# OPINION

## by PROF. DR. IVAYLO PEEV STARIBRATOV

for awarding the educational and scientific degree "doctor"

field of higher education 1. Pedagogical sciences;

professional direction 1.3. Pedagogy of training in …;

doctoral program Methodology of information technology education

**Author**: Vera Petkova Shopova - full-time Ph D student at the OMIIT department at the FMI of the PU

**Topic of the dissertation:** "**Using information technologies for the implementation of interdisciplinary connections in science education in high schoo**l"

**Scientific supervisor:** Prof. Dr. Kosta Andreev Garov

**1. General description of the presented materials**

By order No. PD-21-2451 dated 15.12.2023 of the Rector of the Plovdiv University "Paisiy Hilendarski" (PU), I have been appointed as a member of the scientific jury to ensure a procedure for the defense of a dissertation work on the topic "Using information technologies for implementation of interdisciplinary connections in science education in high school" for the acquisition of the educational and scientific degree "doctor" in

field of higher education **1. Pedagogical sciences**;

professional direction **1.3 Pedagogy of training in …**;

doctoral program **Methodology of information technology education**

The author of the dissertation is Vera Petkova Shopova - a full-time Ph D student at the Department of Education in Mathematics, Informatics and Information Technologies (OMIIT) at the Faculty of Mathematics and Informatics (FMI) of the PU with mentor Prof. Dr. Kosta Andreev Garov from the same university and same department.

The set of paper materials presented by Vera Shopova is in accordance with Article 36 (1) of the Regulations for the Development of the Academic Staff of the PU, includes the following documents:

1. application form to the rector for opening a procedure;

2. curriculum vitae in European format;

3. protocol of the preliminary discussion in the department;

4. abstract;

5. declaration of originality and authenticity of the attached documents;

6. certificate of compliance with the minimum national requirements;

7. list of publications;

8. dissertation work;

9. copies of the publications on the subject of the dissertation work;

10. document for paid fee, according to the Tariff.

11. set of documents on paper from item 1 to item 10 – 3 pieces;

12. set of documents from items 1, 2, 3, 4, 6, 7, 8 (possibly indicating other documents from items 5 and 9 on electronic media) – 3 pieces;.

The PhD student has attached 6 publications, five of which are co-authored and one published in an indexed journal.

**2. Brief biographical data for the doctoral student**

Vera Shopova has completed master's degrees in: biology and chemistry teacher and IT teacher in high school. She has been working on these qualifications for more than twenty years, mainly in secondary schools in Plovdiv and the region. This is the basis of her research in the presented dissertation. The accumulated practical experience is well structured and presented in the articles, the abstract and the dissertation. Her educational qualifications and professional experience are reflected in the presented work.

**3. Actuality of the topic and appropriateness of the set goals and tasks**

In recent years, there has been a decline in the level of education (see the results of HEI, DZI and PISA), which shows not only that the motivation of students is decreasing, but also that there are problems in the approaches to teaching the academic content. With the rapid development of IT, they have become an integral part of teaching methods and techniques in all subjects. The integration of information technology with other academic disciplines is defined as a real necessity. It is a means of expanding the possibilities and quality of education, a way of methodically enriching the teacher, which allows solving the tasks currently set before society.

Interdisciplinary connections in school education are a concrete expression of the integration processes that take place today directly in science and in life. Both problems are relevant and are discussed in collaboration in the dissertation work.

In a scientific and scientifically applied context, IT is integrated with inter-subject connections, which is an important condition for achieving a competence approach in the education of students. A good realization of the relevance of the researched tasks in the dissertation has been achieved.

**4. Knowing the problem**

As a Ph D student Vera Shopova knows the problem well and has applied it many times in her pedagogical practice. She also showed this during the preliminary discussion of the dissertation work, where he not only answered confidently, but also supported his presentation with many practical examples. In addition to practical experience, the PhD student has also studied a significant amount of literature on the subject, as well as attended short-term qualification courses.

In chapter II, item 2, seven implemented projects are shared, which shows a good knowledge of the topic and an insight into the details of the implementation with an emphasis on natural sciences and IT in junior high school.

**5. Research methodology**

A classical methodology has been chosen, which has proven its effectiveness - after conducting the experiment, to analyze its effectiveness, a method of pedagogical research by conducting a test is used. The popular SPSS system was used to process the results and conclusions, which is suitable for the purpose of the research.

The traditional structure of conducting a pedagogical experiment in the three stages - preliminary (finding) experiment has been observed; procedural (formative) experiment; final experiment. The sample is of 300 students, which can give grounds for reliability and statistical credibility of the proposed methodology.

Does the chosen research methodology allow achieving the set goal and obtaining an adequate answer to the tasks solved in the dissertation work.

**6. Characterization and evaluation of the dissertation**

The dissertation submitted for review consists of 161 pages containing – Introduction, three chapters and a conclusion. 133 literature and internet sources were used - including 101 article and book titles and 32 internet sources. Articles and books cited are 63 in Cyrillic and 38 in Latin, and there are three appendices.

The introduction presents the relevance of the problem, subject, object, goals, tasks, hypothesis, research methods and the structure of the dissertation work.

**In Chapter I,** opportunities for using IT in the educational process are presented; the essence of the concept of "interdisciplinary connections" has been clarified in historical terms and from a pedagogical point of view; the possibilities of application of inter-subject connections in the educational process are considered; the possibilities for integrating up-to-date ICT in natural science education are considered; the main concepts and methods of research related to the current dissertation have been clarified.

**In Chapter II,** an interdisciplinary methodical model for teaching natural sciences with the application of IT for the 5th, 6th and 7th grades is presented; the goals, tasks and expected results of each stage of the proposed interdisciplinary model are developed and explained, and approaches, methods and means are given for their implementation in school hours and in the hours of extracurricular activities in the junior high school stage of basic education; projects are proposed (practice is shared), implemented according to the model and approved in the 5th, 6th and 7th grades.

**In Chapter III,** criteria and indicators for diagnosing the results of the pedagogical experiment have been developed; preparations were made to conduct a pedagogical experiment to verify the effectiveness of the proposed interdisciplinary model for teaching natural sciences in the 5th, 6th and 7th grades; a pedagogical experiment was conducted to verify the effectiveness of the proposed interdisciplinary model; the results of the training model performance check were processed statistically and analyzed. Inferences and conclusions are formulated.

The Appendices present the results of the tests used for training and evaluation.

**7. Contributions and significance of the development for science and practice**

In the dissertation, the hypothesis, the goal and the tasks set by the doctoral student are well formulated. A problem has been formulated and justified, which is relevant in a methodological and pedagogical aspect. The developed technological model for conducting the experiment is proprietary and well selected for the purpose of the study. An established system was used for the analysis.

The main contributions of the dissertation can be characterized as scientific-applied and applied. The scientific-applied contributions are the developed interdisciplinary methodological model for realizing the interdisciplinary connections natural sciences - IT in the educational process.

Applied contributions of the dissertation research are: the author's projects with the use of the interdisciplinary methodological model and the pedagogical experiment to establish the

effectiveness of the interdisciplinary methodological model, as well as the processing of the obtained results.

The relationship between the contributions, the tasks, their place of description in the dissertation work and the publications made are shown in table 27.

The main goals and tasks of the dissertation research are fulfilled, as well as the defined hypothesis is confirmed.

## 8. Evaluation of publications on the dissertation

The publications are entirely on the subject of the dissertation and reflect the conducted experiments. I find no signs of plagiarism and copying of similar content on the subject. The research is authored and has a significant applied contribution. A development is noticed in the publications. It doesn't make a good impression that five of them are in one magazine. It is good to have publications in indexed journals or conferences. All results are based on good experience and applied and developed in the practice of the doctoral student, who has many years of professional experience.

Publications can be classified by type as follows: 5 articles and one report published in a scientific conference volume. Reports were presented on four of them. There is one independent work, and the others are with one more co-author. It is not possible to judge from the submissions what the co-authorship ratio is, but the assumption is that they are equal.

## 9. Personal participation of the doctoral student

The personal participation of the doctoral student in the conducted dissertation research is indisputable, because I have not noticed any study that includes the practical topics thus prepared. Vera Shopova has correctly formulated her personal contribution at the end of her dissertation in a well-presented table linking each chapter to the publications and personal contribution.

## 10. Abstract

The abstract is 32 pages long, and the literature used is from 42 sources, 6 of them from the Internet. It includes all the main and most important elements of the dissertation, without omitting the experimental results and their visualization. The developed abstract is made according to the requirements of the relevant regulations, and reflects the main results achieved in the dissertation. I believe that the proposed abstract accurately and correctly reflects the content and quality of the dissertation work.

## 11. Critical remarks and recommendations

The presented documents are as required and comply with the legal requirements.

Regarding the content of the dissertation, there are minor technical errors that do not impair the quality of the research. It is good to multiply the accumulated experience and refine the final results.

I recommend that the research and the accumulated experience be shared with colleagues.

**12. Personal impressions**

From the short meetings with the PhD student, I have the impression that she is persistent and has the scientific and practical training on the subject.

**13. Recommendations for future use of dissertation contributions and results**

I recommend Vera Shopova to continue the work on the topic and share her experience with other well-motivated and young teachers.

Vera Shopova fulfills the minimum national requirements for receiving the ONS "Doctor" in professional direction 1.3. Pedagogy of learning in ... **I have no doubt of plagiarism** in the publications submitted for review.

**CONCLUSION**

The dissertation contains scientific, ***scientific-applied and applied results, which represent an original contribution to science and meet all*** the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for the Implementation of ZRASRB and the relevant Regulations of PU "Paisiy Hilendarski" ".

The dissertation shows that as a Ph D student Vera Petkova Shopova **possesses** in-depth theoretical knowledge and professional skills in scientific specialty 1.3 Pedagogical Sciences, **demonstrating** qualities and skills for independent conduct of scientific research.

With this all said, I confidently give my ***positive assessment*** of the conducted research, presented by the above-reviewed dissertation, abstract, achieved results and contributions, and I ***propose to the honorable scientific jury to award the educational and scientific degree "doctor"*** to Vera Petkova Shopova

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12.01.2024                                    Reviewer: .........................................

                                             **PROF. DR. IVAYLO STARIBRATOV**