

REVIEW

By: Prof. Adriana Lubomirova Tafrova-Grigorova, PhD (University of Sofia, Professional field 1.3. Pedagogy of Teaching ... (Methodology of Teaching Chemistry), Member of the Scientific Jury, appointed with an Order of the Rector of the University of Plovdiv No. 33-3163 from 13.07.2021

Related to: A competition for an academic position “Reader*” (Associate Professor, Docent) open at the Faculty of Chemistry at University of Plovdiv, Field of higher education 1. Pedagogical Sciences, Professional field “ 1.3. Pedagogy of Teaching ... (Methodology of Teaching Chemistry)

A candidate for one of the two positions of Reader (Associate Professor) in Pedagogy of Teaching ... (Methodology of Teaching Chemistry), announced in State Gazette No. 40/14.05.2021 is Dr. Yordanka Petrova Stefanova.

The candidate has submitted a set of documents containing:

I. Administrative documents

- I.1. Application for the competition
- I.2. Curriculum Vitae (CV)
- I.3. Higher education master degree diploma and annex thereto
- I.4. Diploma for educational and scientific degree 'doctor'
- I.5. Professional experience certificate

II. Research activity supporting documents

- II.1. List of all applicant’s scientific publications, a list of publications for participation in the competition together with a list of citations
- II.2. Reference for fulfillment of the minimum national requirements under Art. 2b of the Act on development of the academic staff in the Republic of Bulgaria and the additional regulations of the the Faculty of Chemistry of Plovdiv University
- II.3. Annotation and self-assessment of the applicant’s scientific contributions in English and Bulgarian
- II.4. Statement for originality and assurance of the documents submitted
- II.5. Reference for project and scientific conference participation

III. Teaching activity supporting documents

* The Act on development of the academic staff in the Republic of Bulgaria states “reader” as a corresponding English term of Bulgarian “доцент”. In academic hierarchy of the European universities more popular is the term “associate professor” and in Germany – “docent”.

III.1. Reference for teaching activities: academic courses, development or adaptation of academic courses Programmes of study, supervision experience etc.

All required documents are available, together with information on activities to fulfil the additional criteria related to the selection procedure. The administrative documentation complies with all recommendations and requirements, but the handling of the publication files is hampered by their mismatched naming and lack of correspondence with their place in the publication list.

Biographical information

Ms Yordanka Stefanova graduated from the Faculty of Chemistry and Biology of Plovdiv University's Master programme of Chemistry (1987). She majored as Teacher in chemistry and physics, and she has taught chemistry for two years in a school in her hometown of Parvomay.

Ms. Stefanova defended (2007) a PhD thesis on the explanation in chemistry teaching. Since 1989 till now she has occupied consistently positions of assistant professor, senior assistant professor and chief assistant professor (2007-) at the Faculty of Chemistry of Plovdiv University, Department of General and Inorganic Chemistry and Methodology of Chemistry Education.

Scientific research activities

Over a period of 23 years the candidate has 2 monographs and 40 publications in scientific journals and collections of articles and reports. She is the sole author of one handbook and co-author of three handbooks for laboratory activities and chemical demonstrations. She also notes authorship of 2 textbooks, but I could not find data for these textbooks in her list of publications.

Under the *Act on development of the academic staff in the Republic of Bulgaria* Dr. Stefanova has to present "a published monograph or equivalent publications in specialized scientific issued ... which do not reproduce those presented for awarding the educational and scientific degree of Doctor ..." and "to meet the minimum national requirements under Art. 2b, Para. 2 and 3, respectively the requirements under Art. 2b, Para. 5 (Art. 24, Para 3, 4).

These conditions have been met: Dr Stefanova participates in the competition with one monograph as a habilitation thesis, a book based on her PhD dissertation, 20 articles, including several reports published in of scientific conference proceedings. Four of the articles are

published in *Chemistry/Bulgarian Journal of Science Education*, a SCOPUS abstracted and indexed journal. One paper, co-authored with a PhD student, is published in *Pedagogy* and a self-authored paper has just been published in the *Strategies for Policy in Science and Education*. Both Bulgarian journals are refereed and indexed in Web of Science.

The candidate is the sole author of two of the six articles described above and first author of three papers.

14 papers are published in non-peer-reviewed journals, in edited collective volumes and conference proceedings. Three of them have a single author Dr. Stefanova, who is also the first author of 6 of these 14 articles. 7 articles are in English and one in Russian. In the *Teaching activities reference* the candidate states that she is the sole author of the handbook *Chemistry: observations and experiments* (Plovdiv University Press, 2016, 99 p.) and a co-author of three handbooks for laboratory activities and chemical demonstrations, one of which she is the first author. However, these handbooks are not listed in the list of publications submitted for the competition.

The required minimum number of points for the academic position of associated professor in the Pedagogy of Teaching scientific field according to the *Regulations on the implementation of the development of academic staff in the Republic of Bulgaria Act* are shown in Table 1 along with the individual results of the candidate.

The candidate meets the conditions of Art. 24, Para. 1, including the minimum national requirements under Art. 2b, Para. 2 and 3, respectively the requirements under Art. 2b, Para 5. As can be seen in Table 1 Dr. Stefanova exceeds the minimum number of points specified in the Annex to Art. 1a, Para 1 of the Regulations to the Act.

Table 1.

Group of indicators	A	B	Г				Д		
Indicator	1.	3.	4.	5.	6.	7.	11.	12.	13.
Min. national requirements/points	50	100	200				50		
J. Stefanova/points	50	100	-	75	115	73	30	55	-
			263				85		

The applicant's studies and corresponding publications has been oriented mainly towards three research fields: *Formation and development of scientific literacy*, *Constructivist approach in chemistry education* and *Formation and development of key competences*.

Publications on formation and development of scientific literacy

The growing impact of science and technology on life of the planet calls for a scientifically literate population. The issue of scientific literacy has reached a particularly high

degree of international recognition mainly thanks to the Programme for International Student Assessment (PISA). Because of these circumstances, developing scientific literacy has become a key goal of school science education in recent decades.

From my point of view, among the articles submitted for the competition in this area, I would highlight two: *Scientific literacy: teachers' and students' opinions* (Chemistry, 2011) and *The students' attitudes towards science subjects studied in school* (Educational Alternatives, 2014). Both articles present results from surveys. The first article focuses on exploring current and prospective teachers' views on scientific literacy – its meaning, forms, importance. The second article examines students' attitudes toward science, their perceptions of the nature of science, their interest and appraisal of school science subjects, and the applicability of knowledge to real-life situations. The study has been carried out with a great number (500) of secondary school students and the results have been reported in *Educational Alternatives*, an Open Access Journal. In my opinion, if the study had been published in a peer-reviewed journal in better English, there would have been more citations.

Publications on constructivist approach in chemistry education

The candidate's second research field concerns the constructivist approach in chemistry classroom. Five articles relate to this topic. In two of them (No. 13, No. 15) the authors show how, on the basis of constructivist ideas, description and explanation can be incorporated into teaching together with the inquiry-based method. Paper No. 18 on the list presents some author's ideas on the organization of classroom lesson through collaborative learning. These three articles are not based on pedagogical experiments but on Dr. Stefanova's views and professional experience. The above-mentioned publication No. 15 in translation from Russian into Bulgarian is entitled *Personality-oriented chemistry teaching with application of constructivist approach: a solution of the problem* (in *Актуальные проблемы химического и экологического образования*, Collection of scientific works, 2013, in Russian). Regrettably, I did not find any new ideas in this publication, nor any solution to the problem of personality orientation, as the title claims.

In the research area under consideration, only the very recently published article (August 2021) in *Strategies of Education and Science Policy*, a journal that is abstracted and indexed in Web of Science, is based on a pedagogical experiment. However, I would like to make some remarks on the test used to assess the controlling and experimental group achievements. Some of the tasks go beyond the scope of the general education Programme of study (e.g. task 7). There are also tasks that are not aimed at testing students' scientific literacy as stated by the author (e.g. 1, 3, 7, 9). From my point of view, some items are not formulated

correctly (e.g. 1, 5). Furthermore, it is not clear from the text how the control group was taught and whether the teacher was the same for both groups.

Publications on formation and development of key competences

In the field of key competences the applicant has submitted only 3 publications (No 5, 8 and 9). The most recent of them, *Key competences through the eyes of science teachers – results of the survey* is published in *Pedagogy*, a Web of Science abstracted and indexed journal. The candidate together with a PhD student sets out an interesting and useful survey with 54 teachers with different teaching backgrounds. The conclusions drawn from the survey results should be particularly relevant for education policy decision-makers. Most teachers (68%) share general misconceptions about the nature of key competences and the methodology of developing them. Teachers' perceptions on the teaching and learning methods which should be applied in chemistry classroom favour traditional approaches. The results show that the length of professional experience does not influence teachers' perceptions. My overall impression of this work is that it shows Dr Stefanova at a higher level in her ability to conduct pedagogical research that could contribute to improving the quality of education, provided that a real connection is made between research and pedagogical practice.

The monograph presented as a habilitation thesis – *Modern Educational Technologies in Teaching of Chemistry and Environmental Protection* (Plovdiv University Press, 2020, 135 p.) summarizes the author's research and teaching experience. Dr Stefanova has chosen to present only several of the modern educational technologies which I find to be a very reasonable decision. This allows her to illustrate the technologies described in the book with appropriate tasks. Overall, the habilitation paper is well structured, and it demonstrates the applicant's ability to find, select, analyze and synthesize a lot of information in a very well-organized, relevant and comprehensible way. The applied nature of the book makes it a useful tool for teachers and educators. I would like to add that the book is reviewed by Assoc. prof. Dr Maria Minevska and Prof. Dr Zhelyazka Raykova – two scientific personalities particularly qualified in science education for whom I have deep respect and whose opinion is important to me. As Dr Stefanova notes in her Annotation, she has worked with Assoc. prof. Dr Maria Minevska since 2005 on problems of scientific literacy. Prof. Dr Zhelyazka Raykova is also a well-known expert in the field of constructivist approach to education, as well as in the development of scientific literacy in physics education.

Explanation in Chemistry and Environment Protection Teaching is the title of a monograph based on the candidate's dissertation thesis (Plovdiv University Press, 2021, 110 p.). Undoubtedly, the explanation of phenomena, theories, laws, facts is an extremely important

activity in science education. Too often, however, the explanation in the classroom takes the form of a lecture, a narration, a transmission of knowledge, without the active involvement of students. In her book Dr Yordanka Stefanova reveals explanation as a process different from the transmission of knowledge. She shows how in chemistry teaching explanation could be realized and applied on basis of the constructivist approach. In my opinion, that is the main merit of this book.

Citations

Dr Stefanova has reported the presence of 13 citations (autocitations excluded) of 5 publications. Only 2 citations appeared in Web of Science and SCOPUS abstracted and indexed journals: *Science Education Journal* (2019) and *Chemistry/Bulgarian Journal of Chemistry Education* (2016). All but one of the papers cited are published by a panel of three authors and one is a sole authored by the candidate.

According to SCOPUS the Hirsch index of Dr Stefanova is 1 (excluding autocitations and all co-authors). Nevertheless, the number of points (85) for Group Д (Citations) is more than the required 50 points.

I would recommend to Dr Stefanova to make efforts to publish her scientific papers in peer-reviewed journals. I believe this would bring her more international recognition.

Participations in scientific projects and events

The candidate has submitted a certificate issued by Plovdiv University for her participation in 4 research projects as a member of the project panel. Three of the projects are funded by the Research Fund at a Faculty level and one is in the frame of Operational Programme “Science and Education for Smart Growth”, „Support for Success”.

In her total list of publications, Dr. Stefanova has declared participation in 15 scientific conferences, but I could not find any data on them in the documentation.

Assessment of the personal contributions of the candidate

Dr. Yordanka Stefanova's personal contribution to the research she has published as an independent author or in co-authorship is unquestionable. The annotation and the self-evaluation of the candidate correctly reflect her contributions.

In general, the studies presented are of predominantly practical relevance and would therefore be of use to teachers, educators and to master's degree prospective teacher students.

Teaching activity

Dr Stefanova has reported 2174 teaching hours at Plovdiv University for the period 2017-2021. This is twice the minimum number of 1080 academic hours required at the Faculty of Chemistry of Plovdiv University. She has taught various academic courses in the field of chemistry education both in Plovdiv University bachelor and master programmes and has taken part in development of several university Programmes of study and educational materials.

The candidate declares that she is the supervisor of a PhD student whose dissertation work is in the candidate's research field – developing key competences through the teaching of the subject *Chemistry and Environmental Protection*. I hope that Dr Stefanova will continue to use her experience in this research area.

Personal impressions

Dr. Yordanka Stefanova is a well-known and respected expert in the field of chemical education.

Conclusion

The candidate has submitted a habilitation thesis and scientific articles published after the defense of her doctoral dissertation.

In summary, the documents submitted for review and the overall scientific and teaching activities of Dr. Stefanova prove that she fulfills all the requirements of the *Development of Academic Staff in the Republic of Bulgaria Act* (DASRBA), the Regulations for the implementation of the DASRBA, as well as the requirements and recommendations of Plovdiv University, respectively the Faculty of Chemistry, for holding the academic position of Associate Professor (Reader).

In view of the above, I will vote for the election of Dr. Yordanka Stefanova to the academic position of Associate Professor at Plovdiv University "Paisii Hilendarski", field of higher education 1. Pedagogical Sciences, professional field 1.3. Pedagogy of Teaching ... (Methodology of Teaching Chemistry).

07.09.2021

Reviewer: