

REVIEW

By Prof. Kosta Andreev Garov, PhD

University of Plovdiv “Paisii Hilendarski”

of the scientific works submitted for participation in a competition for holding the academic position “Professor” for the needs of the University of Plovdiv “Paisii Hilendarski”, announced in the State Gazette issue 99 of 20.11.2020 in area in higher education: 1. Educational sciences of professional field 1.3 Pedagogy of Education in ... (Methodology of Education in Informatics and Information Technology)

This review was written based on order № P33-637 of 19.02.2021 issued by the Rector of the University of Plovdiv “Paisii Hilendarski” (PU). By this order, I was appointed as a member of the Scientific Jury for electing a *professor* for the competition announced in the State Gazette issue 99 of 20.11.2020 in area of higher education: 1. Educational Sciences, professional field 1.3 Pedagogy of Education in ... (Methodology of Education in Informatics and Information Technology). At the first meeting of the Scientific Jury I was elected chairman of the jury and was appointed to prepare a review for the competition in accordance with Minutes № 1 of 26.02.2021. The review was written in compliance with Art. 29 (1) of the Law on the Development of Academic Staff in the Republic of Bulgaria (LDASRB), Art. 60 (1) of the Regulations for the Application of the Act for the Development of the Academic Staff in the Republic of Bulgaria (RAADASRB) and Art. 79 (3) of the Law on the Development of the Academic Staff (LDAS) of PU.

To participate in the competition, documents have been submitted by a single candidate – Assoc. Prof. Todorka Zhivkova Terzieva, PhD, from the Department of Software Technology at the Faculty of Mathematics and Informatics (FMI) at the University of Plovdiv “Paisii Hilendarski”. As a member of the Scientific Jury, I received all the documents submitted by the candidate for participation in the competition both in electronic format and on paper and I concluded that they are in accordance with the Law on the Development of the Academic Staff (LDAS) of PU. The documents are **precisely prepared and systematized**, which allows a real assessment of the results achieved by the candidate. As a reviewer, I carried out a thorough verification and **determined the accuracy** of the filed **administrative documents and scientific publications**.

Todorka Zhivkova Terzieva has a solid education in the area of mathematics and computer technology. She graduated high school in 1984 from the elite Math High School "Acad. Kiril Popov", Plovdiv, with the qualification of “Operator-programmer of computing machines”. In 1989 she completed tertiary education with a Master's degree in Computing from the Faculty of Computer Systems and Technology at the Technical University in Sofia, with the qualification of "Electronics and Automation Engineer", and

in 2001 she obtained the qualification of "Teacher of Informatics and Information Technology" at FMI of PU.

In 2012 she successfully defended her dissertation titled "Development of algorithmic thinking in informatics education" for the acquisition of the educational and scientific degree "Doctor".

In the period from 2001 to now she has been working at the Faculty of Mathematics and Informatics at the University of Plovdiv "P. Hilendarski" – as an Assistant Professor (2001-2003), a Senior Assistant Professor (2003-2007), a Chief Assistant Professor (2007-2015), and an Associate Professor (at present).

Todorka Terzieva has a very good theoretical and practical training in informatics and information technology. She has excellent teamwork skills as well as technical and computer skills.

Assoc. Prof. Todorka Terzieva, PhD, meets the requirements of Art. 29 (1) of the Law on the Development of Academic Staff in the Republic of Bulgaria (LDASRB), of Art. 60 (1) and Art. 61 (1) of the Regulations for the Application of the Act for the Development of the Academic Staff in the Republic of Bulgaria (RAADASRB), as well as of the Law on the Development of the Academic Staff (LDAS) of the University of Plovdiv for holding the academic position "professor". She acquired the **educational and scientific degree "Doctor"** in **2006** and has held the academic position "**Associate Professor**" at the University of Plovdiv for more than **5** years. T. Terzieva meets the **minimum** national requirements for her scientific activity for participation in a competition for holding the academic position "professor" in area in higher education: **1. Educational sciences of professional field 1.3 Pedagogy of Education in ...** According to indicator **A**, the minimum number of required points is **50**; Assoc. Prof. T. Terzieva has **50** points. According to indicator **B**, the minimum number of required points is **100**; Assoc. Prof. T. Terzieva has **100** points According to indicator **D**, the minimum number of required points is **200**; Assoc. Prof. T. Terzieva has **304** points. According to indicator **D**, the minimum number of required points is **100**; Assoc. Prof. T. Terzieva has **1100** points. According to indicator **E**, the minimum number of required points is **100**; Assoc. Prof. T. Terzieva has **200** points. With a minimum **total** number of required points of **550**, the candidate has **1754** points.

Todorka Terzieva has submitted **44** scientific papers for participation in the competition and the full list of her works contains **98** publications:

- **5** publications are in **journals with SJR** (numbers 23, 27, 30, 33, and 35);
- **15** publications are in **journals** (numbers 4, 5, 10, 11, 22, 25, 26, 28, 29, 32, 34, 36, 37, 38, and 44);
- **21** publications are in conference **proceedings** (numbers 6, 7, 8, 9, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 24, 31, 39, 40, 41, 42, and 43);
- **1** monograph (under number 1);
- **1** book (under number 2);

- 1 textbook (under number 3).

It is noteworthy that only 4 of the presented publications are single-authored, while all the others are written in co-authorship; 15 of the publications are in Bulgarian and the rest are in English. All presented works were created and published **after** acquiring the academic position “Associate Professor” by Assoc. Prof. Terzieva.

A careful review of all the submitted publications shows that after the habilitation for associate professor in 2015, the publishing activity of Assoc. Prof. Todorka Terzieva has greatly increased. The textbooks and books dedicated to the teaching of programming in higher schools, written by T. Terzieva, are very high-quality and original. During this period, she began to actively supervise graduates from the Bachelor's and Master's degree programs of the Faculty of Mathematics and Informatics at the University of Plovdiv – a total of over 20. She has written reviews of over 40 diploma theses of students completing their Bachelor's and Master's degree programs at FMI at PU. Assoc. Prof. Todorka Terzieva is the research supervisor of 2 defended doctoral students. For 1 doctoral student, the procedure for defense of their PhD thesis before a scientific jury has started, and 5 more have been excluded from the register with the right to defense. Together with the students and the doctoral student, Assoc. Prof. Todorka Terzieva develops and publishes materials related to solving current problems of the methodology of education in informatics and information technology.

The results of the research of Assoc. Prof. T. Terzieva have been acknowledged in the specialized scientific literature – she has presented a list of 110 noticed citations of her publications. The citations in scientific journals, referenced and indexed in world-famous databases, are 30, the citations in monographs and collective volumes with scientific review are 50, and the citations in non-referenced journals with scientific review are 30.

The publications of Assoc. Prof. Todorka Terzieva, according to the researched problems, can be grouped in the following **main** directions:

1. Publications related to the development of innovative technology with application in the teaching of informatics and information technology in higher education institutions

The publications in this direction reflect innovative methodological approaches to teaching programming at the university level. The monograph “*Didactic tools for learning in an electronic environment*” presents pedagogical strategies for activating the cognitive activity of students through the application of innovative digital technology. The book “*Development of algorithmic thinking in informatics education*” describes the results of an in-depth study of the concept of *algorithmic thinking* and classifies the main learning activities for the formation and development of algorithmic thinking in informatics education. A didactic model has been developed for the formation of algorithmic thinking and the implementation of developmental training in informatics of first-year university students. The model is problem-based and it is implemented through a system of tasks that are selected in an appropriate way to form the described activities.

The textbook “*Introduction to Web Programming*” is an introduction to web programming and the content is structured in 10 chapters. Students are introduced to both the basics of web programming and some techniques for maintaining various browsers and devices. The textbook reflects the lecture course on *Introduction to Web Programming* for first-year university students majoring in “Software Technology and Design”, “Mathematics, Informatics, and Information Technology”, and “Information Technology, Mathematics, and Educational Management” at the Faculty of Mathematics and Informatics, University of Plovdiv “Paisii Hilendarski”. It can also be used by other students or learners who are beginning to study web technology and are interested in the means to create web applications.

2. Publications related to the development of a methodology for the application of adaptive e-learning and a technological model for the creation of e-learning content

Assoc. Prof. Todorka Terzieva, PhD, belongs to a group of researchers from the University of Plovdiv “Paisii Hilendarski” and its branch in the town of Smolyan, who are working to create a methodology for applying the so-called “Adaptive learning”. Publications numbers 1, 10, 12, 16, 17, 25, 31, and 36 of the presented list of publications are dedicated to the creation of a technological model and methodology for the implementation of adaptive e-learning. Methodological approaches for adaptive learning are discussed in papers 7, 8, and 14. Elements of a developed model for the design and development of adaptive e-learning content are presented in publications numbers 12, 20, 22, and 24. Pedagogical strategies for adaptive testing and assessment are considered in publications 6, 8, 9, and 19.

3. Publications related to the design, development, and application of modern educational tools for learning in an electronic environment

Assoc. Prof. Todorka Terzieva, PhD, also works on the design, development, and implementation of modern educational tools for learning in an electronic environment. Papers 1, 2, 4, and 25 of the presented list of publications are dedicated to the development of modern methodological and technological models of education. Publications numbers 5, 18, 21, 23, 28, and 40 discuss technological and didactic aspects of game-based learning. Works numbers 38, 39, and 43 are devoted to innovative approaches for increasing the efficiency of learning by using ICT.

The other publications submitted by Assoc. Prof. T. Terzieva for review are dedicated to the description of different approaches for the application of ICT in the education of children with SEN, the development of tools for increasing the motivation of students in the education of informatics and information technology, computer and mathematical modeling with application in solving problems from different fields of practice, etc.

The reviewer **acknowledges** the following **major** scientific and applied scientific contributions of the candidate:

1. A technological model and methodology for adaptive e-learning have been created as well as a model for developing adaptive learning content. Elements of methodological tools for the implementation of adaptive e-learning have been developed.

2. Technological, didactic, and methodological models of learning in a digital environment are proposed.

3. Didactic means for increasing the motivation in the education of mathematics, informatics, and information technology are proposed.

4. A didactic model based on Bloom's extended taxonomy has been developed for the implementation of developmental training in informatics and information technology.

5. Approaches for solving some problems from different areas of practice have been developed with computer and mathematical modeling.

The pedagogical activity of Assoc. Prof. Todorka Terzieva, PhD, is very diverse. She has developed new curricula, new lecture courses, and seminars or laboratory exercises in various academic subjects such as “Web Design”, “Introduction to Web Programming”, “Creating a graphical user interface”, “Programming”, and others. From the submitted documents it is clear that Assoc. Prof. T. Terzieva has led seminars in 11 academic subjects and lectures in 6 subjects in the Bachelor's degree programs and lectures and seminars in 3 academic subjects in the Master's programs of FMI at PU.

Todorka Terzieva actively participates in the realization of various scientific and applied scientific activities. She has participated in 6 international and 7 national projects. She was the leader of 2 of these projects. She has been actively involved in 11 internal projects of the University of Plovdiv “Paisii Hilendarski” and is the leader of one of them. T. Terzieva is a member of the Management Board of the National Scientific Program “Information and Communication Technology in Science, Education, and Security” (ICT in SES), funded by the Ministry of Education and Science (2018-2021).

Assoc. Prof. Todorka Terzieva, PhD, is an active member of the Union of Bulgarian Mathematicians (UBM), Plovdiv section.

My personal impressions of Todorka Terzieva are very good. I have known the candidate for professor for more than 35 years. I taught her the subjects of Programming and Numerical Methods at the Math High School "Acad. Kiril Popov" – Plovdiv. As a student, she displayed curiosity, active participation and creativity in class. She is currently a respected lecturer, a highly professional scientist and a reliable colleague. My recommendations for her future research work are to continue building elements of the methodology of teaching informatics and information technology and to show with greater confidence the results obtained to the scientific community **in the country and abroad**.

Todorka Terzieva **has respected the rules of scientific ethics** – she has not published the same manuscript in different places and has not used the “**copy-paste**” technique. I have no doubts about any **plagiarism** committed in his publications submitted for review. From the review of the submitted documents it is clear that the candidate meets the **minimum national requirements** for her scientific activity for participation in a competition for holding the academic position “professor” in area in

higher education: **1. Educational sciences of professional field 1.3 Pedagogy of Education in ...**

My **assessment** of the pedagogical and applied scientific activity of Assoc. Prof. Todorka Zhivkova Terzieva, PhD, is **high**. She has made a real contribution to the development of the methodology of teaching informatics and information technology. Todorka Terzieva meets the requirements of the the Law on the Development of Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for the implementation of the LDASRB, and the Law on the Development of the Academic Staff (LDAS) of the University of Plovdiv “Paisii Hilendarski” for holding the academic position "Professor".

All of the above is sufficient reason to give a **positive conclusion** for the election of Associate Professor Todorka Zhivkova Terzieva, PhD for the academic position "**Professor**" at the University of Plovdiv “Paisii Hilendarski” in the scientific specialty **Methodology of Teaching Informatics and Information Technology**, in professional field 1.3 Pedagogy of Education in, area of higher education: 1. Educational sciences.

I recommend that the highly respectable Scientific Jury, designated for the announced competition, propose to the Honorable Faculty Council of the Faculty of Mathematics and Informatics at the University of Plovdiv “Paisii Hilendarski” **to elect** Associate Professor Todorka Zhivkova Terzieva, PhD, for **the academic position “Professor”**.

31.03.2021

Plovdiv

Reviewer:.....

Prof. Kosta Andreev Garov, PhD