Sex Education via Computer-Aided Instruction for Early Secondary School Students□

Wachara Eamratsameekool MD*

□ *Presented to 16th World Congress of Sexology for scientific meeting of World Association for Sexology as oral presentation on March 12th, 2003 at International Conference Center of Havana, Cuba*
** Research and Development Division, Provincial Health Office, Roi Et*

Background: *Development and utilization of computer-aided instruction (CAI) on sex education may facilitate learning and provide an additional education channel to early secondary school students.*
Material and Method: *Randomized control-group pretest-posttest design was used and was applied to four student groups from different schools within Roi Et Municipality as 1) CAI, 2) CAI control, 3) Teacher, and 4) Teacher control groups. The CAI were developed and organized in accordance with new sex education concepts. Questionnaires were also developed accordingly. Analysis of covariance (ANCOVA) was employed.*
Results: *One hundred and eighty three students from four rooms from four different schools were enrolled. The pretest scores were 24.65, 27.44, 31.51, and 33.66; and posttest scores were 25.00, 25.74, 33.80, and 34.77 for CAI, CAI control, Teacher, and Teacher control groups, respectively. The ANCOVA revealed there was no significant difference between the CAI and the CAI control groups (F = 0.399; p = 0.529) and between the Teacher and the Teacher control groups (F = 0.307; p = 0.581).*
Conclusion: *Sexual knowledge of CAI group did not differ from the control group. Computer competency of the students underlined CAI usage.*

Keywords: *Computer-aided instruction, Education, Knowledge, Sexuality*

J Med Assoc Thai 2008; 91 (5): 759-63
Full text. e-Journal: *http://www.medassocthai.org/journal*

Unprotected sexual relations increase adolescent risk of early and unwanted pregnancy and childbirth, unsafe abortion and sexually transmitted diseases such as infection with the human immunodeficiency virus (HIV)[1]. In Roi Et, there is evidence of a lowering of maternal age at delivery[2,3]. Sex education serves as one means of helping young people prevent these problems and improve their future reproductive health status[1,4]. However, there are many problems preventing young people from getting the proper knowledge and skills, leading to negative sexual attitudes and behaviors. Development and utilization of a computer-aided instruction (CAI) on sex education may facilitate learning and provide an additional education channel to this group of people. The author has developed an educational instruction package with new concepts on sex education that are organized in six chapters. The CAI was introduced to the students. The present study aimed to measure the effect of the CAI on sexual knowledge scores of the students.

Correspondence to: Eamratsameekool W, Research and Development Division, Provincial Health Office, Roi Et 45000, Thailand. Phone: 043-514-473, Fax: 043-511-087, E-mail: wachara.e@gmail.com

Material and Method

Development of sex education package

The development of a sex education package was mainly based on the "Guidelines for comprehensive sexuality education, 2nd edition, kindergarten - 12th grade" by National Guidelines Task Force[4]. The new concepts in a comprehensive sexuality education program comprised of six new keys, i.e., 1) human development 2) relationships 3) personal skills 4) sexual behavior 5) sexual health and 6) society and culture. The contents were developed, adjusted, and refined to be suitable for the country's context[5-18].

Development of the sex education CAI

The sex education CAI was developed in collaboration with an expert from the National Electronics and Computer Technology Center (NECTEC), a center under the National Science and Technology Development Agency (NSTDA), Ministry of Science and Technology. The development was divided into three steps[19] - 1) planning step, comprised of define the scope, identify learner characteristics, establish the constraints, cost the project, produce a planning document, produce a style manual, determine and collect resources, conduct initial brainstorming, define the look and feel, and obtain client sign-off; 2) design step, comprised of develop initial content ideas, conduct task and concept analyses, do a preliminary program description, prepare a prototype, create flowcharts and storyboards, prepare scripts, and obtain client sign-off; and 3) development step, comprised of prepare the text, write program code, create the graphics, produce audio and video, assemble the piece, prepare support materials, do an alpha test, make revisions, do a beta test, make final revisions, obtain client sigh-off, and validate. The size of the final version was 192 megabytes and could be written into a standard CD-ROM. The CAI needed eight 50-minutes sessions to complete.

Development of the questionnaire

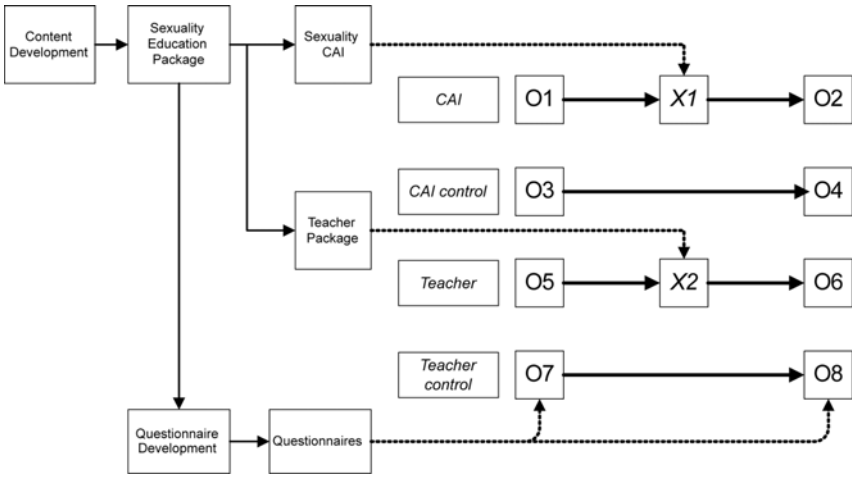
A questionnaire was developed by analyzing the objectives of each chapter of the sex education package. There were 15 questions for each chapter, with a total of 90 questions. The initial set of questionnaires was sent for consultation with three content experts from Khon Kaen University, Chulalongkorn University, and the Ministry of Education. After consultations, the revised version was tested with immediate older students, mathayom 4. Finally, the questionnaire was refined to 60 questions and resent for additional experts' comments. The expert appraisals came back with the average agreement of 83.1%.

Population, samples and random assignment

The population was students of early secondary or mathayom 1-3 in schools within Roi Et Municipality. The subjects were randomly assigned, with the classroom as a study unit, as CAI, CAI control, Teacher, and Teacher control groups. Instructions to each learning package were introduced to each group of students. Pretest questionnaires were administered to all groups. Learning sessions with CAI and with Teacher were introduced to the assigned groups. Questionnaires were administered to all groups again after the learning packages were finished. Framework of the study is depicted in Fig. 1. The study period was between November 2001 and March 2003.

Sample size calculation

Sample size was determined by the alpha value of 5% with the power of the test (1-beta) at 90% and



Notation: O = an Observation measurement; X = A program intervention, an experimental intervention; O and X in a row = a row or line containing a single group of subjects. Questionnaires were applied to all groups, both before and after the interventions

Fig. 1 Framework of the study

standard deviation of 3.0. The expected effect of the learning package was 2 points from total scores of 60. The formula used for sample size calculation was:

$$n = \frac{(Z_a + Z_b)^2 2s^2}{(\mu 1 - \mu 0)^2}$$

Where:

Z_a = Z at α (0.5) level = 1.645
Z_b = Z at β (0.1) level = 1.282
σ^2 = variation of scores = 3
$\mu 1$-$\mu 0$ = effects of the learning package = 2

Then the sample size was:

$$n = \frac{(1.645 + 1.282)^2 \text{ x } 2 \text{ x } (3)^2}{(2)^2} = 39 \text{ cases required}$$

Statistical analysis

Analysis of co-variance (ANACOVA) was employed to evaluate the effect of the CAI.

Results

One hundred and eighty three students from four rooms of four different schools within Roi Et Municipality were enrolled. Each school had been randomly assigned as CAI, CAI control, Teacher, and Teacher control group (Table 1). The pretest scores were 24.65, 27.44, 31.51, and 33.66; and posttest scores were 25.00, 25.74, 33.80, and 34.77 for CAI, CAI control, Teacher, and Teacher control groups, respectively (Table 2). The ANCOVA revealed there was no significant difference between the CAI and the CAI control groups (F = 0.399; p = 0.529) and between the Teacher and the Teacher control groups (F = 0.307; p = 0.581).

Discussion

The present study followed the previous study on sexual knowledge, attitude, and behavior of primary and secondary education school students. That study revealed that the students of early secondary schools had the lowest score on sexual knowledge[20]. Educational reform and technology revolution made massive progress, enabling the use of multimedia for education. Digital technology then came to educational scheme. Multimedia could gather texts, images, and sounds in many formats. Computer-aided instruction had many valuable characteristics that make communication and learning more interactively. In the beginning, the present study had to develop a CAI on sex education for the student.

Sex education is a lifelong process of acquiring information and forming attitudes, beliefs, and values about identity, relationships, and intimacy. It encompasses sexual development, reproductive health, interpersonal relationships, affection, intimacy, body image, and gender roles. Sex education addresses the biological, socio-cultural, psychological, and spiritual dimensions of sexuality from the cognitive domain (information); the affective domain (feeling, values, and attitudes); and the behavioral domain (communication, decision-making, and other relevant personal skills)[4].

The goals of sex education fall into four areas - 1) Information 2) Attitudes 3) Relationships and

Table 1. Characteristics of study samples

	School A	School B	School C	School D
Assignment	CAI	CAI control	Teacher	Teacher control
Number of students	46	39	59	39
- Male	46	19	0	9
- Female	0	20	59	30
Mean age (years)	13.5	13.9	13.3	13.5
Average GPA*	2.07	2.79	2.27	2.42

* GPA = grade point average

Table 2. Pretest and posttest scores [mean, (SD)] (total scores = 60)

Scores	CAI	CAI control	Teacher	Teacher control
Pretest	24.65 (4.95)	27.44 (4.82)	31.51 (5.03)	33.66 (4.49)
Posttest	25.00 (6.15)	25.74 (5.93)	33.80 (7.24)	34.77 (3.81)

Interpersonal skills and 4) Responsibility[4]. Based on these goals, sex education can assist young people in developing a positive view of sexuality, provide them with information they need to take care of their sexual health, and help them acquire skills to make decisions now and in the future. Key concepts of sex education had broad categories of information about sexuality and family living. Guidelines can be organized into six key concepts, as mentioned above, each of which encompasses one essential area of learning for young people[4]. Sexuality guidelines should be based on fundamental principles about the nature of ideal sexuality education programs. Sex education programs will benefit from: 1) Being part of a comprehensive health education program; 2) Well-trained teachers; 3) Community involvement; 4) A focus on all youth; and 5) A variety of teaching methods. This CAI can serve at least for the last two principles.

CAI has many roles in education: drill, tutorials, games, simulations, hypermedia, and test. The present study used CAI as a tutorial.

The present study found no effect of CAI on sexual knowledge scores. It is, however, too early to say that CAI had no effect on sexual knowledge scores. One of the limiting factors is computer competency of the students, which underlined the usability of any CAI package. At least, when there is no difference between CAI and CAI control groups, it implies that CAI can be used when there are not enough instructors to teach sexuality education.

Conclusion

CAI sex education had no effect on the scores of the students. The findings from the present study can show an opportunity to facilitate learning and provide additional education channel to this group of people, a channel they can learn anywhere and anytime, even without the presence of a teacher. The computer competency of the students underlined CAI usage.

Acknowledgement

The present study was supported by the Health Systems Research Institute (HSRI). The author wishes to thank all the staff at the HSRI Northeast Office, Clinical Epidemiology Unit, Faculty of Medicine, Khon Kaen University for their patience and generous assistances, without which this study would not have been possible.

References

1. World Health Organization. Programming for adolescent health and development. Report of a WHO/UNFPA/UNICEF Study Group on Programming for adolescent health. Geneva: WHO; 1999.
2. Eamratsameekool W. Maternal age configuration at Phanomphrai hospital, year 1998-1999. Suppasit Med J 2000; 21: 79-87.
3. Eamratsameekool W. Maternal age configuration at Roi Et, year 1998-1999. An oral presentation to 15th Scientific Meeting of Royal Thai College of Obstetricians and Gynecologists. 17-20 October 2000; Chiang Rai.
4. National Guidelines Task Force. Guidelines for comprehensive sexuality education: kindergarten-12th grade. 2nd ed. New York: SIECUS; 1996.
5. Cole J. Asking about sex and growing up: a question-and-answer book for boys and girls. New York: A Beech Tree Paperback Book; 1988.
6. Gray HM, Phillips S, Forney E. Coming to term with our sexuality. In: Gray HM, Phillips S, Forney E, editors. Real girl/real world-tools for finding your true self. Seattle: Seal Press; 1998: 105-33.
7. Harris RH, Emberley M. It's perfectly normal: changing bodies, growing up, sex and sexual health. Cambridge, MA: Candlewick; 1996.
8. Harris RH. It's so amazing!: a book about eggs, sperm, birth, babies, and families. Cambridge, MA: Candlewick; 1999.
9. Hatcher RA, Trussell J, Stewart F, Stewart GK, Kowal D, Guest F, et al. Contraceptive technology. 16th ed. New York: Irvington Publishers; 1994.
10. Masters WH, Johnson VE. Human sexual response. Boston: Little, Brown; 1966.
11. Moore KL, Dally AF. Pelvis and perineum. In: Moore KL, Dally AF, editors. Clinically oriented anatomy. 4th ed. Baltimore: Lippincott Williams & Wilkins, 1999: 331-430.
12. Moglia RF, Knowles K. Our sexual bodies. In: Moglia RF, Knowles K, editors. All about sex: a family resource on sex and sexuality. New York: Three River Press; 1997: 60-142.
13. Bengtson J. The vagina and female urology. In: Ryan KJ, Berkowitz RS, Barbieri RL, editors. Kistner's gynecology: principles and practice. 5th ed. Chicago: Year Book Medical Publishers; 1990: 107-42.
14. Staprans SI, Feinberg MB. Natural history and immunopathogenesis of HIV-1 disease. In: Sande MA, Volberding PA, editors. The medical management of AIDS. 5th ed. Philadelphia: WB Saunders; 1997: 29-55.
15. Weiss G, Goldsmith LT. Puberty and pediatric and

adolescent gynecology. In: Scott JR, DiSaia PJ, Hammond CB, Spellacy WN, editors. Danforth's obstetrics and gynecology. 7th ed. Philadelphia: JB Lippincott; 1994: 611-9.
16. Somprayoon S, Somprayoon W. Sexuality education. 6th ed. Bangkok: Thai Wattana Panich; 2001.
17. Speroff L, Glass RH, Kase NG. Normal and abnormal sexual development. In: Speroff L, Glass RH, Kase NG, editors. Clinical gynecologic endocrinology and infertility. 5th ed. Baltimore: Williams & Wilkins; 1994: 321-360.
18. Vithayasai P, Vithayasai V. Atlas of HIV infection. 2nd ed. Bangkok: O.S. Printing; 1995.
19. Alessi SM, Trollip SR. Multimedia for learning: methods and development. 3rd ed. Needham Heights: Allyn and Bacon; 2001.
20. Eamratsameekool E, Hongsala P, Simsikeaow B, Singthi L, Patala C. Knowledge, attitude and sexual behavior of late primary and early secondary school students. HSRI Grant no. 42-c-025. Roi Et, Thailand: Health Systems Research Institute; 2000.

การสอนเพศศึกษาโดยใช้บทเรียนคอมพิวเตอร์ช่วยสอนสำหรับนักเรียนมัธยมศึกษาตอนต้น

วัชระ เอี่ยมรัศมีกุล

***ภูมิหลัง**: การพัฒนาและการสอนเพศศึกษาโดยใช้บทเรียนคอมพิวเตอร์ช่วยสอนอาจเสริมการเรียนรู้และเพิ่มช่องทางการเรียนเพศศึกษาสำหรับนักเรียนมัธยมศึกษาตอนต้น*

***วิธีการศึกษา**: การศึกษาแบบทดลองโดยการสุ่มกลุ่มทดลองสองกลุ่ม วัดสองครั้งโดยมีกลุ่มควบคุมอย่างละหนึ่งกลุ่ม โดยคัดเลือกนักเรียนเป็นห้องเรียนจากแต่ละโรงเรียนในเขตเทศบาลเมืองร้อยเอ็ด แบ่งเป็น 1) กลุ่มทดลองบทเรียนคอมพิวเตอร์ช่วยสอน 2) กลุ่มควบคุมคอมพิวเตอร์ช่วยสอน 3) กลุ่มทดลองเนื้อหาใหม่สอนโดยครู และ 4) กลุ่มควบคุมการสอนโดยครู สร้างและพัฒนาบทเรียนคอมพิวเตอร์ช่วยสอนตามหลักสูตรเพศศึกษาใหม่ แบบทดสอบวัดผลถูกสร้างขึ้นอย่างสอดคล้อง สถิติที่ใช้คือการวิเคราะห์ความแปรปรวน*

***ผลการศึกษา**: นักเรียนทั้งหมด 183 คนจาก 4 ห้องเรียนของโรงเรียน 4 แห่งเข้าร่วมในการศึกษา คะแนนทดสอบก่อนการเรียนมีค่าเท่ากับ 24.65, 27.44, 31.51 และ 33.66 และคะแนนหลังการเรียนมีค่าเท่ากับ 25.00, 25.74, 33.80 และ 34.77 สำหรับกลุ่มทดลองบทเรียนคอมพิวเตอร์ช่วยสอน กลุ่มควบคุมคอมพิวเตอร์ช่วยสอน กลุ่มทดลองเนื้อหาใหม่สอนโดยครู และกลุ่มควบคุมการสอนโดยครูตามลำดับ การวิเคราะห์ความแปรปรวนพบว่าไม่มีความแตกต่างทั้งระหว่างกลุ่มทดลองบทเรียนคอมพิวเตอร์ช่วยสอนกับกลุ่มควบคุม ($F = 0.399$; $p = 0.529$) และระหว่างกลุ่มทดลองสอนเนื้อหาใหม่โดยครูกับกลุ่มควบคุม ($F = 0.307$; $p = 0.581$)*

***สรุป**: คะแนนความรู้ของนักเรียนที่ใช้บทเรียนคอมพิวเตอร์ช่วยสอนไม่แตกต่างจากกลุ่มควบคุม ความสามารถด้านคอมพิวเตอร์ของนักเรียนเป็นปัญหาแรกของการนำบทเรียนคอมพิวเตอร์ช่วยสอนมาใช้*