Review

on a competition for occupation of the academic position "Professor" in professional field 4.6 Informatics and Computer Science (Information Technologies), announced in State Gazette No. 74 of August 21, 2020 by Sofia University St. Kliment Ohridski (SU), Faculty of Mathematics and Informatics (FMI)

This review is prepared by Prof. DSc Peter Lubomirov Stanchev from Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, as a member of the scientific jury for the competition according to Order No. РД 38-496/19.10.2020 of the Rector of SU.

One applicant submitted documents for participation in the announced competition: Dr. Eliza Petrova Stefanova, Associate Professor at FMI, SU.

I. General description of presented materials

1. Details of the application

The documents of the applicant comply with the requirements of the Act of the Development of the Academic Personnel of the Republic of Bulgaria (ADAPRB), the Rules for the Implementation of the Act of the Development of the Academic Personnel of the Republic of Bulgaria (RIADAPRB) and the Rules on the Terms and Conditions for Acquisition of Academic Degrees and Occupation of Academic Positions at SU (RTCAADOAPSU).

The overall number of the scientific publications is 150, 26 of them being learning textbooks. The candidate presented 21 papers for the competition, being first author in 2 papers, second author in 9 papers, third author in 9 papers and fourth author in one paper.

The applicant has submitted the following documents for the competition: Professional autobiography, copy of diploma for higher education, copy of diploma for educational and scientific degree "Doctor", copy of certificate for occupation of the academic position "Associate Professor", Certificate of internship in the specialty, Documents proving the fulfillment of the requirements of Art.115, para. 1, item 2 of RTCAADOAPSU, lists of publications (list of all publications and list of publications presented for the competition), Reference for the fulfillment of the minimum national requirements and the requirements of SU for the professional field 4.6 Informatics and Computer Science, Lists of citations of publications of the applicant, reference for original scientific contributions, Reference for the degree of fulfillment of the indicators under Art. 122, para. 2 of RTCAADOAPSU, copies of publications presented at the competition, abstracts of the publications present-

ed at the competition (in Bulgarian and in English), copy of the competition announcement in the State Gazette.

2. Data about the candidate

Assoc. Prof. Eliza Petrova Stefanova graduated at Mathematics High School, Lovech city at 1986, and later graduated as Magister of Science in Informatics and Computer Science at the Faculty of Mathematics and Informatics (FMI), Sofia University "St. Kliment Ohridski" (SU), at 1991. She became Doctor in Informatics and Computer Science in 2012. She is working as Assistant professor from 1999 and as Associate professor since 2014 at SU-FMI. Since December 2015 she is Vice-Rector of SU (till December 2019 is responsible for information activities, academic staff and administration, and since December 2019 she is responsible for information activities and academic staff at SU).

3. General characteristics of the applicant's scientific work and achievements

In the publications submitted for the competition, the original scientific and applied scientific contributions of Assoc. Prof. Dr. Eliza Stefanova can be summarized in the following areas:

- Application of ICT in education (competence-based methods of learning, new methods for assessment in education, application of virtual reality in education, application of software services in education) – publications 3, 4, 7, 9, 10, 12, 13, 14, 16, 20.
- Learning analytics (exploring, storing and analyzing big data related to education, methods and tools for processing and analyzing big data in learning) – publications 4, 5, 6 and 8.
- Inquiry-based science education methods for teacher learning and competence development (inquiry-based science education /IBSE/ methods and models, teacher training methods and models for the application of IBSE, pilot experiments for the implementation of IBSE approach in Bulgarian schools) – publications 1, 2, 3, 4, 8, 11, 15, 17 18, 19, 21.

The presented publications are related with the successful implementation of several European research projects: weSPOT - Working Environment with Social and Personal Open Tools for inquiry-based learning; Enhancing Learning in Teaching via e-inquiries; 21st Century Skills - Changing the Approach to Teaching in Higher Education.

She has one PhD students, who successfully defended his PhD Thesis. She was involved in the project for development of programs for the implementation of electronic form of distance edu-

cation at FMI, SU. She was also involved in the project for the formation of new generation of researchers and students at SU-FMI. She participated in the international projects aimed to develop new methods and forms for learning and teaching, like weSPOT – Working environment for social personalized open tools (for implementing IBSE in regular education at schools and University), and SISTER (Strengthening the IST Research Capacity of Sofia University). She was project coordinator for Bulgarian team in the Sheherezada project (1001 stories for adult education).

In the B group of scientific indicators Eliza Stefanova achieved 222, in the G group 252, in the D group 296, and in the E group 160. She has shown 210 citations of her publications. On the base of these quantitative indicators we may conclude:

a) The scientific publications fully correspond to the national requirements (art. 2b, para 2 and 3 of RTCAADOAP) and to all additional requirements of SU for taking the academic position of "Professor" in the scientific area and professional field for the competition;

b) The presented scientific publications do not duplicate the presented publications from previous competitions;

c) There is no proven plagiarism in the scientific works of Assoc. Prof. Dr. Eliza Stefanova.

4. General characteristics of the applicant's teaching activities

The teaching activity of Assoc. Prof. Eliza Stefanova is significant in scope and diverse in subject matter. In the last 7 years she has developed the curriculum of a total of 7 subjects from the curricula of FMI specialties. She has taught classes in disciplines both in FMI and in other faculties of Sofia University, and for the last 7 years these disciplines are "Computer Systems and Technologies", "Information and Communication Technologies in Teaching and Working in a Digital Environment", "Audio visual and information technologies in teaching", "Fundamentals of computer networks", "Fundamentals of e-Learning", "Software systems for e-Learning", "Specific issues of IT training", "Pedagogical functions of an interactive whiteboard", "Technologies to support educational projects", "Business Telecommunications".

Assoc. Prof. Stefanova has developed, constantly enriches and provides its students in a timely manner a variety of original teaching materials in electronic format for all disciplines she leads.

5. Substantive analysis of the scientific and applied scientific achievements of the applicant, presented in the materials for participation in the competition

The main scientific and applied scientific contributions of the candidate, related to the field of applying ICT in education.

In [20] a platform for the composition of software services was implemented. A critical analysis of five such platforms was performed on the base of their flexibility and application in education. In [9] a model for composition of software services for end users was presented. Oriented for application in the education eco system. In [14] a new approach was presented, based on the application of the "flipped classroom" method. Several specific aspects, related to the application of the model developed, were demonstrated – learning program, detailed description of learning activities, methods for assessment and validation of knowledge and skills achieved.

A new methodology for applying Virtual Reality technology in classroom for specific learning applications was developed. In [18] three available technologies were studied in order to judge about their applicability in real learning situations. In [16] an initial set of scenarios was developed as the base for the new methodology. The presented scenarios were analyzed regarding their feasibility for effective use in learning and teaching. All results described in the publications were applied in the regular educational process at SU-FMI and have innovative features.

The main scientific and applied scientific contributions of the candidate, related to Learning Analytics domain.

A new approach for data aggregation from different Learning Content Management Systems (LCMS) was introduced in [4], aiming to solve the problem with receiving full and accurate statistics related to the educational process. In [6] specific improvement to existing method was proposed through introduction of dynamic data base for storing intermediate results from various data base requests, aiming to optimize the aggregated results and to provide efficient and most reliable answers. In [8] a new method was proposed for the analysis of specific data accumulated through various software services and tools available in one specific LCMS. In [5] various methods for the visualization of data were experimented and specific rules for choosing the best visualization method were proposed. Through the composition of software services from different LCMS a new method for flexible aggregation of learning data was proposed in [4]. Specific visual language was proposed in [6] for making requests to data bases, which will allow in combination with better and improved interface techniques to make intelligent requests without need to know specific syntax and semantics of any DB language for making such requests. In [8] the software services were applied through the distributed software system involving various tools for IBSE method implementation. In such a way the required knowledge and skills from teachers for using the system for substantially minimized. The more intuitive interface, combined with easy commands and powerful visualization services was introduced in [5]. Using the results from learning analytics, several practical improvements of existing courses and their implementation were achieved, resulting in better results with

students. This also reflected in the way IBSE was implemented in various courses at SU-FMI. All these results prove their significance and practicability.

Main scientific and applied scientific contributions of the candidate, related to teacher training and application of IBSE methods in education.

In [3] the results of massive study in several European countries were presented, in the framework of the 7 FP project. On the base of this study, key teacher competences for applying the IBSE methodology were identified. In [15] the main result from science workshop were presented, where the main stakeholders in the educational process at Bulgarian schools formulated the basic competence framework needed to be developed in order to prepare Bulgarian school teachers how best to use the IBSE methodology in their practice. In [13] a new method for developing competences of teachers was presented (problem solving competences, critical thinking competences, systematic problem analysis competences, successful communication and cooperation competences, etc.). In [12] a method is presented for competence development of teachers how best to communicate and cooperate with parents. In [11] a platform for validating the results from applying IBSE in Bulgarian schools was presented. In [2] the "Space safari" scenario was presented, where school boys from 4-5 grade are planning and designing space journeys. In [13] the "Open air lessons – myth or not" scenario was presented for developing IBSE competences of teachers. In [12] the "My girder is rudest" was developed and explained. In [17] the "Neither seen nor heard, but succeed" scenario was developed and presented, where IBSE methodology was applied for children with special educational needs. In [18] scenarios based on virtual reality implementation were presented and discussed involving children to plan and organize virtual journeys. In [21] the "Feeding with balance – health in advance" scenario was described and discussed, in relation with one year long experiment for building the main competences for balanced feeding. In [19] specific experiments were described, aiming to validate the IBSE methodology and all related software tools and systems, developed and used in the framework of several European research projects. The software tools and systems were used in all phases of the educational process (learning policy, learning scenarios, learning guides, assessment methods, teacher competence development, etc.). They also allow involvement of all stakeholders (teachers, parents, management, government, society) and take into consideration the results from all learning activities.

6. Critical remarks and recommendations

To spend more time for scientific activities.

7. Personal impressions from the candidate

I know the candidate from long time. She impressed with her extraordinary precision, work dedication, and excellent results.

8. Conclusion on the application

After being acquainted with the materials and scientific publications, and on the basis of the analysis of their significance and their scientific and applied scientific contributions, I confirm that the academic achievements of the candidate Assoc. Prof. Dr. Eliza Stefanova meet the requirements of the ADAPRB, the Regulations for its implementation and the corresponding Regulations of SU for the occupation of the academic position of "Professor" in the professional field "Informatics and Computer Science". In particular, the applicant meets the minimum national requirements in the professional field and no plagiarism has been detected in her scientific papers submitted at the competition.

I give **a positive assessment** of the application of Assoc. Prof. Dr. Eliza Stefanova.

II. GENERAL CONCLUSION

Based on the above, I **recommend with confidence** to the scientific jury to vote on a proposal to the Council of the Faculty of Mathematics and Informatics of Sofia University St. Kliment Ohridski to select Assoc. Prof. Dr. Eliza Petrova Stefanova for the academic position of "Professor" in the professional field Informatics and Computer Science (Information Technologies).

November 23, 2020 Reviewer: .....

(Prof. DSc Peter Stanchev)