R E V I E W

in relation to a competition for the academic position "Professor"
in the Field of higher education 1. Pedagogical sciences
Professional field 1.3. Pedagogy of Informatics and Information Technology
for the needs of Plovdiv University "Paisii Hilendarski"

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1. General presentation of the procedure

This review is prepared in accordance with Order № P 33-637/19.02.2021 of the Rector of Plovdiv University "Paisii Hilendarski" – Prof. Dr. Rumen Mladenov, in compliance with Art. 4 (3) from the LDASRB (Law for the Development of the Academic Staff in Republic of Bulgaria), Art. 2 (3) and Art. 57 (2) from the Regulations for the Development of the Academic Staff in Plovdiv University (RDASPU) and on the basis of the corresponding Decision of the Faculty Council of the Faculty of Mathematics and Informatics from 17.02.2021 (Protocol № 14), report by Prof. Dr. Angel Golev – Dean of the Faculty of Mathematics and Informatics (FMI). In SG, issue 99/20.11.2020 a competition for the needs of PU "Paisii Hilendarski", Faculty of Mathematics and Informatics, is announced in relation to the occupation of the academic position "Professor" in the Field of higher education 1. Pedagogical sciences; Professional field 1.3. Pedagogy of Informatics and Information Technology. The only candidate in the competition is Associate Professor Dr Todorka Zhivkova Terzieva from PU, FMI, Department "Software technologies". No procedure irregularities were identified.

As a member of the Scientific Jury I have received an access to the documents of the candidate, which include: Application form to the Rector for participation admission in the competition; CV in European format; Higher Education Degree Diploma for the acquisition of educational-qualification degree „master" – original with application, Serries A 89, № 019170, Reg. № 50899/6.03.1990; Doctoral Degree Diploma № 1000033/23.05.2012; Document for academic position „associate professor" – № P 34-463/15 October 2015; List of all publications; List of the publications presented for the competition; Reference for implementation of the minimal national and the faculty additional requirements (RDASPU); Declaration for the originality and assurance of the documents; Annotation of the materials according to Art. 76 of RDASPU, including self-evaluation of the achievements; Author's reference for the scientific results in the publications presented for the competition; Documents for educational activity: Reference for class and extra-curricula activity, List of published textbooks and educational handbooks, Reference for activities with university and PhD students; Documents for research: Reference for research, Reference for participations with reports in international and national scientific events, Reference for participation in research and educational projects, Official notice № НПД 117/09.02.2021 from the Department „Scientific and Applied Activities" in PU "P. Hilendarski", Official notice for national project "Student practices", Reference for mem-

bership in professional organizations; Certificate for work experience – У32/ 25.01.2021; Citations reference; Copies of scientific papers presented for the participation in the competition; Proofs for implementation of the minimal national requirements.

2. General presentation of the candidate

The documents and materials of the only candidate in the competition have been carefully presented and enable an objective and complete evaluation in accordance with the requirements of the National Acts (LDASRB) and the Regulations for its implementation, as well as the Regulations of PU and the specific requirements of FMI with PU (RDASPU). Assoc. Prof. Dr. Todorka Terzieva graduated from the Mathematical school "Acad. K. Popov", Plovdiv with qualification "programmer of ECM". She has a master degree from the Faculty of Computer Systems and Technologies at the Technical University (TU), Sofia, specialization "Computing technique" with qualification "engineer in electronics and automation". In 1992 she graduated also from the Faculty of Public professions at TU, Sofia with qualification "Defence of Intellectual Property". In 2001 Assoc. Prof. Dr. Todorka Terzieva acquired qualification "teacher in Informatics and Information Technologies" in FMI, PU. She realized several additional studies in Hungary, Greece and North Macedonia.

Successfully Assoc. Prof. Dr. Terzieva was assistant (2001–2003), senior assistant (2003–2007) and chief assistant (2007–2012) in the Department "Computer Informatics" with FMI at PU. In 2012 she successfully defended her PhD dissertation on the topic "Development of algorithmic thinking in Pedagogy of Informatics" in the Field of higher education 1. Pedagogical sciences; Professional field 1.3. Pedagogy of Informatics. In 2015 she was elected "associate professor" and holds this position presently in the Department "Software technologies", being the head of it. Until now she has 20 years pedagogical experience in FMI, PU. The methodical career development of the candidate is impressive. It is supported by exclusively active teaching, research, applied scientific and organizational activities. It is worth mentioning: membership in the Board of the National Scientific Program "Information and Communication Technologies in Science, Education and Security", financed by the Ministry of Education and Science (MES) (2018-2021); membership in Faculty committees for science, accreditation; membership in ethic commission; management of the Department "Software technologies" in FMI at PU (since 2015); participation in program, organization and technical committees of various scientific and scientific-educational initiatives, including international ones. Assoc. Prof. Dr T. Terzieva possesses various technical skills and competences. She wields programming languages: C++, C#, Java, JavaScript, Delphi, Visual Basic, Visual Basic for Applications, Assembler, HTML5, CSS3, SQL, MySQL, operational systems Windows and Linux; systems for dynamic mathematical software Geonext, GeoGebra, Elica; software packages Microsoft Office, OpenOffice, Visual Studio and others. The candidate wields English and Russian. She publishes in these languages.

3. Description of candidate's scientific production

The research production of Assoc. Prof. Dr Todorka Terzieva is rich and diverse. It includes 92 scientific papers, 3 monographs and books, 3 textbooks and educational

handbooks in physical form and 13 educational handbooks in electronic form. She presented more than 50 reports at scientific conferences and seminars. The candidate participates in the competition with 44 works, including 41 research publications, 1 monograph, 1 book and 1 textbook. The last three are published in Bulgarian by the University Publishing House "Paisii Hilendarski", Plovdiv. 20 of the presented scientific publications are in journals (12 abroad), 8 in proceedings of international conferences. 12 of the scientific works (out of 33 for the entire scientific production) are presented in the world system for reviewing and indexing, as it follows according the enumeration in the list:

№ 7 and № 21 CBU International Conference Proceedings, Prague, Czech Republic, 2016 and 2018 (Indexed in Thomson Reuters Web of Science);

№ 23 TEM Journal Technology, Education, Management, Informatics, 2018 (Web of Science, SCOPUS) (SJR 2018: 0.15);

№ 25 IJISET – International Journal of Innovative Science, Engineering & Technology, 2018 (Indexed in Thomson Reuters);

№ 27, № 30 and № 33 Communications in Applied Analysis. An International Journal for Theory and Applications, 2019 (SJR 2019: 0.156);

№ 34 and № 37 International Journal of Differential Equations and Applications, 2019 and 2020 (Scopus);

№ 35 Revista Habanera de Ciencias Médicas, 2020 **(**Scopus, Web of Science) (SJR 2019: 0.125);

№ 36 Mathematics and Informatics, 2020 (Web of Science);

№ 44 Pedagogy, Bulgarian Journal of Educational Research and Practice, 2021 (Web of Science).

The works for participation in the competition are not used in the procedures for acquiring the educational and scientific degree "doctor" and taking the academic positions "chief assistant" and "associate professor". All of them fulfil the requirements and are accepted for evaluation.

A high assessment deserves the candidate's monograph „Didactic tools for teaching in electronic environment", 2021, 139 pages, ISBN 978-619-202-631-8. It is designed for lecturers, university and PhD students. The monograph includes pedagogical strategies for activating cognitive activity of trainees applying digital technologies. A special attention is paid to theoretical approaches for the application of adaptive teaching. Accenting on the ways of modelling and elaboration of adaptive educational materials is essential. The focus is on several basic parameters: trainees' preferences, style of learning, level of knowledge, available teaching time, concrete goals, history of visits in educational units, and s.o. An exemplary adaptive scenario is proposed for teaching "Information technologies" by DisPeL (Distributed Platform for e-Learning). Attention is taken on the increase of motivation and the creation of a suitable learning environment. The significance is pointed out concerning existence of game elements and interdisciplinary integration. A prototype of an educational game is elaborated with several interactive puzzles. Frequently used digital educational platforms in Bulgarian school are examined accounting for the possibilities of

applying a ready educational context or creating a proper one and also accounting for the possibilities of assessment and self-assessment, feedback, etc.

The candidate participates in the competition with the book „Development of algorithmic thinking in Pedagogy of Informatics", 2021, 193 pages, ISBN 978-619-202-622-6, which is dedicated to lecturers, teachers, university and PhD students, secondary students and all who are interested in problems of Pedagogy of Informatics, theory and methodology of the developing teaching of Informatics. Results are presented regarding algorithmic thinking investigation with a classification of the main educational activities for its formation and development in connection with Pedagogy of Informatics. A corresponding didactic model for the creation of algorithmic thinking is problem-based and is realized by means of a system of tasks in educational environment for the teaching process and the educational goals. A methodology is proposed for the formation of skills regarding variable thinking in programming teaching. On the base of ontological approach static and dynamic tools are examined for the visualization of sorting methods. Variants are elaborated for the organization of research processing and development of algorithmic thinking using meaningful examination of the most frequently applied software and hardware technologies and tools for overcoming problems of information access. The proposed didactic approaches enable active knowledge absorption and support the formation and the development of skills for algorithmic thinking. The elaborated model for execution of developing teaching enriches the pedagogical practice in Pedagogy of Informatics.

The candidate's scientific production is directed to various research tasks which are solved successfully: a methodological approach for the realization of hybrid teaching in Mathematics and Information technologies of students in Pharmacy from the Medicine University – Plovdiv; system of hybrid conduction of teaching including presence classes for lectures and exercises combined with distant realization of exams; Virtual Environment Simulator for Educational Safety Crossing; methodological approach for the realization of adaptive electronic teaching regarding the educational discipline „Introduction to web programming"; approach to electronic teaching with the electronic textbook „Management of projects and participation in programs"; approach to interdisciplinary teaching in Informatics, Mathematics and Information technologies; methodological approaches to the application of adaptation in the educational process; pedagogical approach to interest provocation and motivation increase of students to study Informatics disciplines with interdisciplinary integration of other educational subjects like History and Physics; analysis of system adaptivness for electronic education; examination of the notion „non-standard task" in Pedagogy of Informatics and Information Technologies in secondary education; methodology of creation and realization of adaptive and individualized conceptions in electronic education; application of DisPeL (Distributed Platform for e-Learning); conception of game-based education; structure finding and use of serious games SG; integration of services from third countries in the architecture of serious games; didactic approaches to design and elaboration of adaptive curriculum; new approaches to modelling of large scale distribution of worms in Internet; new models of computer viruses distribution;

models of approximation distribution data of COVID-19 in Cuba; realization of the reflection process with the adapted cyclic model ALACT.

The candidate's domains of research are: design, elaboration and application of contemporary educational tools for teaching in electronic environment; technological and practical aspects of game-based education; methodological aspects of adaptive electronic education; realization of interdisciplinary approach in education; pedagogical strategies for motivation increase in Pedagogy of Informatics and Information Technologies; development of creative skills of trainees. The scientific contributions of Associate Professor Dr Todorka Terzieva in the cited domains cover with surplus the requirements for occupation of the academic position "professor". A proof of their high quality is the considerable number of citations – 110 in total, 30 of which are of scientific publications that are reviewed and indexed in world-known data bases, 50 in monographs and collective toms with scientific reviewing, 30 in not-referred journals with scientific reviewing. The data is for the entire scientific production of the candidate, which describes her as a scientist of high rank.

4. Presentation of candidate's scientific and applied scientific activity

The applied scientific activity of the candidate is also rich and highly varied. She participated in 6 international educational and research projects: DAAD-project "Center of Excellence for Applications of Mathematics" – "Modern education with dynamic mathematics software GEONExT ", 2004; Fe-ConE (Framework for e-learning Contents Evaluation), Institute of Applied and Computational Mathematics – FORT/ IACM - "e - Learning Fundamentals", 2007; European project InnoMathEd „Innovations in Mathematics Education on European Level", Comenius Multilateral Project 2009/2011; European project FIBONACCI – Large scale dissemination of inquiry based science and mathematics education, FP7-SCIENCE-INSOCIETY – 2009/2011; Project under OP DHR: BG051PO001-3.1.07-0009 „Increasing of the teaching quality of Pedagogy of Informatics and Information and Communication Technologies in FMI, PU by creating and applying a sustainable model for actualization of educational programs in regard with the EU strategy for growth "Europe 2020" and the requirements of the labor market", Operative program "Development of human resources", European social fond, 2013-2014; Project under OP DHR: BG051PO001-3.3.07-0002 (2012-2014) „Students' practices". The management should be added to them of 2 projects D01-205 (2018-2021) National Scientific Program (NSP) „Information and Communication Technologies in Science, Education and Security (ICT in SES", financed by the Ministry of Education and Science and SP 17-FMI-011 (2017-2018) with Fond „Scientific investigations" at PU: „Business applications and educational technologies, based on contemporary ICT"; participation in 7 national educational and research projects; participation in 11 science-educational and research projects of PU, being manager of one of them.

5. Presentation of candidate's teaching

During the first years of her teacher's activity the candidate participated in the preparation and conducting of exercises for students regarding bachelor and master programs. The main disciplines in the bachelor programs are: „Foundation of the Computer Informatics", „Programming", „Computer architectures", „Structures of data and pro-

gramming", „Object-orientated programming" and „Algorithms and structures of data". In the master programs they are: „Computer nets and communication" and „Computer architectures". Later the candidate gave lectures on: Creation of graphical custom interface (C#), Web design, Introduction to web programming, Computer architectures. She guided exercises on: Creation of graphical custom interface (C#), Computer architectures, Programming. The lecture activity as associated professor includes preparation and execution of lectures on: Creation of graphical custom interface (C#), Introduction to web programming, Programming, Didactic technologies, Introduction to programming in school, Digital technologies in education, Application of graphical custom interface and others.

The considerable number of textbooks and educational handbooks by Assoc. Prof. Dr. T. Terzieva is above mentioned. What is included from them in the procedure for the election of a professor is the textbook „Introduction to web programming", 2021, 216 pages, ISBN 978-619-202-623-3, which represents a lecture course for students specializing „Software technologies and design", „Mathematics, Informatics and Information Technologies" and "Information technologies, Mathematics and educational management" in FMI, PU, but also it is of interest for other students or trainees. Its goals are the basic stages in the process of creation and support of websites and Internet-based applications. The textbook considers browser, hyper text, HTTP protocol, system client-surver, World Wide Web and tools for the elaboration of websites. Contemporary standards are proposed for description of web content – HTML5, means for dynamic management of content and custom interface by CSS and JavaScript, accenting on the document object model DOM.

Assoc. Prof. Dr. T. Terzieva has two PhD students with successfully defended dissertations in Professional field *1.3. Pedagogy of Informatics and Information Technologies* with FMI, PU. One PhD student is in procedure of defense in Professional field *4.6. Informatics and Computer sciences*; Doctoral program: Informatics. Five PhD students are deducted with the right to defend their dissertations. Presently the candidate guides six PhD students in two professional fields. She has more than 20 graduated students and has reviewed more than 40 diploma works. Assoc. Prof. Dr. Terzieva participated in state exam committees and diploma work defenses of students in bachelor and master programs, she participated in practical preparation of 45 students as academic tutor in the fames of the National project BG051PO001-3.3.07-0002 „Student practices" under OP „Development of human resources" with co-financing from the European social fond of the European union, 2013-2014, while in the period 2017-2018 she managed the student project with the fond „Scientific investigations" at PU on the topic: „Business applications and educational technologies, based on contemporary ICT" with the participation of six PhD students and six university students.

Concluding, the educational and teaching activities of Assoc. Prof. Dr. Todorka Terzieva are enormous and of high quality. These activities surplus considerably the requirements for occupation of the academic position „professor".

6. Critical notes and recommendations

I have no critical notes. The recommendations to the candidate are mainly wishes to use the full acceleration for further career development.

CONCLUSION

From all of the above it is obvious that Assoc. Prof. Dr Todorka Zhivkova Terzieva is a proven specialist in methodology of Informatics and Information Technologies with an impressive results and experience in this professional field. Her scientific production complies with the minimum national requirements under Art. 2b of LDASRB for the scientific field 1. Pedagogical Sciences, 1.3 Pedagogy of Informatics and Information Technologies with 1754 points in total. Her works have been repeatedly cited. There is no reason to believe that they are not her personal work and work of her co-authors, which excludes a presence of plagiarism. This makes me conclude that her scientific, scientific-applied, teaching activity and her qualities fulfil the requirements of the LDASRB, the Regulations of its implementation, as well as the Regulations of Plovdiv University "Paisii Hilendarski" for academic staff development required to candidates for the academic position "Professor". The additional requirements of the Faculty of Mathematics and Informatics from 14 November 2018 (Protocol № 34) are fulfilled too. Therefore, **my conclusion is positive about the election of "Professor"** and I would like to propose to the honourable members of the Scientific Jury to support this application and to submit a proposal to the Faculty Council of FMI, PU to elect Assoc. Prof. Dr Todorka Zhivkova Terzieva for **"Professor" in Pedagogy of Informatics and Information Technology**, with the strong believe that she deserves it.

Sofia, 31 March 2021 Reviewer:

(Prof. Dr Habil Sava Grozdev)