STATEMENT REPORT

under the procedure for acquisition of the educational and scientific degree "Doctor"

by candidate: **Diana Bozha 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 science**
Professional Field: **1.3. Pedagogy of the education in…**
Doctoral Program: „**Teaching Methodology of Mathematics and Informatics**", department „**Department of Education in Mathematics and Informatics**"
Faculty of Mathematics and Informatics (FMI),
Sofia University "St. Kliment Ohridski" (SU),

The review is prepared by: **Assoc. Prof. Mariana Ilieva Atanasova, PhD** - from FMI at SU, as a member of the scientific jury, according to Order No. № RD 38-669/ 23.12.2022 of the Rector of Sofia University.

1. General characteristics of the dissertation and the related materials

The dissertation of Diana Starja aims on building of a model for improved effectiveness of personalized education in mathematics through information and communication technologies (ICTs). Personalized learning in mathematics through ICT is a process that requires a balanced combination of many components like recognizing students' skills and needs, student's learning style, use of technological support, digital competencies, and

most importantly the skills of the teacher to introduce each of these components at the right time.

The object, subject and research goals of the dissertation are clearly formulated. To achieve the main goal, 6 tasks are defined, 3 of which with various specific sub-tasks.

The dissertation is 244 pages, structured in an introduction, six chapters, a conclusion, 55 figures and 16 tables, 5 appendices, and a bibliography of 129 literary sources, books, electronic sources, and reports in English.

In the introduction, the topicality of the problem is justified, the object and subject of the research are defined, the purpose, tasks, research methods and tools are discussed and the structure of the dissertation is presented. The first chapter presents an overview of the literature on the role that ICT tools play in supporting personalized maths education and introduces the Albania context in terms of the regulatory framework and school ICTs infrastructure. The second chapter analyses the mathematical context of the four main components of successful personalized education – setting students' goals, targeted instruction, flexible path and pace, and collaboration and creativity. The third chapter aims on giving an inside on the state-of-art of using ICTs in teaching mathematics in Albania. In the fourth chapter a training of math teachers on personalized education based on students' learning styles by ICT support is presented. The fifth chapter describes the implementation of the training in the actual work of teachers, confirming the effectiveness of the training and showing improvement in students' mathematical thinking, motivation and self-esteem. Chapter six addresses the role of educational technologies in mathematics teaching to motivate students and increase their self-esteem. In the conclusions some suggestions on the design and implementation of educational policies for personalized teaching of mathematics by ICT tools are given.

The presentation is clear, comprehensive and balanced. The dissertation work is well structured and appropriately illustrated.

2. Data and personal impressions about the candidate

Diana Starja was a part-time doctoral student at the Faculty of Informatics and Mathematics at Sofia University since 2019. She has been granted the right to defense by order No. RD 20-2430/21.12.2022. She has professional experience as Mathematics teacher in various secondary schools for about 30 years now and part-time lecturer at the University of Elbasan for almost 10 years, teaching Applied Mathematics and

Methodological Teaching of Mathematics. The last twenty years she went through 14 qualifications and trainings in various aspects of math's teaching, among which Interactive Teaching, Pupil centered teaching, The benefits of using ICT in teaching mathematics and many others. She has a master's degree in Applied Mathematics, 2011-2013, from Elbasan University "Aleksandër Xhuvani", and bachelor's degree in Mathematic Sciences, Teacher of Mathematics, 1988-1993, from Elbasan University "Aleksandër Xhuvani". She participated in numerous international and national research projects.

The rich work experience of Diana Starja dedicated to the teaching of high school students and her diverse trainings in the field of technologically augmented and personalized education testify to her dedication to the teaching profession and the pursuit of excellence.

3. Content analysis of the candidate's scientific and applied achievements, contained in the submitted dissertation and the publications to it, included in the procedure

The main scientific contributions in the dissertation can be formulated as follows:

Scientific contributions

1) Analysis on how technological tools supports active mathematics teaching.
2) Detailed examination on how personalized math lesson can be accomplished, including the tasks teacher have to accomplish.
3) Research and analysis on the use of ICTs in mathematics education in Albania – types, interest, personal experience, difficulties, etc.
4) Model of personalized education considering the skills, needs and talents of the students as well as many other psycho-pedagogical factors on one hand and implementation of educational technology innovations for personalization of math on another.

Applied contributions

1) Teachers'training to provide personalized math education, supported by ICT tools.
2) Successful implementation of personalized teaching of mathematics supported by ICTs tools in three secondary schools.
3) Validation of the positive influence of personalized math teaching supported by ICTs on students' mathematical thinking, their motivation and self-esteem.

4) Number of sets of exercises and problems according to the topics as well as the mathematical competencies they develop and the level of the students are worked out and applied.

The achieved scientific and applied results are an important step in finding an adequate approach to the use of technologies in personalized education, so that they positively affect both the process of learning the material and the motivation and interest of the students.

4. Approbation of the results

All the main results of the dissertation are published in 6 publications, of which 1 is indexed in Web of Science, the rest are published in journals with peer review or in edited collective volumes. In two of the articles the PhD student is a single author, in the rest, she is a co-author. There is no doubt about her contribution to the publications. At present, no citations of these publications are known.

Apart from the publication on the dissertation, the PhD student has an impressive number of other publications – 5 books, 9 study guides, one journal article, and several publications in conference proceedings.

In addition to her publication work, during her PhD studies the student has participated in 5 scientific projects of the Ministry of education as well as the Scientific Research Fund.

The scientific works meet the minimum national requirements (under Article 2b, Paragraphs 2 and 3 of the RSARB) and, accordingly, the additional requirements of SU "St. Kliment Ohridski" for the acquisition of an educational and scientific degree "doctor" in the scientific field and professional direction of the procedure.

The results presented by the candidate in the dissertation work and related scientific works do not repeat those from previous procedures for acquiring a scientific title and academic position.

There is no proven plagiarism in the submitted dissertation and scientific works under this procedure.

5. Quality of dissertation's abstract

The abstract has been prepared in accordance with the requirements of the Regulations of FMI - SU for the terms and conditions for acquiring scientific degrees and occupying scientific positions. The abstract fully, comprehensively and accurately reflects the content of the dissertation, as well as the main scientific and applied achievements.

6. Critical remarks and recommendations

I have no significant notes or recommendations.

7. Conclusion

Having familiarized myself with the dissertation work presented in the procedure and the scientific works accompanying it and based on the analysis of their significance and the scientific and applied contributions contained in them, I **confirm that the presented dissertation** work and the scientific publications to it, as well as the quality and the originality of the results and achievements presented in them, **meet the requirements** of ZRASRB, the Regulations for its application and the relevant Regulations of SU "St. Kliment Ohridski" for the candidate's acquisition of the educational and scientific degree "doctor" in the scientific field 1. Pedagogical science and professional field 1.3. Pedagogy of the education in... In particular, the candidate satisfies the minimum national requirements in the professional direction and no plagiarism has been found in the scientific works submitted for the competition.

Based on the above, I **recommend** to the respected scientific jury **to award to Diana Bozha Starja the educational and scientific degree "Doctor"** in the scientific field 1. Pedagogical science and professional field 1.3. Pedagogy of the education in... (Teaching of Mathematics and Informatics)

27.02.2023 Signature:

/Assoc. Prof. M. Atanasova, PhD/