

OPINION

by: Prof. Nikolay Stoimenov, Ph. D.

on dissertation for obtaining educational and scientific degree

“Doctor (Ph.D.)”

member of the scientific jury Order №345/29.12.2025 of the Director of IICT-BAS

Author of the dissertation: Maya Stefanova Staikova

Thesis topic: „INFORMATION AND COMMUNICATION TECHNOLOGIES IN STEM EDUCATION“

Professional field: 5.2. „Electrotechnics, electronics and automation“

Doctoral Program: „Application of cybernetics principles and methods in various fields of science“

Scientific supervisor: Prof. Nayden Chivarov, Ph. D.

1. General characteristics of the dissertation.

As a member of the scientific jury, I have received the dissertation, its abstract, and all necessary administrative documents related to the procedure.

The submitted dissertation on "Information and Communication Technologies in STEM Education" is 186 pages long and includes figures, tables, appendices, and a bibliography. The dissertation is structured into an introduction, three chapters, and a conclusion. A total of 11 publications on the topic of the dissertation, two appendices, a declaration of originality of the results obtained, and a bibliography are presented.

2. Relevance of the problem developed in the dissertation in scientific and scientific-applied terms.

The dissertation undoubtedly deals with a topical issue that is currently being applied worldwide, with this method being most widespread in Europe in Estonia, Germany, and Finland. In recent years, STEM education has been developing rapidly in Bulgaria, as evidenced by the creation of STEM programs in every state and municipal school. This in itself is proof of the state's commitment to investing in education, which raises the level of students and teachers.

3. Degree of knowledge of the state of the problem and creative interpretation of the reference sources.

The introduction to the dissertation, which covers the industry, the history of the creation of STEM, national and global analyses on the topic, and a literature review of 126 bibliographic sources, demonstrates the doctoral student's knowledge of the subject matter. There are strong statements with a small representative sample that could be revised.

The objectives and tasks of the dissertation are formulated in a reasoned manner after analysis and systematization in the field of STEM education.

4. Correspondence of the chosen research methodology and the set goal and tasks of the dissertation with the achieved contributions.

The dissertation correctly examines technologies that are set to become an integral part of education and society in the 21st century. The proposed methods and tools for STEM education contribute to the expansion of the subject matter in scientific and applied terms. The comprehensive use of existing methods and tools and the experiments conducted show that the doctoral student has successfully implemented the chosen methodology, which is in line with the set goals and the scientific and applied contributions achieved.

5. Scientific and scientific-applied contributions of the dissertation.

I accept the contributions formulated by the author, which are of a scientific and applied nature. Some consolidation and refinement could be achieved. The availability of experimental results and their validation make a good impression.

6. Evaluation of the dissertation publications.

There are eight publications related to the dissertation. One of the publications is independent, one is included in a collection of papers from an international conference, and two are in MDPI, Engineering Proceedings. All publications are referenced and indexed in world-renowned scientific information databases, thus complying with the requirements of the law on the development of academic staff in the Republic of Bulgaria.

7. Opinions, recommendations, and remarks.

It is impressive that the publications presented are mainly from international conferences. The dissertation is well-developed. I recommend that the research be continued with more in-depth analyses of state education. There are some gaps in the citations in the dissertation that correspond to the bibliography used. The structure of the accompanying documents could have been better presented in a more in-depth form. The comments made do not detract from the dissertation.

CONCLUSION

The author has conducted a precise and in-depth study on a global topic and a developing field. All requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its implementation, as well as the specific conditions for obtaining scientific degrees and holding academic positions at the Institute of Information and Communication Technologies, in terms of scope, volume, abstract and quality of the dissertation are met. **My assessment is positive.** The results obtained demonstrate the candidate's depth and capacity to conduct independent scientific research.

Based on the above, **I propose that the esteemed Scientific Jury award** Maya Stefanova Staikova the educational and scientific degree of "**Doctor**" in scientific field 5. "Technical Sciences," professional field 5.2. "Electrotechnics, Electronics and Automation" specialty "Application of cybernetics principles and methods in various fields of science"

04.03.2026
Sofia

