OPINION

by Ph.D. Eng. Borislav Hristov Milenkov - Associate Professor at the University of Food Technologies - Plovdiv

of dissertation for award ofeducational and scientificdegree "doctor" in: field of higher education: 5. Technical sciences; professional direction: 5.3. Communication and computer technology; doctoral program: "Automation of fields from the non-material sphere (medicine, education, science, administrative activity, etc.)".

Author: Mag. Tsvetelina Lachezarova Ivanova - Varadinova

Topic: "A SYSTEM OF TECHNOLOGY-BASED SOLUTIONS IN ENGINEERING EDUCATION"

Supervisor: Assoc. Dr. Eng. Nadezhda Kafadarova

1. General presentation of the procedure and the doctoral student

By order No. RD-21-719/02.04.2024 of the Rector of Plovdiv University "Paisiy Hilendarski" (PU), I have been appointed as a member of the scientific jury to ensure a procedure for the defense of a dissertation on the topic "A SYSTEM OF TECHNOLOGY-BASED SOLUTIONS IN ENGINEERING EDUCATION"for the acquisition of the educational and scientific degree "doctor" in the field of higher education: 5. Technical sciences, professional direction 5.3. Communication and computer technology, doctoral program "Automation of fields from the intangible sphere (medicine, education, science, administrative activity, etc.)". The author of the dissertation work is M.Sc.Tsvetelina Lachezarova Ivanova - Varadinova- full-time doctoral student in the Department of "Electrical Engineering, Communications and Information Technologies". with research supervisor Assoc. Dr. Eng. Nadezhda Mincheva Kafadarova from PU "Paisiy Hilendarski".

Presented by Mag. Tsvetelina Lachezarova Ivanova - Varadinova set of materials on paper and electronic media, is in accordance with Art. 36 (1) of the Regulations for the Development of the Academic Staff of the PU and includes the following documents:

–request to the Rector of the PU to disclose the procedure for the defense of a dissertation work, entered on March 25, 2025;

–CV in European format;

–transcript-excerpt of protocol No. 61 / 28.02.2024 from the departmental council, related to reporting the readiness to open the procedure and preliminary discussion of the dissertation work;

–dissertation work;

–abstract - in Bulgarian and English languages;

–list of scientific publications on the topic of the dissertation;

–copies of scientific publications;

–declaration of originality and authenticity of the attached documents;

The doctoral student has attached 8 (eight) publications on the topic of the doctorate.

The PhD student was born in 1993. She graduated from the "Paisii Hilendarski" Polytechnic University, first the "Bachelor's College" with the qualification "Information Physics and Communications", and then the "Master's" College - "Physics Teacher". He currently holds the academic position of "Assistant" in the Department of "Electrical Engineering, Communications and Information Technologies".

I don't know mag.Tsvetelina Lachezarova Ivanova – Varadinova personal. I am not related to her, nor have a co-published.

2. Relevance of the topic

Training in the field of technical sciences requires the assimilation of both certain theoretical knowledge and the acquisition of practical skills. The classic method for this is conducting laboratory classes, in laboratories equipped for the purpose. The timing of COVID – 19 has disrupted this pattern. On the other hand, modern students more easily perceive and remember facts and skills presented in electronic form - computer animation and/or video.

It follows that the current dissertation is extremely relevant and offers new opportunities for training and the transition to "education 4.0".

3. Knowing the problem

To formulate the purpose of the present work and the tasks for its implementation, the doctoral student M.Sc. Tsvetelina Ivanova – Varadinova, used 92 literary sources, of which 79 were in English. The use of other dissertation works (3 number) related to the present one is impressive.

4. Research methodology

To achieve the goal, yesdeveloped and researched a system of technology-based solutions in engineering education, with the main emphasis being the correct definition of the specifics of engineering education and providing opportunities for qualitative evaluation of the effectiveness of the developed system. I believe that the research methodology was correctly chosen in the dissertation work, which fully corresponds to the set goal and resulting tasks.

5. Characterization and evaluation of the dissertation work and contributions

The dissertation is 229 pages long. It begins with a list of abbreviations used. At the end, three appendices are presented - 64 pages, describing the conduct of specific laboratory exercises in the studied methods (present, with remote access and distance learning with simulation).

It is structured with an introduction, four chapters, conclusions, a description of the contributions, a list of publications and a bibliography (references).

To achieve the goal of the dissertation "System of technology-based solutions in engineering education" 7 (seven) tasks are set. They are formulated at the end of Chapter One and implemented in the following chapters of the dissertation work.

In the first chapter, an analysis of technology-based solutions in education is made, and the experience of the Faculty of Physics and Technology in this direction is also described. At the end of the chapter, the purpose of the dissertation work and the tasks for its achievement are formulated.

The second chapter examines a model of technology-based solutions in engineering education. It describes various technology solutions for distance learning (asynchronous and online) that have entered education "on the go" during the COVID restrictions.

On the basis of an analysis of the advantages and disadvantages of using modern technologies in education, a model has been developed, which includes: developing a system of laboratory exercises in engineering disciplines and a methodology for conducting them, building remote access to the laboratory and conducting research and analysis of the obtained results from a pedagogical point of view.

In the third chapter, an analysis is made of the presented methods for researching the results of applying technology-based solutions in engineering education and their interpretation.

The presented methods for researching the results of implementing the system for technology-based solutions in engineering education, the data, the results of the individual research methods carried out and their interpretation are described in detail in the fourth chapter.

The contributions presented in the dissertation correspond to the purpose of the implementation of the set tasks.

At the end of the dissertation (p. 154) 5 (five) scientific and applied contributions are formulated. I accept contributions 2 to 5 as such, but I think that contribution 1 is more of an applied nature.

6. Evaluation of the publications and personal contribution of the doctoral student

To publicize the achieved results, the doctoral student has submitted 8 (eight) articles, all in English. He is the independent author of two of the articles (No. 7 and 8). In five of the articles (No. 1, 2, 3, 5 and 6) he is the first author. Two of the articles (No. 5 and 6) are co-authored by specialists in the field of "teaching methodology" from the PU "P. Hilendarski".

All articles address various aspects of technology-based solutions, including a survey of students on "self-efficacy in face-to-face, hybrid, and online learning."

7. Abstract

The abstract is presented in Bulgarian and English. It consists of 32 pages, including contributions and publications related to the dissertation work.The abstract reflects the overall content of the dissertation and highlights its contributions.

The numbering of the figures and tables in it, as well as the titles to them, correspond to those used in the dissertation.

8. Recommendations for future use of dissertation contributions and results

I would recommend the PhD student to continue with the creation of technology-based solutions (creating other exercises in this and other disciplines), as this will be extremely useful for

distance learning.

CONCLUSION

The dissertation contains scientific and applied contributions, which represent an original contribution to science and meet the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for the Implementation of ZRASRB and the relevant Regulations of PU "Paisiy Hilendarski".

The dissertation shows that the doctoral student mag.Tsvetelina Lachezarova Ivanova - Varadinovapossesses in-depth theoretical knowledge, both in the field of engineering sciences, and in teaching methodology and professional skills in the scientific specialty "Automation of fields from the intangible sphere (medicine, education, science, administrative activity, etc.)" by demonstrating skills for independent conduct of scientific research.

Due to the above, I confidently give my positive assessment of the developed dissertation work, abstract, achieved results and contributions, and I propose to the honorable scientific jury to award the educational and scientific degree "doctor" to M.Sc.Tsvetelina Lachezarova Ivanova - Varadinovain a scientific field 5. Technical sciences, professional direction, 5.3. Communication and computer technology, doctoral program "Automation of fields from the intangible sphere (medicine, education, science, administrative activity, etc.)".

.....08.05... 2024 **Prepared the opinion**: .....

Prof. Dr. Eng. Borislav Milenkov