

# REVIEW

by Associate Professor **Todorka Atanasova Glushkova, PhD,**

**University of Plovdiv “Paisii Hilendarski”, Plovdiv**

in reference with a dissertation thesis for awarding the Educational and Scientific Degree “Doctor” in

**Area of higher education:** 1. Pedagogical Sciences

**Professional field:** 1.3. Pedagogy of teaching in....

**Doctoral program:** Methodology of teaching mathematics

**Author of dissertation:** Radka Todorova Zlatanova

**Dissertation title:** Formation of creative thinking in students in teaching geometry using dynamic geometric software

**Supervisor:** Assoc. Prof. Ivaylo Peev Staribratov, Phd, University of Plovdiv “Paisii Hilendarski”

## **1. General presentation of the procedure and the PhD student**

By order № P33-5349 of 22.10.2021 of the Rector of the University of Plovdiv “Paisii Hilendarski”, I was appointed as a member of the Scientific Jury in a procedure for the defence of the dissertation work on “Formation of creative thinking in students in teaching of geometry using dynamic geometric software” for obtaining the educational and scientific degree “Doctor” in the area of higher education “1. Pedagogical sciences”, Professional field “1.3. Pedagogy of teaching in.... “, Doctoral program “Methodology of teaching in mathematics”. The author of the dissertation is Radka Todorova Zlatanova, a PhD student in a part-time form of study at the Department of Education in Mathematics, Informatics, and Information Technology with supervisor Assoc. Professor Ivaylo Peev Staribratov, PhD, at the University of Plovdiv “Paisii Hilendarski”.

The set of paper materials, presented by the doctoral student, is in accordance with Art. 36 (1) of the Law on the Development of the Academic Staff of the University of Plovdiv, and it includes the following documents:

- an application to the Rector of the University of Plovdiv to initiate the procedure for the defence of the dissertation;
- CV in a European format;
- Protocols from the Department Council, related to reporting the candidate’s readiness for initiating the procedure and the preliminary discussion of the dissertation;
- the dissertation thesis;
- abstracts in Bulgarian and English;

- a list of scientific publications on the topic of the dissertation;
- copies of scientific publications;
- a list of observed citations;
- a declaration of originality and authenticity of the attached documents;
- a reference to the minimum national requirements;
- a certificate for a second professional qualification degree.

The PhD student has submitted six publications, five of which in a journal and one in conference proceedings. This set of documents meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for the Application of the Act for the Development of the Academic Staff in the Republic of Bulgaria, and the Law on the Development of the Academic Staff of PU “Paisii Hilendarski”. The dissertation was discussed and proposed for defense at a meeting of the Department of Education in Mathematics, Informatics and Information Technologies at the Faculty of Mathematics and Informatics of the University of Plovdiv, held on 14th September 2021. The procedure for obtaining the Educational and Scientific degree “Doctor” is legally organized. The dissertation and the abstract correspond to the requirements of the Regulations on the terms and conditions for acquiring scientific degrees and for holding academic positions at the University of Plovdiv.

The PhD student Radka Todorova Zlatanova received a Master’s degree in Mathematics and Informatics from the University of Plovdiv “Paisii Hilendarski” in 1996. The consistency in the professional growth of the PhD student is impressive. From 2001 to 2015 she successively acquired Fifth, Fourth, Third, and Second Professional-Qualification Degrees, as well as One-year professional-pedagogical specialization “Personality-Oriented Education”. All this unequivocally shows the desire of the PhD student to constantly improve her skills and develop in the area of education, methodology, and didactics. This is fully complemented by her successful development as a teacher from 1996 until today.

## **2. Relevance of the topic**

The dissertation is dedicated to a current problem related to the need to change the model of education to activate interest and desire for learning in students. It is aimed at creating a system of tasks and methodological tools for teaching mathematics with the application of dynamic geometric software (DGS) on topics from general education programs in mathematics in different grades of school.

The main goal of the dissertation is to find appropriate didactic and methodological approaches and tools to serve for the compilation of a system of problems in geometry through the use of dynamic geometric software in mathematics education in 5th, 8th, 9th, and 11th grades of the Bulgarian school, which will fit into the general practice model to realize an increase of the creative thinking in students. The goal is clearly defined and supported by equally clear and specific sub-goals, which strengthens the nature of the dissertation research. Explicit and logically consistent five tasks have been identified, the

implementation of which inevitably leads to the accomplishment of the goals. The object, the subject, and the hypothesis of the research are also formulated in accordance with the other elements of the research.

### **3. Knowledge of the problem**

The theoretical study of the respective field, presented in the introductory part and the first chapter, leads to an analysis of the possibilities for using dynamic geometric software in solving certain problems in the education of students. The Sam and GeoGebra environments are thoroughly examined and the experience of their application in the process of students' learning is studied. This, as well as the long-term experience of the doctoral student as an innovative teacher, gives grounds to assume that the researched problem is known in the necessary depth.

### **4. Research methodology**

The methodological approach used for the research is a diagnostic procedure for control of the knowledge, skills, and competencies, and additional methods are used for the realization of the specific goals and objectives of the research, such as theoretical and empirical research methods (observation, comparison, analysis, synthesis, modeling, discussions, talks, tests, etc.), use of the rich personal pedagogical experience of the doctoral student, didactic experiment, mathematics and statistical methods for information processing, etc.

## **5. Characteristics and evaluation of the dissertation and contributions**

The dissertation has a volume of 173 pages, which include eight pages of references and additional pages with four appendices. It consists of an introduction, three chapters, a conclusion, used literature from 74 sources, four appendices, a list of six publications and one presented conference report, a list of observed citations, and a declaration of originality of the results and contributions. The presence of seven noticed citations of four publications of the doctoral student makes a very good impression, which once again proves the relevance of the research. The main content includes 127 figures, which illustrate the use of the chosen methodology. The processing of the collected information is appropriately structured and visualized through multiple tables, diagrams, and formulas. The applications contain a test on educational content, a survey with bilingual children, a survey with experts, and students' results from the conducted testing. Thus described, the content of the dissertation characterizes it as a serious, complete, and voluminous development.

The above characteristics define the nature of the dissertation as scientific and applied scientific. The main contributions, according to the author, are six. I agree with the scientific contributions proposed by the doctoral student, related to the development of methodological tools for teaching geometry and technology for the application of DGS for the formation of creative thinking in students. From the point of view of practice, the dissertation research is valuable with the developed system of tasks and methodological approaches for the use of SFE in teaching mathematics and the development of a model for diagnostic procedure.

## **6. Evaluation of the publications and personal contribution of the doctoral student**

The main results of the research are published in journals and conference proceedings. Most of the publications are in Bulgarian, which makes them accessible to the Bulgarian teachers for whom they are intended. There are a total of six publications on the topic of the dissertation thesis. Five of them are in journals, and one in a collection of academic papers from a scientific conference, of which three publications are referenced in the Web of Science, one in MathSciNet, and one in ERIH Plus. Four of the publications are in Bulgarian and two in English. All publications are co-authored. The proposed publications are proof of the good promotion of the results of the research as well as the ability of the doctoral student to work in a team, to take responsibilities, and to hold a responsible position. The PhD student's contribution to the publications is indisputable.

The number and quality of publications meet the requirements of the Regulations on the terms and conditions for acquiring scientific degrees and for holding academic positions at the University of Plovdiv and their content reflects the main results, which are sufficiently presented to a specialized scientific audience.

## **7. Abstract**

The abstract reflects the content and contributions of the dissertation and meets the requirements.

## **8. Recommendations for future use of dissertation contributions and results**

The presentation of each chapter of the dissertation begins with a summary and ends with conclusions, which, together with the precise language and excellent graphic layout, outline the good style of work, which I fully approve.

The doctoral student realistically formulates the future use and development of the dissertation results. As a recommendation, I think that in the future the experience and results of the research should be presented in single-authored publications of the doctoral student.

## CONCLUSION

The dissertation **contains scientific, scientific and applied, and applied results, which represent an original contribution to science and meet all the requirements** of the the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for the Application of the Act for the Development of the Academic Staff in the Republic of Bulgaria, and the Law on the Development of the Academic Staff of PU “Paisii Hilendarski”.

The dissertation shows that the doctoral student Radka Todorova Zlatanova **has** in-depth theoretical knowledge and professional skills by **demonstrating** qualities and skills for independent research.

Due to all of the above, I confidently give my *positive evaluation* of the research presented by the above peer-reviewed dissertation thesis, abstract, results, and contributions, and I *propose to the members of the honorable Scientific Jury to award the educational and scientific degree “Doctor”* to Radka Todorova Zlatanova in the Area of higher education: “1. Pedagogical sciences “, Professional field “1.3. Pedagogy of teaching in ... “, Doctoral program” Methodology of teaching mathematics “.

20.11.2021

**Reviewer:** .....

Assoc. Prof. Todorka Glushkova, PhD