Original Articles/นิพนธ์ต้นฉบับ

Evaluation of the Web-based Critical Thinking Software: Diagnostic Reasoning Clinician in Ramathibodi's Medical Curriculum.

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Abstract

Introduction: Clinical reasoning skills are essential for problem-solving process for medical students. DxR Clinician, a web-based critical thinking software, is a computerized case series, in which students learn to gather and interpret data, generate hypotheses and make decisions to solve patient problems. This study aimed to evaluate students' perceptions and satisfactions of DxR Clinician software in the fifth-year medical students at Ramathibodi Hospital, Faculty of Medicine, Mahidol University, Bangkok, Thailand.

Methods: The questionnaires consisted of 33 questions (Likert scale 1-5) with an open response section which were developed to explore students' perceptions and satisfactions of the program. The respondents were 116 medical students who used the computer-based program to practice clinical reasoning skills in family medicine rotation. The data were analyzed by using SPSS program, version 11.5.

Results: Students were found to high satisfaction in the area of feasibility in the use of the program, ability of this program to support the students' clinical reasoning skills and clinical learning. However, they evaluated low satisfaction in term of the ability to stimulate self-directed learning after practicing the program.

Conclusions: The web-based software can be used as an effective educational tool for students to improve their diagnostic skills and refine their knowledge base.

Key words: evaluation, Web-based software, computer program, DxR clinician, patient simulation, teaching tool

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Introduction

Medical students need to practice clinical reasoning skills which are one of the core professional competencies.[1] Nowadays, patient safety, medical knowledge, doctors' workload and healthcare delivery have changed.[2] To develop the clinical reasoning skills in our students' competency, the faculties have to look for new learning tools which could provide opportunities for safety and independent learning situations.[3-6] Virtual simulator is now well recognized for not only training in the aspects of problem solving skills,[7] communication skills[8] and practical procedures[9] but also for use as formative and summative assessment tools.[10,11] With thoughtful application, the new technology can enhance the students' learning.[12]

Faculty of Medicine, Ramathibodi Hospital, is one of the famous medical schools in Thailand which was established in 1965. The number of medical students has been increasing from 64 to 160 per year. To encourage effective learning process, we have used Diagnostic Reasoning Clinician (DxR clinician): a web-based critical thinking software in 5th year family medical rotation since 2005. This program is a complete computer patient simulation package consisting of prepared patient cases, management tools for setting the evaluation criteria, analyzing student records, and enriching the program with learning resources and content questions, and the authoring tools for developing their own new cases.[13]

The role of the computer-based program to enhance clinical skills learning has been demonstrated in computer-based tutorials with instant interactive feedback.[14] In family medicine rotation, the faculties give formative feedback of their students' performances after study from DxR clinician case scenario. After 2 years of using the program, this study aimed to explore the students' satisfactions and perceptions of the learning tool in the aspects of:

1. Feasibility of using the web-based software
2. Ability of the software to improve clinical reasoning skills
3. Ability of the software to stimulate self-directed learning
4. Ability of the software to support students' learning process

Methods

The questionnaire consisted of 33 questions (Likert scale 1-5) with an open-ended response which was designed for exploring students' perceptions and satisfactions of the program.[15,16] We piloted and refined the questionnaire with 20 medical students.

The study was conducted in January 2008. Participants were 119 fifth year medical students. Written informed consent was obtained from all participants. The study protocol was approved by the Ethics Committee on Human Experimentation of the Faculty of Medicine Ramathibodi Hospital.

The data were divided into 4 categories: the feasibility of using the program, the ability of the program to improve clinical reasoning skills, the ability of the program to stimulate self directed learning, and the ability of the program to support the students' learning process. To analyze the data, we used the Statistical Package for the Social Science (SPSS) 11.5 to calculate median and standard deviation.

Results

We excluded 3 from 119 participants due to incomplete data. The remaining was 116 students who were included in our data analysis, giving a response rate of 97.48 percent. There were 54 males (45.38%) and 65 females (54.62%). The majority of the participants were 23 years old (range 21-27), and all of them were single.

The mean and standard deviation of students' perceptions and satisfactions of the program are shown in Figure 1, and the percentage of students' perceptions and satisfactions of the program are shown in Table 1.

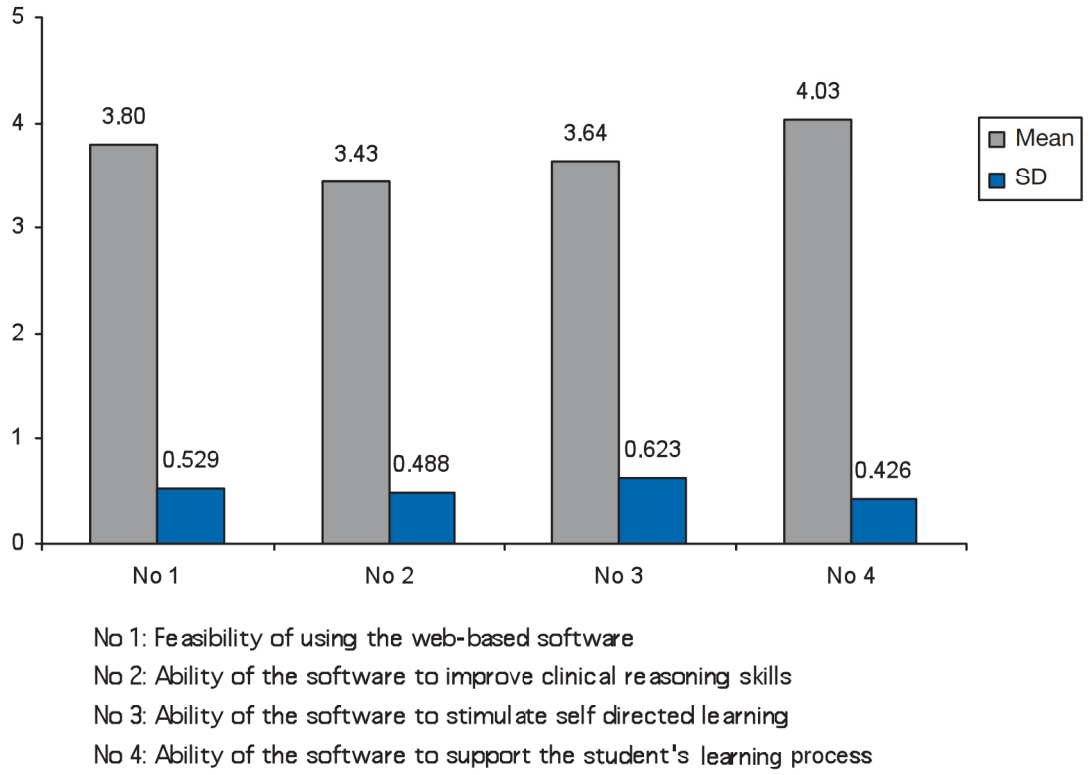


Fig 1. Mean and standard deviation of students' perceptions and satisfactions with various aspects of DxR clinician program

Table 1 Percentage of students' perceptions and satisfactions with various aspects of DxR clinician program

Students' perceptions and satisfactions	Percentage of agree and strongly agree (Likert score 4-5)
The feasibility of using the software	72.59
The ability of the program to improve clinical reasoning skills	68.57
The ability to stimulate Self-directed learning	65.52
The ability to support the students' learning process	81.01

Satisfaction with the feasibility of using the software of the students was fairly high. If training was provided, most of the students (88.79%) agreed that this program could be easier to use. The mean score of satisfaction with the ability of the software to improve clinical reasoning skills was 3.43 ± 0.488. The majority of the participants (88.79%) expressed positive satisfaction with the program that could be used as a test to assess their knowledge. The program could also help them to practice problem solving skills and provide safe environment. In term of the ability of the software to stimulate self-directed learning, only 65.52 percent of the participants rated high satisfaction. But 76.72 percent of them agreed that recognition of gaps in their knowledge could stimulate them for further study. Regarding satisfaction with the ability of the software to support the students' learning process, the mean was very high. If they discussed in wrap-up session with a teacher after finishing the cases and if computers were always available to access, most of them (95.69%) would express positive satisfaction with the program that would best help them to learn.

In the open-ended section, the participants gave comments about their problems with the English language and differences in the cultural issues. For example, histories of patients' lifestyles were differing from Thai patients. The opportunity to practice was limited. There were only two departments using the program in the undergraduate curriculum, and the participants received faculties' feedback only from Family Medicine faculties. Moreover, the number of functioning computers was inadequate.

Discussion

This DxR clinician program was evaluated by 5th year medical students who studied this program in family medicine and adult medicine rotations. The majority of them agreed that program could be an effective learning tool.

From their opinions, in the questionnaire and open-ended section, the program would best help them if discussed with a faculty after finishing cases and the faculties apply these opinions in their courses' plan.

However, we used this program without editing it. Some of the participants gave comments about the different ways, especially in term of investigations, to approach the clinical problems. There were some differences in culture, patient expectation, financial problem and health service systems of our country from the original country of this program. So, before using this program, if we edit the cases and change or add the criteria before evaluating the students' performances, it may improve the relevancy of the program.

The others problems were the availability of the program and number of computers. The participants had to access this program from intra-network of the Ramathibodi Hospital which limited the feasibility of using the program from anywhere outside the hospital. We plan to edit the cases in term was consistent with those used in Thailand and manage the available of the program and computers in medical students' dormitory. We hope to increase the opportunity to practice the critical thinking skills of our students by encouraging the other departments to apply this program in their courses. After that, further study should be done to re-evaluate the potential to be an effective learning tool of the DxR clinician program.

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Appendix: Questionnaires

Questions	Strongly disagree	disagree	fair	agree	most agree
1 I could use computer efficiently.					
2 I felt the program was user friendly.					
3 After being trained, I could use the program easily.					
4 I had fun while using a good computer program to support my learning.					
5 Learning the program was fun.					
6 The program supported me to choose appropriate questions in the history taking, physical examination and investigations.					
7 The program supported me to learn from the whole process of the clinical encounter.					
8 I was annoyed by the limitation of history questions.					
9 Limitation of the history questions caused difficulty in differential diagnoses.					
10 I aimlessly asked history questions.					
11 The program supported me to aware of the over investigations by providing overall cost.					
12 The program supported me to learn by getting my performance feedback.					

13 The program assisted me to develop my clinical reasoning skills.					
14 The program supported me to have more confidence in my clinical reasoning skills when dealing with real patients.					
15 After learning from the program, I actually applied the knowledge to my real patients.					
16 Recognizing my lack of knowledge stimulated me to study on that issue.					
17 The program encourages me to further study to fill the gaps in my knowledge					
18 Learning the program stimulated me to further study patients' problems.					
19 The program supported me to improve my thinking processes.					
20 The program supported me to assess my knowledge.					
21 The program assisted me to find the defect in my knowledge.					
22 The program supported me to systemize my knowledge.					
23 The program supported me to learn by trial and error process in a safe learning situation.					
24 The program provided me to practice problem solving skills.					

25 The program is an effective learning tool if used appropriately.					
26 The program would best support me if instruction on how to use the program was provided.					
27 The program would best support me if cases were related to what we were learning at that moment.					
28 The program would best support me if cases were categorized by symptoms rather than organ systems.					
29 The program would best support me if relevant information of each case was provided.					
30 The program would best support me if the program and computer were always available to access.					
31 The program would best support me if I could use the program freely.					
32 The program would best support if I was learning in my preferable group.					
33 The program would best support me if discussed in a concise summary session with a teacher after finishing the cases.					

Original Articles/นิพนธ์ต้นฉบับ

การประเมินผลของการนำโปรแกรม Diagnostic Reasoning Clinician: Web-based Critical thinking Software มาใช้ในการเรียนการสอนนักศึกษาแพทย์ของโรงพยาบาลรามาธิบดี

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บทคัดย่อ

บทนำ: การฝึกทักษะการแก้ปัญหาผู้ป่วย เป็นสิ่งจำเป็นสำหรับนักศึกษาแพทย์ คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี ได้มีการใช้โปรแกรม Diagnostic Reasoning Clinician เพื่อให้นักศึกษาแพทย์ชั้นปีที่ 5 เรียนรู้กรณีผู้ป่วยผ่านคอมพิวเตอร์ออนไลน์ ให้ซักประวัติ ตรวจร่างกาย และส่งตรวจทางห้องปฏิบัติการ เพื่อตั้งสมมุติฐานให้การวินิจฉัยและรักษาโรค

วัตถุประสงค์: เพื่อประเมินความพึงพอใจและมุมมองของนักศึกษาแพทย์ชั้นปีที่ 5 ต่อการเรียนรู้จากการใช้โปรแกรม Diagnostic Reasoning Clinician

วิธีการวิจัย: สร้างแบบสอบถาม 33 ข้อเพื่อประเมินความพึงพอใจและมุมมองของนักศึกษาแพทย์ชั้นปีที่ 5 ต่อการเรียนรู้จากการใช้โปรแกรม Diagnostic Reasoning Clinician โดยมีคะแนนตั้งแต่ 1-5 มีผู้เข้าร่วมการวิจัย 116 ราย วิเคราะห์ข้อมูลโดยใช้โปรแกรม SPSS program, version 11.5

ผลการศึกษา: นักศึกษาส่วนใหญ่มีความพึงพอใจต่อความสะดวก และให้ความเห็นว่าโปรแกรมช่วยให้นักศึกษาได้ฝึกทักษะทางการแพทย์และช่วยให้เกิดกระบวนการเรียนรู้ แต่ยังไม่สามารถกระตุ้นให้นักศึกษาส่วนใหญ่ศึกษาค้นคว้าเพิ่มเติมหลังฝึกปฏิบัติได้

สรุปผลการศึกษา: โปรแกรมคอมพิวเตอร์ออนไลน์ สามารถเป็นเครื่องมือในการเรียนรู้ที่มีประสิทธิภาพในการฝึกทักษะการแก้ปัญหา และประเมินตนเองของนักศึกษาในด้านความรู้ทางการแพทย์ได้

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