derive generalizations and general propositions while respecting cultural and historical traditions in the educational sphere of each country. In this sense, it is no coincidence that one of the goals of comparative education is to improve research in national, regional, and global educational systems

by developing the theoretical and methodological aspects to bring out general and specific problems in educational systems and find out overlapping territories.

In the context of the mentioned aim of comparative education in the first chapter of the dissertation the doctoral student has precisely and in coordination formulated the object, subject and aim of the research from which the set tasks directly follow. The relation object - subject - goal - tasks is extremely precise, for which the doctoral student deserves congratulations. This is also an illustration of her knowledge and skills in deriving the methodological framework of the research, which is henceforth a kind of guarantee of the quality of the final product of the research. The research methods are properly chosen, described as the essence, which also ensures the achievement of the set goal and the resulting objectives.

### **3. Characteristics and evaluation of the dissertation**

In the context of the above-mentioned relation, after a critical analysis of the state of the educational system in Bulgaria, the main problem in the meaning of the study is outlined in the introduction, which is also an argument for the choice of the research topic. Among the arguments, special attention is paid to the place of biological education in the content of education in our country and its importance for the overall development of the student's personality. Against this background, a brief characterization of the specifics of education, the environment, the means and the teaching subjects of the American English Academy in Sofia is made. In the first chapter (Research Methodology), the doctoral student presents the specifics of the mixed research (with a predominance of qualitative characteristics), and the resulting choice of theoretical analysis and synthesis as the leading method in the research. In addition to the precise formulation of the main methodological categories for the research, I would like to make special mention here of the content and generalisations in the main stages of the research outlined. The methodological stage is visualized by a figure (p. 14) that illustrates the specificity of the different comparison criteria and the relationships between the levels of comparison (conceptual, structural, and content). The three levels of comparison described and visualized hereafter determine both the structure of the development and the territory of comparison for each of its parts. This fills with content both the practical-applied and the content part of the general-logical comparison approach. Overall, the methodological framework of the study in my opinion is one of the significant contributions of the research.

The theoretical foundations and practical dimensions of the competency approach are presented in chapter two of the dissertation. As a result of a theoretical analysis of literature sources, several highlights of direct relevance to the research are presented - the nature of the concepts of competence and competency (and hence the definition of the chosen approach), methodological competence and the different types of classical teacher competences at different levels, the relationship between competences and education, the place and importance of teacher competences in the context of the European Framework of Key Competences and the normative framework for educational management. All this makes this part of the chapter comprehensive with precise relationships between part and whole on the problem.

The second part of the same chapter is devoted to the content of learning as the main construct in the benchmark. The place of this construct in the didactic problematic is visualized in a diagram (p. 23) as main issues and a corresponding decomposition of the mentioned criterion of comparison. The similarities and differences between the concepts of educational content, learning content, learning process, their representation in the normative framework and the relations between them are correctly and objectively brought out (diagram on p. 26).

The following decomposition of the mentioned comparison criteria is presented in the third part of chapter two. The theoretical analysis is constructed in the relation "curriculum – National Educational Standards for content - curricula" in the Bulgarian and American educational systems in terms of concept, content, specificity in the two educational systems, points of contacts and differences. This part of the dissertation is a natural center in the development. The analysis is thorough, precise and critical. The results of the comparison at the level of learning process - standards- curricula is presented as a summary in Tab. 7, p. 77 of the three levels - conceptual - structural - content - previously derived. These summaries as a whole are a ready tool for comparison with broad possibilities for transfer to other subject areas and are a significant contribution of the PhD student.

The following decomposition of the benchmarks is presented in Chapter 3, "Theoretical analysis of instructional documentation related to the concept of content in the learning process. Concept about textbooks and teaching aids in Bulgarian education" as the essence and main characteristics. It is centered on the toolkit for teaching and learning as composition, specificity of content, structure and normative requirements for each of the elements of the toolkit. A special emphasis in the analysis is the specificity in the content of the textbooks and the essential characteristic (structural and functional) of their elements and relationships among them. From this angle, a critical analysis of biology textbooks for the middle school and high school stages is carried out, with the positive and negative aspects, respectively, correctly illustrated with examples (pp. 87-91). Similar in concept and content is the analysis of the textbooks as the main tool for the formation of the skills of students included in the curriculum. Positive aspects and deficits of the workbooks for different grades are again highlighted and illustrated.

An analysis of textbooks and teaching aids in the United States is an integral part of the above content chapter. The objective reasons making the analysis difficult (mainly the lack of a uniform normative framework) and their implications for deriving common characteristics are summarized. A natural focus is the analysis of science standards in California, which is in the research field. The analysis also includes a brief historical overview of the concept for American textbooks, which adds to the overall picture of the issue. Special attention is given to textbook controversies and the process of textbook development as changes and challenges. Overall, this part of the chapter outlines the essential characteristics of the level of comparison major sources of content and hence the points of contact and differences with Bulgarian sources of biological content. The analysis is again accompanied by sample illustrations (pp. 114-138).

The aforementioned content chapter is the natural centre and occupies accordingly the bulk of the development volume. The theoretical analysis is detailed, precise and, both structurally and in terms of content, entirely in the context of the aim and objectives. On page 151, again in tabular form, the general features in the learning process-textbook relationship and other features are set out in comparative terms at the conceptual, structural and content levels. This table is complementary to the one mentioned above (Table 7) and adds comprehensiveness to the comparison tool.

The next part of the chapter is devoted to assessment scales and equating values in Bulgaria and the USA (pp. 154-157). The content is devoted to the last element of the goal-means-outcome relation to identify differences in the achievement of students who are taught under the two systems. A period of 5 consecutive years is covered for subjects in grades 5, 7, 9 and 10, and the analysis is by grade and overall. The author shares personal observations over a period of 9 years regarding motivation

to study the biology subjects. The main research question addressed in the analysis of the results is whether there is a statistically significant difference in the achievement of students who are taught under the two educational systems under comparison. The results show statistically significant differences in favour of the Bulgarian education system and the author selectively for each grade justifies the reasons for the differences. The data are presented in tabular form and through bar graphs, making it easier for the reader to follow the results and compare them. A correlation analysis is also carried out to answer the question of whether and how strong the correlation is between the achievement of students taught under the two education systems. Overall, the statistical tools chosen are adequate and correct to draw generalizations from the analysis of the results in the context of the purpose and research objectives.

#### **4. Analysis of the conclusions and contributions**

I fully accept the conclusions, contributions and recommendations formulated by the doctoral student as objectively arising from the research carried out. The two main research questions that the study seeks to answer have been correctly formulated and empirically proven. The contributions are formulated in theoretical and applied aspects, derived from the subject - object - goal - objectives relationships of the research. Here, I would especially like to highlight the contributions of the PhD student in methodological aspect and the tools for their technological provision, which also provides opportunities for transfer in other comparative researches.

I have no comments to the author only one recommendation for future research in the field. The last chapter as content could be enriched with a comparative analysis of tools (as types of tasks) for assessing students' learning achievements in the given subjects in the context of the skills included in the standards and curricula.

The abstract structurally and in terms of content presents the dissertation work in a summarized way.

#### **5. Conclusion**

In general, the development of the doctoral student is relevant not only in the field of comparative researches but is also new as an idea and implementation in the subject field of methodology of biology education. The comparative analysis is correct and innovative in the sphere of methodology of comparative studies and their technological provision. As an implementation it is precise and logically correctly structured.

In conclusion, I believe that the dissertation submitted for analysis, "**The Content of Biology Education in Bulgarian and Californian Educational Systems - A Comparative Analysis**", meets the qualitative and quantitative criteria of the PhD Degree and undoubtedly illustrates the high research level and originality of the ideas presented. The dissertation shows that the PhD student Maya Ivanova Gacheva possesses in-depth theoretical knowledge and professional skills, demonstrating qualities for independent research. I confidently give my positive assessment and propose the honorable evaluating jury to award the educational and scientific degree "PhD " to Maya Ivanova Gacheva in the professional field 1.3. (Methodology of Biology Education).

24.08.2024

Reviewer: .....  
(prof. Natasha Tsanova)