

The Development of a Computer Based Learning (CBL) Program in Diabetes Management

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Objective: To develop a computer based learning (CBL) program in diabetes management for health care providers and academic staff.

Material and Method: A CBL program was developed using "Authorware Professional ver. 6.0" software. Content validation, computer background survey and investigation of the usability of the program, was conducted as part of the production of this program. The involved participants were university staff, hospital care providers (e.g., doctors, nurses and pharmacists) and nursing & pharmacy students.

Results: Overall, the results were positive. Some limitations regarding computer background were revealed. Few of the participants were familiar with self-learning materials. The usability of the CBL program was generally encouraging however some comments were made regarding program function, such as the duration of the program, and minor problems with the audiovisual effects. All comments were noted and addressed for future implementation.

Conclusion: The CBL program was found to be a user-friendly, interactive multimedia program for diabetes management.

Keywords: CBL, Patient history taking, Multimedia, Audio clips, Usability

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In Australia, it is necessary to understand fully diabetes and its management in patients as it is a serious cause of death and amputations. Furthermore, it is responsible for a large amount of budget expenditure^(1,2). Health care professionals (e.g., doctors, nurses, or pharmacists) dealing on a daily basis with diabetic patients are required to recognize the disease, gather relevant patient information and give appropriate care. However, difficulties arise due to hospital personnel's lack of patient care experience, busy work schedules and large numbers of patients^(3,4). In an attempt to overcome some of these difficulties, a number of interactive multimedia materials have been introduced to health environments⁽⁵⁻⁹⁾. These have had a range of results,

from positive to unimpressive⁽¹⁰⁻¹³⁾. It is generally recommended to use these interactive materials as a supplement for self-learning purposes⁽¹⁴⁻¹⁶⁾. In the health areas, most of them have been used for achieving the objectives of enhancing knowledge, developing clinical skills or improving the quality of patients' records⁽¹⁷⁻¹⁹⁾. Previous studies showed that interactive programs were successful in achieving some of these objectives^(20,21). However, none of them demonstrated that a user-friendly interactive multimedia program, using digital videos, video simulations, and audio clips achieved all three of the objectives.

As a result, a computer based learning (CBL) program in diabetes management was developed. It contained information about diabetes, digital video clips of simulated patient interviews and audio clips of monitoring of patients to facilitate health care plans. Self-assessment procedures were also provided for the users. This program was designed for health practitio-

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ners working in hospital environments (e.g., doctors, nurses and pharmacists), university staff, and nursing & pharmacy students.

Material and Method

1. Design of the CBL program

The CBL program was developed using “Authorware Professional Ver. 6.0” (Authorware) software. Authorware is a program allowing the author to create an interactive experience for the student. This is done by allowing the creation of a story board, storing and editing items of multimedia information. Moreover, this software is user-friendly interactive, thus, the software function is suitable to develop a useful self-learning program for teaching and learning purposes. Interestingly, this program is so easy to use that even the developer without any experience can develop a course. The CBL program can be used with a standard Personal Computer (PC). Additionally, the CBL program can run through a website with video and audio clips.

1.1 Contents of the CBL program

The program contained 5 sections:

- a). Introduction to diabetes
- b). Definition, classification, classic symptoms, diagnostic/screening tests, complications and management
- c). Recording of patients’ histories - general reviews, Subjective-Objective- Assessment-Plan (SOAP) note and patient case demonstration
- d). Monitoring of patients - instruction, self-monitoring blood glucose, diet and physical activity
- e). Self-assessment (using forms consisting of multiple-choice questions, fill-in-the-blanks questions and questions requiring true/false responses)

1.2 Functional structure of the CBL program

The basic function of the CBL program was to allow users to interact and learn from the course but with little computer knowledge (Fig. 1). In this research, the screens and the interactive multimedia functions were used to assist users to achieve the tasks (Fig. 2).

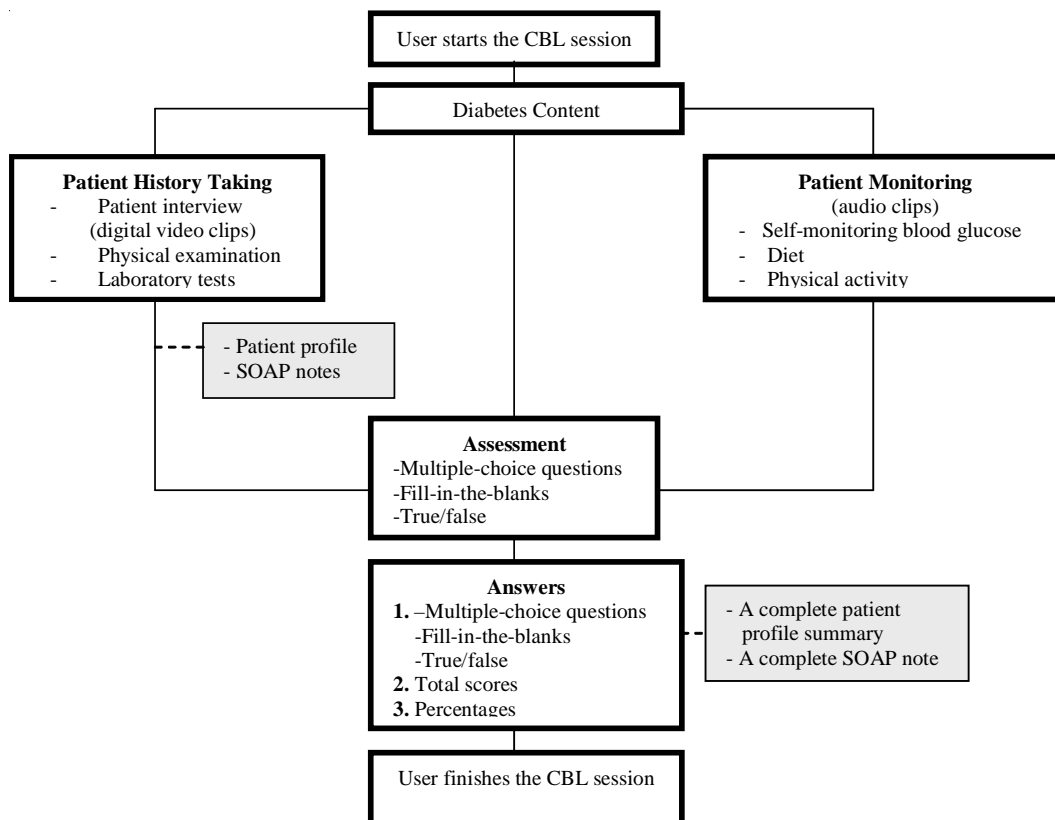


Fig. 1 Functional structure of the CBL program



Fig. 2 The CBL program pictures screens

2. Evaluation

After development of the CBL program, it was evaluated prior to public use. Three procedures were completed:

2.1 Content validation

Basic knowledge of Diabetes in the CBL program was taken from the Diabetes Australia Guideline (2005/6). Five validators involved in diabetes management in different environments, *three* university academic staff and *two* members of Diabetes Care Centre (one doctor and one nurse) at a local hospital were asked to read the program contents and evaluate the intellectual appropriateness of the material by recording their comments on a validation form.

2.2 Computer background survey

To gather basic computer background related to the use of self-learning computer programs, seven volunteers including *three* university teaching staff, *two* doctors, and *two* nurses from a local hospital, were asked to fill out a computer background survey. The contents of the survey included demographic data of

the volunteers, their computer skills experience and their computer self-learning materials use.

2.3 Usability of the CBL program survey

Twelve volunteers completed a survey about the usability of the CBL program. These volunteers included *seven* from a procedure 2.2 and *three* pharmacy students & *two* nursing students who had completed coursework concerning diabetes. The volunteers underwent the CBL program and then filled out a Likert scale survey containing twenty statements adapted from Chaikoolvatana et al (2003)⁽⁹⁾ about attitudes to and/or opinions of the program. Some changes to the program were made based on these volunteers' comments. The findings were shown as frequency and percentage of participants' attitudes toward CBL program.

Results

Content validation

Overall, the validators agreed in informal discussion that CBL program contents were suitable for self-learning skills. There were some suggestions of the abbreviations using in the program due to a com-

plexity. Most of the suggestions were incorporated into the final version of the program. Some noticeably positive opinions were stated regarding the self-assessment models.

Computer background survey

Results revealed that all seven volunteers had some experience in computer use. Most of them used computers for typing reports, accessing the Internet, following teaching and demonstration, collecting data and self-learning programs. Noticeable problems during computer use included a difficulty of using Internet and unclear functions of computer software (e.g., example Microsoft Excel and Microsoft Word). The examples of self-learning packages used included HyperText (e.g., course syllabus in patient education), Flash (e.g.,

community pharmacist interview) and Authorware Professional (e.g., computer based learning in diabetes). Some limitations were stated such as some unclear instructions and a lack of good user-friendly interactive response.

Usability of the CBL program

The results in Table 1 show the volunteers' responses to statements about the usability of the CBL program. Most volunteers generally thought that the CBL program was useful, easy to use and understandable. It was found to be easy to move from one topic to another and the graphic designs, colors, figures and diagrams were appropriate. However, responses questioned the development of skills in recording of patients' histories. Seven volunteers agreed that it took too

Table 1. Users' attitudes toward a CBL program concerning Diabetes Management (n = 12)

Statements	Strongly agree/Agree n (%)	No opinion n (%)	Strongly disagree/Disagree n (%)
Program instructions are easy to follow	10 (83.33)	2 (16.67)	-
I enjoy using the program	12 (100)	-	-
I need to learn more about computers before I can use this program	1 (8.33)	1 (8.33)	10 (83.33)
The program helps me understand about basic knowledge of Diabetes	10 (83.33)	2 (16.67)	-
The program helps me develop patient history taking skills	8 (66.67)	4 (33.33)	-
The program helps me to improve my knowledge regarding Diabetes Patient Monitoring	10 (83.33)	1 (8.33)	1 (8.33)
The program is difficult to understand as a whole	1 (8.33)	2 (16.67)	9 (75)
I would use the program frequently	7 (58.33)	4 (33.33)	1 (8.33)
The program is too slow to respond	1 (8.33)	3 (25)	8 (66.67)
The program should not be used as a supplement for those involved in Diabetes Education	10 (83.33)	2 (16.67)	-
The patient interview clip is too long	2 (16.67)	8 (66.67)	-
It is easy to move from one topic to another	11 (91.67)	1 (8.33)	-
It takes too long to complete the whole program	4 (33.33)	-	8 (66.67)
Overall, the program is useful regarding Diabetes	12 (100)	-	-
The patient video clips are helpful for learning in patient history taking skills	10 (83.33)	2 (16.67)	-
Graphic designs and colors are appropriate	9 (75)	2 (16.67)	1 (8.33)
I would like to see modules on others clinical topics	8 (66.67)	2 (16.67)	2 (16.67)
The assessment section in the program is functionally useful			
Patient profile and SOAP note models in the program are easy to follow	8 (66.67)	3 (25)	1 (8.33)
The manuscripts of patient monitoring are less interesting	3 (25)	-	9 (75)
The CBL program was poorly organised	3 (25)	9 (75)	-
The CBL program did not facilitate my learning skills	1 (8.33)	3 (25)	8 (66.67)
The challenge of the CBL program doesn't appeal to me	-	2 (16.67)	10 (83.33)

long to complete the program. There were some minor limitations such as the quality of the audio clips, and a small screenplay of patient interviews. Overall, volunteers were satisfied with the CBL program.

Discussion

Four volunteers in the computer background survey had experience in using learning packages and few had used them for self-learning purposes. The reasons for this may be that traditional methods of learning, such as textbooks, lectures and demonstrations are still more readily recognized and accepted than CBL. Additionally, there is poor access to these programs. This lack of access does not help to increase people's familiarity to them. Furthermore, many people have fears due to lack of basic computer knowledge and/or unpleasant experiences with computer program use. The availability of such materials should be increased so that people are able to access and learn more about them. Their public use must be promoted in the different environments, such as education, data-collection and entertainment. The quality of self-learning materials also needs to be improved and be based on a national standard protocol.

There was a positive reaction to the usability of the CBL program in diabetes management. However, there was uncertainty about the development of skills in recording patients' histories via a CBL program. The possible reason for this was the complexity of the program's procedures in this respect, especially for those not familiar with hospital protocol. Some staff remarked about the poor quality of audiovisuals used in the program, and alterations were made to rectify this. The limitations of the study included a small number of participants in a usability test. Thus, a further evaluation of the effectiveness of the program needs a large number of volunteers to be enrolled.

Conclusion

The CBL program in diabetes management was found to be a useful, user-friendly interactive tool for the purpose of self-learning, especially for academic and hospital staffs. Some limitations were identified and adjustments were made to the package prior to further study.

Limitations of the study

1. The total number of volunteers in each evaluation process was limited. However, a time limitation in the present study was the main cause. Thus, a large group of volunteers should be stated. Additionally,

more program usability tests should be conducted to gain a whole picture of the attitudes toward the program.

2. The CBL program should be converted into a Thai version, because further study will be conducted with Thai volunteers regarding the effectiveness of a CBL program in Diabetes Management. The language barrier will bias the results of the study.

Future works

Further evaluation of the effectiveness of the program in Thai health environmental areas needs to be conducted with a well constructed study design. This objective measurement will concentrate on the effectiveness in gathering patient history data and planning for the patient. More attitude surveys toward this CBL program should be performed when the program is more accessible to the general community. The updating of the content of the CBL program will follow an annual update guideline. The users will be able to gain some new and updated information regarding Diabetes via this CBL on the website.

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การพัฒนาโปรแกรมเรียนรู้ด้วยตนเอง เรื่องการดูแลรักษาผู้ป่วยโรคเบาหวาน

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วัตถุประสงค์: เพื่อพัฒนาโปรแกรมการเรียนรู้ด้วยตนเอง เรื่องการดูแลรักษาผู้ป่วยโรคเบาหวานให้กับบุคลากรการแพทย์และคณาจารย์ผู้สนใจ

วัสดุและวิธีการ: โปรแกรมดังกล่าว ถูกสร้างขึ้นจากโปรแกรมพื้นฐาน "Authorware Professional ver. 6.0" หลังจากนั้นโปรแกรมได้ถูกนำไปประเมินในด้านต่าง ๆ ดังนี้คือ เนื้อหาโรคเบาหวาน ความรู้พื้นฐานด้านคอมพิวเตอร์ ประโยชน์ที่ได้รับและทัศนคติของโปรแกรมช่วยสอนดังกล่าวจากการสำรวจกับกลุ่มตัวอย่าง ซึ่งกลุ่มตัวอย่างที่เข้าร่วมในงานวิจัยครั้งนี้ประกอบด้วยแพทย์ พยาบาล และอาจารย์มหาวิทยาลัยที่สอนในรายวิชาที่เกี่ยวข้องกับเนื้อหาโรคเบาหวาน

ผลการศึกษา: ผลโดยรวมเป็นที่น่าพอใจ ความรู้พื้นฐานด้านคอมพิวเตอร์ของกลุ่มตัวอย่าง แสดงให้เห็นว่า การนำโปรแกรมเรียนรู้ด้วยตนเองไปใช้จริง ยังคงไม่แพร่หลายเท่าที่ควร ในด้านประโยชน์และทัศนคติต่อโปรแกรมนั้น พบว่าอยู่ในเกณฑ์ดี แต่ยังมีข้อจำกัดบางประการเกี่ยวกับหลักการทำงานของโปรแกรม เช่น ระยะเวลาที่ใช้ของโปรแกรมระบบมีลติมีเดียในเรื่องของภาพและเสียง ยังต้องแก้ไขเล็กน้อย

สรุป: โปรแกรมเรียนรู้ด้วยตนเองที่ถูกพัฒนาขึ้นนี้ มีประโยชน์ในเรื่องการดูแลรักษาผู้ป่วยโรคเบาหวาน
