# Courseware Development for University Instructors: Problem-Based Learning for Teaching Management

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**Abstract**
The purposes of this study were to (1) develop a courseware for university instructors entitled *Using Problem-Based Learning for Teaching Management* and (2) survey the subjects' opinions about the developed courseware. The subjects were 21 course instructors whose work related to the School of Educational Studies at Sukhothai Thammathirat University. The research instruments were a developed courseware and a questionnaire on the subjects' opinions on the 5-level Likert's Scale, containing 18 positive-opinion questions, and open-ended questions. The obtained data were analyzed by the SPSS/PC+ program to get primary statistics namely frequency, percentage, mean and standard deviation. The results of this study were: (1) the courseware entitled *Using Problem-Based Learning for Teaching Management* for university instructors developed by the researcher consisted of the interactive pre-test, the contents with sound tracks, the video of the example of the teaching management in Life Science Physics and the interactive post-test, and (2) the subjects' overall opinions were at a strongly agreed level (Mean =4.03, S.D. = .63).

***Keywords****: Courseware, Teaching management, Problem-based learning, University instructors*

## 1. Rationale of the Study

At present**,** sustainability of lifelong learning is highly valued for the fact that the rapid advancement of sciences and technologies has resulted in a vast amount of knowledge. Higher education institutions have progressed and changed so speedily that instructors and students have to adjust themselves accordingly. In the current age of Science and Technology, learning does not occur only in the classroom but extends to limitless boundaries in the course of technological potentiality. Teaching is not merely a process of transferring knowledge from instructors to students, but it is also the process of conveying meanings to learners with opportunities to operate, select and synthesize knowledge by themselves. In such a scenario, it is essential for course instructors to shift from the traditional teacher-centered approach to the student-centered approach (Phungphol, 2005).

From the above concept, higher education institutions in the Higher Education Net known as HEDNet: Upper Central Division in Thailand required that their university instructors develop the teaching paradigm to support the adjustment of classroom dynamic that encourages learners to become active and involved in self- directed learning. This is obviously a move from the teacher-centered or lecture-based approach to the student-centered and non-lectured approach. University instructors are to develop continuously their various teaching management processes to help students to be more engaged in learning and in turn willing to seek knowledge through eclectic teaching methods and challenging activities toward the learning goals. The ultimate learning outcome is on developing students into the world citizens--ready for self-learning and knowledge-seeking.

The teaching models and methods that have been widely recognized as significant strategies for reinforcing positive learning attributes at the higher education level are inquiry-based learning, cooperative learning, case-study, project-based learning and

problem-based learning (Chanprasert, 2011). These models and methods have prompted evaluation of multi-dimensions in nature to suit required contents and student needs. In this regard, university instructors are to be encouraged and supported to develop efficient teaching management for their teaching-learning context. Their new role in teaching management will directly affect the production of graduates with desirable abilities to analyze, synthesize and learn by themselves; such abilities can make possible lifelong learning for students at the university level.

## 2. Background of the Study

### 2.1 Mission of HEDNet

Higher education institutions in the HEDNet: Upper Central Division have focused on the development of university instructors to have comprehensive knowledge in their specialization, self-directed learning skills and the ability to apply technology to teaching management. As documented at Meeting 1/2010 on 5 July 2010, HEDNet members unanimously agreed to work on potentiality and readiness for the identified contents related to teaching management and electronic media production. To serve their purpose, they requested a budget from Thailand Cyber University Project of the Commission on Higher Education. Consequently, a budget was allocated to those selected university instructors for the development of the non-lectured courseware. After completion of the courseware media production, HEDNet was to publicize them on the websites of Thailand Cyber University Project and those of its higher education institution members. Interested university instructors can study the courseware by themselves in support of teaching management skills. The researcher of this study was assigned by Rangsit University to participate in the HEDNet Project coordinated by Sukhothai Thammathirat University.

### 2.2 Problem-Based Learning (PBL)

Problem-Based Learning (PBL) was first documented as a development by the Faculty of Health Sciences at McMaster University in Canada. It was initially used in the tutorial process for exams, and later became the teaching management model for universities in the U.S. Starting from the end of 1950, Case Western Reserve University used this model and set up an interdisciplinary laboratory to make experiments on new teaching models. The teaching model developed by Case Western Reserve University has become the base for curriculum development of many schools in the U.S. at the levels of secondary schools and higher education institutions. At the end of the 60's, McMaster University in Canada developed the problem-based curriculum of medicine and used it as a teaching method. Since then, the University has been recognized worldwide as the leader in using problem-based learning for teaching management (Harden, 2007; Woods, 2008).

Problem-based learning for teaching management is one of the leading methods that enable students to develop self-directed learning. It is the teaching management process that has stemmed from the concept of constructivism. According to this theory, students create new knowledge by using problems that occurred in the real world as the context of their learning (Brooks & Brooks, 1993; Colliver, 2000; Norman & Schmidt, 2000). Students are to develop analytical and problem-solving skills, and in turn simultaneously acquire knowledge in the field of their studies. Problem-based learning is therefore the result of the working process based on the learner's understanding of the problem and its solution.

As part of teaching management, problem-based learning can be simply defined as a teaching technique that enhances students to use their ideas when encountered with problems by themselves. Such a learning process can help students practice their thinking skills in many forms in a complete loop, containing judgment, analysis, synthesis and creativity. The use of problem-based learning for teaching management can work effectively at the higher education level because students generally have the ability to think and work well by themselves (Koh et al, 2008). Conditions for learning consist of (1) students' previous knowledge that helps them understand new data and (2) the given virtual situation that encourages students to express themselves and use the acquired knowledge efficiently. Students have ample opportunities to deliberate about the known data, answer questions, take notes, exchange ideas with peers, make a summary and criticize the hypothesis well (Panhan, 2004).

The integration of contents is the key to problem-based learning for teaching management and serves as the base for specific professional studies. Main contents are collected and selected as the cores and many unnecessary study contents are reduced; consequently, students can participate in the target learning and change from passive to active learners. Necessary skills such as problem solution, communication, teamwork, self-directed learning and incentive creation are reinforced for creative learning in that the new knowledge is added to the previous knowledge (Angsuwothai, 2007). Problem-based learning can challenge undergraduate students to seek knowledge by themselves and to be consistently enthusiastic about discovering the new knowledge. In this regard, students will be able to develop their learning capacity by themselves and in the course of learning can reinforce their learning habits for lifelong learning as an ultimate goal.

It should be noted that problem-based learning or PBL is not problem-solving learning. It is possible that PBL can be mistaken as teaching of some parts of the planned contents, followed by making an experiment in which students are assigned to solve the problem in small groups. Such an activity is simply *problem-solving* learning and it is not *problem-based* learning. The latter begins with specifically choosing the problem directly relevant to the students' discipline and using it as a stimulator or guideline for students to seek knowledge by themselves in pursuit of a solution to the identified problem. This is in fact students' self-directed knowledge in search of a self-learning process for acquiring their own problem-solving skills (Chanprasert, 2011).

**3. The Study**

Based on the rationale and background given so far, the researcher would like to develop for university instructors a courseware of problem-based learning for teaching management. The process of problem-based learning for teaching management initiated by the researcher consists of 8 steps: Step 1: Introduction, Step 2: Problem, Step 3: Analysis, Step 4: Planning, Step 5: Investigation, Step 6: Synthesis, Step 7: Conclusion and Step 8: Learning Assessment (Chanprasert, 2011).

**4. Objectives of the Study**

The study has two objectives:

4.1 To develop a courseware entitled *Using Problem-Based Learning for Teaching Management* for university instructors.

4.2 To assess the courseware users' opinions on practicality of and satisfaction with the use of the developed courseware entitled *Using Problem-Based Learning for Teaching Management.*

**5. Research Methodology**

This section deals with the subjects used in the study and the research instruments. In particular, two research instruments—the newly developed courseware and the questionnaire on the users' opinions on practicality of and satisfaction with the use of the developed courseware—will be described in detail.

5.1 Subjects

The subjects were 21 course instructors whose work related to the School of Educational Studies at Sukhothai Thammathirat University in the academic year 2012. The subjects participated in the study on a voluntary basis.

5.2 Research Instruments

5.2.1 Research Instrument 1: Problem-Based Learning Courseware

The development of the courseware for university instructors entitled *Using Problem-Based Learning for Teaching Management* was in five stages:

1. Study and synthesis of knowledge in three steps:
   1.1 Study the demands and nature of the curricula and teaching methods in life science and physics disciplines.
   1.2 Study the existing guidelines and knowledge models for courseware references.
   1.3 Synthesize the obtained knowledge to identify guidelines and knowledge models and formulate a courseware prototype.
2. Development of the prototype in four steps:
   2.1 Write a media script and a corresponding storyboard.
   2.2 Produce relevant learning media and tool kits on implementation techniques or tools, workshop type and self- evaluation.
   2.3 Have a standard check by a group of specialists for suggestions for revision of the constructed materials.
   2.4 Publicize the courseware on http://www.lic.chula.ac.th/e-learning/index.php/medias of the HEDNet: Upper Central Division and upload it on the Online Learning Management System of the Universities in support of SCORM under HEDNet: Upper Central Division.
3. Components of the self-directed learning media in five parts:
   3.1 Introduction
   3.2 Contents
   3.3 Implementation techniques or tools
   3.4 Workshop
   3.5 Evaluation
4. Details of each component of the self-directed learning media:
   4.1 Introduction:
      4.1.1 Objectives
      4.1.2 Students' expectation
      4.1.3 Structure of the media and the length of the contents
      4.1.4 Workshop and supplementary tools for learning
      4.1.5 Criteria for self-evaluation
   4.2 Contents with the following characteristics:
      4.2.1 Being self-completed
      4.2.2 Being discrimination-free
      4.2.3 Being properly referenced
      4.2.4 Being concise but giving a clear detailed picture of the contents
      4.2.5 Having an interesting design that directly presents the contents

4.2.6 Having a proper length that can be divided into subtopics to suit students' attention spans

4.2.7 Having a conclusion which gives the whole picture and the essence of the contents

4.3 Media presentation with the following characteristics:

4.3.1 Standard quality of each kind of media: video, streaming animation, statement, picture and sound.

4.3.2 Logical sequence of media components conveying the target knowledge clearly and precisely.

4.3.3 Aesthetic and properly attractive to target learners.

4.3.4 Standard production techniques without technical mistakes.

4.3.5 Quality of presented contents to ensure no deviation from the original source of data.

4.4 Implementation techniques or tools with three considerations:

4.4.1 Criteria or conditions and advice about the use of the method or the process in the contents.

4.4.2 Conditions, cautions or restraints of the application.

4.4.3 Supplementary tools for the media contents, particularly lesson plans, observation tools, and inspection tools.

4.5 Workshop activities with two concerns:

4.5.1 Activities for students' workshop are designed in line with the principles or the media contents to create clarity for full understanding.

4.5.2 Activities for students' workshop are designed for students to practically apply the principles secured from the media contents to add the new knowledge onto their original knowledge.

4.6 Evaluation:

The outcome of students' workshop can be evaluated by the self-evaluation criteria or the automatic feedback device.

5. Guidelines for the production of electronic media:

5.1 Set electronic media in the forms of streaming media, macromedia flash, or the combination of animation, video (demonstrating teaching/classroom atmosphere) and supplementary multimedia based on the principles of media design with the statements encouraging students' self-directed learning. The interactional mode of electronic media aims to help students to follow the lesson guidelines and understand the target knowledge as benchmarked by Thailand Cyber University Project.

5.2 Set the contents, designed the media presentation, the target interaction and usability. The term usability in this study refers to efficiency by users' satisfaction according to the goals of each particular environment, design simplicity and the quality of evaluation interface. The identified components of usability are (1) ability to learn, (2) effectiveness of use, (3) ability to remember, (4) mistakes in use, and (5) users' satisfaction. After concluding the guidelines for the production of electronic media, the researcher worked with computer experts in audio visual equipment to produce the courseware according to Sharable Content Object Reference Model known as the SCORM (Wirski, Brownfield, and Oliver, 2004). The SCORM is a collection of standards and specifications for the courseware or e-learning. It accommodates accessability, interoperability, reusability, durability and affordability for the contents of courseware or e-learning.

5.2.2 Research Instrument 2: Questionnaire on Practicality and Satisfaction

Research Instrument 2 was a questionnaire on the subjects' opinions on the courseware for university instructors entitled *Using Problem-Based Learning for Teaching Management.* The subjects were asked to respond with their opinions on practicality of and satisfaction with the developed courseware on 5-level Likert's Scale. The instrument consisted of 18 positive-opinion questions, and open-ended questions.

The criteria for mean interpretation are as follows:

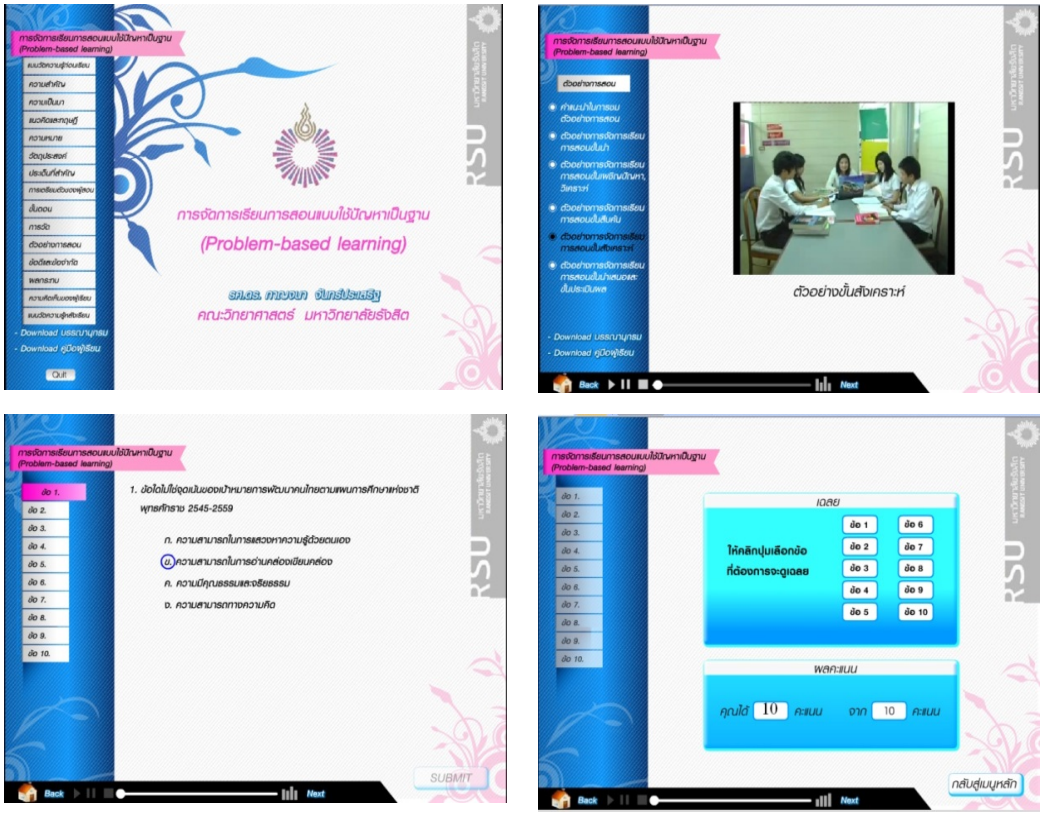
| Mean | Interpretation |
|---|---|
| 1.00-1.49 | Least agree |
| 1.50-2.49 | Slightly agree |
| 2.50-3.49 | Agree |
| 3.50-4.49 | Strongly agree |
| 4.50-5.00 | Mostly agree |

## 6. Research Results

Major results of the study are as follows:

6.1 The courseware for university instructors entitled *Using Problem-Based Learning for Teaching Management* consisted of 4 components: (1) the interactive pre-test, (2) the content with the sound track, (3) the sample video of the teaching management in life science physics subject, and (4) the interactive post-test as shown in Figure 1.

**Figure 1**: Exemplified Courseware Pages



6.2 The subjects' overall opinions on practicality of and satisfaction with the courseware

6.2.1 The subjects' overall opinions on practicality of and satisfaction with the courseware were on the positive side (Mean = 4.03, S.D. = 0.63) suggesting their acceptance of the PBL courseware. Details of the subjects' opinions about the courseware are presented in Table 1.

**Table 1:** The Subjects' Opinions about the PBL Courseware for Teaching Management

| Question | Mean | SD | Order of Mean | Interpretation |
|---|---|---|---|---|
| 1. Advice for learning | 4.19 | 0.60 | 3 | Strongly agree |
| 2. Learning evaluation | 4.33 | 0.59 | 1 | Strongly agree |
| 3. Concise and easily understood contents | 4.05 | 0.55 | 5 | Strongly agree |
| 4. Length of the contents in each lesson | 3.76 | 0.74 | 10 | Strongly agree |
| 5. Suitable language for students | 4.29 | 0.66 | 2 | Strongly agree |
| 6. Clear communication through pictures and statements | 4.05 | 0.37 | 5 | Strongly agree |
| 7. Examples corresponding with the lesson. | 4.10 | 0.84 | 4 | Strongly agree |
| 8. Attractive form of the lesson | 4.05 | 0.34 | 5 | Strongly agree |
| 9. Simple main menu and easily accessed data | 3.86 | 0.89 | 9 | Strongly agree |
| 10. Creative screen design | 4.00 | 0.59 | 6 | Strongly agree |
| 11. Suitable and beautiful screen proportion | 3.95 | 0.96 | 7 | Strongly agree |
| 12. Size, quality and color of the alphabets | 3.86 | 0.68 | 9 | Strongly agree |
| 13. Size and quality of slides, animation and sound | 4.05 | 0.46 | 5 | Strongly agree |
| 14. Size and quality of graphics | 4.10 | 0.64 | 4 | Strongly agree |
| 15. Convenient and easy interaction | 3.90 | 0.46 | 8 | Strongly agree |
| 16. Convenient and simple navigating system | 3.86 | 0.78 | 9 | Strongly agree |
| 17. Convenient data downloading | 3.95 | 0.87 | 7 | Strongly agree |
| 18. Application of knowledge and understanding of the assigned work | 4.29 | 0.37 | 2 | Strongly agree |
| Overall satisfaction | 4.03 | 0.63 | - | Strongly agree |

6.2.2 The subjects responded to the open-ended questions in eight major points:

1) The presentation format is interesting, beautiful and creative.
2) The contents are interesting.
3) It is easy to learn, understand and adapt to one's use.

4) The explanation in the introduction of the example video takes time.
5) Downloading is rather slow and it is rather difficult to return to the main Menu.
6) The alphabet size is too small.
7) Easy and quick access to the system should be upgraded.
8) More details and diversity of examples should be added.

**7. Discussion of the Results**

When looking at details of the subjects' evaluation of the courseware, the researcher can see the courseware strength lying in the items "learning evaluation" (Mean=4.33, S.D.=0.59), "application of knowledge and understanding of the assigned work" (Mean =4.29, S.D.=0.37), followed by "suitable language for students" (Mean=4.29, S.D.=0.66). These positive results suggest practicality of the courseware regarding its self-evaluation and user-friendly contents. However, the subjects were concerned with the technical parts and delivery of the courseware as seen in their evaluation of (1) "convenient and easy interaction" (Mean=3.90, S.D.=0.46), (2) "size, quality and color of the alphabets (Mean=3.86, S.D.=0.68), (3) "convenient and simple navigating system" (Mean=3.86, S.D.=0.78), and (4) "simple main menu and easily accessed data (Mean=3.86, S.D.=0.89). In particular, the item on "length of the contents in each lesson" (Mean=3.76, S.D.=0.74) has the lowest mean suggesting an immediate remedy in this aspect of the courseware.

The results on positive evaluation of items 2, 5, and 18 clearly indicate that self-directed learning and self-evaluation in the teaching of life science-physics subject are possible and productive. They also reveal practicality of self-directed learning in successive stages as earlier suggested by Welty (2008), and Angiah (2013) and in a well-known learning development called the ADDIE Model consisting of analysis, design, development, implementation and evaluation.

The evaluation results on "suitable language for students" and "the application of knowledge and understanding to the work" reveal a possibility that the courseware of this type can deliver the contents to students at the university level with good understanding of the transferred contents. In addition, learners at the university level can cope with teaching management of self-directed and problem-based learning model (Koh et al., 2008; Chanprasert, 2011). Such learning attitudes can support the learning mode in demand of Thailand Cyber University Project of the Commission on Higher Education.

**8. Conclusion**

As seen in this study, it is time for university instructors in Thailand to develop teaching management in line with problem-based learning and self-directed learning for learners at the university level. With a vast amount of knowledge in Science and Technology-exemplified in Life Science-Physics in this study, university course instructors need to develop a learning mode for their students to be self-reliant in seeking and learning the target knowledge. The courseware for university instructors entitled Using Problem-Based Learning for Teaching Management developed by the researcher in this study could serve as a tool for them to increase their students' learning opportunities and reduce the limitations of place and time. Both interested course instructors as well as their students can access the courseware on-line as preferred with a sense of control for their learning pace.

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**10. The Author**

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