

REVIEW

**of the dissertation work of Prof. Daniela Ananieva Orozova, PhD,
for obtaining the scientific degree “Doctor of Sciences”
in Professional field 4.6 Informatics and Computer Science
titled “Application of Data Science in the Virtual Learning Space”**

1. From the presented professional curriculum vitae of Prof. Daniela Orozova, one can see that she was born on May 6, 1967, in Gorna Oryahovitsa. In 1990 she graduated from the Faculty of Mathematics and Informatics of Sofia university “St. Kliment Ohridski”. In the period 1990-1994 she was a full-time PhD student at the same faculty. After that, she held the position of Chief Assistant Professor at the faculty until 2000. From 2000 to 2022 she worked at Burgas Free University initially as a Chief and Senior Assistant Professor and from 2005 on as she has held the position of Associate Professor. Meanwhile, in 2001 Prof. Orozova defended a dissertation thesis at the Specialized Scientific Council of Informatics and Mathematical Modelling of the Higher Attestation Commission in scientific specialty 01.01.12 “Informatics” and acquired the educational and scientific degree “Doctor” (PhD). In the period 2009-2010, she also worked at the Central Laboratory of Biomedical Engineering of the Bulgarian Academy of Sciences (now the Institute of Biophysics and Biomedical Engineering of BAS). In 2012, she won a competition for academic position “Professor” at Burgas Free University. In the period 2019 – 2021 г., she had a second labor contract with the Institute of Information and Communication Technologies of the Bulgarian Academy of Sciences. Since 2022, Prof. Orozova has been working at the Faculty of Economics of Trakia University – Stara Zagora.

2. The dissertation work of Prof. Daniela Orozova, PhD, is dedicated to methods and models, to processes for observation and analysis of the activities of the students in e-learning environments connected to Big Data Analytics, Data Mining tools, Web metrics, Generalized Nets, Machine Learning and Intuitionistic Fuzzy Logics. In essence, the results of Prof. Orozova are scientific and applied scientific.

The dissertation work consists of Introduction, 5 chapters and Conclusion. It spans over 190 pages and the Bibliography includes 220 sources.

In the first chapter, short notes on the virtual learning space and the architecture of the data in it are given. An overview of the types of Big databases in it and the used technologies for working with them is made as well as an overview on the possible risks. Short notes on the Theory of the Generalized Nets, proposed by me more than 40 years ago, are also given. Here, I must mention that during the past 20 years Prof. Orozova was one of the actively working Bulgarian scientists in this field.

The second chapter has also, to a large degree, summarizing but also analytical character. The possibilities of the basic tools for information processing in the virtual learning environment are discussed. The size of the first two chapters is less than 25% of the whole dissertation work – a requirement which existed at the time of the Higher Attestation Commission, but which in recent years has been often neglected.

The significant scientific and applied scientific results are included in the next three chapters. In Chapter 3, methods and techniques for modelling and analysis of processes with application of instruments for data extraction in educational context are described. This research is based on the long standing experience of Prof. Orozova as a lecturer as well as a specialist in the field of Machine Learning. I will also mention that years ago she was among the authors of two monographs published in Australia and Poland, and later she published her own monograph. In the three monographs similar problem are discussed but based on already outdated technologies. In this sense, the present work can be regarded on one hand as a continuation of these monographs and on the other hand – it reflects the new advancements in this area of Informatics and gives, at least partially, answers to open problems related to the modelling of Data Mining processes through Generalized nets.

Clearly, the most interesting chapter to me is Chapter 4 where 6 Generalized net models are described. They describe respectively the following processes: processes of personalization and use of learning environments; the process of use of tools for extraction of knowledge from data collected in a learning environment; processes of project-based learning; process of integration of game elements and techniques in e-learning with the aim of supporting the acquiring of the education content as well as a model of the activities related to providing the quality and accreditation of the higher education. Behind the last model stands the experience of Prof. Orozova as a member of expert commissions at the National Evaluation and Accreditation Agency. It must be specially pointed out that the developed Generalized net models clearly reflect the parallelism of the modelled processes.

The final chapter, Chapter 5, contains results related to the applications of the research and analyses done in educational environment and solutions to some applied scientific problems in e-learning.

In conclusion, apart from summarizing the results of the preceding three chapters, the fact that directions for future research in the area of the dissertation work are outlined, makes a very good impression.

I accept the formulated “Contributions of the dissertation work”.

All of my remarks with respect to the dissertation work before the internal defence have been correctly reflected and therefore now I have no critical remarks.

3. The author’s summary of the dissertation spans over 60 pages (presented in both Bulgarian and English) and meets the requirements for short, complete and concise presentation of the dissertation work.

4. The scientific publications in the field of the dissertation work are 41 and can be classified as follows:

First:

- 15 publications are either journal articles or thematic books, including such of Springer;

- 26 publications are published conference reports.

Second:

- 17 publications are in journals with SJR, 3 of which have also IF, with which the requirement of the Regulations of IICT-BAS: *“the candidates for acquiring of the scientific degree “Doctor of Sciences” should have at least 15 publications with IF/SJR”* are met.

- the rest 24 publications have no SJR.

All publications are in English and have been published after 2014, i.e., after the acquiring of the academic position “Professor” (in 2012).

She has authored one textbook titled *“Knowledge representation in systems with artificial intelligence”* published by publishing house Bozhich, Burgas, 2018.

5. Prof. Orozova has presented a list with 66 citations of 22 publications on the topic of the dissertation work which are included in the scientific databases Web of Science and Scopus. With this, the requirements of the Regulations of IICT-BAS, namely *“the candidates for acquiring of the scientific degree “Doctor of Sciences” should have at least 50 citations in WoS/Scopus”* are met. In Google Scholar though, one can see that 6 papers of Prof. Orozova published in the last 5 years have more than two times more citations.

6. I have known Prof. Orozova since 2001 when I was appointed as a reviewer of her dissertation work for acquiring of the educational and scientific degree “Doctor” (PhD) and I evaluated it highly. In 2005 I was a member of the Specialized Scientific Council for Informatics and Mathematical modelling of the Higher Attestation Commission which regulated her procedure for acquisition of the academic position “Associate Professor”. In 2012 I reviewed her monograph “Generalized net models of intelligent learning environment” published by Academic Publishing House “Prof. Marin Drinov” – the most prestigious Bulgarian publishing house specializing in scientific literature. After that I was also a reviewer of her procedure for acquisition of the Academic position “Professor” which was successful.

7. The dissertation work of Prof. Daniela Orozova, PhD, meets the requirements of the Regulations for the specific conditions of IICT- BAS and the Law for Development of the Academic Staff in the Republic of Bulgaria for acquisition of the scientific degree “Doctor of Sciences”.

Having in mind the above said, I give a positive evaluation of the dissertation work and recommend to the honorary members of the Scientific Jury to vote for awarding the scientific degree “**Doctor of Sciences**” in professional field **4.6 Informatics and Computer Science** to **Prof. Daniela Ananieva Orozova, PhD.**

November 3, 2023

Signature:
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