

# OPINION

by Prof. Angel Atanasov Golev, PhD  
University of Plovdiv “Paisii Hilendarski”

on a PhD thesis for acquisition of educational and scientific degree “Doctor”

in area in higher education: 4. Natural Sciences, Mathematics and Informatics

professional field: 4.6 Informatics and Computer Science

Doctoral Program “Computer Science”

**Author:** Yavor Ivanov Dankov

**Title:** Instruments for Management and Evaluation Applying a User-Centered Approach for the Design of Video Games for Education

**Scientific supervisor:** Prof. Boyan Paskalev Bontchev, PhD, Sofia University “St. Kliment Ohridski”

## 1. General description of the procedure and the PhD student

By order № ПД 38-170 / 30.03.2022 of the Rector of Sofia University „St. Kliment Ohridski“, I was appointed a member of the Scientific Jury to provide a procedure for the defense of a PhD thesis “Instruments for Management and Evaluation Applying a User-Centered Approach for the Design of Video Games for Education” for obtaining the educational and scientific degree “Doctor” in area in higher education: 4. Natural Sciences, Mathematics and Informatics, professional field: 4.6 Informatics and Computer Science, Doctoral Program “Computer Science”.

The author of the thesis is Yavor Ivanov Dankov - PhD student in full-time education at the Faculty of Mathematics and Informatics at Sofia University with scientific supervisor Prof. Boyan Bonchev, PhD.

The set of materials presented by Yavor Dankov is complete and is in accordance with the Regulations on the Development of the Academic Staff at Sofia University “St. Kliment Ohridski”.

Yavor Dankov graduated with a bachelor's degree in Economics – „Intellectual Property“ University of National and World Economy (UNWE) in 2013. In 2016 he received a master's degree in „Intellectual Property and Business“ at UNWE. In 2016 he was enrolled as a full-time PhD student at FMI at Sofia University. From 2017 to 2020 he was a part-time lecturer at FMI, and in October 2020 he was an assistant at FMI. From March to July 2020 and from August 2020 to June 2021 he was a researcher at the Research Center of Sofia University. I do not know the doctoral student personally.

## 2. Relevance of the topic

The development of video games and in particular the creation of educational video games and serious games is a modern and rapidly evolving field. These games are increasingly used successfully in the learning process. This topic provides great opportunities for scientific and applied research, as in the last 5 years there are over 700 indexed publications in Scopus and Web of Science, connect with educational video games. The PhD student has substantiated the relevance of the research in the Introduction of the Thesis.

### **3. Knowledge on the topic**

Yavor Dankov is very familiar with the field of research related to the PhD thesis. The design of video games for training, the tools for managing the design of video games and taxonomies of video games have been studied and analyzed in detail.

### **4. Evaluation of the methodology of the study**

The applied research of the PhD student has led to solving the set tasks and achieving the main goals of the dissertation.

### **5. Characteristics and evaluation of the PhD thesis and contributions**

An extensive study of the topic of the dissertation has been made. There are 130 literary sources.

The first chapter presents the study of video games and their application in the modern world. The design of video games for training and the tools for managing their design have been studied and analyzed. A classification and comparative analysis of the analytical tools for analysis and evaluation of the design of video games for training has been made.

The second chapter presents the principles of taxonomy development. A common taxonomy of software instruments for managing and evaluating the design of video games for education is designed. Based on this, a specialized TIMED-VGE taxonomy of software tools for management and evaluation of video game design training has been developed, which can be used for all types of educational maze video games.

The third chapter discusses the use of the proposed specialized TIMED-VGE taxonomy for the design of tools for management and evaluation of the design of educational video games of the maze type in the APOGEE platform. The software architecture of the APOGEE platform has been designed. The requirements and designed functionalities of the management and evaluation tools are described. An analysis and description of the business processes of the use of the designed tools for management and evaluation of the design with a user-oriented approach, of educational maze video games.

The fourth chapter presents a methodology for validation of designed software tools, based on their practical use. Several experimental video learning games are described, which were created with the help of the designed tools in the APOGEE platform. An analysis of the results of the practical use of the developed video games for training is presented

I accept the scientific-applied and applied contributions presented in the conclusion:

- ✓ Systematic analysis of the tools for management and evaluation of the design of video games for training has been performed;
- ✓ A common taxonomy of software instruments for management and evaluation of the design of video games is designed, as well as specialized taxonomy of software instruments for management and evaluation, applying user-centered approach for the design of maze video games for education;
- ✓ Design of software instruments for management and evaluation of the design of maze video game for education describing the functional requirements and business processes was performed. The software architecture of the APOGEE platform for creating video games has been designed, where the designed software instruments are integrated into the platform and based on that architecture within the APOGEE project, the platform itself is created;

✓ Practical validation of the designed software instruments for management and evaluation of the design of maze video game for education was performed.

The PhD student has well outlined the possibilities for future development

#### **6. Evaluation of the scientific publications and the personal contribution**

Five of the publications are indexed in Scopus. The latest attached publication is also indexed in the Web of Science. Five articles have been published in scientific papers at international conferences, and one article - in an international journal. All publications are in English. Three of the PhD student's publications have one co-author, two have two co-authors and one publication has three co-authors. According to the attached declarations, the contribution of the authors to the publications is equal.

#### **7. Extended abstract of the PhD thesis**

The extended abstract is 38 pages long, meets the necessary requirements, correctly describes the content of the thesis and reflects the achieved scientific and applied results.

#### **8. Critical remarks and recommendations**

I have no recommendations or remarks on the dissertation. The field of video development and game-based learning offers great opportunities for the scientific development and academic growth of Yavor Dankov.

### **CONCLUSION**

The PhD thesis contains scientific-applied and applied results, which represent an original contribution to science and meet the requirements, conditions, and criteria of the Law on the Development of Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for the Application of the LDASRB, and the Rules on the Conditions and Procedure for Acquiring Science Degrees and Holding Academic Positions in Sofia University "St. Kliment Ohridski".

PhD student Yavor Dankov has in-depth theoretical knowledge and professional skills in the professional field 4.6. Informatics and Computer Science by demonstrating qualities and skills for independent research.

Due to the above, I confidently give my positive assessment of the research presented by the above reviewed PhD thesis, abstract, results and contributions, and I invite the highly respectable Scientific Jury to award the educational and scientific degree "Doctor" to Yavor Ivanov Dankov in area in higher education: 4. Natural Sciences, Mathematics and Informatics, professional field: 4.6 Informatics and Computer Science (Doctoral Program "Computer Science").

03.06.2022

Plovdiv

Signature: .....

/Prof. Angel Golev, PhD/