REVIEW

by competition for the academic position of "Associate Professor"

Field of higher education: 1. Pedagogical Sciences
Professional field: 1.3. Pedagogy of Education in... (scientific specialist "Methodology of Education in Chemistry and Environmental Protection")
Candidate: Senior Assistant, Dr. Eng. Hristivelina Kostadinova Zhecheva
Author of the review: Prof. Valentina Nikolaeva Voinohovska, Ruse University "Angel Kanchev"
(Order No. RD-341 of 22.10.2024 of the Rector of the University "Prof. Dr. Asen Zlatarov")

1. Description of the competition procedure

In the announced competition for the academic position of "Associate Professor" in the professional field 1.3. Pedagogy of Education in ... (scientific specialty "Methodology of Education in Chemistry and Environmental Protection"), for the needs of the Department of Chemistry, announced in the "State Gazette", issue 70 of (August 20, 2024), 1 candidate participated: Senior Assistant Professor Dr. Eng. Hristivelina Kostadinova Zhecheva.

The documents of Senior Assistant Professor Dr. Eng. Hristivelina Kostadinova Zhecheva, submitted for participation in the competition show that the procedure for its disclosure and announcement has been complied with and they are in accordance with the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its implementation, as well as with the Regulations on the terms and conditions for acquiring scientific degrees and for occupying academic positions at the University "Prof. Dr. Asen Zlatarov", Burgas.

No violations have been found, the procedure is ongoing, the competition is legitimate. All preliminary procedural and regulatory rules provided for in this procedure have been complied with.

2. Candidate's biographical data

Senior Assistant Professor Hristivelina Kostadinova Zhecheva completed her higher education at the University "Prof. Dr. Asen Zlatarov" - Burgas, where in 1992 she acquired the qualification "Chemical Engineer" with a specialty "Silicate Technology". In 1997 she completed her second higher education with a Master's degree in Chemistry with a professional qualification "Chemist and Chemistry Teacher". In 2011 she received the educational and scientific degree "Doctor" in the scientific specialty "Methodology of Teaching Chemistry and Environmental Protection" based on a defended dissertation before the Higher Attestation Commission. Since 2014 she has held the academic position of Senior Assistant Professor in the Department of Chemistry at the Faculty of Natural Sciences at the University "Prof. Dr. Asen Zlatarov" - Burgas. In her academic career, Dr. Zhecheva has taught a wide range of disciplines, including "Chemistry Teaching Methodology", "Interactive Technologies in Education", "Environmental Chemistry", "Competency-

Based Approach and Innovations in Education", as well as specialized methodologies for teaching natural sciences.

She has many years of experience in preparing students for pedagogical practice, actively participates in the educational and methodological work of the department and contributes to the development of innovations in teaching chemistry and natural sciences.

3. Scientific indicators

According to the Regulations on the conditions and procedure for acquiring scientific degrees and for occupying academic positions at the University "Prof. Dr. Asen Zlatarov", Burgas, the scient metric indicators of the candidate Senior Assistant Professor Dr. Eng. Hristivelina Kostadinova Zhecheva for occupying the academic position "Associate Professor" are the following:

The indicator from group "A" – 50 points (fulfilled)

The indicator from group "B" is not required for this position.

The indicator from group C – monograph presented as a habilitation thesis – 100 points (fulfilled)

The indicators from group "D":

- Articles and reports published in non-refereed journals with scientific review or published in edited collective volumes (10 items each) – 45 pcs / 401.6 points

Total number of points under indicator "D": 401.6 points

Indicators from group "D":

- Citations or reviews in scientific publications, referenced and indexed in global databases with scientific information or in monographs and collective volumes (15 items each) – 1 item / 15 points
- Citations in monographs and collective volumes with scientific review (10 items each) – 6 items / 60 points
- Citations or reviews in non-refereed journals with scientific review (5 items each) – 5 items / 25 points

Total number of points for indicator "D": 100 points

Indicators from group "E":

- Participation in a national scientific or educational project (15 points each) – 1 issue / 15 points
- Published university textbook or textbook used in the school network (40 points each) – 1 issue / 40 points

Total number of points for indicator "E": 55 points

The scientific production presented by Senior Assistant Professor Dr. Eng. Hristivelina Kostadinova Zhecheva corresponds to the scient metrics set out in the Regulations on the conditions and procedure for acquiring scientific degrees and for occupying academic positions at the University "Prof. Dr. Asen Zlatarov", Burgas and to the minimum national requirements under Art. 2b, para. 2 and 3 of the ZRASRB and Art. 1a, para. 1 of the PPZRASRB and respectively under Art. 24, para. 1 of the Regulations for the implementation of the ZRASRB (for the academic degree "associate professor") for the field of higher education 1. Pedagogical sciences, professional field 1.3 Pedagogy of education in....

4. Directions in the candidate's research work and scientific contributions

The contributions of Senior Assistant Professor Dr. Eng. Hristivelina Kostadinova Zhecheva are mainly grouped into 4 thematic areas.

- Thematic area 1. Design of chemistry education.
- Thematic area 2. Methodological and motivational aspects of competence-oriented experimental activity in chemistry.
- Thematic area 3. Health and environmental aspects of the educational chemical experiment in real and digital environments.
- Thematic area 4. Possibilities of the experiment for personal and professional development and preservation of the mental health of the subjects of experimentation.

The candidate's scientific contributions in thematic area 1: Chemistry Education Design, are focused on the development and implementation of innovative approaches to designing the learning process, taking into account the specifics of chemistry. The main emphases are the following:

- A theoretical framework of educational design has been developed that unifies the concepts of instructional design and adapts them to the specifics of chemistry. The framework is highly versatile and can be used in various educational contexts, including real and digital environments.
- A detailed literature review of a historical and analytical nature has been carried out, covering over 20 educational design models described in the English-language literature up to 2021.
- Adaptation and specification of general educational design models (e.g. Gagné, Merrill, Morrison, ADDIE, Dick & Carey) to the chemistry curriculum for different grades and topics, with an emphasis on chemical experimentation and cognitive development of students.
- Integration of innovative tools such as Rapid Collaborative Prototyping, Action Mapping and models such as SAVI and 4C/ID into learning scenarios, for the purpose of personalization and active learning.
- Design options for learning systems have been developed that combine traditional methodologies of the Bulgarian pedagogical school with modern learning strategies.
- An experimental study of the effectiveness of the proposed models in real conditions was conducted with the participation of trainee teachers from the University "Prof. Dr. Assen Zlatarov" - Burgas. The results are aimed at increasing their readiness for practical application of modern pedagogical approaches.
- A platform for research work of students has been created, which supports the acquisition of skills for designing training within the university discipline "Methodology and Technology of Scientific Research".
- The monograph "Design of Training - from General Models to Specific Pedagogical Practices in Chemistry" provides useful guidelines and tools for students, teachers and lecturers, which can be used to improve their qualifications and work with students and undergraduates.
- The published articles contribute to the development of methodological science by specifying theoretical concepts, adapting educational design models and analysing their effectiveness in a learning environment.

The candidate's scientific contributions in thematic area 2: Methodological and motivational aspects of competence-oriented experimental activity in chemistry are focused on the development and implementation of innovative approaches to educational experiments aimed at increasing the motivation, cognitive interest and competencies of students through effective and environmentally friendly chemical experiments, combined with constructivist and interactive methodologies. The textbook "Methodology of the Educational Experiment in Chemistry and Environmental Protection. General and Inorganic Chemistry Module" (2022) offers an innovative approach to educational experimentation aimed at increasing motivation and interest in chemistry through effective and engaging experiments. 25 experiments with over 33 varieties are included, which combine classical and modern methodologies, consistent with the principles of "green chemistry" and health and environmental requirements. The main highlights are the following:

- Systematization of experiments with clear instructions, including principles, reagents, equipment, OHS requirements, duration and methodological guidelines.
- Preparation of a risk assessment plan, consistent with Bulgarian legislation, and safety guidelines according to European standards (CLP regulation).
- Classification of experiments by topics, which facilitates their integration into the learning process and adaptation to a digital environment, especially in online learning.
- Presentation of oscillatory reactions and their mechanism - rarely considered in Bulgarian literature.
- Assistance to student-future teachers in designing motivating learning situations, including in internship practice and pedagogical initiatives.
- Expansion of the methodological toolkit of acting teachers through effective experiments, applicable in school activities, extracurricular activities and qualification courses.
- Support for improving the professional qualification of teachers, as well as their pedagogical and methodological competence.

A number of scientific articles have been published in this area, which examine methodological approaches to the formation of scientific literacy and key competencies in students, applying a constructivist and interactive educational environment.

The candidate's scientific contributions in thematic area 3: Health and environmental aspects of the educational chemistry experiment in real and digital environments, are focused on the development of methodologies and tools for safe and environmentally friendly experimentation, including the integration of digital technologies to reduce health and environmental risks and improve the educational process. The main emphases are as follows:

- A detailed 15-step plan for risk assessment and exposure control in educational chemistry experiments is proposed. The plan supports future and current teachers in compliance with regulatory requirements, waste management and environmental protection.
- Inclusion of digital technologies such as multimedia simulations, virtual laboratories, augmented reality (AR) and platforms such as EON-XR and EON Metaverse to conduct educational experiments with minimized health and environmental risk.
- Shared positive pedagogical experience with the use of electronic textbooks, interactive simulators and educational platforms such as "Digital Backpack", MozaBook and Canva, in the context of STEM and STEAM education.

- The potential of intelligent platforms and tools such as OpenAI GPT, Google Bard and the future Bulgarian language model BgGPT for planning and implementing lessons in a STEM/STEAM environment is analyzed.
- Methodological guidelines for the use of digital tools and virtual resources in the training of future teachers of HOS are derived, which enriches their competence to conduct safe and effective experimentation.

These contributions are presented in a number of publications examining aspects of the integration between safety, ecology and digitalization in educational experimentation, which supports the preparation of teachers for work in a dynamic STEM/STEAM educational environment.

The candidate's scientific contributions in thematic area 4: Possibilities of the experiment for personal and professional development and preservation of the mental health of the subjects of experimentation, are focused on studying the impact of the educational chemical experiment on the personal development, mental health and professional preparation of the participants in the educational process. The main emphases are:

- The possibilities of educational design for the formation of competencies in students for planning and conducting training in natural sciences have been studied.
- Methods have been developed for creating pedagogical conditions that favor the overall personal development of students and optimal interaction between teachers and students in the context of experimental activity.
- The risks to the mental health of students, interns and lecturers arising from non-compliance with methodological requirements for experimentation in real and digital environments have been analysed.
- Strategies have been proposed for minimizing these risks, aimed at preserving mental resilience and improving opportunities for personal and professional realization.
- Emphasis is placed on the methodological preparation of students - future teachers of natural sciences, in order to build skills for creating a safe and supportive environment for experimental activity.
- Training models have been developed that stimulate the emotional intelligence, creativity and professional identity of students.
- Publications that examine contemporary aspects of planning and management of experimental activity related to the topics of personal development, mental health and professional realization are included.

The candidate's contributions emphasize the importance of the integration between experimental activity and personal and professional development, emphasizing the need for a safe and supportive environment for all participants in the educational process.

I accept the contributions proposed by the candidate as significant and important for the development of the relevant scientific field.

5. Critical notes, recommendations, questions

I have the following recommendation for the candidate:

I recommend that Senior Asst. Prof. Dr. Hristivelina Kostadinova Zhecheva publish the results of her research in world-renowned databases such as Scopus and Web of Science. Publication in these databases will increase the visibility and accessibility of her works at an international level, which will enable a wider scientific audience to become familiar with the methodology and contributions.

6. Conclusion

Based on the materials submitted for the competition, I believe that the candidate Senior Asst. Dr. Eng. Hristivelina Kostadinova Zhecheva meets the criteria for holding the academic position "Associate Professor", determined by the Act on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its implementation, as well as the Regulations on the terms and conditions for acquiring scientific degrees and holding academic positions at the University "Prof. Dr. Asen Zlatarov", Burgas.

I propose to the esteemed members of the Scientific Jury to vote positively and to propose to the Faculty Council of the Faculty of Social Sciences at the University "Prof. Dr. Asen Zlatarov", Burgas, to elect Senior Asst. Dr. Eng. Hristivelina Kostadinova Zhecheva to the academic position "Associate Professor" Field of higher education: 1. Pedagogical sciences, Professional field: 1.3. Pedagogy of education in ... (scientific specialty "Methodology of education in chemistry and environmental protection").

Date: 21.12.2024 г
Ruse

Member of the scientific jury:
(*Prof. Valentina Nikolaeva Voinohovska*)