OPINION

by Assoc. Prof. Dr. Irina A. Radeva

Institute of Information and Communication Technologies - BAS

for the PhD thesis for the educational and scientific degree "Doctor" in the field of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.6 "Informatics and Computer Science", Doctoral programme: 01.01.12 "Informatics"

"Technological approaches for personalized learning using educational computer games"

by Valentina Todorova Terzieva-Bogoycheva

By order No. 168/05.07.2023 of the Director of IIKT - BAS Corr. Mem. Sv. Margenov, D.Sc. on the basis of Art. 4, para. 2 of the Act of the Development of the Academic Staff in the Republic of Bulgaria (ADASRB) in connection with the procedure for acquiring the educational and scientific degree "doctor" Professional direction 4.6. Informatics and computer science, doctoral programme 01.0.12 "Informatics" by Eng. Valentina Todorova Terzieva-Bogoycheva with a dissertation on the topic: "Technological approaches for personalized learning using educational computer games" I have been appointed as a member of the Scientific Jury.

For the evaluation of the dissertation paper, the conditions of the Act on Development of Academic Staff in the Republic of Bulgaria (ADASRB), the Regulation on the Implementation of the Development of Academic Staff in Republic Act (RIDASRBA) (Decree № 202 of 10.09.2010, amend and suppl. SG 15/19 February 2019) and the Regulations on the specific conditions in the IICT-BAS for implementation of the law are defined:

1. Pursuant to Art. 6 (3) of the ADASRB "The dissertation paper must contain scientific and applied science results being and original contribution to science. The dissertation paper must show that the applicant got deep theoretical knowledge in the respective speciality and the capacity for independent scientific research".
2. According to Art. 27 (2) of the RIDASRBA "The dissertation paper must be presented in a form and volume corresponding to the specific requirements of the primary unit. The dissertation

paper must contain: a title page, contents, introduction, presentation, conclusion – summary of the obtained results with declaration for originality, bibliography.

3. According to the RIDASRBA and the Rules of Specific Conditions in IICT-BAS, the minimum required points by groups of indicators for the educational and scientific degree "Doctor" of 4.6. "Informatics and Computer Sciences" are:

A group of indicators	Content	Number of points
A	Indicator 1	50
D	Sum of indicators from 5 to 10	30

Scientific supervisors of the thesis are Prof. Boyan Bonchev, PhD - FMI, SU and Assoc. Prof. Rumen Andreev, PhD - IICT - BAS.

The purpose of the dissertation is formulated on page 3 as: „to analyze existing approaches to designing educational games and to develop a model and methodology for creating personalized educational video games to be validated through practical experiments".

1. To achieve the purpose, seven tasks are formulated:
2. Toanalyzetechnological-basedteachingapproaches,partofwhichareeducationalgames.
3. To make a quantitative assessment of the application of technological-based approaches and educational games in Bulgarian schools.
4. To analyze the opinions of teachers and students regarding suitable educational computer games for learning.
5. To analyze the constructive components of educational computer games and to develop an approach for their personalization.
6. To create models of educational videogames and the user as a learner and player, as well as an approach to customizing educational video games.
7. To develop a methodology for creating a customizable educational video game of type enriched maze in the APOGEE platform and to develop sample customized learning resources for embedding in mini-games.
8. To develop a protocol for conducting experiments to validate and evaluate personalized educational video games and to analyze the results obtained.

The formulated goal and tasks are actual and have a scientific and scientific-applied potential in the field of research and application of pedagogical and technological models and techniques in training with personalized educational computer games of different types. Personalization of learning in different

fields is considered as an innovative interdisciplinary approach, with great potential for positive impact and an option for adaptation to the paradigm shift for the educational process as a whole.

In the development of the dissertation, the doctoral candidate demonstrated a thorough knowledge of the state of the art in the field.

The chosen research methodology allows achieving the set goal and obtaining an adequate answer to the problems solved in the dissertation.

The dissertation is 164 pages long and includes: a glossary of terms and abbreviations used, lists of figures and tables, an introduction, five chapters, a conclusion, a declaration of originality of the results, a bibliography with 213 sources and 5 appendices.

There are 8 publications on the topic of this dissertation, including:

- 4 publications in English in proceedings of international conferences, of which 1 refereed in Scopus and 4 in WoS;
- 4 publications are in Bulgarian, 3 of them in proceedings of national conferences and 1 in a national journal;
- Seven publications are co-authored and one is individual.

A list of 33 noted citations of 6 publications is presented.

The scientometric indicators for fulfilling the requirements for the educational and scientific degree "Doctor", **according to the Regulations for the specific conditions of the IICT - BAS in Group D are 56 points with a minimum requirement of 30 points**.

The requirements of the RIDASRBA and the Rules for specific conditions of IICT - BAS are fulfilled.

The results achieved in the dissertation are scientific and applied and can be presented as follows:

1. A conceptual combined learner model for personalizing educational computer games is created.
2. A classification of types of educational computer games is proposed.
3. A qualitative and quantitative assessment of the use of ICT and educational computer games in Bulgarian schools is presented.
4. A methodology for customizing educational video games based on a combined learner model is created.

5. A methodology for customizing a maze-type educational video game enriched with embedded didactic mini-games is created.
6. A methodology was developed to investigate, validate, and evaluate the learnability, game impact, effectiveness, and attitudes of using a personalized maze-type educational video game.
7. Universal and personalized maze-type educational video games with embedded didactic mini-games dedicated to Bulgarian medieval history have been created.

I accept that the results are consistent with the scope and content of the aims and objectives and have potential for further development. The PhD student has demonstrated the necessary theoretical and practical knowledge of the specialty, has developed skills and gained experience to conduct independent research.

I accept that the PhD student has undeniable participation and merit for the realization of the presented tasks, formulated contributions and obtained results.

Some of the results in the dissertation work have been achieved in participation in 3 national and one international research projects for the period 2016 - 2023.

As critical remarks can be pointed out: according to article 27 (2) of the RIDASRBA instead of "Conclusion" should be used "Conclusion - summary of the results obtained"; the figures presented in the dissertation are in different languages; too much emphasis is made on the statistical analyses of the conducted surveys and less on the technological approaches as defined in the title.

I take the opportunity to make a recommendation for the realization of future developments and projects related to the topic of the dissertation and the enhancement of independent publishing activity.

The submitted abstracts are in Bulgarian and English, respectively 51 pages and 47 pages and **present the dissertation work.**

I have no evidence of plagiarism or unreliability of the scientific data presented in the dissertation.

CONCLUSION

I accept that the dissertation meets the requirements of the Act on Development of Academic Staff in the Republic of Bulgaria (ADASRB), the Regulation on the Implementation of the Development of Academic Staff in Republic Act (RIDASRBA) and the Regulations on the specific conditions in the IICT, and

I give a positive opinion for the acquisition of the educational and scientific degree "Doctor" of Valentina Todorova Terzieva-Bogoycheva.

I propose to the Scientific Jury to unanimously vote Valentina Todorova Terzieva-Bogoycheva the degree of Doctor of Education in the field of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.6 "Informatics and Computer Science", doctoral programme "Informatics".

На основание
ЗЗЛД

26.08.2023 г.