

## OPINION

**Hristina Aleksandrova Kostadinova, PhD –  
Associate Professor at New Bulgarian University, Sofia**

on a dissertation for the award of the educational and scientific degree of “**Doctor**”

of: Field of higher education: 4. Natural sciences, mathematics and informatics

Professional direction: 4.6. Informatics and Computer Science

Doctoral program: Informatics

**Author:** Maria Metodieva Gorgorova

**Topic:** Intelligent Components in E-Learning Environments

**Scientific Supervisors:**

*Professor Stanka Ivanova Hadzhikoleva, PhD*

*Associate Professor Silvia Nikolaeva Gaftandzhieva, PhD*

### **1. General Presentation of the Procedure and the Doctoral Candidate**

By order № ПД 22-1412 from 17.07.2026 г. of the Rector of Paisii Hilendarski University of Plovdiv, I have been appointed as a member of the scientific jury for the procedure for the defense of the dissertation entitled „**Intelligent Components in E-Learning Environments**“ for the acquisition of the educational and scientific degree of “Doctor” in the Field of Higher Education 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.6. Informatics and Computer Science, doctoral program “Informatics”. Maria Gorgorova is the author of the thesis. She is a PhD student enrolled as a full-time doctoral candidate in the Department of Computer Informatics, under the supervision of professor Stanka Ivanova Hadzhikoleva, PhD and associate professor Silvia Nikolaeva Gaftandzhieva, PhD at PU “Paisii Hilendarski”. The set of materials submitted by Maria Gorgorova is in accordance with Article 36(1) of the Regulations for the Development of the Academic Staff of Paisii Hilendarski University of Plovdiv. The following documents are included:

1. Application for the initiation of a procedure for the acquisition of the educational and scientific degree of “Doctor”;
2. Curriculum vitae;
3. Statement by the scientific supervisors regarding the initiation of the procedure for the defense of the dissertation;

4. Minutes from the preliminary discussion held by the Departmental Council of the Department of Computer Informatics regarding the submission of the dissertation for defense;
5. Abstract of the dissertation in Bulgarian and English;
6. Declaration of originality and authenticity of the dissertation;
7. Report on the fulfillment of the minimum national requirements for the acquisition of the educational and scientific degree of “Doctor”;
8. List of 8 scientific publications related to the topic of the dissertation, 3 of which have been published in refereed international journals/publications;
9. Complete list of 13 scientific publications related to the topic of the dissertation;
10. Dissertation with a total length of 187 pages.

Maria Gorgorova works as an adjunct assistant professor at PU „Paisii Hilendarski“ and at the Academy of Music, Dance and Fine Arts “Prof. Asen Diamandiev”. She teaches fundamental courses in the Computer Science professional field, including “Databases,” “Software Technologies 2,” “Software Project Management,” and others. In her role as a coordinator of the Union of Scientists in Bulgaria, she also organizes scientific conferences and academic events. She has a Bachelor’s degree in “Software Technologies and Design” and a Master’s degree in “Business Informatics with English Language” from the Faculty of Mathematics and Informatics at PU “Paisii Hilendarski”. She has participated in a number of projects and regularly takes part in professional development and training activities aimed at enhancing her qualifications in the field of teaching.

## **2. Relevance of the Topic**

The dissertation examines current problems in the field of computer science, presenting solutions in two leading directions in modern education - game-based learning and artificial intelligence (AI). The integration of tools with AI to support teachers in creating educational games responds to the real need for easier and faster development of interactive learning materials without mandatory technical expertise. The integration of the module into a learning management system (LMS) ensures practical applicability of the results and facilitates its implementation in a real learning environment. The study is important for both theory and practice, as it proposes a solution that can directly improve the effectiveness and accessibility of e-learning.

## **3. Knowledge of the Research Problem**

Maria Gorgorova demonstrates a very good understanding of the problem and its context. The main challenges facing teachers in creating educational games are clearly defined - lack of time, technical skills and appropriate tools. Knows the limitations of existing e-learning systems and justifies the need to integrate tools with AI. Understands the relationship between pedagogical

requirements, technological capabilities and practical needs of the learning environment, which shows a thorough study of the research area.

From a technical point of view, the dissertation demonstrates the high level of competence of the PhD student and the in-depth knowledge of modern technologies for creating software applications. The developed solution shows an excellent understanding of both the principles of designing and implementing game mechanics and the capabilities of AI for generating and adapting game content.

#### **4. Research Methodology**

The chosen research methodology is adequate to the set goal and corresponds to the nature and specificity of the tasks solved in the dissertation. The methods and approaches used provide the necessary basis for a systematic study of the possibilities for developing and integrating game modules based on AI in LMS. The methodological framework allows for a consistent transition from analysis and study of existing solutions to design, development and evaluation of the proposed solutions. The results obtained are in accordance with the set research tasks and provide an adequate and reasoned answer to the main research problem. In this sense, the chosen methodology creates the necessary prerequisites for achieving the set goal and for obtaining reliable and practically significant results.

#### **5. Characterization and Assessment of the Dissertation and Its Contributions**

The thesis is 187 pages long. It includes an introduction, four main chapters, a conclusion and bibliography. The first chapter systematically describes innovative approaches and trends in the educational process. The focus is on two main areas: the use of AI and game-based learning. The shortcomings of LMS are summarized from the point of view of providing an easy-to-use interface for using intelligent tools in the process of gamification of education. The second chapter defines the conceptual framework for the development and integration of intelligent game components. The research methodology, the stages through which it is passed and the models of the main games that are the subject of the implementation are presented in a structured form and illustrated with appropriate diagrams. The third chapter is devoted to the technical details during the development and integration of intelligent game components. A place is allocated for the architecture of the software solution: database, server part and graphical user interface. The fourth chapter includes experimentation with the implemented tools, results of working with them and user evaluation. Students from various majors who have worked with the tools in a real work environment using Moodle SeO participate in the experiments. The conclusion summarizes the work on the topic of the thesis and describes the contributions of the PhD student.

The contributions of Maria Gorgorova working on the topic of the research are scientific, scientific and applied, and practical. The main scientific contributions are related to the

development of a conceptual framework and the definition of a methodology for designing gamified and intelligent components. The scientific and applied contributions include building conceptual models and a methodology for creating various educational games and their integration into the Moodle LMS. The practical contributions are primarily related to the software implementation of prototypes of intelligent tools in Moodle and individual games aimed at developing knowledge and skills in database courses.

Taken as a whole, the doctoral candidate's contributions constitute a logically coherent and significant outcome of the research conducted. They demonstrate a high level of research and technical competence, the ability to independently address current scientific and applied problems, and the capacity to transform scientific ideas into functional technological solutions.

## **6. Assessment of the Publications and the Doctoral Candidate's Personal Contribution**

The publication activity of the doctoral candidate deserves a highly positive assessment. The scientific publications presented are directly related to the subject matter of the dissertation and reflect the main results obtained in the course of the research. A total of eight scientific publications have been presented, three of which are indexed in the Web of Science and Scopus databases. One of the publications is indexed in Web of Science and has an Impact Factor (IF) of 0.3 (Q4). The citations of her scientific publications testify to their visibility and recognition within the research community and indicate that the reported results are of interest to other authors working in similar or related research fields.

Based on an analysis of the dissertation and the results presented, I consider that the main scientific, scientific and applied, and practical contributions are the result of the doctoral candidate's independent and focused work. Her personal contribution is convincingly demonstrated and is of significant importance to the overall value of the dissertation.

The only recommendation I would make concerns the implementation of the ideas presented in the dissertation: the developed game-based modules could be implemented using a standard for integration with LMS, rather than being tied exclusively to a specific platform such as Moodle. This would enhance their interoperability, portability, and applicability across different LMS environments.

## **7. Abstract of the Dissertation**

The abstract of the dissertation is 32 pages in length, including the bibliography. It provides a sufficiently clear overview of the essence and results of the research conducted and allows the relevance, scientific significance, and practical applicability of the work to be assessed. The presentation is professional, terminologically consistent, and accurately reflects the content of the dissertation. I consider that the abstract fulfills its purpose and adequately presents the doctoral candidate's main achievements and contributions.

## **8. Recommendations for the Future Use of the Dissertation Contributions and Results**

The ideas and results developed in the dissertation provide a solid foundation for the further development of AI-assisted game-based modules. A promising direction for future development is the creation of adaptive game-based modules that dynamically adjust their content, complexity, and game scenarios according to the learner's knowledge, behavior, and progress.

## **CONCLUSION**

The dissertation contains scientific, research-oriented, and applied results that represent original contributions to the field and meet all the requirements of the Academic Staff Development Act of the Republic of Bulgaria, the Regulations for its implementation, and the relevant Regulations of Paisii Hilendarski University of Plovdiv.

The dissertation demonstrates that Maria Gorgorova possesses in-depth theoretical knowledge and professional skills in Professional Field 4.6. Informatics and Computer Science, as well as the qualities and competences required to independently conduct scientific research.

In view of the above, I give my strongly positive assessment of the research presented in the dissertation, the abstract, the results achieved, and the contributions made, and I recommend that the esteemed Scientific Jury award the educational and scientific degree of "Doctor" to Maria Gorgorova in the Field of Higher Education 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.6. Informatics and Computer Science, Doctoral Programme "Informatics".

10.8.2026

**Opinion prepared by:**

Associate Professor Hristina Kostadinova, PhD