English translation

OPINION

under the procedure for acquisition of PhD degree
by Fabien Teofanis Kunis,
topic of the dissertation: Creating and using information systems for
team problem solving in physics education
in professional field for the award of the degree of Doctor of Education and Science
field of higher education: Pedagogical sciences
professional field: teaching methodology of ...
doctoral program: teaching methodology of physics,
Faculty of physics,
Sofia University St. Kliment Ohridski,
Scientific Supervisor: Assoc. Prof. Maya Guaidarova, PhD
Scientific consultant: Chief Assist. Prof. Ivelina Kotseva, PhD

By Prof. Irina Zinovieva, Dr. Sc.
Sofia University St. Kliment Ohridski, Department of Psychology, in her capacity of Member of the Scientific Jury following
Order# RD 38-311_03.7.2023 of the Rector of Sofia University St. Kliment Ohridski

I. General description of the presented materials

1. The submitted documents

Candidate Fabien Teofanis Kunis has submitted a dissertation and an abstract of the dissertation, as well as the mandatory tables for Physical Science from the Regulations for the Terms and Conditions for Acquiring Scientific Degrees and Holding Academic Positions at SU "St. Kliment Ohridski". The documents submitted by the candidate for the defense fulfill to the requirements of the ŽRASRB, PPZRASRB and the Rules for the conditions and procedure for acquiring scientific degrees and occupying academic positions in SU "St. Kliment Ohridski".

The doctoral student has passed the required minimums in the major and in a foreign language, as well as four additional courses for doctoral students that deepen the preparation for conducting research with humans.

2. The applicant

Fabien Kunis currently works as a teacher at 125 SU "Boyan Penev" (since 2018) and teaches physics and astronomy, informatics and information technology. He started his career in 2009 as an administrator in the consulting agency Desbo, where the main activity performed by the candidate was database management system maintenance. This was followed by two years as a GIS system operator at Datecs GIS Center and another two as an administrator at GoGoNet, where he was responsible for creating, maintaining and updating e-commerce systems, as well as website and database maintenance. In the period 2014-2018, he was a freelance programmer and consultant, creating software for external clients.

Since 2020, he has been a full-time doctoral student in the Department of Teaching Methods in Physics with the supervisor Assoc. Maya Gaidarova, PhD.

Fabien Kunis is a graduate of Sofia University "St. Kliment Ohridski", where in 2012 he graduated with a Bachelor's degree in engineering physics and acquired a teaching license. In the period 2012-2014, he completed a master's program in microelectronics and information technologies at Sofia University "St. Kliment Ohridski" with excellence and received a Master's degree.

He has certificates for additional training in two areas - training programs and pedagogical skills.

In the field of programming, the trainings were obtined in Coursera, Udacity, Stanford University - OpenEdx, University of Helsinki and cover a wide range of approaches and techniques. In the field of working with people and training, courses were completed on Team work for pedagogical specialists - development of skills for effective team interaction in a school team, Individual approach to outstanding students, Methods for assessing natural science literacy in the international study of PISA 2022, Innovative Teaching Methods, Game, and Web Tools, CERN Teacher Program, Innovative Practices - Research Approach in Science Education.

This extensive list of additional training testifies to a desire for continuous development of skills and a high standards for one's own qualification.

Fabien Kunis is fluent in written and spoken English at C1 level, as well as German and Russian at A2 level.

3. General characteristics of the candidate's scientific achievements

a) The scientific publications included in the dissertation meet the minimum national requirements (according to Art. 2b, paras. 2 and 3 of ŽRASRB) and, accordingly, the additional requirements of SU "St. Kliment Ohridski" for the acquisition of the educational and scientific degree "doctor" in the relevant scientific field and exceed them.

Dissertation work has been published in 6 peer-reviewed publications (with one more under review) and reported in 18 papers or posters at international and national conferences.

Regarding the recommended requirements of the Faculty of Physics of the SU for the contribution nature of the works of Fabien Teofanis Kunis, with a required minimum of 2 publications, of which at least 1 publication is from group I or from group II, the candidate presents 4, of which 2 publications with substantial contribution (where one is required). Regarding participation in conferences with a paper or poster, the requirement is one while Mr. Kunis presents 18.

b) Scientific publications included in the dissertation work do not repeat those from previous procedures for acquiring a scientific title and academic position.

c) An automatic check was made with licensed software, which shows that there are no unregulated repetitions from works by others in the submitted dissertation and abstract, and there is no plagiarism proven in the court of law.

4. Content analysis of the candidate's scientific and scientific-applied achievements contained in the materials for the dissertation defense procedure

The dissertation is dedicated to the implementation of some of the skills of the 21st century in an educational environment related to team problem solving. The main hypothesis of the research is that with an appropriately chosen methodology to be implemented in the teaching of physics and astronomy, a significant improvement of students' skills for solving problems in a team can be achieved. For this purpose, a concept of collaborative problem solving is developed, which is based on 12 selected skills that form collaborative problem solving.

The main research to establish the level of competence for team problem solving is conducted with a stratified sample and a quasi-experimental model with a control group, the participants are students from junior high school and high school level in a metropolitan school.

Each of the participating classes is divided into two groups - one falls into the control group, and the other into the research group. For the implementation of the research task, an information system has been created to support the development and improvement of students' competencies for both problem solving and team problem solving.

Two types of contributions can be found in a dissertation.

The theoretical ones concern creating a methodology for assessing team problem solving competence. On this basis, a model for team-based problem-solving in physics was created, and basic teamwork skills were formulated that served as performance indicators. An information system design based on the teamwork model was created to investigate teamwork skills and problem solving in physics. Criteria have been formulated for the degree of skill formation.

The applied contributions of the thesis refer to the development of a design and creation of an information system for teamwork, testing and improvement of the platform with the aim of its full implementation in a school environment in the process of real physics education.

The results show that with the help of the created information system it is possible to achieve an improvement of both team problem-solving skills and relevant competence. It is shown that when using the created information system, which simulates a dialog mode of solving physics tasks, the differences between boys and girls in the competence of team problem solving can be reduced.

I am convinced that in terms of setting the problems of the study; the analyzes and summaries made, the applied methods, the level of significance, the accuracy and completeness of the obtained results and the literature awareness, the author has shown the necessary level for awarding the sought scientific degree "doctor".

5. Critical notes and recommendations

I have no critical remarks on the dissertation and the abstract.

6. Personal impressions of the candidate

I have known the candidate from his participation in three of my courses for doctoral students, in which he performed excellently, showed a high motivation for learning the material and completing the tasks and an interesting point of view on the main ideas presented in the discussed publications. In the presented work from his dissertation, thoroughness and creativity were evident, as well as a good preparation for working with people.

7. Conclusion

After having familiarized myself with the presented dissertation work, abstract and other materials, and based on the analysis of their significance and the scientific and scientific-applied contributions contained in them, I confirm that the scientific achievements meet the requirements of ZRASRB and the Rules for its application and the relevant Regulations of the SU "St. Kliment Ohridski" for acquiring the educational and academic degree "doctor". In particular, the candidate satisfies the minimum national requirements in the professional field and no plagiarism has been found in the submitted dissertation, abstract and scientific works.
I give my positive assessment of the dissertation work.

II. GENERAL CONCLUSION

Based on the above, as a member of the scientific jury, I m convinced that there is every reason to award the educational and scientific degree "Doctor" in the professional direction 1.3 Pedagogy of physics education to Fabien Theofanis Kunis.

September 4, 2023.

Prepared the opinion: IRINA ZINOVIEVA Digitally signed by IRINA ZINOVIEVA
Date: 2023.09.04 22:57:31 +03'00'

Prof. Irina Zinovieva, Dr. Sc.