

EVALUATION REPORT

on the Competition for the occupation of the academic position "Professor"
Professional field 1.3 Pedagogy of Education in Mathematics and Informatics

Scientific speciality Geometry

for the needs of the Nikola Vaptsarov Naval Academy – Varna

The Competition has been announced in the DV, number 91, 19 November 2019

Candidate: Assoc. Prof. Veselin Nenkov Nenkov, PhD

Member of the Scientific Jury: Prof. Velizar Todorov Pavlov, PhD

1. General characteristics of the candidate's research and applied activities.

Veselin Nenkov graduated the Paisii Hilendarski University of Plovdiv in 1989, speciality *Mathematics and Informatics*. He has been an Associate Professor since 2013 and has been awarded a PhD degree in the field of Geometry in 2011.

The applicant participates in the competition with one monograph and 27 scientific publications. The publications can be classified as follows:

by type: 5 papers in editions of international scientific conferences;

1 conference proceedings article published in a national scientific conference volume;

21 articles in scientific and educational journals.

by relevance: articles published in referenced and indexed journals in world-renowned databases of scientific information (Web of Science) – 15 items.

by the language of publication: 4 papers published in English, 1 in Russian and all others are published in Bulgarian.

by the number of co-authors: single-authored publications – 2, the rest are co-authored.

The monograph is in Bulgarian and Assoc. Prof. Nenkov is its single author.

The main fields of research and applied activities of the applicant are geometry, application of information technologies in the discovery of new geometric facts, geometry of polynomials.

In his research, he applies the Poya scheme to solve mathematical problems, demonstrates the heuristic capabilities of THE GEOMETER'S SKETCHPAD (GSP) and develops methodological ideas for the formation of research and teaching skills. He uses elements of analytic and projective geometry, basic properties and theorems for curves of the second degree, Barycentric coordinates in the plane, and basic dependencies on the geometry of complex numbers. He has obtained series of mathematical facts and inferences related to triangles, harmonically conjugated straight lines, Eulerian straight lines generated by some remarkable points in the plane, dynamically generated algebraic curves, second class parabolic curves, Simpson circles, counting the real roots of polynomials of Sturm etc.

In my opinion the problems under study are relevant and definitely a matter of considerable research interest.

2. An assessment of the candidate's pedagogical experience and activity.

The candidate has extensive pedagogical experience as a high school math teacher, Mathematics Teacher at the Technical College Lovech, Assistant Professor and Associate Professor in Mathematics at the Nikola Vaptsarov Naval Academy – Varna

He is a proven and recognized specialist in Euclidean geometry and teaching methodology. He is the author of numerous original mathematical problems for Olympiads. The candidate is a member of committees and evaluation committees for conducting national and international Olympiads and competitions for students and leader of teams who participate in them. His graduates have won a number of awards (some of which prestigious).

He is a member of the editorial boards of the journals: *Mathematics Plus* (ISSN 0861-8321), presenter of the "Tasks" section; *Mathematics and Informatics* (ISSN 1310-2230), leader of the "Tasks" heading; *Mathematics and Mathematical Education* (ISSN 1313-3330), *Volume of the forty-third Spring Conference of the UBB*.

Assoc. Prof. Nenkov has co-authored 7 textbooks for teachers and secondary school students. In some of them, tasks with solutions and additional materials for the European Kangaroo competition were published, and in other, methodical instructions to assist the teacher were provided.

He has given lectures to teachers under the framework of the following projects: "Preparing teachers for working with talented children in the field of mathematics, physics and computer science" and "Mathematics with computer"; the Summer Academy of Mathematics; Lectures by students from the "Mikhail Lomonosov" SAFU, Arkhangelsk, Russia.

Based on the information provided above it becomes clear that Assoc. Prof. Veselin Nenkov is a highly qualified teacher and lecturer in the field of Methods of Teaching Mathematics.

3. Basic scientific and applied scientific contributions.

The monograph entitled "Increasing Mathematical Competences with Dynamic Geometry" is presented in the current competition. It provides a full and complete study of the possibilities for the implementation of the interactive computer program GSP in the process of teaching mathematics which leads to increased motivation to learn and increased cognitive interest.

The main contributions of the applicant can be grouped in the following two strands: scientifically applied and methodically applied contributions.

The contributions in the first strand are related to proving generalizations of classical theorems in the geometry of the triangle; new geometric locations of remarkable points in the quadrilateral; new remarkable points, straight lines and curves in the plane of the triangle; generalization of isogonal and isotomic images in the triangle plane; a complete description of the plurality of centers of conical sections described and inscribed in a quadrilateral; the discovery of a remarkable sphere in the orthocentric tetrahedron; description of a special class of hyperbolic curves in the quadrilateral plane. Dependencies between faces of sections and walls in some polyhedral walls have been proved. Theory of linear programming for areas encircled by curves and surfaces of the second degree has been developed. Contributions in this direction can be attributed to the group of proofs with new means of significant new sides of already existing theories and problems.

The candidate's contributions to the second strand are related to the development of original methodologies for: teaching and learning on the topic "Second-degree curves";

application of the barycentric coordinates when examining and proving geometric claims; application of complex numbers in the study and proof of geometric claims; generalizations in geometry. New tools are proposed in the middle of the interactive and dynamic GSP computer program for: working with second-degree curves; isogonal, isotomic and other correspondences; constructing remarkable points, lines and curves related to different geometric shapes. The general idea of establishing dependences between the radii of tangent circles in the plane of a triangle is presented. Some concepts and theorems of the geometry of the triangle have been summarized. Contributions in this area can be attributed to the group of creating new methods in mathematics education.

I identify all the contributions of the applicant as original and produced entirely by the author. I have not detected any evidence of plagiarism.

4. The importance of the contributions for the science and practice.

I consider that the applicant's contributions are significant in the field of Methods of Teaching Mathematics. His research related to the interactive dynamic computer program GSP can find important applications in the process of mathematics training and in particular in geometry.

In accordance with the *Law for the Development of the Academic Staff in Bulgaria* and the *Regulations* for its implementation, a reference has been prepared by the applicant for the fulfillment of the minimum national scientific metric indicators for occupying the academic position of "Professor" in the professional field 1.3 *Pedagogy of training in ...* based on part of his works submitted for the competition. After careful review, I can conclude that all requirements have been fully fulfilled.

The presented Web of Science report on Assoc. Prof. Veselin Nenkov's profile shows that the total number of indexed publications is 62, the total number of citations – 51, the H-index = 5, from which it can be concluded that he is an established scientist with international recognition.

5. Critical notes and recommendations.

The submitted works of the candidate for participation in the competition should include the teaching aids. I recommend to the candidate to focus part of his future research work on interdisciplinary projects which comply with the specifics of the Nikola Vaptsarov Naval Academy – Varna.

CONCLUSION

On the basis of the submitted scientific works, their importance, the scientific and applied contributions contained therein, and considering the requirements of the *Law for the Development of the Academic Staff in Bulgaria* and the *Regulations* for its implementation, I propose in conclusion that the candidate Assoc. Prof. Veselin Nenkov is appointed for the academic position "PROFESSOR" in the Department of Mathematics and Physics in the professional field 1.3. Pedagogy of the Education in Mathematics and Informatics, speciality Geometry.

16 March 2020

MEMBER OF THE JURY:

Prof. Velizar Pavlov, PhD