

To the Chairman of the Scientific Jury

At the Medical University – ‘Prof. Dr. Paraskev Stoyanov’ - Varna,

Appointed by Order No. R-109-300/07.06.2023

To the Rector of MU - Varna ‘Prof. Dr. Paraskev Stoyanov’, according to procedure for the defense of a dissertation work for the acquisition of the educational and scientific degree "DOCTOR" in the Department of ‘Social Medicine and Organization of Health Care’ at the Faculty of Public Health of the MU - Varna ‘Prof. Dr. Paraskev Stoyanov’

with a candidate Eng. Deyan Grigorov Grancharov

R E V I E W

By Prof. Blagoi Ivanov Marinov, MD, PhD

Director of Medical Simulation Training Center,

Medical University - Plovdiv

About: Dissertation work of Eng. Deyan Grigorov Grancharov ‘EFFECTIVENESS AND PERSPECTIVES OF SIMULATION TECHNOLOGIES IN THE EDUCATION OF STUDENTS OF HEALTH SPECIALTIES’ with supervisors:

Assoc. prof. Nataliya Vasilevna Usheva, MD, PhD

Assoc. prof. eng. Kristina Stanimirova Bliznakova, doctor,

for the acquisition of an educational and scientific degree ‘DOCTOR’

in the doctoral program "Public Health Management"

in the Department of ‘Social Medicine and Organization of Health Care’, Faculty of Public Health of the Medical University - Varna ‘Prof. Dr. Paraskev Stoyanov’

Biography

Eng. Deyan Grigorov Grancharov was born on 05.09.1973 in the city of Varna and completed his secondary education at the Second Mathematical High School 'Dr. Petar Beron' - the city of Varna. In 1997, he graduated from the Technical University - Varna with a major in 'Electronic Engineering and Microelectronics', and in 2014 he obtained a master's degree in 'Health Management' from the Medical University - Varna 'Prof. Dr. Paraskev Stoyanov'. His career development includes experience as a computer specialist and manager of an organization, and he currently holds the position of assistant rector at the MU - Varna 'Prof. Dr. Paraskev Stoyanov'. In 2020, Eng. Deyan Grancharov was enrolled as a doctoral student in the doctoral program "Public Health Management" at the Faculty of Public Health of the MU - Varna. His academic development includes participation in numerous scientific projects funded by the European Union. He speaks English and Russian at a good level.

Relevance of the Topic

The dissertation developed by Eng. Deyan Grancharov is in an interdisciplinary field, with prospects to influence the entire training paradigm in medical universities. The history of simulation-based training in medicine goes through different stages and is associated with the introduction of anatomical models, mannequins, standardized patients, high-tech computerized simulators (through augmented reality and interactive virtual simulation) and 3D printing. This variety of methodologies means that there is a need to combine multiple individual indicators into complex systems for evaluating the effectiveness of medical simulations on the retention of knowledge and skills acquired in this specific way by students. Also of utmost importance are the attitudes of the instructors in the relevant medical specialties, as well as the correct perception of the advantages and disadvantages of simulation training.

Structure of the dissertation

The dissertation is prepared and presented perfectly. In general, the requirements for the structure of a dissertation are met, although there is some disproportionality between the chapters. The total volume of the manuscript covers 167 pages (including bibliography, contributions and a list of publications related to the dissertation), and 22 pages with 8 appendices (Questionnaire cards, student observation and evaluation cards, technical characteristics of the used simulators etc.). The dissertation is extensively annotated and the bibliography is arranged alphabetically, with all sources cited in Vancouver style.

The literature review is multifaceted and thorough, but at times too propaedeutic. It would be appropriate to shorten it by at least 20 pages. The general impression is that the dissertation student shows a thorough ability to summarize and analyze information, as well as a high degree of awareness of the problem being developed. The conclusion of the review creates an effective prelude to the presentation of the goal and tasks.

The goal is formulated very well, and 5 tasks are defined for its solution. I think they are adequate for the purpose, although some of them, e.g. Task 5 may be the subject of an independent dissertation development due to the national importance of the issues involved.

The studied medical students are more than 180, and the students of dental medicine are more than 70, incl. from Bulgarian and English language training. The contingents were selected very well, although it is not clear how the numbers of participants in the respective subgroups were determined (there is no data on a Power analysis). It is noteworthy that a group of Ob-Gyn specialists was also included to determine their knowledge, attitudes and subjective experience for the application of simulation technologies in training in this specialty. Expert opinion of people directly involved in the introduction, application and evaluation of the use of simulation technologies in the education of students in health specialties was also sought. The rest of the analytical methods used are comprehensively described. Objective, modern methods of statistical processing are used.

The results are presented logically and well illustrated with 15 tables, 1 figure and 6 photographs (the photographs in Appendix 6 should also be numbered).

More than half of the surveyed students believe that there is a need to provide additional simulators to increase the accessibility of simulation training. They also express the opinion that seminar classes with the inclusion of simulation technologies are not sufficiently represented in their training. This is a matter of national importance because it requires the development of normative documents to regulate simulation training in universities where medicine is taught. I fully support the dissertation's observation that elective simulation training with a greater number of teaching sessions has a beneficial effect on clinical thinking through better retention of knowledge and skills.

Almost all participants indicated that simulation-based learning supports the development of various clinical skills and competencies. The proportion of future doctors who agree on this question is higher (98.9%) than that of future dental doctors (95.8%).

The majority of all surveyed students (90%) shared the opinion that the construction of a specialized simulation center would increase the effectiveness of simulation training, and this proportion was higher among medical students (91.8%) than among dental students (79.7%). An extremely important observation, as this creates a secure environment for dedicated learning, which in turn increases efficiency. In global practice, there are analyses that indicate that this type of organization of simulations also leads to greater safety for the patient.

The dissertation convincingly confirms the observation that standardized patients are more effective than simulation mannequins in terms of the ability to perform the examination methods and history taking, but not in the acquisition of procedural competence and psycho-motor skills. Experts also believe that in the future, electronic standardized patient platforms such as CyberPatient and BodyInteract will gradually displace mannequins from simulation centers.

The training of medical specialists in a specialized simulation center requires adequate provision of human resources. The level of training of the instructor is critical to the delivery of effective simulation training. For me, the question of the need for two instructors during the conduct of the training with simulation technologies is irrelevant, since it would be at least not cost-effective, having in mind the existing staffing problem

at the moment. It would be more interesting to report the effectiveness of the instructor depending on his annual retraining as a trainer (participation in the so-called Train-the-Trainer courses).

A significant part of the participants in the experimental group shared that they needed guidance from the trainer during the simulation task. This observation demonstrates the important role of the instructor, who must explain the objectives of the simulation, devote sufficient time to each student, and assist them as needed. It is found that students with previous experience of using simulation technologies in their training show higher average results.

I also appreciate the critical analysis done based on the recommendations that the medical students make in different aspects of the simulation training. The relatively large groups, the smaller number of practical activities involving simulation technologies and the need for longer working hours of the simulation center in order to permanently access it are outlined as common problems.

As an interesting addition to the collected data, I would also like to see an analysis of subgroups of students regarding their experience with electronic games and their success rate when working with the simulators. Many authors point out the association of psychokinetics developed while playing electronic games with a more developed ability for laparoscopic navigation during surgery.

The discussion is focused and competent. It demonstrates the student's ability to analyze their own results in the context of data shared in the literature.

The dissertation student drew 11 conclusions in response to the 5 tasks set, thereby realizing the classic ratio of conclusions: tasks – 2:1. The conclusions are precise and comprehensive, and some of them may be paraphrased in order to avoid inaccuracies and ambiguities).

The developed dissertation has contributions of a scientific, applied and confirmatory nature, namely:

- The present multifaceted study is the first initiative in our country regarding the effectiveness and perspective of using modern simulation technologies in the training of students of clinical medicine and dentistry.

- For the first time, a study was carried out on the attitudes and experience of the application of simulation technologies in the education of students from the specialties 'Medicine' and 'Dental Medicine'.
- An experimental study was conducted for the first time in Bulgaria to evaluate the effectiveness of the application of ST in the training of the discipline 'Obstetrics and gynecology' of students from the specialty 'Medicine'.
- The knowledge, subjective experience and experiences of students and teachers in working with simulation technologies in the discipline 'Obstetrics and Gynecology', specialty 'Medicine' were analyzed.
- The first qualitative expert analysis was carried out to identify the main barriers to the wide application of simulation technologies for training students and specialists in health specialties in Bulgaria.
- The overall analysis of the collected data allows for recommendations to be made to the relevant institutions for the introduction of routine and effective training for students and interns in higher medical schools in Bulgaria.

Conclusion

The dissertation presented to me for evaluation shows very well the professional qualities of the doctoral student and his ability to conduct scientific research, as well as to make an adequate analysis of the obtained results and to formulate the conclusions arising from them. The development is a personal work of the author and it is evident that it is the result of serious work. Three articles have been published in the respective field of the dissertation topic in scientific journals, of which 1 is in print. Among the documents submitted by the author, I do not find any data on participation in scientific forums in our country and/or abroad.

I believe that my presented dissertation 'EFFECTIVENESS AND PERSPECTIVES OF SIMULATION TECHNOLOGIES IN THE EDUCATION OF HEALTH SPECIALTIES STUDENTS' meets the requirements of the the Law for Higher Education, the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its Application, as well as the Regulations of the Medical University - Varna for the acquisition of the educational and scientific degree 'DOCTOR'. Bearing in mind the

positive aspects and the undoubted contributions of the presented dissertation work, I will vote with 'Yes' for awarding the educational and scientific degree 'DOCTOR' to Eng. Deyan Grigorov Grancharov.

04.09.2023 г.

Plovdiv

Reviewer:

Prof. B. Marinov, MD, PhD