Creating Teaching Materials for Students of Nursing with the Use of E-Learning Methods

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ABSTRACT

Background With the widespread introduction of computers and Internet access, distance education becomes increasingly poluar and is accepted as a form of supplementing or replacing traditional teaching methods. Changes in education systems and socio-technological transformations have affected various areas of life, especially the education process. Development of information technology offering interactive software multimedia for education, obliges academic teachers to create courses provided through e-learning. One of the most important stages of e-learning involves developing educational materials, as the quality of prepared and presented content should be reflected in the students' knowledge. Aim of the study The aim of the study is to present a way to create and use educational materials for e-learning methods of teaching.Materials and method The educational tool in the form of a "virtual case of a patient with bedsores" developed as part of teaching materials using e-learning is the result of the authors' own conceptual work and a review of available scientific literature on the creation and practical use of distance education tools.Results The educational tool in the form of "a virtual case of a patient with bedsores" was prepared using the CASUS system for first-year students of nursing (full-time first-degree studies) as part of a lesson/course unit concerning the care and treatment of bedsores on the basis of content tailored to the requirements of the curriculum for Fundamentals of Nursing. The tool's content concerned the problems of nursing care provided to a patient runs the risk of bedsores and a patient who actually has such lesions. ConclusionsSolving the problems of a "virtual patient" running the risk of bedsores and a patient suffering from such lesions made it possible for the students to learn about daily practice; it also encouraged them to acquire knowledge. Most of the students were satisfied with that method of learning. It was an interesting supplement to traditional teaching.

Keywords: *education, information technology, e-learning, virtual patient, nursing*

INTRODUCTION

Education, like other areas of human activity, is undergoing constant transformation. Directions of change are determined by educational systems and naturally result from general social and technological transformations. Advancements in information technology, easy access to the Internet and the students' expectations all influence the methods of knowledge transfer and determine certain changes in the existing educational methods [4, 6, 18].

Development of information technology offering interactive and multimedia educational software forces teachers to convert their traditional course format into distance courses and to combine elements of traditional teaching with e-learning (e-teaching) [18].

E-learning is used in distance teaching which applies information technology and eliminates the need to directly

contact the student. That is possible due to the provisions included in the Regulation of the Minister of Science and Higher Education dated 2nd November 2011 and in the Act on Higher Education of 2005. The directives therein impose certain obligations on educational institutions related to teacher training related to teaching with the use of such methods, e.g. development of teaching materials in an electronic format and equipping universities with the necessary infrastructure. It is also necessary to supervise the students' activities and verify the quality of education provided through the use of new methods [6, 14, 16, 17].

E-learning is carried out with the use of distance learning platforms such as Pegasus and Blackboard and systems such as CASUS. Each platform consists of modules that make it easy to communicate remotely, to create, process and store documents, and to manage e-courses. CASUS allows the creation of virtual patient cases [8].

A distance format course is managed by a tutor who has full control over its settings. The teacher can modify the contents on a regular basis, add and remove individual elements and adapt them to the goals. E-course participants can take part in activities on the platform as a whole course group, or they may be divided into task groups performing identical or different tasks. One of the most important elements of e-learning is the need to develop educational materials, as the quality of content to be prepared and presented will be reflected in the students' knowledge [3].

People who prepare e-courses face many difficulties. One of them is how to transfer the elements of verbal communication (voice intonation and its impact on the selection of content) into the system and another is how to focus and motivate students to acquire knowledge. Distance format materials should be interesting enough to engage students in the problems of patients and to motivate them to find the best ways to help such patients.

To meet the above-mentioned educational requirements, education materials should be much more attractive and varied than the materials used in traditional teaching; therefore, several standards to help build educational materials have been developed. One of the most famous is the *Sharable Content Object Reference Model* (SCORM) which includes technical tips to help develop virtual learning content and the *E-Learning Courseware Certification* (ECC) designed for asynchronous courses based on websites and mixed media [3,12].

Course content developed by a teacher or a group of teachers may be presented according to the themes and concepts of the course's author(s) as written words, tables, figures, charts, photos, videos, etc. Each of the course units (lessons) can have attachments in the form of supervisory elements and self-check tools (examination and educational cases). Students, using the synchronous (real-time communication) or asynchronous technique (at any time), can interactively participate in the classes and assess their own knowledge or skills, e.g. by answering test questions [6, 16].

E-learning has a special place in the teaching of medical courses. With this teaching method one can use various graphic forms and images that may be zoomed-in or apply real-life descriptions, which is extremely valuable. These features are highly useful in acquiring knowledge in the fields of anatomy, physiology, histology, microbiology and other subjects (like the fundamentals of nursing or specialist nursing) which fall within the standards of education in the nursing curriculum [6, 13].

E-learning courses also use problem-solving methods, which is another advantage. In problem-solving education (e.g. *Problem Based Learning,* PBL) the students are encouraged to find solutions independently. The role of the teacher is also changed from an authoritative transmitter of knowledge into an accompanying mentor ready to assist in their independent search for knowledge. The teacher points out errors in the student's reasoning and suggests further paths of research. Teaching with PBL involves identifying ways to acquire knowledge instead of transferring that knowledge. The concept of PBL is associated with a related type of education based on examples (*Case Based Learning, CBL*) which originally uses examples from real life based on case reports; it may be used in the creation of e-learning courses [7, 13].

A "virtual patient" is an example of a tool to assist the implementation of problem-solving teaching methods. The concept (*virtual patient*) refers to a computer program that simulates a meeting between a healthcare professional (doctor, nurse, dentist, nutritionist, or physiotherapist) and the patient. A student who plays the role of a doctor, nurse or physiotherapist has a wide range of information to use (description of the patient, signs, symptoms, test results). Working with the virtual patient translates into a number of therapeutic, diagnostic, nursing and rehabilitation decisions; the decision-making process is aided by teaching materials and the information contained in the program. The student has the opportunity to apply their knowledge and skills on a hypothetical patient. Students have to demonstrate their independence and the ability to synthesize facts and knowledge from many fields in order to make the right decisions before having contact with a real patient. Simulating a direct encounter with a patient is similar to daily practice and encourages learning by showing the application of knowledge in practice [7].

Electronic Virtual Patients (e-ViP) is a repository of e-learning tools. It is a place to store documents for sharing data in an orderly manner. Making e-ViP popular is to make the teaching of clinical skills more attractive and more effective. However, creating a variety of cases as part of e-ViP is associated with a significant amount of work and high

costs. The way to reduce these costs is to collaborate and share/exchange cases of virtual patients among educational institutions. That idea is the basic premise of the European e-ViP project. Its participants are European medical schools (including the Jagiellonian University Medical College) [12].

The Department of Bioinformatics and Telemedicine of the Medical College at the Jagiellonian University in Kraków, in order to meet the expectations of teachers and students, has organized a number of courses as part of the "Pro bono Collegii Medici Universitatis Jagiellonicae" project. One of them was the course entitled "Advanced educational techniques in medical education: e-learning tools in the teaching of medicine." The course inspired the authors of this article to prepare the case of a "virtual patient with bedsores," which – in cooperation with the Department of Bioinformatics and Telemedicine of the Jagiellonian University – was uploaded to CASUS and made available to first-year students of nursing at the Faculty of Health Sciences at the Jagiellonian University.

AIM OF THE STUDY

The aim of the study is to present a way to create and use educational materials for e-learning methods of teaching.

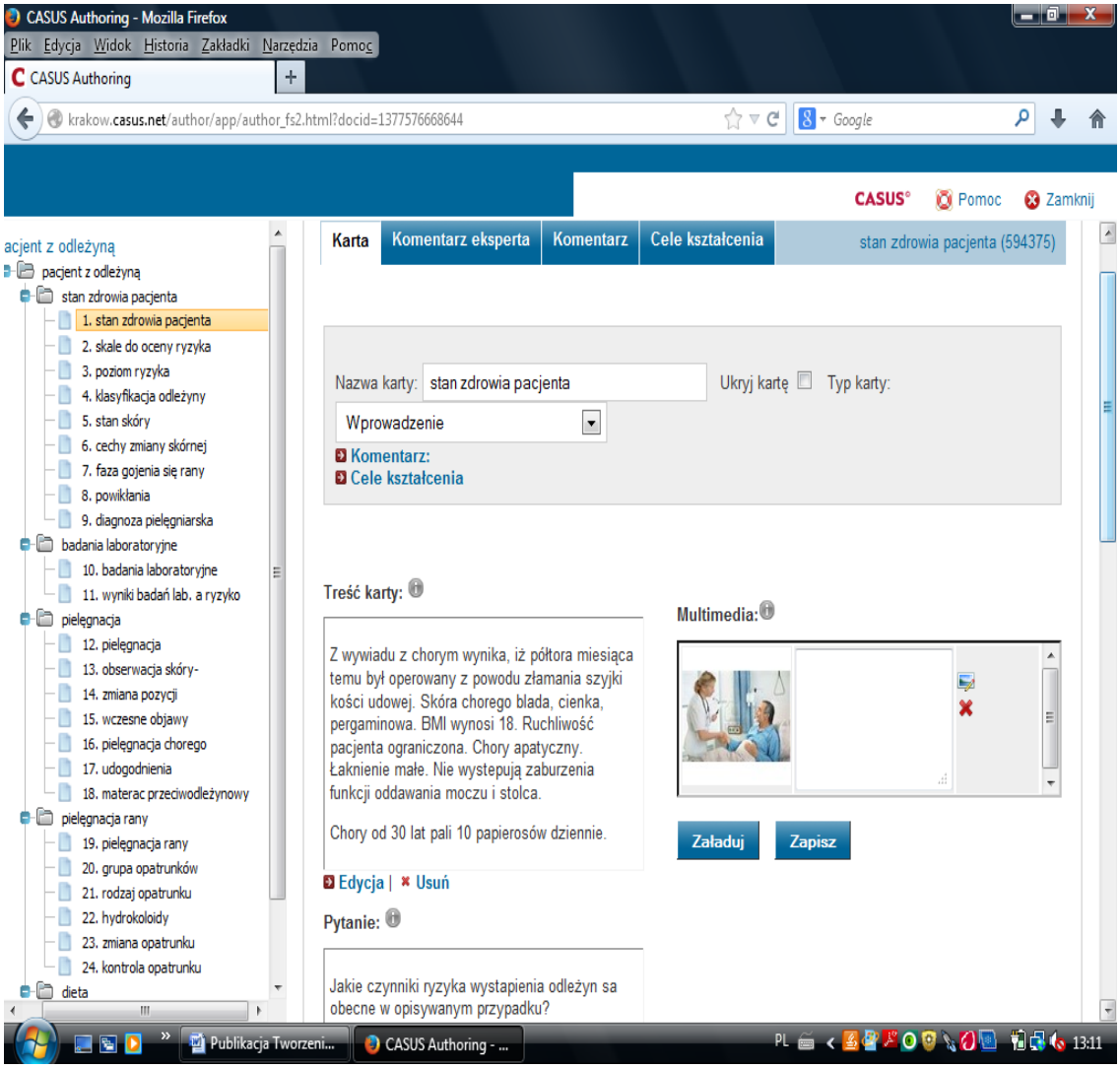
MATERIALS AND METHODS

The educational case developed as part of teaching materials using e-learning is the result of the authors' own conceptual work and a review of available scientific literature on the creation and practical use of distance education tools.

The educational tool in the form of "a virtual case of a patient with bedsores" was prepared for first-year students of nursing (full-time studies) as part of a lesson/course unit concerning the care and treatment of bedsores. The contents to form the basis for the case of a "virtual patient with bedsores" were aligned with the curricular requirements for the Fundamentals of Nursing. The idea which steered the authors was to facilitate the understanding of the problems of nursing care provided to a patient running the risk of bedsores and one with such lesions. The case of a "virtual patient with bedsores" was to help students decide on the issues of nursing during practical training in hospitals.

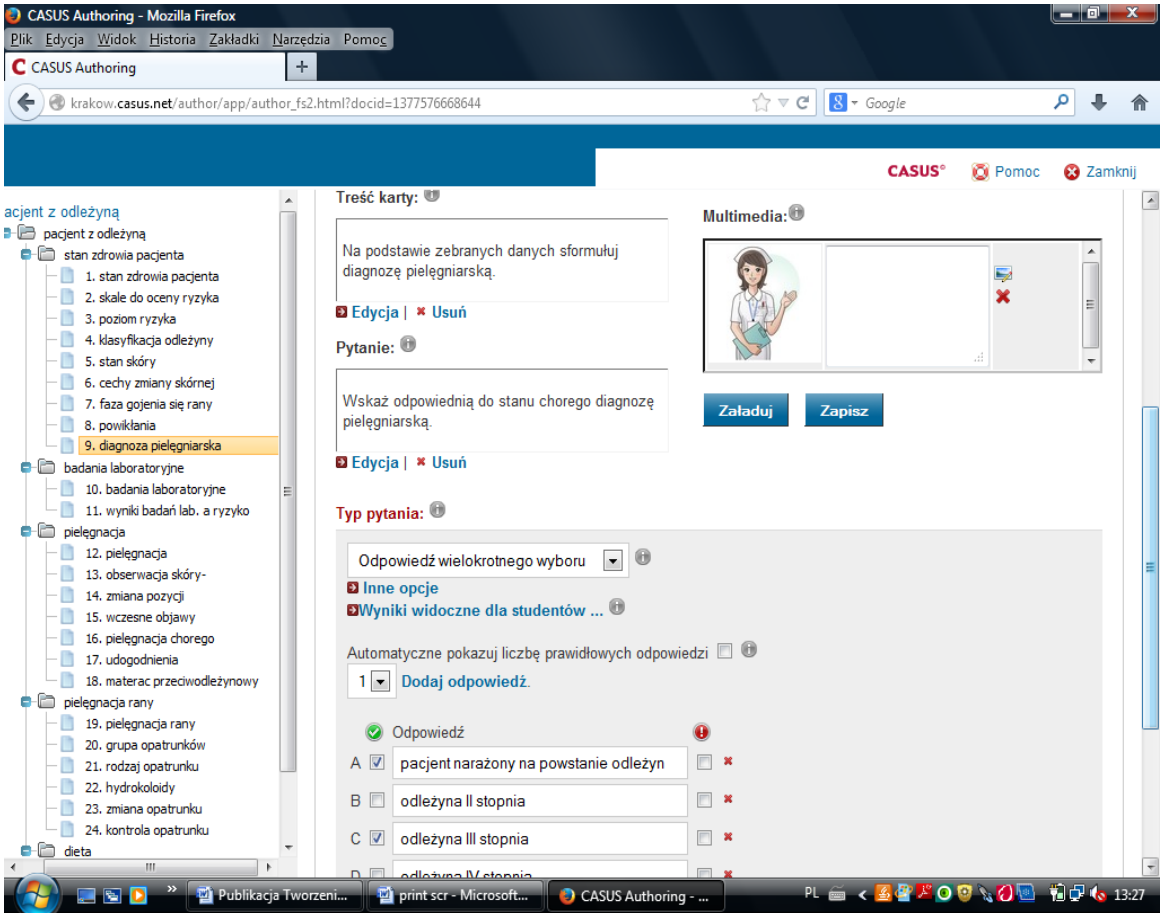
RESULTS

The educational case of a "virtual patient with bedsores" for nursing students was based on the linear model, in which events have a certain cause-and-effect order. The tool in the form of a "virtual patient case" consists of five parts which contain certain content and questions about the health of, laboratory tests on and nursing of that patient, his/her dietary care, and bedsore treatment. Each section contains tabs with card content, a question, a field for the student's answer and another one for the expert's comments on the answer. Photos and diagrams to clarify or further describe an issue are included as well. There was also a feature to upload a short video.



Dialog box taken from the CASUS system. Sample excerpt from an interview with the patient.

The card content includes a background description on the basis of which the student should respond to various questions. In the case of "a virtual patient with bedsores" these relate to risk factors for bedsore occurrence, the scales used to assess the risk of pressure sores, a scale to assess the stage of bedsores, the phases of wound-healing, and the signs of wound infection. Students have the opportunity to formulate nursing diagnoses. They can analyze the results of laboratory tests and determine the relationship between abnormal laboratory test results and the risk of bedsores for that patient. In the section related to nursing, the questions are focused on the rules of patient care, and especially on the facilities applied, a change in position, or the frequency of observation related to the sites of bedsore risk. Bedsore treatment is a part wherein the students select dressing groups that can be used on the virtual patient, then they suggest the most appropriate dressing and determine the sequence of actions during dressing replacement. In the final subsection, questions concern the type of diet applied to patients with bedsores, and certain food products and dietary supplements which should be included in such diets.



Dialog box taken from the CASUS system. A part of a sample question related to the nursing diagnosis.

Replies take various forms. The most common is a multiple-choice response to be underlined and a free-format text box where the student can give a written answer of any length. An additional type used here is a ”sort/assign” response type and a gapped-text test. The version described here is intended for educational purposes; students are informed of their mistakes and guided towards the right path of reasoning. After the student answers the question, he/she is presented with an explanation. The expert's advice allows the students to expand their knowledge and provide a hint that often affects their course of thinking.

The case of a "virtual patient with bedsores" was made available to first-year students in the academic year 2012/2013. The problem of bedsores and modern dressings was not discussed during lectures. Each student, in order to log on to CASUS, had received an individual access code to that course unit to use the shared content at any time of his/her choice. The students were given a certain amount of time to complete their self-learning objectives. Finally, they were asked to complete an evaluation questionnaire. The results of the evaluation clearly show that the method makes it easy to understand and learn the provided content. Most of the students were satisfied with that method of learning. According to them, it was an interesting supplement to traditional teaching and a valuable educational experience.

DISCUSSION

E-learning tools, such as the virtual patient, can be used in distance learning not only by students of nursing, but also by practicing nurses. These tools present an opportunity for current higher and post-graduate education. Studies conducted by B. Zych, I. Oskędra and W. Klapa [19] in 2002 among male and female nurses working in health care facilities in southern Poland and further studies conducted by I. Oskędra, B. Zych and M. Kózka [11] in 2006 in the population of nursing students of full-time and part-time studies of the 1st and 2nd degree showed that the respondents were interested in improving their occupational skills through the use of e-learning tools.

Similar results were also obtained by H. McVeigh [10] who polled nurses in the UK. Most of them declared that they were eager to use online courses which allow them to expand their knowledge and obtain professional qualifications, and which provide broader access to professional information, allow for flexible time management and guarantee an individual learning pace.

A similar opinion about the advantages and benefits of online education was expressed by students in other

fields. Studies conducted in 2007 by P. Betlej [1] among the students of the University of Information Technology and Management in Rzeszów and studies conducted by J. Karewicz [5] among the students of Organization and Management at the Silesian University of Technology who took part in a course on a Distance Teaching Platform based on Moodle software confirm that e-learning does not require note-taking and provides unlimited access to knowledge databases and training. The teaching process is individualized, and it saves time and learning costs. Additionally, students of the Silesian University of Technology found that classes conducted with the use of e-learning tools are more effective than traditional lessons. The students were convinced that the use of distance teaching methods and tools is connected with better teaching results.

To meet these expectations, the Maria Curie-Skłodowska University in Lublin and the School of Humanities and Economics in Łódź (currently the Academy of Humanities and Economics), with the use of information technology and a wide range of mixed media, established the Polish Virtual University in 2002. The institution aims to provide distance training and studies. Nursing classes for university students have been provided there since 2003. Studies conducted in 2009, assessing the level of satisfaction expressed by the nursing graduates of the Polish Virtual University related to the online teaching system, confirmed that it is a good alternative to traditional teaching. In the respondents' opinion, it has more advantages than disadvantages. Nurses valued the curriculum subjects, cooperation with the coordinators of classes, the working rules and the evaluation system applied in the course. The nurses also expressed their satisfaction by their willingness to continue education by means of the online system and recommend it to others as a good method to supplement nursing education [2].

In 2008, A. Stachoń, E. Walewska, L. Ścisło et al. [15] prepared an examination case in CASUS and introduced it into the teaching process of the Medical College at the Jagiellonian University. The case of a virtual patient concerned a person with gastrointestinal bleeding; it was prepared for third-year nursing students who had already attended classes in surgical nursing within the module of specialist nursing. All the students admitted to the exam were provided with a room equipped with computers with access to the Internet and the CASUS system. While simultaneously gaining access to the examination case, they were able to solve the problem within a specified time-frame. The results generally showed a high examination passing rate in that area. An evaluation questionnaire related to the presented case of a "virtual patient with gastrointestinal bleeding" showed that most of the students had positive impressions.

The Fundamentals of Maternity Care Laboratory, as one of the first units of the Medical College at the Jagiellonian University, also joined in the implementation of the e-ViP objectives. Two obstetric cases were created. They related to a 19-year-old pregnant patient at risk of preterm labor, and a preterm delivery in the case of a 41-year-old pregnant woman. The cases were presented to second- and third-year students of midwifery in the academic year 2009/2010. Most of the students had positive impressions in relation to the cases solved. The training element of the case, allowing the students to consolidate and expand their knowledge, was very important to the students. The tutors appreciated the chance to use the cases in the teaching process. They also claimed that these attracted more interest and motivated the students to work independently [9].

Preparation and implementation of the case of a "virtual patient with bedsores" in education as part of the course on the Fundamentals of Nursing at the Faculty of Health Sciences of the Medical College at the Jagiellonian University in 2013 was also very popular among students. They were satisfied with the features offered by that form of independent learning. The cases made a very good test before real-life contact with the patient, which is normally associated with additional stress, as the student is really responsible for his/her actions. An important advantage of the tool used in teaching is unlimited access to knowledge and the opportunity to choose any place and time for learning.

It may take some time before the library of virtual patients within the e-ViP project becomes available to the general community of medical schools in Europe (www.virtualpatients.eu). Therefore there is a need to create new cases of virtual patients with varying degrees of difficulty to be used in Polish medical schools for nursing students. Such cases could be tested and improved, so that they can make the teaching process more attractive and enhance the quality of education; in future, they could be available from a bank and exchanged between Polish and foreign universities.

CONCLUSIONS

1. The "case of a virtual patient" helps students prepare for nursing activities during practical sessions in hospitals and allows them to verify their clinical reasoning.
2. Preparation of teaching materials in the form of a virtual patient is extremely time-consuming and requires the ability to operate computer systems.
3. E-learning methods make it possible to re-use the "case of a virtual patient" in the teaching process, improve it and introduce changes related to the evolving best practices or the new means emerging on the market of medical services.

EXPECTATIONS

1. It is expected that university authorities should make efforts to include the working hours devoted to the creation of teaching materials using e-learning in the university staff teaching load.
2. To prepare or improve the computers and technical facilities used to teach with e-learning methods.
3. To create a bank for an inter-university exchange of materials used to teach with e-learning methods.
4. To provide access to the database of materials for nurses and students with no registration required.

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