

## OPINION

**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 “Teaching Methodology of Mathematics and Informatics”, Department „Education in Mathematics and Informatics”,

**Faculty of Mathematics and Informatics (FMI), Sofia University “St. Kliment Ohridski” (SU).**

The review has been prepared by: **prof. Toni Chehlarova**, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences (IMI-BAS), Sofia, as a member of the scientific jury for the defense of this PhD thesis according to Order № RD-38-669/23.12.2022 y of the Rector of the Sofia University.

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

The dissertation was developed under the supervision of Assoc. Prof. Nikolina Nikolova, Faculty of Mathematics and Informatics, Sofia University "St. Kliment Ohridski" and Assoc. Prof. Bederiana Shiti, University " Aleksandër Xhuvani", Elbasan, Albania.

It is presented in English on 244 non-standard pages, of which 215 are main text and the rest are appendices and references. It is structured into an Introduction, six chapters, a Conclusion, Discussion and Further Work, and an Author's Contributions. In its development 130 sources were used.

Chapter 1. contains a literature review on the topic and recommendations for intervention in Albania in terms of 1) teacher training; 2) ensuring appropriate ICT infrastructure in Albanian schools; 3) creating a structured system of policies and priorities related to teachers' digital competence; and 4) coordinating with universities preparing mathematics teachers. Chapter 2 discusses the characteristics of personalized learning in mathematics. Focused instructions for developing a personal learner profile on which to base personalized learning are offered. Chapter 3 provides an overview of the state in Albania regarding the use of ICT in mathematics teaching.

The results show the variety of difficulties that Albanian teachers face in personalizing the teaching of mathematics through ICT - parents' scepticism, technological limitations, low level of teachers' digital competences, etc. Chapter 4 proposes a framework and model for teacher training to deliver personalized mathematics instruction supported by ICT tools. Their validation was conducted through a pilot training edition. Its results suggest the need for periodic refresher/update courses on digital competencies, ongoing monitoring of agencies authorized to offer teacher training in terms of relevance of subject matter and quality of training, establishment of mentoring structures among teachers.

Three case studies of personalized learning for students in mathematics were followed. The three case studies are related to different target groups and the training is supported by different ICT tools (SmartBoard, Geogebra and Kahoot!). Conditions for teacher success in terms of motivating students to learn mathematics are formulated.

## **2. Short CV and personal impressions of the candidate**

The CV of the Ph.D. candidate shows a high level of professionalism and influence in terms of mathematics education in the country. She is an author of textbooks and teaching-aid literature on mathematics for students and teachers. She works as a part-time lecturer at the Aleksandër Xhuvani University in Elbasan.

## **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**

The candidate's scientific contributions are related to the systematic study of the situation in Albania regarding mathematics education (strategies, policies, infrastructure, teacher training). An overview of the characteristics of personalized learning in mathematics and of the role of ICT tools in its implementation is made. Tools for outlining a student's personal profile were developed. A model was developed, accompanied by a curriculum and resources for training mathematics teachers to personalize instruction.

The applied contributions are associated with a list of recommendations regarding educational policies in Albania, the development of specific topics of mathematics curricula for personalized learning through ICT tools, authoring tools for the study of students' learning styles, digital competences and mathematics teachers' attitudes towards personalization of learning through ICT tools.

## **4. Approbation of the results**

Two of the publications on Diana Stary'a's dissertation are independent, and the rest are co-authored. The review of the publications shows that they **meet the minimum national requirements** (under Art. 2b, para. 2 and 3 of ADASRB\*) and, respectively, the additional requirements of Sofia University "St. Kliment Ohridski" for acquiring the educational and scientific degree "Doctor" in the scientific field and professional field of the procedure.

The results presented by the candidate in the dissertation and the scientific papers accompanying it **do not repeat** such from previous procedures for acquiring a scientific title and academic position.

An anti-plagiarism check has shown that there **is no evidence of plagiarism** in the thesis and scientific papers submitted under this procedure.

## **5. Qualities of the abstract**

The abstract correctly presents the results and the content of the dissertation. It **meets** all the requirements of its preparation.

## **6. Critical notes and recommendations**

The bibliography is not described according to a particular standard. Different styles of description have been used for different sources. Some of the sources are incompletely described. There is overlap of images in some places in the abstract.

## **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 ADAS 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. Pedagogy**, 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 recommend** the scientific jury to award **Diana Starja**, the educational and scientific degree “Doctor” in the Scientific field 1. Pedagogy, Professional field 1.3. Pedagogy in learning in... .

Date: 20 February, 2023

prof. Toni Chehlarova, PhD

*\*ADASRB - Act on Development of the Academic Staff in the Republic of Bulgaria*