# *Computer-Mediated Lessons for the Development of Knowledge of Rehabilitation for Patient Undergone Laminectomy for Nursing Students in Thailand*

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**Abstract**
The purposes of this study were to develop and test computer-mediated lesson efficiency in relation to laminectomy knowledge for nursing students. The investigator developed the Computer-mediated lessons utilizing 7 steps: (1) preparation; (2) instruction design, based on the concept of the interaction between the learner and the lesson; (3) development of a flowchart lesson; 4) storyboard creation;(5) program lesson development, using Adobe Captivate version 4.0, including tutorial, simulation, and test formats; (6) supporting materials production; and (7) evaluation and revision. After that, it was tried out by individuals and groups of nursing students. The contents of the Computer-mediated lessons were composed of principle of rehabilitation and a video of rehabilitation for patient undergone laminectomy. After that, efficiency was used with 30 third-year nursing students from the Faculty of Nursing, Thammasat University. The process/outcome efficiency was 85/87, which achieved 80/80 efficiency. Subjects rated the Computer-mediated lessons as good and very good regarding the information, presentation, applicability, and instruction. This result is suggested that Computer-mediated lessons can reduce learning time, can be accessed at any time, and are cost-effective. Computer-mediated lessons are also regarded as one of the major functions of the instructor to cause the development of teaching in Thailand, a developing country that is about to step into the Asian Economic Community (AEC).

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## Introduction and Background

Education policy of the country in 2009, with guidelines on teaching and learning by providing students were the most significant person and considered that all students can learn and develop themselves. Teaching process must encourage students to develop their knowledge of nature and full potential. Therefore, lecturers should provide a learning environment and educational media and technology related to educational facilities for the students to learn and encourages critical thinking. Providing other educational resources are used to develop the students' knowledge increased to achieve the objectives and goals of the course. The creation classroom environment and educational technology, will help promote self-learning beyond learning in the classroom can help students understand the lessons of the rise and lead to the most accurate and efficient.

The nursing education system faces challenges in preparing students to live and work in an information, communication and technology driven world, which is characterized by constant innovations and revolutionary changes. The digital revolution has brought about transformation in the way people communicate, gain access to and process information. Digital technologies are revolutionizing the manner in which education is provided. It enables nurse educators to utilize information communication technologies in nursing education to provide learning experiences that support students' optimal learning in spite of differences in learning styles [1]. Nursing Education is the process of improving the quality of nursing education to nursing students with the knowledge and skills to be a nurse quality. Education to develop learners need to focus on using learner-centered teaching-learning process and emphasis on practice in real situations to achieve learning to be utilized to the maximum. The development aims to develop students' critical thinking skills, problem solving ability and self-learning by using appropriate technology and full potential [2]. Therefore, teachers should create learning materials to help students achieve learning to help students to learn by practice in real situations. Teaching materials will help to achieve the learning objectives and goals of nursing education programs. Education today is considered the medium of instruction is a priority to help the teaching process with good quality and performance for media arouse the interest of learners, participate on learning helps students understand clearly, remember faster and remember them for the students to learn faster in time is limited [2], so that the study was effectively are therefore required. The development process of teaching and learning at all times. Computer plays an important role in different fields of Education. Nowadays, government provides good Infrastructural facilities like faculty of nursing, Thammasat University to promote education-technology based learning and with the effort of teachers, teaching learning process makes effective and interesting. Using modern computers are rapidly growing. Computer-Mediated Lesson (CML.) has been important role in the field of management education because CML as a high instructional technology for teaching using computers as aids to present learning content to the learner. CML represent knowledge content in text, images file, graphics, charts, graphs, animations, video file and audio file that aims to teach similar content knowledge in classrooms [2]. CML is the interaction between the learner and the computer, and a reinforcement learner immediately [3] make the learning fun never bothered studies have found that most students were satisfied with the CML offers that help support learning, fun, colorful images in particular are invited to follow exercises to practice, remember to make students understand the

theory more knowledge .In addition, computer-assisted instruction is a teaching that helps students learn to meet their own skill level and needs. Previous Studies have found that students who were taught by teachers with computer-aided instruction score higher knowledge than students who were taught by teachers only [3]. Therefore, the use of CML may be help students learn and experience more efficient patient care.

Spinal surgery as a way to treat patients with disorders of the spine such as herniated disc (HNP), scroll, degeneration of the spine, the sliding motion of the spine and spinal narrower [4-6], the patient with back pain, some cases with symptoms radiating to the leg, calf and heel and may have muscle weakness in conjunction with, some case may have been crushed nerve, spine, particularly the small of the patient cannot control the excretion of urine and feces. These causes are indications that doctors consider treatment by surgery [4-6]. Currently, the disease is spinal increasing in Thai people and maintaining the most efficient method is spinal surgery. Spine surgery is minimally important to the life, career and image of the patient because it is major surgery that requires a long period of time and the patient needs to be sedated throughout the body, thus affecting both physical, mental, emotional, social, and economic [4-6]. By the impact of the body including spine surgery, complications from receiving anesthesia throughout the body affects the respiratory system, such as the lung tissue of lung ischemia is not fully expanded, the exchange. Gas in the lower body cause lung collapse [4] may be due to blood loss from surgery, which can affect the cardiovascular system. The amount of blood that flows back to the heart decreases, low blood pressure, rapid pulse, breathing fast and deep, skin cold, body temperature decreased tissue oxygen deficiency [4]. In postoperative patients must bed rest, restricted movement, routine down can cause complications from the bed up as pressure ulcers, infections of urinary tract, flatulence, constipation and atelectasis. It may be cause to nerve damage neighbouring increasing irritation or injury to the spinal cord and nerve roots, causing bleeding and a blood clot pressing on the spinal cord. The impact of psychological and emotional after spinal surgery that will cause the patient stress and suffering from pain, fear cannot return to your career and uncertainty about the illness and treatment have been sent that results in patients with mood changes and behavioural expressions such as restlessness, excitement, fear, and depression. It also affects the society is made to perform the role of family and social change, cannot serve as head of the family, the family roles, cannot be held responsible for it. normal and everyday lifestyle changes, there must be someone who will help in activities of daily living and affect the image of the patient, the patient have body movements using a back support and walk using a walker. It can also affect the economic condition of the patient, the patient must lack the income, and the patient and family are responsible for various costs higher. So, to prevent the impact of potential patients and their families need to be prepared before going home only to get knowledge about the disease and treatment received, which prepares you both physically and psychological. From the study of the needs of patients who have undergone surgery found that patients who underwent surgery with the information requirements such as surgery, the purpose of the surgery, the pros and cons of surgery, complications may occur and correct behaviour after surgery. Therefore, the most important method to prevent the complications one is the use of discharge planning by multidisciplinary care team especially nurses who care for patients 24 hours and nursing students who are involved in patient care should be more knowledge, understanding, as well as recognizing the importance of rehabilitation

after surgery to strength in a short time and without complications. Experience of the researcher in the care of patients who received spinal surgery patients with complications arising after surgery, particularly pressure ulcers, muscle atrophy , the patient must lie admitted to the hospital, high cost of treatment without any benefit. Our objective was to study the development of computer assisted instruction on spinal surgery for nursing students to help students achieve a better understanding and ability to apply knowledge to apply in practice and can advise on rehabilitation in patients and their families , which will effectively guide the teaching and learning in practice anyway.

**Conceptual Framework.**

The development of Computer-Mediated Lesson (CML.) based on concepts of Alessi & Trollip (1991) [7] aims to use as learning tools for the third-year nursing students to achieve the learning principles of principle and method of rehabilitation for patient undergoing laminectomy to nursing students by taking into account the individual differences, the students can learn based on their own needs and dialog and interaction with the computer immediately. Computer has been prepared in the form of media, including text, images, animations, sounds and colours. Computer has been prepared in the form of media, including text, images, animations, sounds and colours. Process of interaction between students and the lessons are an important part of learning with CML and provide immediate feedback to reinforce learning and increase student morale happy. Students do not feel pressured and fun to use CML, especially doing the quiz provide increased students knowledge and processes to explain the reasons of the answers in the form of sounds and texts that make students happy and willing to learn. There is also the scenario presented by the students to review the images, video content to understand more. Students can practice the test and review the content frequently and repeat as needed until satisfied with no time limits on learning. The opportunity to practice or review frequently to help nursing students can use to practice nursing in particular, patients who received spinal surgery in adults and elderly nursing courses effectively. In this CML content consist of principles, practices and methods of rehabilitation after spinal surgery to provide nursing students' knowledge to educate and advice on the correct practices rehabilitation after spinal surgery is increasing.

Research objectives

1. Development of Computer-Mediated Lesson in title principle and method of Rehabilitation for patient undergone laminectomy for nursing students.
2. Evaluate the effectiveness of Computer-Mediated Lesson that comparison between the knowledge points of the sample before and after learning by Computer-Mediated Lesson.

Hypothesis

1. Computer-Mediated Lesson entitles principle and method of rehabilitation for patient undergone laminectomy performing above the standard 80/80.
2. Posttest knowledge score of the subjects with Computer-Mediated Lesson entitle principle and method of rehabilitation for patient undergone laminectomy is higher than previous enrolled

## Definition

Computer-Mediated Lesson (CML.) refers to computer assisted instruction, multimedia presentation formats include text, images, graphics, animation, sounds, movies that can interact to the students appropriately. [8] In addition, CML embraces a wide range of ICT applications and approaches to teaching and learning foreign languages. In addition to CML as a form of computer-based learning which carries two important features: individualized learning and bidirectional learning. This is a form of student-centred learning materials, which promote self directed learning; moreover, it is an interactive way of teaching that helps learners achieves the goals of learning, and the ability to learn on their own. And researches have been shown that using the computer is efficient on education. People use technology because technology can do certain necessary or desirable tasks more efficiently or effectively than people. The principles and factors of education for applying technology into education are as follows:

1. Motivation
   (1) Attract students' attention
   (2) Enhance the perception control of students
   (3) Encourage students to participate in activities
2. The special function of teaching
   (1) Help students to find problems and solutions
   (2) To trace the students performance of learning
   (3) Help students to connect and get information and educational resources
3. Help new teaching strategies
   (1) Cooperative learning
   (2) Shared intelligence and distributed intelligence
   (3) The solution to problem
4. Enhance teachers' productivity
   (1) Deal with heavy burden
   (2) Save time to do many designs of curriculum
   (Roblyer, 2003)[10]

Applying computer technology makes teachers have rich productivity, teaching effect, and change students learning styles, which can make the relationship of interaction and connection between teachers and students closely. So more and more educational researchers emphasize the issue of integrating technology into teaching.

## Target group

The target group was a class of 37 the third-year nursing students in the first semester of the 2010 academic year at Faculty of Nursing, Thammasat University,Thailand. All of them studied in the course NS 391 (Practicum in Nursing Care of Adults and the Aged I).

## Methods

This Development Research was to develop a Computer-Mediated Lesson in title principle and method of rehabilitation for patient undergone laminectomy for nursing students. The test 3 times is one single person, group of 6 people and the field of 30.

**Research instruments**

The instruction and data collection instruments were constructed as follows.

1. **Instructional instruments**

Instructional instruments were divided into two categories (1) the lesson plans based on CML and (2) CML materials selected from the Adobe Captivate 4.0 program.

1) Lesson plans: The lesson plans were divided into five sections; spine surgery, laminectomy indications, principles, practices, accurate and rehabilitation after surgery.
2) CML materials: CML entitle principle and method of rehabilitation for patient undergone laminectomy for the third year nursing students generated by Adobe Captivate 4.0 program with the following 7 steps including:
   (1) Research data and content analysis: the material used in this study consists of the following content knowledge, spine surgery, and indication for surgery, principles and practice correct rehabilitation after spinal surgery. Researched how to build a computer-assisted instruction, content analysis, set objectives, learning activities, the test, to measure and collect / analyze content knowledge appropriate to the learning objectives.
   (2) Development of Computer-Mediated Lesson.
   (3) Import content from content analysis knowledge to write about the activities carried out, design template.
   (4) Creating lesson objectives by bringing content into the lessons as a unit test using standard SCORM.
   (5) Structure Determination presentation sequence by sorting the content as intended.
   (6) The Computer-Mediated Lesson is created successfully performed to determine the efficiency of the CML by bringing to trial the next step.

2. **Data collection instruments:**

Questionnaire measuring knowledge consist of the questions about the principles of rehabilitation after spinal surgery were evaluated by 3 experts consisting of orthopedic doctors who exported in spine surgery procedure and lecturer specialized in teaching computer media and nursing lecturer. Following objective criteria scoring is the "+1" on some tests that directly measure learning objectives to " 0" when not sure that the test is consistent with the purpose and " -1" on some items not directly. measurable learning objectives And calculate the index of the corresponding entry purposes (IOC) , which is the index of the corresponding entry purposes (IOC) of this query is 0.8 to 1.00 .The IOC must be between 0.80-1.00, it can be considered a good test. After that, brought questionnaire to determine the reliability of the test using the formula KR20 and the index of difficulty (P) and the Discrimination Index (r) by 10 the fourth year students have been studying in this lesson. Criteria for determining the value of p and r by choosing a particular benchmark test in which p values ranged from 0.20 to 0.80 and the 0.20 r over 10 questions. This quationare showed that knowledge about rehabilitation after spinal surgery with confidence KR 20 was .70 average difficulty indexes (p) 0.47 and the average discrimination index (r) 0.64.

**Ethical Considerations**

Ethical approval was obtained from the Research and Ethics Committee of Faculty of Nursing, Thammasat University. Verbal permission from the researcher in charge of the third year respondents was obtained. Voluntary, informed consent was obtained from each respondent. Verbal information was given to the respondents regarding the purpose of the study and the importance of their participation. This information was also indicated in the cover letter accompanying each questionnaire. The respondents were assured that anonymity and confidentiality would be maintained. No personal details of the respondents were written on the questionnaire.

**Procedure**

Phase 1 trial individual : The researcher used the Computer-Mediated Lesson to test with 1 the third-year nursing student by the student sit at the computer then the researcher explained the process and how the teaching of the CML to the learner. After that, Samples do the measurement to measure the level of knowledge that appears in the CML in 10 items. After that, the students study the following content to the end. Then they do the measurement to measure the level of knowledge that appears in the CML in 10 items similarly. After that, the researcher used the scores from the two tests times for evaluated the effectiveness of CML (E1/E2) (E1 refers to the efficiency of processes, E2 refers to the effectiveness of the results.), which in the first Test, the effectiveness of CML is the 70/70. There is also a suggestion from the samples taken were analyzed for the various defects to further improvement.

Phase 2 trials in small groups, the researcher used the CML to evaluate in 1 the third-year nursing student by the student sit at the computer then the researcher explained the process and how the teaching of the CML to the learner. After that, Samples do the measurement to measure the level of knowledge that appears in the CML in 10 items. After that, the students study the following content to the end. Then they do the measurement to measure the level of knowledge that appears in the CML in 10 items similarly. After that, the researcher used the scores from the two tests times for evaluated the effectiveness of CML (E1/E2) (E1 refers to the efficiency of processes, E2 refers to the effectiveness of the results.), which in the first Test, the effectiveness of CML is the 80/80. There is also a suggestion from the samples taken were analyzed for the various defects to further improvement.

Phase 3 field trials, the researcher used this created CML with 30 the third-year nursing student by the student sit at the computer then the researcher explained the process and how the teaching of the CML to the learner. After that, Samples do the measurement to measure the level of knowledge that appears in the CML in 10 items. After that, the students study the following content to the end. Then they do the measurement to measure the level of knowledge that appears in the CML in 10 items similarly.

Instruments used in data collection consists of a quiz about rehabilitation after laminectomy procedure is a question about spine surgery (laminectomy), indication for surgery, how to rehabilitation after spinal surgery, 10 questions, which the multiple-choice. Respondents were given 1 point and 0 points for wrong answers.

## Research Findings

This development Computer-Mediated Lesson entitles principle and method of rehabilitation for patient undergoing laminectomy for nursing students consist of four main topics including: spine surgery, surgical indications, principles, practices, accurate and rehabilitation after surgery. Lessons are two forms consist of content which presents content knowledge as text, a simulation, image, video shows the steps to perform daily activities and rehabilitation was needed to help the students understand and exercises that include pre-test and post-test. The tests with a set of questions that sent the explanation of the correct answer, give feedback and reinforcement encourages the students to greater understanding. In addition, Students can choose classes according to their own needs and the learner can return to the main menu without having to wait to finish the lesson, then, can be traced back to the content is still not understood. This Computer-Mediated Lesson divided into 42 frame by frame content development, instructional design based on the concept of Alessi & Trollip [7] in 7 steps. The screen design to deliver content with the screen elements, use of graphics, video, video, sounds, colors and characters associated with the content. Screen design with colors that appeal to the students to encourage and motivate the students to want to learn. Development of Computer-Mediated Lesson is created using the straight-line tutorials, a branch and a separate framework presented is not a major topic for the students to choose a topic. Students can choose courses according to their own ability and can go back and review the content is not understood. After creating the lesson finished, the researchers have applied the lessons to education expert to examine the validity of the model of the arrangement of content, how the content of the lessons and quizzes CML built. Researchers improve upon the recommendation of the experts. Then evaluate the effectiveness of computer-assisted instruction to test in a single person, a group of 6 people and a field of 30, after which the researchers used scores from the test to evaluate the effectiveness of Computer-Mediated Lesson (E1/E2) that it was found that the efficiency of the computer assisted instruction was 85/87. The findings of this study revealed that the achievement scores after the computer assisted instruction lessons of the sample were significantly higher than those before at the 0.01. In addition, most students have a comment about the CML is inside the content and presentation was good with an average of 4.42 (SD = .56). Opinions on the topic Computer-Mediated Lesson in the other side such as: 1) image, audio and language was good with an average of 4.07 (SD = .65) 2) the design of the monitor is at a good level with an average of 4.21 (SD = .49. 3)), the sequence and steps in a good level averaged 4.37 (SD = .54), and 4) Comments satisfaction in learning a lesson in what is a very average. 4.37 (SD = .54)

## Discussion

Researchers develop computer-assisted instruction program by offering content in the text, still images, movies and audio, students can study the contents and determine progress in their learning abilities. Appropriated Classes for using Computer-Mediated Lesson must be the learners who are students with basic nursing knowledge because the content is complex. As a sample of the opinion that the content of the lessons covered in the patients who received spinal surgery, especially presented to illustrate how to care and give advice on how to do various daily activities and can be implemented more accurate. Samples can take the time to learn the Computer-

Mediated Lesson (CML.) by the ability and needs of the individual. The study found that the students take to the unequal class is from 50 minutes to 65 minutes. Computer skills and proficiency in the use of the individual may make use of the time in different classes. In addition, the opinion of samples that the presentation of content in Computer-Mediated Lesson is easy to understand and easy to find topics / content because Computer-Mediated Lesson has created a main menu with the subject content four main topics that the students can study and choose to review the content they want to make the majority opinion and the satisfaction of learning is very good with Computer-Mediated Lesson averaged 4.37 (SD = .54). The findings of this study revealed that the achievement scores after the computer assisted instruction lessons of the experimental group were significantly higher than those before the Computer-Mediated Lesson lessons at the 0.01 level. Additionally, Computer-Mediated Lesson also multimedia that contain text, pictures, animations file, videos file, visual and sound effects that stimulate the learner's interest and willingness to enrol in lessons, making the recognition and behavioural knowledge to correspond to the objectives set.

Computer-Mediated Lesson also has the appearance of quizzes to improve students' knowledge and practice skills and could interact with lessons. This creates an incentive for students to teaching and learning which is based on principles that are aimed at specific individuals and the students-centred corresponding with the previous study. The effectiveness of Computer-Mediated Lesson (E1/E2) was 85/87 that mean it is a good education media [2] as well as CML over the past [11-14], so it is considered Computer-Mediated Lesson can serve as a lesson to help the students with the knowledge to care for patient undergoing laminectomy has been increased and the sample commented that they gained knowledge about the care of patient undergoing laminectomy and much more in the end. The samples show that they can apply their knowledge to practical use, more accurate, and the importance of caring for the patients who received spinal surgery. Samples have suggested that we should include in this CML entitle principle and method of rehabilitation for patient undergone laminectomy in units of the hospital utilization. This program is very useful to use in nursing education which corresponds with the results of computer assisted instruction [15,16] found that the students' satisfaction in learning and thinking how useful can used in clinical practice as well.

**Conclusion and Suggestions**

This process of applying new technology in nursing education is a challenge every nursing lecturer will have to face. Applying Computer-Mediated Lesson to teaching has become a new trend to the advanced countries in the current world. Meanwhile, information technology and multimedia teaching will be a direction that the government advocates in our educational policy. Whether there is integration between technology and nursing teaching efficiently and successfully depends on the lecturers' efforts and professional abilities. More importantly, the government and education authorities concerned should put emphasis on the need of information technology in schools, fostering the coordination of policy and resources. Although the integration of technology into nursing is difficult and complicated, it is suggested that lecturers can build up confidence, and consult with the other professional teachers or education expert to continue innovation. The most important, Computer-Mediated Lesson or

Computer-Assisted Instruction can never replace lecturers but it compliments them and helps in easier, faster and effective learning of content.

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