

ASSESSMENT OF APPLIED COMPETENCE AFTER USING VIDEO ALGORITHMS FOR INJECTION TECHNIQUE AMONG MEDICAL STUDENTS

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Abstract: *The report examines the creation of a new kind of educational resources - video algorithms for injection technique. Students from the Department of Health Care of the University of Ruse took part in the making of the videos. The video algorithms are based on the internet platform Youtube. Students are expressing considerable interest in them. The applied professional competence is assessed through specially designed protocols. The conclusion drawn from the study is that the video algorithms are positively accepted by the students. Through them the future medical personnel could acquire new interactive experience, develop their critical and analytical thinking and acquire new manipulative skills and professional competence.*

Keywords: *training, medical specialists, nurses, midwives, video algorithms, injection technique, professional competence, assessment of acquired skills.*

Introduction

The changes taking place in today's world require the need for the formation of professional competence in students, medical and health professionals studying in higher education institutions. The preparation of highly qualified nurses, midwives, directly depends on the skills of teachers to acquire professional competence in terms of their educational institution – the university, of interaction with medical staff in hospitals and social institutions involved in the training and the qualities of the students and their willingness to acquire professional competencies. For the formation of such competencies in university it is important to follow the principles of educational cooperation in solving both the professional and personal problems arising in the process of professional training. This research paper is an attempt to justify and prepare an innovative educational strategy to meet the needs of today's generation of students.

The specific features in the training of medical professionals generate demand of adequate modeling of learning situations and processes, taking into account more factors and requirements, imposed by both the increased consumer demand for health personnel, the changing conditions in healthcare, and from the explicit need to ensure the safety of the patient in clinical training facilities. Reflecting the complex relationship between the ill, the teacher, the student and the clinical supervisor calls for new educational structures and models for

optimization, considered from a logistics point of view. In such systems, the traditional educational models lose their rigid boundaries and evolve, reflecting the changing of educational clinical environment.

The use of information, communication and technical resources is a necessary condition for optimization, adequate reading of the complex clinical conditions and creating a safer and more effective educational and clinical environment in modern hospital training base.

The main goal of this report is:

*Achieving greater personal involvement of students in research through self-assessment and in the final stage – to study the effect of the introduction of the new type of educational and research resources – video algorithms for injection technique.

Main body

In the changing contemporary profile of healthcare students is a tendency, strongly influenced by technology development and digital revolution. This presents a challenge for academics to prepare, provide and explore educational tools and technologies that appeal to, meet the learning styles of today's generation of young people, improve pedagogical practice and raise the level of professional competence of future medical professionals.

Information and communication technologies develop very dynamically and for a short period of time (a decade) they became routine for the young people. As a result of the complete digital

environment and the continuous interaction with it, present and future students perceive and process information in a very different way, have a different way of thinking and learning style of their predecessors. It is not a secret that our educational system can hardly meet their needs and expectations and is facing serious problems in their training.

How is growing the modern child? It was born in a digital world and from an early age is intensely showered with information and media in any format. This child does not say "Mom, do you remember the story about...", it asks "Mom, do you remember the movie about...". For this child it does not matter whether it sits in front of a desktop computer, laptop, netbook or tablet, whether it uses a mouse, touchpad or touchscreen, or whether the operating system is windows 7, 8, linux or Mac OS – it always manages to find what he or she needs. This child is growing in a highly interactive environment – colourful and dynamic, which quickly reacts to his every action, in which every moment is an adventure. In this environment the growing child is a discoverer, character artist, designer and many others. (Ivanova, A. 2012) and the same child, a grown up now, enters the student audience where you stand passively and read, write and listen to what the professor teaches. It is obvious that the classical teaching methods cannot touch, nor engage today's students.

Training of personnel in healthcare sets new demands on the responsible educational systems. Raising the quality of training in medical and health professionals in the system of higher education will be seen as one of the important tasks in the concept of modernization of the profession of medical and health personnel.

In recent years, with the implementation of the National Programme for Virtual Educational Space, as well as the projects of the Ministry of Education "National Educational Portal", "Improving the qualification of teachers in higher education" and others, were made serious steps toward the right direction.

The launch of the program "Development of electronic forms of distance learning in higher education" and "System training and career development of teachers in higher education" as well as some measures of the National Reform Programme (2011-2015) of Bulgaria, developed in implementing the strategy "Europe 2020" are also a prerequisite for adapting the system of higher education to the digital generation. By far that is not enough. This adaptation is a complex problem, with the solving of which should be engaged all related to it and of course the necessary funds ought to be allocated. In some

countries this process has already begun. Suffice it to bring just one example: South Korea set aside from its budget about \$2 billion for the transition from paper textbooks to tablets. The education system of the country will actively use the so called "Cloud" technology, which will significantly facilitate the access to academic information supplementing the already stored in tablet multimedia teaching material (Stoykova, V., 2014). Obviously, this is a result of the understanding that the attractiveness of the educational system and the public benefit from it will be greater, as the more opportunities it offers, the more the expectations of the digital generation are met ahead of time. Those expectations are mostly related to active and effective use of information and communication technologies in the educational process. But even here it should be noted that these technologies, although a factor for change in all spheres of human activity, are not a panacea for solving all the problems in the education system - they are only one of the main prerequisites for finding an efficient solution. Today's students are the generation that is called "digital natives" and also "digital generation." M. Prensky calls them digital natives "N-Generes". They have grown up with the Internet, digital technologies are present throughout their whole lives, making them the first digitally literate generation. (Prensky, M. 2001) It is believed that digital media provided this generation platforms to explore, discover, interact and debate. Thus, they are characterized as "curious", "tolerant", "affirmative", "self-reliant", "very smart" but also "contentious". Digital natives communicate among themselves differently than their predecessors, using digital resources and easily converse with the world. Increased communication makes them more connected and socially oriented toward services than the students before them. As the digital generation have always had access to digital media for communication and information, they expect a similar way to training, feedback and assessment. So digital generation expects spontaneity, commitment, teamwork, and visualization and kinesthetic methods in training. The digital generation is different from the previous generations and this is why an educational transformation is necessary. (Hodges, T. L. 2008) Scientists suggest that projects that involve students in learning together, will enable them to navigate the cognitive process where information is developed phenomenally fast and where knowledge sharing is essential. In this world of "information boom", the profile of the nurse and midwife seems to be strongly influenced by social networks, games, wikis, virtual worlds, Web 1 and

Web 2, technology, blogs. Educators found that the introduction of new technologies in the classroom is the most important change in education over the past 100 years. Wireless technology, digital communication and mobile computing have a strong impact on teaching strategies. Prensky, M. (2001) Jennings, D., Cashman, D. (2008), Kingston, L., S. Tighe, (2010), Parker B., Myrick, F (2009).

This generation is committed to a wide variety of technologies and demonstrates the ability of versatility and processing multiple streams of information simultaneously.

In the Bulgarian educational space targeted research is done in the use of Internet technologies. The project of the Ministry of Education "Increasing the qualification of teachers in higher education in 2010" for the current generation of students the term "digital generation" is used. The comparative analysis of the literature shows that authors use the same meaning in concepts like "digital natives" and "digital generation." In this study will be used the term "digital generation." Considerations for choosing this term are that one of the key skills, cited by the European reference framework for key competences is digital competence. With the appearance of the digital generation in the university auditorium, the higher education system faced a big challenge - to ensure adequate training of students whose way of thinking, behavior, preferences, expectations and learning styles are radically different from both the teachers and the preceding them students. The classic style of teaching in universities with outdated methods and resources definitely bores students who have grown up actively using all the "extras" of the information society. Pedagogical models of today are uninteresting for present-day students and will become even more inadequate for the students of tomorrow if they do not match their level of technological development. Students in our universities today are from a generation that grew up in the world of computers, computer games and internet, but students from the generation who prefer wireless communications and mobile devices are still to be trained. It is natural for them to expect not to be separated from their digital world and in the university.

In the changing profile of the students in health care - nurses and midwives, emerges a line strongly influenced by the developments in technology and the digital revolution. This poses a challenge to teachers to prepare and provide educational tools and technologies that appeal to today's learning style of students. Academic teachers now have to abandon traditional didactic

training models and adopt constructive approaches for greater involvement and participation of students in the learning process. Serbezova, I. (2013)

Following this logic, the academic staff of the Department of Health Care and a group of students carried out research work on the project "Developing a model for videoalgorithms for injection technique." The study aimed to explore the construction of psychomotor skills and the formation of professional competence to perform injections among midwifery students in a simulated clinical environment through videoalgorithms.

One of the responsibilities of modern educational environment is to form proper clinical thinking in every future medical and health professional. Another specificity stems from the changing profile of the profession of medical and healthcare professionals. There is a trend both their training and practicing, of to be influenced by modern computer technology. From a technological point of view, society is using digital multimedia presentations and global communication on an increased level. Multimedia presentations allow conversion of all kinds of dynamic information / text, images, animation, audio and video/. Fastest growing information communication technologies change dynamically the models for training of medical and healthcare professionals. Digital technologies, as part of interactive technologies, are preferred in training from the students.

Specific for the educational environment is that it is responsible for the formation of competencies. The European Qualifications Framework includes requirements related to digital competence. By definition of the documents of the European Qualifications Framework, competence is a combination of knowledge, abilities, attitudes and learning skills. Also "competence" according to the Definition Dictionary of Bulgarian language is "expertise, skill, knowledge, ability, experience, proficiency, awareness, credibility, competence, specialty". Competence has contemporary sounding concept, as it is already a major emphasis in the European Qualifications Framework (EQF) and the National Qualifications Framework of the Republic of Bulgaria (NQF 2012).

There is an accepted definition that the competence of medical and health professionals is the successful use of integrated knowledge, skills and opportunities in giving quality health care for people - healthy or sick. The acquisition of competencies and clinical thinking with the help of health care supervising professors starts from the first day of training and practical development in the Faculty of Public Health and Health Care.

Competence is dependent on the content of the curriculum, in which training is carried out, on the technology used and on the teaching practice and professional experience of the trainees. Health care teachers are interested in increasing the competence of students to enable them to care for those in need without harming them. The available teaching methods present to the students the theoretical formulation in the technique of giving health care, which is needed for their preparation for conducting educational and practical training. In the process of their practical education, the medical and health care specialists build professional competences which they have to apply in real hospital environment on a real patient under the control of their supervisor. The subjects undergoing research in this project are:

- Video algorithm to perform intradermal injection;
 - Video algorithm to perform subcutaneous injection;
 - Video algorithm for performing intramuscular injection;
 - Video algorithm to perform intravenous injection;
 - Video algorithm to perform intravenous infusion.
- Knowing, researching and properly implementing the different types of injections is the basis for giving quality health care for each patient, healthy or sick.

The developed algorithm is a unified technological mechanism, through which the concept in the report is realized. The algorithm is constructed in the following parts:

- Ontodidactic selection of educational content;
- Unified methodology for a specific elaboration of didactic component;
- Structural composition of the didactic component.

A major feature of the work is the selection and development of educational accents on which the video algorithms will be structured.

The utilization of competence in injection technique for “Nurses” and “Midwives” degrees in Rousse University “Anghel Kanchev” takes place in the classes of “Philosophy and introduction to nursing and obstetric care” and “Practical foundations of “nursing and midwifery care” included in the curriculum of “Nurse” and “Midwife” degrees. Besides lectures, there are also practical exercises provided in a cabinet on Health care, where students practice manipulations on mouldings and with slow pace under supervision. Students are required to acquire knowledge and skills that will enable them to perform flawlessly all kinds of injections before being introduced to a real patient during clinical practice. Students believe that the main difficulties and obstacles are as follows: firstly, there is a

large volume of academic information, and the other is the fear of inflicting pain on another person, even more - to a child or a pregnant woman. This causes stress and brings insecurity. They realize the necessity of giving regular, quality and scientific care for those in need, and thus flawlessly mastering the injection technique. There is high interest for the profession and the studied disciplines. This explains the increased activity of students and their motivation for learning in the training process. The opportunity to freely interpret the material, the use of additional information resources, involvement of students in research work add diversity to the learning process, making it more dynamic and interesting. The preparation and delivering of modern teaching tools is very well accepted by the students, especially if they themselves participate in this process.

To learn something new, usually there are not countless options. Students can assimilate new information by attending the lecture, using a textbook and a book online or using the trial and error method. Injection technique, however, requires a perfect mastery of the manipulation of fine tuning and trial and error is not allowed. When a medical professional needs to learn new skills, reading a book is not always enough, and trial and error are not options. Moreover, detailed and automatic mastery of manipulation and procedures is required before being administered to the patient. The question is how to determine the corresponding treatment without error and following a certain algorithm? All this motivates professors and students majoring in “Midwifery” to discuss and prepare video algorithms for injection technique to be provided to all medical students - nurses and midwives in FOZZG, Department of Health Care of the University of Ruse.

Students were asked to participate actively in the scenario / educational accents / capture five video algorithms the following topics involving the formation of psychomotor skills and building professional competence in injection technique: intradermal injection; subcutaneous injection, muscular injection, intravenous injection and intravenous infusion. Sufficient information resources on paper and online were provided, as well as guidelines how to find them themselves. Future health care professionals participated actively in the process and enjoyed the experience. They learned new interactive skills, gained experience in the searching, collecting, structuring and analyzing educational information. Some of them were initially discouraged but subsequently adapted quickly to technology and started to define it as useful for the student. They

developed critical thinking and rationalized their professional development through the ability to take responsibility for their own education.

Once the scenarios / educational accents / were ready, the trainees had to shoot the videoalgorithms in a simulated hospital environment with a simulated patient. Students voluntarily expressed their desire to take on the role of the sick by posing for different types of injections. They filled the roles and at one point some of them were a nurse/midwife, and in another - patient. In this simulated clinical environment future midwives and nurses mastered clinical skills needed to safely practice under the supervision of teachers, when they are not a threat to the patient. The place where the simulated manipulations were carried out was specially adapted and provided by the hospital of Ruse.

Students had the opportunity not only to master those responsible manipulations but also to prepare for control procedures. When they felt sure in the manipulation they filmed it. Of course they had the chance to do a fewshots as long as they considered the shoot successful. If they were dissatisfied with their achievement they could film again the videoalgorithm until the moment when all criteria are met. This ensured that students achieve required standards for different types of injectable treatments. This way, a higher level of professional competence is formed. It gives students self-control and self-esteem. The best videoalgorithms are accessible via You Tube.

Those interested can review them later through the Internet. Students have the means to improve the manipulations, a chance to always remember a forgotten detail or find a error. Evaluating the results of the acquired skills and competences is an important part in the activities of the faculty in the Department of Health Care. The assessment is anticipated by the students, because as well as assessment of the acquired professional competence, they also receive instructions for further training and how to use the acquired knowledge, skills and apply them in work or study situations in professional and personal development.

In the specifics of the training of health personnel an objective system need to be used for assessing the competence acquired. This system must ensure safety and eliminate the possibility for errors.

Associate Professor Georgieva, D. (2015) recommends for assessment of practical skills involving dexterity, use of methods, materials, tools and instruments, such as handling in injection technique to work with an established algorithm of sequential activities, shaped into a

document. She believes that planned pedagogical supervision with a clear evaluating methodology can minimize subjectivity in evaluation. Clear methodology ensures subjective, reasoned evaluation of the students' skills. In this case, to assess the acquired professional competence in injection technique are used five protocols with individual educational monitoring for assessment of practical skills, done by Georgieva, D. (2015).

The video algorithms are based on the electronic platform You Tube and students have continuous online access to them from both their PCs and their mobile phones. This enables them to have constant acces to the information source and gives them a chance to pace their own work anywhere and anytime. A proof of the interest in the provided videoalgorithms is that till 24th January 2016 they were viewed 8695 times. However, for the team of teachers it was important to clarify the effect of the application of the videoalgorithms in injection technique for acquiring practical skills, respectively, professional competence. The assessment of practical skills of students was carried out by teachers from the Health care department –participants in the projects. The obtained data was processed with statistics in EXSEL tables. In this analysis are taken into account the number of views of videoalgorithms in You Tube, to which students have online access. The videos are viewed 5391 times until 03rd December 2015, as following:

Subcutaneous injection – 1410 views

Intramuscular injection - 2216 views

Intravenous injection -551 views

Intradermal injection -458 views

Intravenous infusion - 756 views

In the statistical data results of intradermal injection have not been studied because of the smallest amount of views and the relatively limited application of this manipulation. The following graphics show the results of the experiment and the received evaluations at the end of the summer semester before shooting the videos and watching them and at the end of the winter semester after filming and watching videoalgorithms for injection technique.

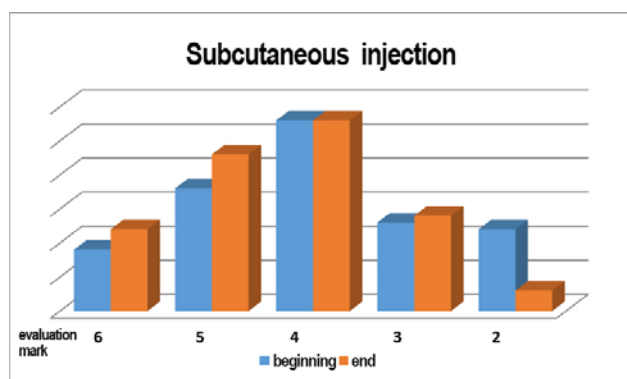


Fig. 2. Results of the evaluation of practical skills in giving subcutaneous injection before and after using video algorithms.

The data from all manipulations clearly shows better results after filming and watching video algorithms.

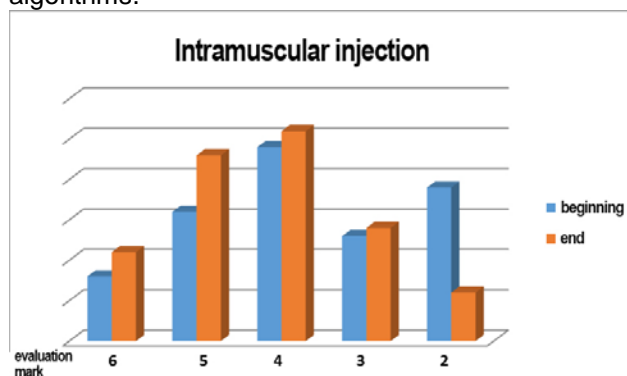


Fig. 3. Results of the evaluation of practical skills in giving intramuscular injection before and after using video algorithms.

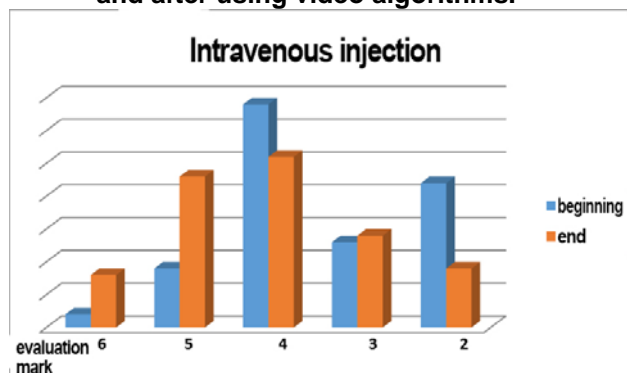


Fig. 4. Results of the evaluation of practical skills in giving intravenous injection before and after using video algorithms

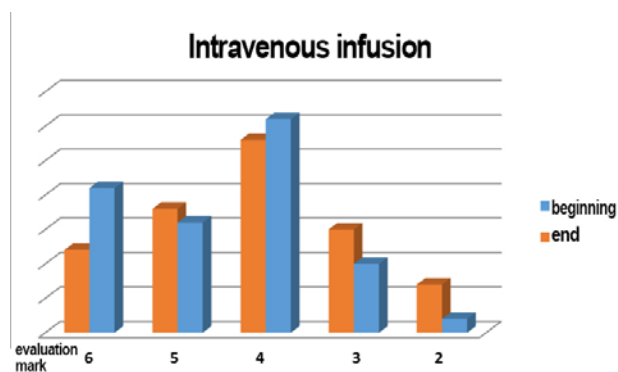


Fig. 5. Results of the evaluation of practical skills in giving intravenous infusion before and after using video algorithms

From the charts it is worth mentioning that the largest increase in results can be observed in manipulations that are viewed the most times.

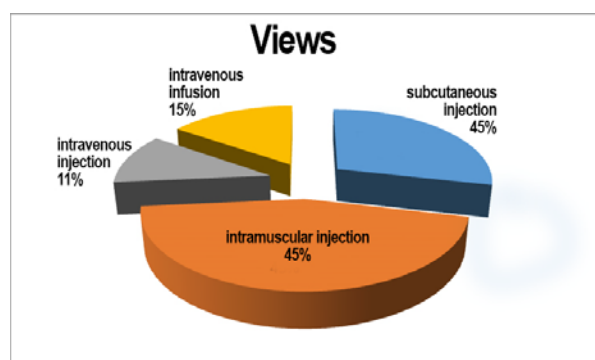


Fig. 6. Proportion of views according to the different types of injections

The following two graphics show the results of the obtained skills of manipulations according to various types of injections at the beginning of the project and after.

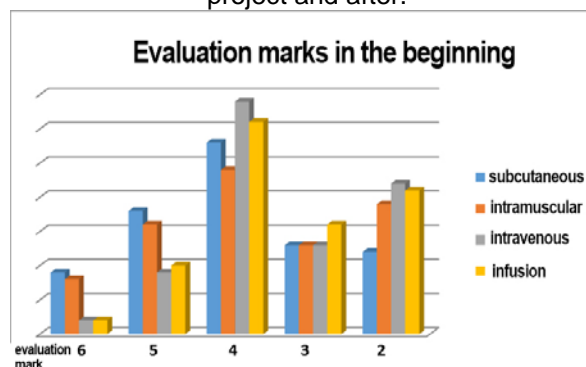


Fig. 7. Acquired skills at the beginning of the project evaluated by a six-grade system

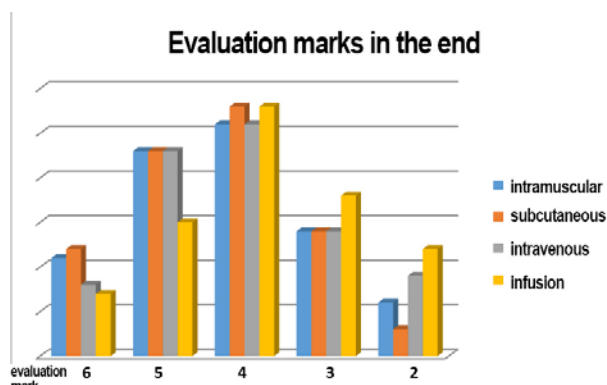


Fig. 8. Acquired skills at the end of the project evaluated by a six-grade system

At the end of the analyzed period the training results increased and that is found in greater extent in the most popular videos - technique for subcutaneous and intramuscular injection. The established correlation between the type of injection technique and more intensive work with electronic-based videoalgorithms could be

explained by the fact that subcutaneous and intramuscular injection are the most commonly used in hospital and outpatient care and their mastery requires perfection. Intravenous injection and infusion therapy are difficult for students, sometimes even "scary." Perhaps this is the reason for less work with the electronic system and respectively - for lower results in assessment.

Main results:

- Acquired manipulation skills, professional competence in students through videoalgorithms in the conduct of clinical practice and educational research during practice.
- Developed an optimal model of learning by applying videoalgorithms for injection technique.
- Established videoalgorithms for injection technique.
- Application of results in practice and in educational research process.

CONCLUSION:

Today universities consume more resources to improve their information infrastructure, but the rapid development of technology often puts them in catching positions on providing educational process with the latest technology to enable quality education and research process. It is necessary to find a balance between traditional and interactive communication between teachers and students. The introduction of non-traditional educational technologies is positively accepted by students. Such technology is videoalgorithms for injection technique. Through them, future medical professionals gained new interactive experience, developed their critical and clinical thinking, mastered manipulation skills and acquired professional competence.

BIBLIOGRAPHY

- [1] Георгиева, Д. Оценка на практически умения на студенти от специалност Медицинска сестра., Сборник протоколи за педагогическо наблюдение, Русенски университет "А. Кънчев", Русе, 2015, стр. 25-39
- [2] Сербезова И., Видеофилмите в обучението на медицински и здравни специалисти - монография, Печатна база на Русенски университет, Русе, 2013 г.
- [3] Иванова, А. „Дигиталните“ деца: надежди и тревога. В: Материали XII международных педагогических чтений „Коллективные субъекты педагогической и управленческой деятельности в культурно-компетентной и системно-деятельностной образовательных моделях“, Волгоград, ВГАПК РО, 2012, ISBN 978-5-904776-22-0.
- [4] Стойкова, В., Дисертация за присъждане на образователна и научна степен „Доктор“, на тема: Реализиране и изследване на елементи от концепция за адаптиране на системата на висшето образование към дигиталното поколение, Русенски университет „А. Кънчев“, Русе, 2014
- [5] Разработване на модел за видеоалгоритми за инжекционна техника. Проект по Фонд Научни изследвания на Русенски университет – 2015-ФОЗ-02, научен ръководител И. Сербезова, Русе 2015
- [6] Hodges, T. L.(2008); Examination of Gaming in nursing Education and The Effects on Learning and Retention. Disertation Submitted to the Graduate Faculty of Auburn University Alabama, Degree of Doctor of Education. pp.180 <http://etd.auburn.edu/etd/bitstream>
- [7] Jennings, D., Cashman, D. (2008). Mature cynics and fledgling electricians: elaborating instructional design for the next generation, The Changing Roles and identities of Teachers and Learners in Higher Education in Ireland. Cork: NAIRTL, 23-25
- [8] Kingston, L., S. Tighe, (2010). "Lights...camera...action", a changed approach to clinical skills teaching; nursing students in Ireland sit in the director's chair, AISHE 6th International Conference. Designing & Delivering Curricula for the Future, Dublin City University, p. 9

- [9] Parker B., Myrick, F (2009). A Critical Examination of High-Fidelity Human Patient Simulators, within the Context of Nursing Pedagogy. Nurse Education, 29, 322-329
- [10] Prensky, M. (2001). Digital natives, digital immigrants. On the Horizon (MCB University Press), 9(5), 1-6.
- [11] https://ec.europa.eu/ploteus/sites/eac-eqf/files/broch_bg.pdf ЕВРОПЕЙСКА КВАЛИФИКАЦИОННА РАМКА
- [12] [http://www.strategy.bg/StrategicDocuments/НАЦИОНАЛНА КВАЛИФИКАЦИОННА РАМКА НА РЕПУБЛИКА БЪЛГАРИЯ](http://www.strategy.bg/StrategicDocuments/НАЦИОНАЛНА_КВАЛИФИКАЦИОННА_РАМКА_НА_РЕПУБЛИКА_БЪЛГАРИЯ) Документът е приет с Решение № 96 на Министерския съвет от 02.02.2012 г.