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9th International and National Conference on

Engineering Education

Search

May 4-6, 2011
Hilton Phuket Acadia Resort&Spa,
Karon Beach, Phuket

Organized by
Faculty of Engineering,
Rajamangala University of Technology Thanyaburi

Message from the President of
RAJAMANGALA UNIVERSITY OF TECHNOLOGY THANYABURI

Numyoot SONGTHANAPITAK, Ph.D.
President of Rajamangala University of Technology Thanyaburi
Conference Chairman of 5th EMSES

Message from the Dean of
FACULTY OF ENGINEERING
RAJAMANGALA UNIVERSITY OF TECHNOLOGY
THANYABURI

Sommai Pivsa-art

Dr. Sommai PIVSA-ART
Dean of Faculty of Engineering, RMUTT

Message from the President of
FACULTY OF ENGINEERING COUNCIL

It is my privilege and honor to invite you to participate in the 9th International and National Conference on Engineering Education (INCEE9) that will be held on 4-6 May 2011 in Hilton Phuket Acadia Resort & Spa, Karon Beach, Phuket province of Thailand.

The 9th International and National Conference on Engineering Education (INCEE9) is the leading forum for the presentation of scholarly educational research in the fields of Engineering Education. The conference is organized by The Council of Engineering Deans of Thailand (CEDT) and Faculty of Engineering, Rajamangala University of Technology Thanyaburi (RMUTT). This event will provide an interdisciplinary forum for academic, research and industrial collaboration on teaching methods, practical experiences and research towards the future of global engineering education. The theme of the conference is "The Creative Development of Global Engineering Education". The conference will bring together deans and vice deans of engineering faculty, heads of department, faculty staff, educators, researchers, students and industrial leaders from all over Thailand and the world.

I am confident that this event will provide the best conference to present the latest progress in engineering education development and I look forward to seeing you in Phuket province of Thailand where the completely fascinating place for everyone who really wants to visit.

Dr. Somchai HIRANVARODOM
President of Faculty of Engineering Council
Chairman of 9th International and National Conference on Engineering Education

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The 9th International and National Conference on Engineering Education (INCEE9)

May 4-6, 2011 Hilton Phuket Acadia Resort & Spa, Karon Beach Phuket, Thailand

เวลา	May 4, 2011				
07:00 – 11:00	Sport Activities for Members				
13:00 – 16:00	Registration at in front of Grand Ballroom				
13.30 – 16.30	Grand Annual Meeting of the Council of Engineering Deans of Thailand (only deans or representatives) at Acadia Hall				
18.00-22.00	Welcome Party at Kun-Eng 2 Restaurant				
เวลา	**May 5, 2011**				
8.00-9.00	Registration				
09:00 – 09:20	Opening Ceremony Welcome Speech by Phuket Governor of Thailand Introduction by Asst. Prof. Dr. Somchai Hiranvarodom (Chairman of the Council) Opening Speech by Assoc. Prof. Dr. Numyoot Songthanapitak (President of Rajamangala University of Technology Thanyaburi)				
09:20 – 09:50	Keynote Speaker I : Dr. Norkun Sitthiphong Permanent Secretary, Ministry of Energy หัวข้อที่จะบรรยาย				
09:50 – 10:20	Keynote Speaker II : Professor Dr. Yildirim Omurtag Founding Dean – School of Engineering, Mathematics and Science, Robert Morris University, U.S.A. KP01: Engineering Education in the Early 21st Century: Challenges and Changes				
10:20-10:40	Break				
Oral Presentation					
10:40-12:00	**Similan Room**	**Acadia Hall 1**	**Acadia Hall 2**	**Lagoon Hall A**	**Lagoon Hall B**
Chair person	Assoc. Prof. Dr. Atikom Roeksabute	รศ.ดร.วิบูลย์ ชื่นแขก	ผศ.ดร.วรานนท์ คงสง	รศ.ดร.อุรุยา วีสกุล	ผศ.สราวุฒิ์ วรสุมันต์
Paper IDs	INV01, E001, E002, E003	T014, T015, T022, T024	T006, T007, T013, T023	T004, T005, T019, T020	T001, T003, T009, T030
12:00-13:20	Lunch				
13:20-15:00	**Similan Room**	**Acadia Hall 1**	**Acadia Hall 2**	**Lagoon Hall A**	**Lagoon Hall B**
Chair person	Assoc. Prof. Dr. Suarmkiat Jomjunyong	รศ.นาวาอากาศเอกนิกร ชำนาญกุล	รศ.ดร.บุญสม เลิศหิรัญวงศ์	รศ.นอ.ดร.วรพจน์ ขำพิศ	รศ.ดร.สมนึก ธีระกุลพิศุทธิ์
Paper IDs	E004, E005, E006, E007, E008	T026, T039, T008, T032, T044	T029, T031, T038, T040, T047	T021, T025, T027, T033, T036	T012, T037, T043, T045, T035

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เวลา	May 5, 2011 (continue)				
15:00-15:20	Break				
15:20-17:00	**Similan Room**	**Acadia Hall 1**	**Acadia Hall 2**	**Lagoon Hall A**	**Lagoon Hall B**
Chair person	ผศ.ดร.สมชัย หิรัญวโรดม	รศ.ดร.จรัญ บุญกาจน์	ผศ.ดร.รวิน ระวิวงศ์	ผศ.ดร.นิตย์ เพ็ชรรักษ์	รศ.บุญเลิศ สื่อเฉย
Paper IDs	T054, T011	T018, T017, T034, T002, T055	T046, T051, T050, T016, T019	T041, T028, T010, T048, T034	T052, T049, T042, T053
16:00-17:00	สัมมนาเชิงปฏิบัติการ				
เวลา	May 6, 2011				
09:00 – 11.30	Discussion and Wrap Up				
11:30 – 12.00	Closing Ceremony				

Content

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E004

An Interactive E-tutor System for Industrial Engineering Courses

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Abstract

This research objective was to develop an e-tutor system that is web-based, and could be adapt to courses in Industrial Engineering program. The system based on Moodle Learning Management System tool with some adjustment to support its service to four user groups: 1) Administrator 2) Instructor 3) Student and 4) Guest. The system had been on-line tested by 47 students registered for Production Planning and Control course for the length of one month with 4 steps: 1) user registration 2) user log-in 3) on-line tutorial of selected topics and 4) on-line quiz. The satisfaction survey result indicated a high user satisfaction with average score of 3.75.

Keywords: engineering education, e-tutor, learning management system, Moodle

1. Introduction

Department of Industrail Engineering at Rajamangala University of Technology Thanyaburi (RMUTT) offers various study programs to serve different groups of students. [1] There are

1) 4-year bachelor degree program in Industrial Engineering for Grade 12 graduates and Vocational Certificate graduates (full time with regular class hours)
2) 3-year bachelor degree program in Industrial Engineering for Vocational Diploma graduates (full time with regular class hours)
3) 3½-year bachelor degree program in Industrial Engineering for Vocational Diploma graduates (part time with evening and weekend class hours)
4) 2-year master degree program in Industrial Engineering (regular class hours)
5) 2-year master degree program in Industrial Engineering (weekend class hours)
6) 2-year master degree program in Production Engineering (weekend class hours)

Students who study part time mostly work during regular hours. Therefore, there are very limited chances to for them to get academic support outside the classroom during regular office hours.

The decision to develop the e-tutor system was based on feedback from the questionnaire that was distributed to the students in academic year 2009. Analysis of the responses highlighted that the main need of academic support was to make the learning materials available to students plus a proper amount of tutoring hours. In order to enhance traditional classroom-based activities, the information and communication technologies are believed to be a promising approach to allow better participations between instructors and students [2]. With the 21st century advances in computer technology, the instructors can add video, audio and interactive functions to help the students' learning the new subjects. The computer-based multimedia technologies could be classified into two categories: e-learning and e-tutoring [3]. Rosenberg defines e-learning as the "use of internet technologies to deliver a broad array of solutions that enhance knowledge and performance" [4]. An e-learning platform is used to deliver the course materials including learning resources, instructions, interaction, discussion, assignment submission and tracking learning progress. There are several popular commercial e-learning systems such as Blackboard [5], WebCT [6] and non-commercial system such as Moodle [7] as well as systems developed at several schools, colleges, universities and institutions [8-10]. This research focused on developing an e-tutoring system that can be used as an additional tool to traditional lecture and e-learning to support the students when they face with problems and guide them back to the course materials they should review.

2. E-Tutor System Design

2.1 User Groups

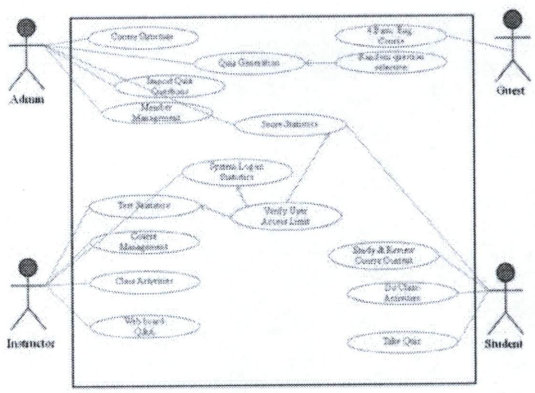

Figure 1 Use Case Diagram of E-tutor System

The use case diagram can be illustrated as shown in figure 1 with the following details.

1) Administrator: is responsible for managing users (add, delete, correct) and course structures as well

as importing test problems into test generation module

2) Instructor: is responsible for managing course contents, answering questions, giving suggestion, creating course activities and allowed to access students test score and statistics.
3) Student: only registered students can access to e-tutor system to review course materials, participate course activities and take tests.
4) Guest: is allowed to access specific courses for demonstration purpose.

2.2 Moodle Structure Adjustment

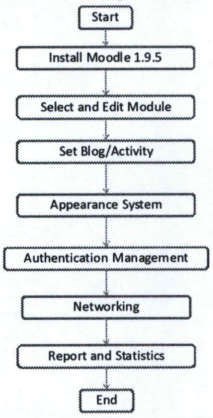

Figure 2 Work Flow for E-tutor and Moodle Structure

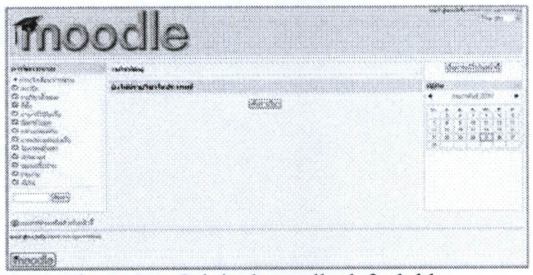

Figure 3 Original moodle default blogs

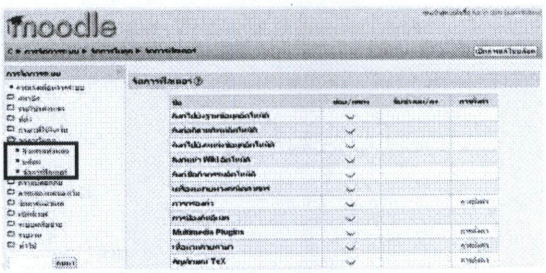

Figure 4 Additional blogs to support e-tutor system

In order to design e-tutor system to support tutoring function rather than Moodle's feather as a learning management system tools, the Moodle structure was adjusted following the steps as shown in figure 2

Original Moodle provides default blogs as shown in figure 3. Thus, additional blogs were added to support e-tutoring function as shown in figure 4.

Figure 5 Main homepage of e-tutor system

Figure 5 shows the main page of e-tutor system. Next step was to decide the course code structure for importing course materials, course activities and quiz questions. There were 4 main courses for all engineering majors and 8 courses for industrial engineering majors. The code structure is shown in Table I.

Table I COURSE CODE AND NAME IN E-TUTOR SYSTEM

Course Code	Course Name
Main courses for all engineering majors	
BE0010	1 Engineering Drawing
BE0020	2 Engineering Mechanics-Statics
BE0030	3 Engineering Materials
BE0040	4 Computer Programming
Industrial engineering courses	
IE0010	1 Industrial Work Study
IE0020	2 Operations Research
IE0030	3 Production Planning and Control
IE0040	4 Quality Control
IE0050	5 Industrial Plant Design
IE0060	6 Safety Engineering
IE0070	7 Maintenance Engineering
IE0080	8 Engineering Economy

The student could choose to review course materials, does course activities or take quiz. The quiz algorithm was designed to randomly select from test database with ratio of easy questions 60%, intermediate questions 30% and difficult questions 10%. If the student wishes to take a second quiz, the algorithm would also consider %of missed answer from previous quiz. Figure 6 shows course selection page.

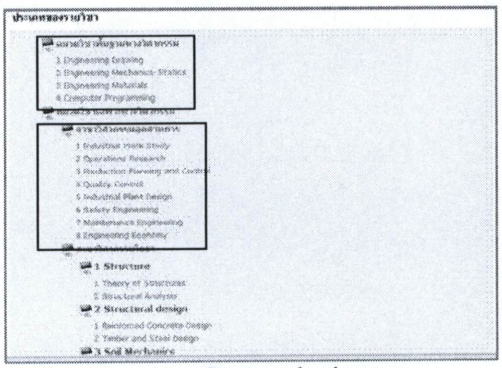

Figure 6 Course selection page

2.3 Course Topics

With the e-tutor system platform, Production Planning and Control course was selected to develop an on-line tutorial program. The course topics were as following

Production Planning and Control
Forecasting
Aggregate Planning
Inventory Management
Material Requirement Planning (MRP)
Capacity Planning
Scheduling
Project Management

2.4 Progress Report

After the student review course materials and take quiz, the system will generate report with the following details:

1) ID of question number
2) Question text
3) Total number of quizzed taken
4) Number of correct answers
5) Number of wrong answers
6) % of correct answers
7) % of wrong answers

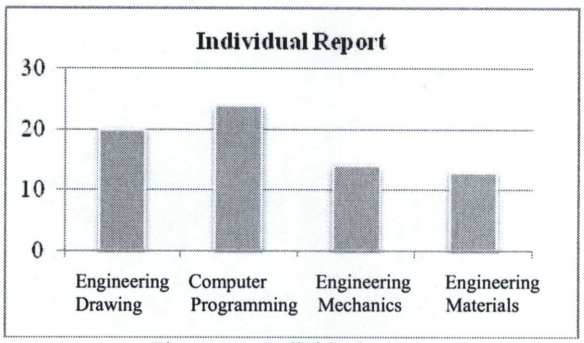

Figure 7 Individual report

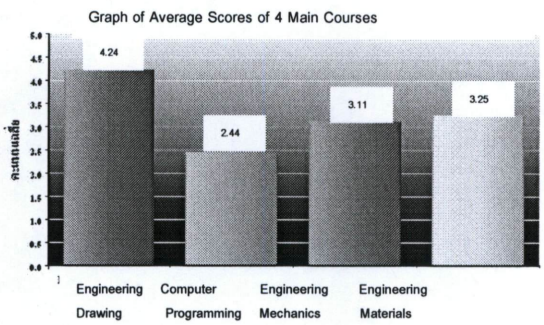

Figure 8 Average score report

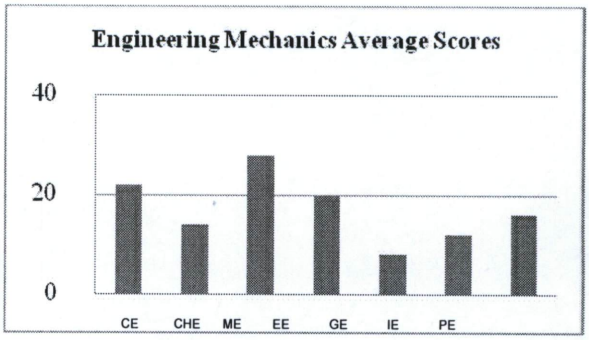

Figure 9 Average score of Engineering Mechanics course comparing among engineering majors report

The test result can also be shown in graph of individual report as shown in figure 7. The average score of all students and students of each major can also be illustrated in graph as shown in figure 8. For 4 main courses that all engineering majors can access and take quiz, the report can also be shown to compare between engineering majors as shown in figure 9.

3. E-Tutor System Implementation

The e-tutor system was launched with on-line tested by 47 students registered for Production Planning and Control course. The system test included 4 steps of:

1) User registration: the students were guided through registration steps on the webpage as shown in figure 10.

2) User log-in: after registration, a message will send to e-mail address of registerer in order to activate the account.

3) On-line tutor of selected topics: after logging in with the username and password, the student could access to course materials and review the content with text and audio files. The students were required to spend three to four hours per week for 4 weeks. Thus, they can give feedback information for system improvement.

4) On-line quiz: when the students finished reviewing selected topics, they took end of chapter quiz and viewed their quiz result.

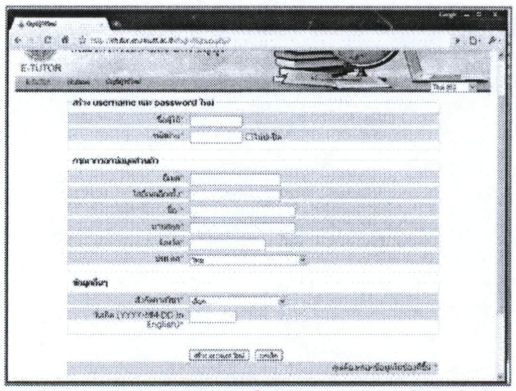

Figure 10 Webpage for new user registration

The e-tutor system user satisfaction survey questionnaire was distributed to all 47 participants. The respondents were 27 (57%) male and 20 (43%) female

students, 30 (63%) students were in the 3rd year and 17 (37%) were in the 4th year. Out of 47 respondents, 34 (71%) of them had never used any e-learning or on-line tutorials before. 98% of the respondents found that the e-tutor system were very useful for them. The resulted in a high user satisfaction with average score of ranging from 3.75 – 3.84 as shown in Table II.

Table II E-TUTOR SYSTEM EVALUATION

E-tutor Components	Average Score (5)	Standard Deviation
Course review materials	3.76	.606
Structure	3.75	.579
Quiz and result	3.84	.621
Overall	3.78	.542

4. Discussion and Suggestion

E-tutor system aimed to support 4 user groups which were Administrator, Instructor, Student and Guest with different level of permission and accessibility. The result showed that the system could serve each user group effectively.

With knowledge of computer programming of the team, the open source learning management system tool (Moodle) structure could be adjusted with theme, module and blog additions. New courses, more materials, activities, reviews and quiz questions of current courses can be easily added to e-tutor system.

The randomly questions selection algorithm worked efficiently. The end of chapter quizzes were generated with designed ratio. The statistical report function allowed users to view

1) numbers of log-in both total and by student majors
2) quiz result statistics: both individual, by student majors and by courses
3) question statistics: number of correct and incorrect answers.

This paper represented the beginning of e-tutor system with the design and construction of the main pages, system structures, system algorithms and its functions of only industrial engineering courses. Overall, students found the e-tutor system useful.

Next, we aim to communicate faculty-wide to draw more instructors and students to participate in e-tutor system. Comparative studies between traditional classroom lecture with tutoring hours and e-tutor system can also be investigated. More add-on modules and functions can also be included in the e-tutor system such as web-board, chat-room and other help functions.

5. Conclusions

E-tutor system was designed to serve academic support to students as tutorial hours. Since the system was web based, that make it accessible to students according to their flexible timetable. It allowed instructors to experience on-line teaching technology with the e-tutor platform available for them to add course materials, activities and quiz questions.

6. Acknowledgment

The authors would like extend their sincere thanks Mr. Manoch Ketmanee and Mr. Anuwat Tantipipattana, students from Computer Engineering Department as well as Mr. Yodnapa Ketmuang from Industrial Engineering department for their tremendous efforts and contributions as part of e-tutor system development team.

References

[1] Faculty of Engineering, Rajamangala University of Tehcnology Thanyaburi. 2009. Curriculum Catalog.
[2] Wang, Q., Zhu, Z., Chen, L., and Yan, H. 2009. "E-learning in China". *Campus Wide Information Systems,* Vol. 26 No. 2, pp. 77-81.
[3] Biswas, S., Sendaula, M., Yeruva, S., Sannidhi, K.P. and Dwivedul, R.S. 2006. "An Intelligent Interactive Tutoring System for an Electric Circuits Course". *Proceeding on an Annual Conference on American Society for Engineering Education.*
[4] Rosenberg, M.J. 2001. *E-learning: Strategies for Deliverign Knowledge in the Digital Age.* McGraw-Hill Professional, New York, NY, pp. 28
[5] Blackboard Inc., http://www.Blackboard.com
[6] WebCt Inc., http://www.webct.com
[7] Moodle, http://www.moodle.org
[8] Daniels, R.G., Crawfor, M., and Mangum, M. 2004. "Web Based Interactive EE Lesson Development: A Modular Approach", *ASEE Annual Conference, Boulder, Colorado, 2004.*
[9] Brockman, J., Butler, J., McCready, M., "A Web Based Learning Tool that Introduces Engineering Concept by Simulating a Chemical Reactor", *ASEE Annual Conference, Boulder, Colorado, 2004.*
[10] Chaturvedi, S., Osman, A., Bawab, S., Abdel-Salam, T.M., and Venkataraman, M. 2004. "A Web-based Multimedia Virtual Experiment", *Frontiers in Education Conference, Nashville, TN, 2004.*