A Comparison of the Innovative Instructional Methods by Using a Problem-Based Learning (PBL) or a Web-Based Computer-Assisted Learning (CAL) for the Premed Health Sciences Education

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Abstract

The PBL and web-based CAL are the unique approaches of innovative instructional methods in the current educational world. The authors assessed the Premed students' response of two different methods after a health sciences education course. By using program evaluation including questionnaire checklists, the author found some strengths and weaknesses of the two different methods particularly for the Premed students. In conclusion, medical educators need to try innovative instructional methods more intensively and extensively for their students' effective leaning in the 21st century.

Keywords:
Health Sciences Education, PBL, Web-Based Computer Assisted Learning (CAL), Effective Learning

Introduction

Since middle of 1980, the problem-based learning (PBL), defined as a learning process to understand and solve the problem, has been an innovative education stool in health sciences education [1]. Barrows stressed that natural problem solving skills may actually be impaired in conventional medical education.

In contrast, recent computer assisted education presents various possibility for overcoming limitations of one-sided lecture-based education [2]. McKimm et al. indicated the following advantages and disadvantages [3]: Advantages of web-based learning include ability to link resources in many different formats, an efficient way of delivering course materials, available resources from any location and at any time, potential for widening access for example, to part time, mature, or work based students, the possibility for encouraging more independent and active learning, and for providing a useful source of supplementary materials to conventional programs.

Disadvantages include learners' access problem to appropriate computer equipment, learners' frustration for access graphics, images, and video clips due to poor equipment, available and affordable necessary infrastructure needed, various quality and accuracy on information, necessary guidance and signposting, and learners' feeling isolated.

iReport, as a software program of web-based computer-assisted learning developed by Paul Kim, is a web-based multimedia content management system which was developed from a course project at Stanford University School of Education [4]. iReport allows students to easily create, share, and store visual presentations using digital contents including text, graphical image, sound, and video.

The learning cycle, like the educational spiral by Guilbert [5], is useful to bear in mind when planning a web-based course (Figure 1). Guilbert indicated that behavior should be defined explicitly in the form of educational objectives derived from professional tasks that respond to the priority health problems of the community. Before delivery of teaching, an evaluation system should be planned so that better educational decisions can be taken and more appropriate assessment of student learning performed. Any education program including PBL and web-based CAL should be prepared and implemented to facilitate attainment of educational objectives by students. The evaluation process should be used to measure the extent to which the objectives have been achieved.

The research question for this study is "How would the Premed students at Gachon Medical School accept the innovative instructional methods such as PBL or web-based CAL ?"
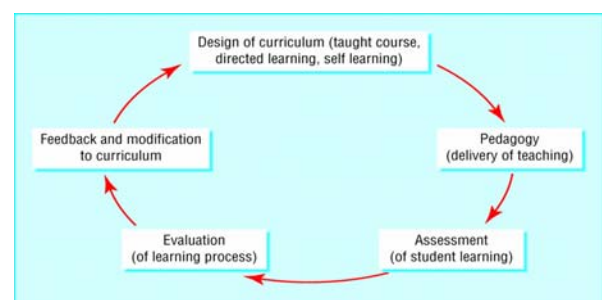

Figure 1. Learning Cycle (McKimm et al. 2003)

Methods

The author applied a PBL or a newly developed web-based CAL [4][6] for the Health Sciences Education course to 39 Premed students at Gachon Medical School by random

sampling. Most Korean Premed students take similar course like the Introduction to Medicine by using lecture-based instruction. The study employed the program evaluation method for the learner needs analysis.

General objective for the course is for the student to obtain health care leadership by using the basic principles and methods of health sciences education. Specific behavioral objectives are described in Table 1.

Table1. Specific Behavioral Objectives of Health Sciences Education at Gachon Medical School

1	To recognize students' own identity; why did the student apply for this medical school?
2	To understand about principles of adult learning
3	To experience the interaction of teaching-learning in health sciences education
4	To figure out the differences between conventional and innovative medical curricula
5	To know how to use instructional technology
6	To support learning environment of primary health care for the community
7	To describe the role of basic, clinical, and social medicine in modern society

A social medicine case (stab wound emergency patient, 40 years old man) was presented to the Problem-based learning (PBL) group. 20 students were divided with 4 small groups, and student tutor facilitated each group under two faculty tutors' supervision. Raised learning issues (tasks) were performed and reviewed by individual and peer study, group presentation, and portfolio submission.

iReport, a newly developed web-based CAL, is a visual-message system which could let the learner create or share visual information without multimedia authoring or file transferring tool [4].

Figure 2 shows how one can access iReport through a web browser and put together multimedia objects on a working space. Creating a template and attaching multimedia files to the objects to create a visual map is mostly a drag & drop process. Students can create multiple templates or visual maps with multimedia files and archive the entire contents in a relational database for later retrieval or sharing purposes.

The researcher facilitated 19 Premed students to use this iReport, to draw concept maps, and to present their own portfolios including a variety of digital multimedia information. iReport group students were divided as 5 different small groups having their own social issues raised by themselves.

A course evaluation included a pre- and post-course questionnaire that consists of degrees of interests, satisfaction and achievement. Rating scales for general questions like satisfaction were 5, and ones for specific objectives' achievement were 7.

7 months after the course finished, 6 students out of two different groups (3 students for PBL group vs. 3 students for iReport group) were interviewed by phone-call to know what the student remember about they learned by each different instructional method.
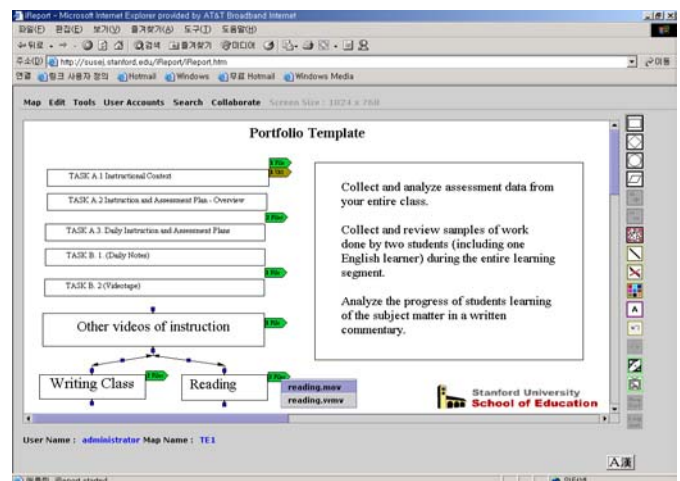

Figure 2. iReport as a Portfolio Template

Results

The pre-course questionnaire (response rate 100%, all 39 students) showed that 15% of iReport group expected their difficulty to adapt to the program. Some students of PBL group looked more confident to do PBL.

According to the post-course questionnaire (response rate 79%, 31 out of 39 students), specific behavioral objectives were achieved high (4.59~5.64 on 7 rating scales), but enough self-directed learning was not done yet due to lack of understanding about the course necessity and its innovative instructional methods.

PBL group students were very satisfied with the program (4.95 on 5 rating scales). They wanted to experience more PBL cases, and demonstrated longer and more precise memory about what they learned about on PBL on the delayed interview 7 month after the learning. Both Premed students' presentation about their learning issues (tasks) and portfolios did not show particular problem-solving difficulty except understanding professional content and using relevant references.

iReport group students experienced difficulty in managing

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computer software and hardware and overcoming those compatibility problems (2.69 on 5 satisfaction rating scales). Participated students indicated the necessity for the ability to utilize a variety of educational software and hardware and the hands-on training of computer literacy, program management, and information searching.

Conclusions and Discussion

This pilot study provides positive evidence that Premed students can effectively learn about health sciences education by using innovative instructional methods. Gachon Premed students in a newly established medical school agreed with the continuous trial necessity of PBL and web-based CAL methods even though they indicated difficulties in searching relevant resources and overcoming technology problems.

PBL and iReport group students presented three important comparative implications.

1) The level of PBL group students' satisfaction were higher than that of iReport group ones.

Gachon Premed students were more satisfied with team learning through PBL than web-based CAL through simple consensus for learning issues and tasks.

2) Students did similar level of achievement for the specific behavioral objectives (SBOs) by two different innovative instructional methods.

All students agreed with the achievement for 7 SBOs on questionnaires, and did good performance on portfolios. They did not present statistically meaningful difference of the course grade between two groups even though more number of high-level achievement students was found in iReport group.

3) Students stressed that web-based CAL like iReport was more difficult for adaptation and utilization because of their limited management ability than PBL.

iReport group students looked more stressful to adapt to the newly developed software program and to overcome limitations of less upgraded computer hardware system. Students, faculty members, and medical school staffs need more concern and hands-on education to improve their ability for instructional technology and digital information management [7].

Consequently, the researcher found some reflective evidence that innovative instructional methods such as PBL and web-based CAL would be appropriate approaches for Premed students to achieve specific behavioral objectives of health sciences education even though there might be lack of educational resources at the initial stage for implementation.

In the design of this study, the author has recognized the following three weaknesses: 1) limitations of a pilot study, 2) course characteristics of introductory level and limited resources and manpower, and 3) differences in learning process and reasoning from two instructional methods.

Accordingly, the recommendation for further studies is to focus web-based PBL rather than simple PBL or web-based CAL to prevent students' frustration in situation of limited resources [7][9][10][11].

In conclusion, more effective health sciences education requires innovative instructional methods to motivate Premed students, comprehensive participation and administrative support for successful implementation, and more intensive and extensive research and development [7][11][12][13].

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