

STATEMENT REPORT

In connection with a procedure for the acquisition of the educational and scientific degree “Doctor” by candidate Iliana Ivanova Tsvetkova, Title of the PhD Thesis: “Extracurricular Work in Mathematics in Elementary and Junior High School - an important factor in Discovering and Developing Mathematical Talent”,

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. Kl. Ohridski” (SU),

The statement report has been prepared by: Prof. Doctor of Mathematical Sciences Petar Stoyanov Kenderov (pensioner) as a member of the scientific jury for the defense of this PhD thesis according to Order № CA-38-677/ 22.12.2023 of the Rector of Sofia University.

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

The dissertation consists of an Introduction, five chapters, a Conclusion and References. In the latter, in addition to traditional publications (32 in number), 9 links to Internet resources used in the dissertation are included. In the Conclusion, an impressive list of 21 publications of the doctoral student, which are related to the topic of the dissertation, is given. All this is spread over 70 pages. However, it should be noted that each page contains about 35 lines with over 85 places for characters per line. Converted to standard pages (30 lines with 60-70 places for characters), this gives more than 100 pages of text. After the text part of the dissertation work, within 8 pages, there are also "Declaration of Originality", "Report on Similarity" and three Appendices - results of two surveys and a reference to the web page of the International Mathematics Olympiad, where the arrangement of the countries (Bulgaria included) in the unofficial ranking "by country" in the respective years can be seen.

2. Short CV and personal impressions of the candidate

I assume biographical data about the candidate will be presented in the reviews and there is no reason to put here something of this sort as well.

Due to my many years of involvement with competitions in mathematics and informatics and with activities to discover and develop the abilities of young people in Bulgaria, I have direct, long-lasting, and very good impressions of Iliana Tsvetkova's work and professional qualities. She is an outstanding and highly qualified teacher who has managed, for many years, to attract and motivate a solid number of students, including such with achievements in international competitions, to in-depth study of school mathematics. For this reason, twice (in 2005 and in 2013) she was honored with the award "For the greatest contribution to the discovery and development of talents", jointly awarded by the International Foundation "St. Cyril and St. Methodius" and the Union of Mathematicians in Bulgaria.

Along with a number of other prominent teachers, she made a tangible contribution to raising the level of the Sofia Mathematical Gymnasium to the enviable status and authority that this

school now has among educational institutions not only in Bulgaria, and not only at the school level.

I am particularly pleased with Iliana Tsvetkova's active involvement in the activities of the World Federation of National Mathematical Competitions. It is also gratifying that, regardless of the labor-intensive and time-consuming daily duties as a teacher, she has also managed to grow as a researcher in the field of pedagogical sciences.

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

The education systems of modern countries were created with the main goal of involving all young people. Therefore, the volume of knowledge taught and the speed of its teaching are adjusted to the learning capabilities of students with average cognitive abilities. Students with stronger cognitive potential easily cover educational requirements, do not make serious efforts to develop their abilities and, as a result, these abilities are stunted and not developed to a level corresponding to the concept of talent. This is especially true of innate abilities in mathematics and other exact sciences. On the other hand, it is well known that the development of society depends on the full use of the abilities and gifts of young people. This shortcoming of mass education systems was realized already at the end of the nineteenth century, when mathematics competitions and extracurricular forms of preparation for them appeared in Eastern Europe (Romania and Hungary). One of the characteristic features of the twentieth century is that the idea of supplementing school education with opportunities for the development of gifted students has spread throughout the world. Many different types of competitions appeared. The forms of preparation are also diversified. Gradually, this kind of activities formed and singled out a specific branch of mathematics and its applications, which today is present in almost all countries of the world. Bulgaria is no exception. Moreover, today we can say with confidence that this branch of mathematics is well developed in our country, and in order to maintain this level, it is necessary to carry out research, such as that of the dissertation presented for defense. In this sense, the topic considered by Iliana Tsvetkova is very relevant.

The object of the research is extracurricular work in mathematics with students from 8 to 14 years of age - something in which Iliana Tsvetkova has many years of experience and active personal participation. The focus is both on the framework - Curricula, work organization, etc. (Chapter 2 of the work), as well as on the substantive aspect expressed in the methods of work on the discovery and development of talents (Chapters 1 and 4). From the point of view of the applications, the tasks presented in Chapter 4 and specific recommendations in which class and how to consider individual tasks in the course of working with able students are of greatest interest. The selection of the tasks, their arrangement, the successive upgrading, as well as the explanations themselves, reveal a high level of originality, pedagogical mastery and expertise in this field. The material presented is ready for use by other teachers, especially by those who are newly involved in similar activities.

Of no less interest from the point of view of practice is the method proposed in Chapter 5 for evaluating the contribution of individual students in collective work on a given problem.

One of the main theses of the author, that for the discovery and development of mathematical abilities it is necessary to start the activities as early as possible, is not entirely new. For other fields (music, learning foreign languages, sports, etc.) such a thesis has long been perceived as something established. In relation to mathematical ability, this thesis is accepted "by inertia"

and "for general reasons". Chapter 3, however, presents a pedagogical experiment with a survey of three graduating classes of students who went through a full cycle of study at the Sofia Mathematical High School. The survey provides experimental confirmation of this thesis. I find this also a contribution.

4. Approbation of the results

The articles related to the dissertation have been published mostly in English in good places (Springer, a journal of IEEE, Mathematics Competitions Journal, National Council of Teachers in Mathematics (USA)). As of today (05.03.2024), five records of publications in which Iliana Tsvetkova is an author or co-author can be found in Google Scholar. In this case, the real "Impact Factor" for Iliana Tsvetkova's work should be sought not so much in the number of citations of her publications in other peoples' publications, but in the extent to which the works are usable for practical purposes.

In Chapter 3, there is a wealth of information about students prepared by her to the point of receiving prizes in prestigious international competitions. This is also the result of her efforts and is a special kind of impact on the development of society.

During the pre-defense, it became clear that the scientific works meet the minimum national requirements and, also the additional requirements of SU "St. Kliment Ohridski" for acquiring the educational and scientific degree "doctor". The similarity check does not detect plagiarism in the submitted dissertation and scientific works under this procedure.

5. Qualities of the abstract

The abstract correctly reflects the content of the dissertation and gives a good idea of the author's contributions.

6. Critical notes and recommendations

A written Statement from the doctoral student to Associate Professor Filip Petrov dated 07.11.2023 contains the following strange text, probably copied from another text or obtained after filling in an inadequately prepared standard form:

"I have covered 223.5 ECTS, which is more than the required minimum of 180 ECTS credits required for my PhD studies. I hope that, with a positive decision of the primary unit (Mathematics and Informatics Education Department), I will be dismissed ahead of schedule and that it will be proposed to the FS of FMI to open a procedure for the acquisition of the ONS "Doctor" after a public defense before a scientific jury of the submitted dissertation. "

(A note for the translation in English: In Bulgarian this text sounds as if written by a man while the doctoral student is a woman)

Some of the less important documents accompanying this defense were provided with a delay. This, of course, does not change the overall good impression of the dissertation.

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 Iliana Ivanova Tsvetkova, the educational and scientific degree "Doctor" in the Scientific field **1. Pedagogical Sciences**, Professional field **1.3. Pedagogy of learning in ...** (.....), Doctoral program "**Teaching Methodology of Mathematics and Informatics**".

Date: 05.03.2024

Signature:

/Professor Petar Kenderov/

Note:

The Statement Report must be prepared in Bulgarian and English and is in the recommended volume of 3 - 4 standard printed pages.

The Statement Report shall be submitted within the statutory term to the administrative secretary of the competition in electronic form and in two signed copies on paper, sealed in an envelope.