

STATEMENT REPORT

**under the procedure for acquisition of the educational and scientific degree “Doctor”
by candidate Diana Starja,**

**of the PhD Thesis entitled: “Personalization of secondary school mathematics education
through the use of modern information technologies”,**

In the Scientific field: **1. Pedagogical Sciences**

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

Doctoral program “Methodology of mathematics and informatics training”, Department „OMI”,
Faculty of Mathematics and Informatics (FMI), Sofia University “St. Kl. Ohridski” (SU)

The statement report has been prepared by: Professor PhD Kiril Gueorguiev Bankov – FMI as a member of the scientific jury for the defense of this PhD thesis according to Order № ПД-38-669/23.12.2022 of the Rector of the Sofia University.

1. General characteristics of the dissertation thesis and the presented materials

The dissertation contains 243 standard pages. It consists of an introduction, 6 chapters, a conclusion, 4 appendices and a list of references. The titles in this list are not numbered, spread over 8 pages, and the list contains over 100 titles.

2. Short CV and personal impressions of the candidate

Diana Starja has completed her BA and MA degrees at University “Aleksandër Xhuvani” Elbasan, Albania. She has worked as a part-time lecturer at the same university as well as a mathematics teacher in high schools in Albania. I do not know the candidate and have no direct impressions of Diana Starja's work.

3. Content analysis of the scientific and applied achievements of the candidate, contained in the presented PhD thesis and the publications to it, included in the procedure

Modern education policies stress on several features for the education of school students, one of which is personalized learning. Generally speaking, this means that the teacher should look for such methods and means of teaching to meet the needs of each student in a given class according to his/her desires, skills and talents. This is particularly important for mathematics teaching, not only because of the importance of mathematics and its specific role in the education system, but also because mathematics is a difficult subject everywhere in the world, both to teach and to learn. If the mathematics teacher can find an approach to reach each individual student, it would make mathematics easier to learn and understand. That is why I consider the topic of the dissertation to be relevant and important.

The introduction specifies the objects and the subject of the research, the research questions and the hypotheses, the goals and tasks of the research. The research methods and tools are described in detail. They are suitable to the objectives set and to the specific context in which the research was carried out (mathematics education in Albania). According to the dissertation, the main mean for achieving personalization of mathematics education is the use of modern information technologies (IT). To support this, the author explores three main case studies in the pilot implementation of the proposed personalized learning: (1) using the SmartBoard to support problem solving in seventh grade students with different learning styles; (2) the use of GeoGebra for visualization, demonstration, group work, and mathematical modeling of

problems related to the concept of “function”; (3) the effect of educational games on the development of logical, critical and algorithmic thinking of students in grades 5-9. These case studies are well selected to answer the hypotheses and objectives set in the dissertation, as well as from the perspective of mathematics education methods in Albania.

The first chapter reviews the literature related to the role of IT in personalizing mathematics learning. The process is examined in an evolution from pencil and paper teaching to the use of modern technologies. The second part of the chapter describes the Albanian context of school IT infrastructure. The presented results are well known. Therefore the author has no claims for own contributions to their development. However, I consider this chapter to be an integral part of the dissertation because it helps to understand the results in the following chapters.

The second chapter examines the general idea of personalized learning and the mathematical context of four main components of successful personalized learning. A tool for developing a personal learning profile for each student is described. The author's contribution here is in justifying the conclusion that personalized mathematics teaching and learning through IT has an impact on all the main aims of mathematics education.

The third chapter analyses the current state of IT use in mathematics teaching in Albania. The author used a questionnaire for mathematics teachers, especially prepared for this purpose, and a semi-structured interview. These are generally accepted methods for collecting data from a pedagogical experiment and analyzing them. The experiment was conducted correctly and the interpretation of the results is meaningful. The analysis show a need of training in the field of teaching through IT to personalize mathematics learning.

The fourth chapter describes the preparation and implementation of mathematics teacher training in one region of Albania. It is about personalized mathematics learning based on students' learning styles and IT support. The two-day training, prepared and conducted by the author of the dissertation, is combined with conducting surveys and interviews. The conclusions show that despite the professional experience of mathematics teachers and despite the high scientific level they have in the subject, they must constantly apply teaching methods that combine psychological, pedagogical, and methodological aspects with the support of IT tools.

The fifth chapter describes and analyzes the experimental part of the dissertation. The experiment includes the three case studies described in the introduction. It is analyzed in terms of the benefits of using specific educational technology platforms to personalize mathematics teaching in secondary school. The results confirm the fact that personalized mathematics learning supported by IT tools contributes to higher results of students' mathematical learning.

The sixth chapter focuses on the experimental group of students. The author has prepared a questionnaire for them to investigate the frequency of using IT tools for various learning activities, the opinions of students about the importance of using IT in mathematics education to make it as understandable and fun as possible, and how it affects their motivation and self-esteem. Data analyzes show that a well-thought-out combination of learning activities developed with the help of IT tools and perfect planning of teachers' work leads to positive

attitudes towards the learning process as a whole and increases students' motivation and self-confidence.

The conclusion summarizes the findings in chapters 1-6. Interestingly, some questions are raised related to personalization of mathematics teaching for all schools in Albania. This makes a good impression and shows an understanding of the specific needs of the educational environment in the country.

4. Approbation of the results

The contributions of the dissertation are mainly in a well-founded analysis of the advantages of personalized learning in mathematics from a modern perspective, based on the support that IT offers. I am convinced that the contributions are the work of the author alone.

It should be noted that the author knows and correctly uses modern methods of scientific research in mathematics education. The chosen methodology and research methods are properly selected to achieve the objectives of the dissertation and to answer the research questions posed. This increases the validity of the analyses and conclusions made, which sound reasonable and are well-founded. The rich and analytical literature review on the topic of the dissertation deserves admirations.

There are 7 scientific publications presented, which are related to the topic of the dissertation work. Two of them are independent, and the rest are co-authored. Six of these are from EDULEARN annual conferences. The sum of the points for these publications is more than 30, which is the minimum number according to national requirements for educational and scientific degree "Doctor". No citations of publications are presented. (This statistics is according to the author's reference in the abstract. In a separate file, the publications related to the dissertation are presented. There are 6 of them in this file. One of the publications is missing, which is co-authored and is in EDULEARN. The sum of the points for these 6 publications is also more than 30.)

I am not aware that the author has participated in previous procedures for acquiring a scientific degree and an academic position.

I do not find plagiarism in the dissertation. The author properly cites each publication from the reference list. Citations are clearly indicated.

5. Qualities of the abstract

The abstract correctly reflects the content of the dissertation. It meets the requirements for completeness and compactness. I agree with the author's reference on scientific and applied scientific contributions stated in the abstract.

6. Critical notes and recommendations

I don't have any significant critical notes or recommendations.

7. Conclusion

Having become acquainted with the PhD thesis presented in the procedure and the accompanying scientific papers and on the basis of the analysis of their importance and the scientific and applied

contributions contained therein, **I confirm** that the presented PhD thesis and the scientific publications to it, as well as the quality and originality of the results and achievements presented in them, meet the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria, the Rules for its Implementation and the corresponding Rules at the Sofia University “St. Kliment Ohridski” (FMI-SU) for acquisition by the candidate of educational and scientific degree “Doctor” in the Scientific field 1. Pedagogical Sciences, Professional field 1.3. Pedagogy of learning in In particular, the candidate meets the minimal national requirements in the professional field and no plagiarism has been detected in the scientific papers submitted for the competition.

Based on the above, **I strongly recommend** the scientific jury to award Diana Starja the educational and scientific degree “Doctor” in the Scientific field 1. Pedagogical Sciences, Professional field 1.3. Pedagogy of learning in

Date: 14 February 2023

Signature:

/Kiril Bankov, professor, PhD/