STATEMENT REPORT

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

by candidate **Iliana Ivanova Tsvetkova**

of the PhD Thesis entitled: **"the extracurricular work in mathematics in the primary and lower secondary school stage – an important factor for discovering and developing mathematical talent",**

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

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

Doctoral program **"Teaching methodology in mathematics and informatics", Department „Education of mathematics and infomatics",**

Faculty of Mathematics and Informatics (FMI), **Sofia University "St. Kl. Ohridski" (SU),**

This statement report has been prepared by prof. dr.math.sci. Peter Boyvalenkov, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, as a member of the scientific jury for the defense of this PhD thesis according to Order № RD-38-677/22.12.2023 of the Rector of the Sofia University and decision of the Scientific Jury (Protokol 1/11.01.2024).

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

The presented dissertation is in Bulgarian, contains 82 pages and consists of an introduction, five chapters and a bibliography of 41titles (including 9 webpages) as well as 3 applications. The abstract (24 pages) summarizes the content of the dissertation, reflecting the main contributions. The candidate's submitted list of publications, related to the topic of the dissertation, contains 21 titles. One of these works, published in 2022, is indexed in Scopus and WoS, and another is in the Springer book of 2017. These indicators meet the generally accepted minimum requirements for a substantive dissertation work, in particular the minimum national requirements of Art. 2b. para. 2 and para. 3 of ZRAS in the Republic of Bulgaria. A full set of other necessary documents is also presented.

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

I have known Iliana Tsvetkova since the 1990s, when she led teams of students from SMG in national competitions and Olympiads. My excellent impressions of her professional work with young talents also date from that time. From the presented documents, it can be seen that Mrs. Tsvetkova is enrolled as a PhD student, free preparation, for the doctoral program "Teaching Methodology in Mathematics and Informatics", department "Mathematics and Informatics Training", FMI-SU, on 15.03.2022 and was completed (early) with the right to defend, starting from 30.01.2023, with Order No. RD-20-2418/20.12.2023.

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 presented dissertation is dedicated to a theoretical and practical study of working with young talents in mathematics, and experiments and observations of the dissertation student at the Sofia Mathematical Gymnasium (SMG) were used as a model example. SMG is the lead school in this field at least since the end of the last century and can reasonably serve the purposes set forth in the dissertation. The main goal is to prove that finding mathematical talents should be done as early as possible and be followed immediately by development -- a thesis that seems clear to professionals, but surely needs to be explained to the public in order to obtain strong support for talent discovery and development activities.

The first chapter discusses the role of extracurricular work and different types of mathematical competitions to discover and talent development. A special place is devoted to comment on the role of tasks and the systems of tasks they demonstrate the diversity of mathematical ideas and solutions. The second chapter is devoted to an analysis of current curricula, such as discussed the imbalance between time for new knowledge and time for practice and continuity of topics in movement to higher grades. In the third chapter, a pedagogical experiment conducted by the author is described on students from three graduations in the period 2004-2020. The description of the experiment is accompanied by a survey on the time of initiation of participation in extracurricular circles and in competitions, and for their effect. In the fourth chapter, two systems of tasks are presented - Puzzles and Method for solving

back-to-front problems accompanied by a large number of example problems. In the fifth chapter, the author's method for evaluating the mathematical talent, as the main focus is placed on the teamwork of students.

The presented results allow me to conclude that the candidate Iliana Ivanova Tsvetkova has in-depth knowledge of the subject of the dissertation work, as well as that his original contributions are sufficient to acquire the scientific degree "Doctor".

4. Approbation of the results

The dissertation is based on the candidate's many years of experience in working with young talents and on publications in Bulgarian and international editions. The list of publications includes 3 book chapters, 11 journal articles and 2 works in collections of conferences. One of the publications is indexed in Scopus and WoS through the IEEE Xplore database. There are eleven publications independent, and the remaining five are with one co-author (in three of the cases, the co-author is the scientific supervisor). 7 presentations were made by the dissertation at conferences. I found one citation of a work from the list of publications.

Iliana Tsvetkova is a co-author in the groups of 5 textbooks and one collection of mathematics in the last few years.

5. Qualities of the abstract

The 24-page abstract is prepared according to the requirements and summarizes the content of the dissertation, by clearly and accurately reflecting the main contributions of the dissertation.

6. Critical notes and recommendations

Some analyzes in the thesis could be expanded upon. The survey in the third chapter is discussed very briefly, and the conclusions from it is presented in just one short paragraph. Also, it would be interesting for such a survey to have a follow-up that explores how much people who have chosen the path of a professional mathematician or computer scientist. The dissertation draws attention to the benefit of the so-called olympad book of problems, but none are cited (except those with the author's participation). Such citations would be useful to young teachers who will become familiar with the dissertation. In connection with teamwork, students' work on essays for UCHIMI could be discussed in more detail.

These remarks do not diminish the value of the work and do not change my overall positive rating.

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"/the scientific degree "Doctor of Science" 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 to Iliana Ivanova Tsvetkova the educational and scientific degree "Doctor" in the Scientific field 1.Pedagogical Sciences, Professional field: 1.3. Pedagogy of learning in …

Date: 07.03.2024 Signature: .....

/Peter Boyvalenkov, professor, dr.math.sci/