STATEMENT REPORT

on the procedure for receiving educational and scientific degree "Doctor" (PhD) in

field of higher education: 1. Pedagogical Science

professional field: 1.3 Pedagogy of training in...,

Author: Mladen Georgiev Valkov

Dissertation: Development of digital competence in mathematics education

The report was prepared by Prof. Dr. Sci. Emil Milanov Kolev, Institute of Mathematics and Informatics, BAS, in a capacity of a member of the Scientific Jury according to Order No. 53/ 27.02.2024 г of the Director of IMI-BAS and decision of the Scientific Jury (Protocol 1/11.03.2024).

1. General characteristics of the dissertation and the presented materials

The dissertation is 207 pages long and consists of an introduction, three chapters, acknowledgments, conclusion, contributions and references. The abstract is in a volume of 39 pages and correctly reflects the contributions of the dissertation student.
The materials and documents submitted by doctoral student Mladen Valkov certify that all the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRAS in the Republic of Bulgaria) and its regulations have been complied with. It is evident from the publications of Mladen Valkov that he meets the minimum national requirements of Art. 2b. para. 2 and para. 3 from ZRAS in the Republic of Bulgaria for the acquisition of an educational and scientific degree "doctor".

2. Data and personal impressions of the candidate

Mladen Valkov graduated from PPMG"Nancho Popovich", Shumen. He received his bachelor's and master's degrees from the FMI of Sofia University in 2015 and 2017, respectively.
I have known Mladen since his school days. He was an active participant in competitions and Olympiads, having repeatedly won prizes and medals (silver medal from the Youth Balkan Mathematical Olympiad 2007, bronze medal from the Zhautikov Olympiad 2010 and silver medal from the Balkan Olympiad 2011). As a student, he was actively involved in the student Olympiads, winning a gold medal from SEEMOUS 2012. In 2013 and 2015, he won the award of ak. Obreshkov, and in 2015 he was chosen as the student of the year in mathematics and informatics.

3. Content analysis of the candidate's scientific and scientific-applied achievements, contained in the presented dissertation

The topic of the dissertation is extremely relevant because it is directly related to the development of key competences and the digital transformation of education, described in various documents at the European and national level. In the first chapter of the dissertation, a review of the existing documents was made, analyzing different approaches to achieve the set goals.

The main contribution is the *StruniMa* system presented in the second chapter, which aims to generate different games by providing online communication, monitoring and training. Several specific games have been generated for which free access is provided, respectively for working with a computer, augmented reality and virtual reality. Methodological guidelines for using the training system have been developed. Opportunities are presented to use the functionalities of *StruniMa* in learning about some topics such as “Symmetry on a board”, “Covers on a board”, “Graphs and chains”, “Knots and connections”. All games are presented in their full functionality, with various examples of possible applications given.

In chapter 3, a toolkit for conducting a pedagogical experiment was developed, with which the possibility of providing conditions for the development of digital competence in school mathematics education using the *StruniMa* training system was proven.

4. Approbation of the results

The dissertation is written on the basis of 4 articles. One article is in the journal Culture and Science, and the other three are in the journal Pedagogicheski Forum. One of the articles is independent, and the other three are co-authored.

Dissertation results have been reported many times at IMI seminars, at national seminars related to the subject and at other educational forums.

5. Qualities of the abstract

The author's abstract in Bulgarian is 39 pages long and gives a clear and adequate idea of the content and main results of the dissertation.

6. Critical Notes

My only criticism is regarding the way mathematical formulas are presented. In many places this is not done in the conventional style of using italics font.

7. Conclusion

After having familiarized myself with the dissertation work and the accompanying scientific works presented in the procedure and based on the analysis of their significance and the scientific and scientific-applied contributions contained in them, I confirm that the presented dissertation 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 law, the Regulations for its application and the relevant Regulations of IMI-BAN for the candidate's acquisition of the educational and scientific degree "doctor" in the field of higher education 1. Pedagogical sciences, professional direction 1.3 Pedagogy of training in...,. In particular, the candidate

satisfies the minimum national requirements in the professional field and no plagiarism has been found in the presented dissertation and scientific works. Based on the above, I recommend the scientific jury to award Mladen Georgiev Valkov an educational and scientific degree "Doctor" in the field of higher education 1. Pedagogical sciences, professional direction 1.3 Pedagogy of training in...

24.04.2024 г

Signature:.

/Prof. Dr. Sci. Emil Kolev /