สำนักหอสมุดกลาง พระจอมเกล้าลาดกระบัง

HELPDESK SYSTEM FOR E-LEARNING FRAMEWORK

SOMSACK INTHASONE

เลขหมู่.....................................
เลขทะเบียน.....50172.....
วัน,เดือน,ปี...23...พ.ค....2551

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT

OF THE REQUIREMENT FOR THE DEGREE OF

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SCHOOL OF GRADUATE STUDIES

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หัวข้อวิทยานิพนธ์	ระบบแผนกช่วยเหลือสำหรับอีเลิร์นนิงเฟรมเวอร์ก
นักศึกษา	นายสมศักดิ์ อินทสร
รหัสประจำตัว	47068012
ปริญญา	วิทยาศาสตรมหาบัณฑิต
สาขาวิชา	วิทยาการคอมพิวเตอร์
พ.ศ.	2550
อาจารย์ผู้ควบคุมวิทยานิพนธ์	ผศ.ดร. ศรัณย์ อินทโกสุม

บทคัดย่อ

อีเลิร์นนิงได้รับการยอมรับว่าเป็นวิธีการที่มีประสิทธิภาพในการปรับปรุงระบบการเรียนการสอน ในปัจจุบันมีเครื่องมือมากมายทั้งที่เสียและไม่เสียค่าใช้จ่าย ที่ช่วยให้การพัฒนาและการนำบทเรียนออนไลน์ไปใช้ทำได้สะดวกและมีประสิทธิภาพมากขึ้น เครื่องมือต่าง ๆ เหล่านี้จะจัดเตรียมช่องทางการสื่อสารพื้นฐานระหว่างผู้สอนและผู้เรียนไว้สามช่องทางคือ ห้องคุย ไปรษณีย์อิเล็กทรอนิกส์ และกระดานสนทนา อย่างไรก็ตามช่องทางการสื่อสารเหล่านี้ยังมีข้อจำกัดของการใช้งานอยู่บางประการ งานวิจัยนี้เน้นไปที่การเติมเต็มข้อจำกัดดังกล่าว โดยการนำระบบแผนกช่วยเหลือมาใช้เป็นช่องทางที่สี่ในการสื่อสาร ระบบแผนกช่วยเหลือในงานวิจัยนี้พัฒนาขึ้นมาให้เป็นคุณลักษณะที่เสริมเข้าไปในโปรแกรมมูเดิล ซึ่งเป็นโปรแกรมอีเลิร์นนิงเฟรมเวอร์กที่ไม่มีค่าใช้จ่ายในการใช้งาน และเป็นโปรแกรมแบบเปิดเผยรหัส แม้ว่าระบบแผนกช่วยเหลือนี้จะพัฒนาขึ้นมาให้ทำงานภายใต้โปรแกรมมูเดิล แต่แนวคิดและการออกแบบสามารถนำไปใช้ในการพัฒนาระบบดังกล่าวเข้ากับโปรแกรมอีเลิร์นนิงใด ๆ ได้โดยง่าย

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Thesis Title	HELPDESK SYSTEM FOR E-LEARNING FRAMEWORK
Student	Mr.Somsack Inthasone
Student ID	47068012
Degree	Master of Science
Program	Computer Science
Year	2007
Thesis Advisor	Asst.Prof.Dr.Sarun Intakosum

ABSTRACT

E-learning has been proved to be an effective way to improve a learning system. There are numerous tools both commercial and non-commercial that can greatly increase the ability for rapid development and deployment of online learning. These tools allow teachers and students to communicate through three basic channels: chat room, email, and forum. These channels, however, have some limitations. This research focuses on fulfilling those limitations by applying a helpdesk system as the fourth communication channel. The proposed helpdesk system is implemented as a new feature added into Moodle, a non-commercial and open-source e-learning framework. Although this helpdesk system is implemented for Moodle, the concept and design can be easily applied to almost all of e-learning programs.

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CHAPTER 1

INTRODUCTION

1.1 Problems and Motivation

E-learning has been considered a new and effective way for learning beyond the frontier. It overcomes the limitation of normal class room in that teachers can provide their course materials once in various electronic forms and with the support of the internet, students can access to those materials from anywhere and anytime. In addition, they can learn and review the same materials as much as they wish.

Although e-learning encourages students to study by themselves, the communication between students and instructors is still necessary. Almost all e-learning programs provide three basic channels of communication, email, chat room, and forum, between teachers and students. These three channels, however, have some limitations. Email is very common form but it may be the most ineffective one. The reasons are described as follows. Firstly an email may not reach a teacher and no one notices this. Secondly, it is not an interactive communication; students may need to wait for days after they sent their questions. Lastly, teachers may have to repeatedly answer the same question. For chat room teachers need to be online with students to answer their questions, which may be previously asked. Teachers, then, have to spend much time in front of computers while giving less contribution to the course. For students, they must be online at the specific date and time; this is opposite to the concept of learning anytime. Forum allows teachers and students to have discussions in more structural manner. Questions and answers are searchable and well categorized. However, the communication is not interactive, students need to post questions and wait for the answers. Moreover, students may need to post many related questions before they obtain the desire solutions.

Helpdesk is a service provided by many companies to support their customers. The most well known form may be a computer trouble shooting system in which users follow the instructions provided by the system to solve their problems.

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Another example is an automatic call center where customers phone in for their questions and the system responses with the steps that the customers can follow to find the solution to their problems. In summary, a helpdesk system allows users to ask questions, the system then responses with some guidelines, based on the knowledge stored in the database that may lead to the solution to the problems. Therefore, applying the helpdesk concept as a new communication channel may solve the previously mentioned problems in that the communication is interactive, the information is well organized, teachers do not need to continually answer the same questions, and students can access to the information whenever they want.

Many e-learning products are available today, among them is Moodle. Moodle has almost all necessary features for developing an online course. It has a user friendly interface. It can be used free of charge and has a large community that can support for both users and developers. In addition, it is open source and it also provides good programming interfaces so new features can be easily added. Unfortunately, Moodle does not provide helpdesk as one of its communication channel. This research, therefore, aims to solve the previously mentioned problems by adding helpdesk system, which this research calls HelpDesk, to Moodle.

1.2 Objectives

This major objective of this research is to design and implement the idea of helpdesk as a new communication channel for e-learning.

1.3 Scope

The helpdesk system will be developed as a new feature added to Moodle, The system is divided into two parts, back-end and front-end. The back-end will be used by teachers for creating helpdesk topics for students. Teachers can create a new helpdesk topic from scratch or import some materials from forum or other helpdesk topics. The front-end is for students, they can search for the topics they want and follow the steps provided by the helpdesk to solve their problems.

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1.4 Contributions

HelpDesk system can enhance an e-learning capability by providing a new communication channel between teachers and students. This channel is interactive, well organized, and supports the concept of learning at any time. Although the system is implemented under Moodle, the design can be reused by any e-learning products.

1.5 Organization of the thesis

The remaining thesis is organized as follows:

- Chapter 2 is about Moodle's background and general overview of a helpdesk system.
- Chapter 3 discusses the analysis, design and implementation of the HelpDesk system.
- Chapter 4 shows the experiment and results of this thesis.
- Chapter 5 is conclusions and recommendations.

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CHAPTER 2

RELATED LITERATURE

This chapter will discuss on two main points, Moodle and Helpdesk background.

2.1 Moodle background

Moodle stands for Modular Object-Oriented Dynamic Learning Environment and is a Course Management System (CMS) and Learning Management System (LMS) for e-learning framework. It is designed to support modern pedagogies based on social constructionist theory [1]. Moodle offers a free alternative to commercial software such as WebCT [2] and Blackboard, and is being used by a growing number of universities, schools, and independent teachers for distance education or to supplement traditional face-to-face teaching.

Moodle was started by Martin Digammas and today is one of the most user-friendly and flexible open-source e-learning Framework. It has a robust development community with members composing of numerous developers from around the world. They continue to add and improve the features, functionality, scalability and performance of Moodle.

This background is organized into three sections.

1. Moodle features and scalability.
2. Modules and plug-ins.
3. Plug-in development.

2.1.1 Moodle features and scalability

Moodle is written in PHP and is easily installed and used on Windows, Linux, Mac OS X, SunOS, BSD, and Netware 6 or any other system that has PHP. Moodle has been translated into over 75 languages in over 175 countries, and supports the popular SCORM standard for content packaging. The study courses can be categorized and searched. Each page is authenticated. Text editor has integrated WYSIWYG[1] which is helpful for inexperienced users when they create new courses, lessons, and other contents.

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[1] WYSIWYG = "What You See It What You Get"

The main webpage Moodle contains Menu block, Welcome message block, Calendar block, Available courses, Search courses, Login link, and language selector, as shown in figure 2.1.

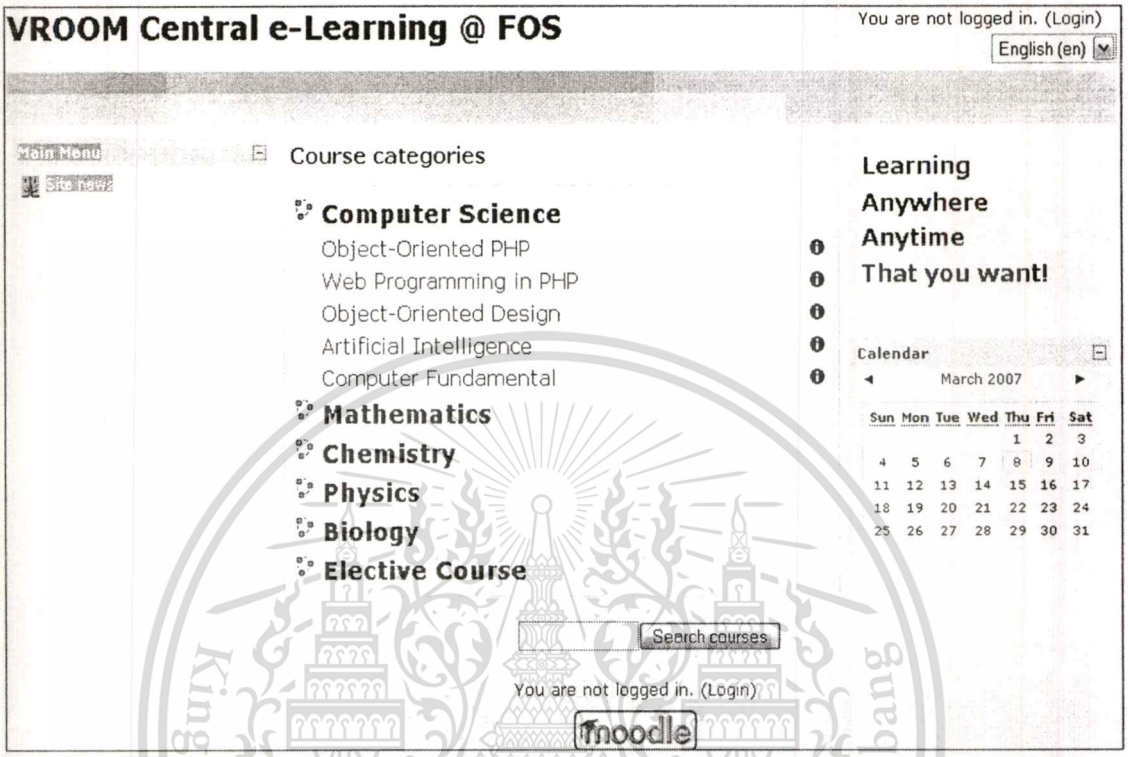

Fig. 2.1. An example of Moodle's main page

Users must login to the system. Login and sign-up page is shown in Figure 2.2

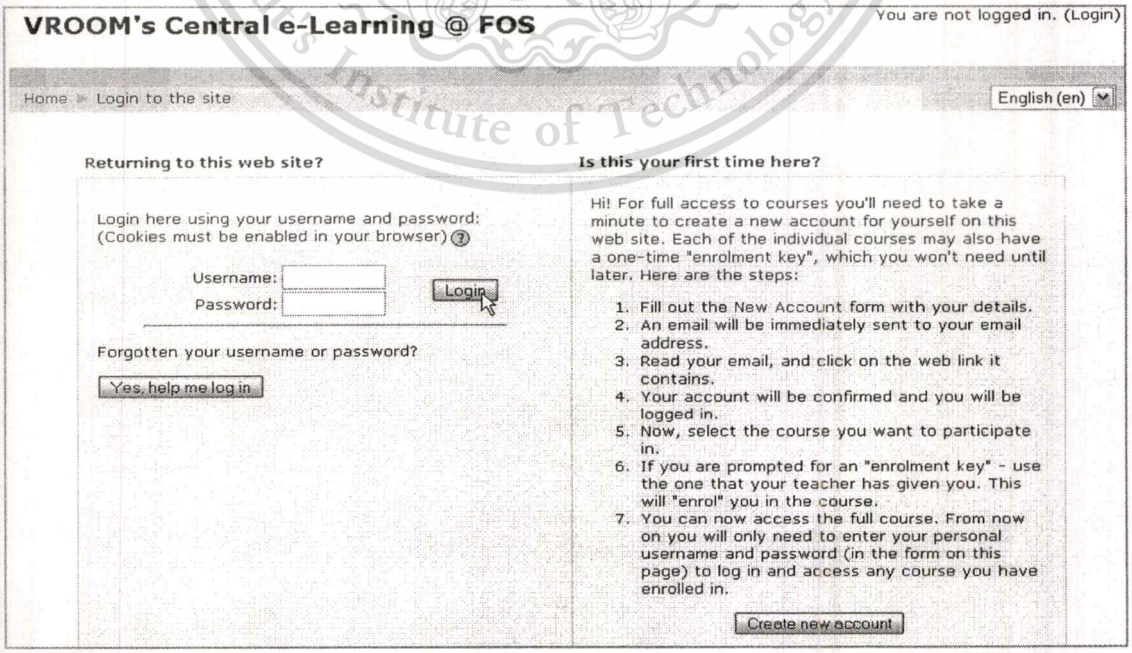

Fig. 2.2. This page is for users to login and sign up

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If a user is a student (Figure 2.3)

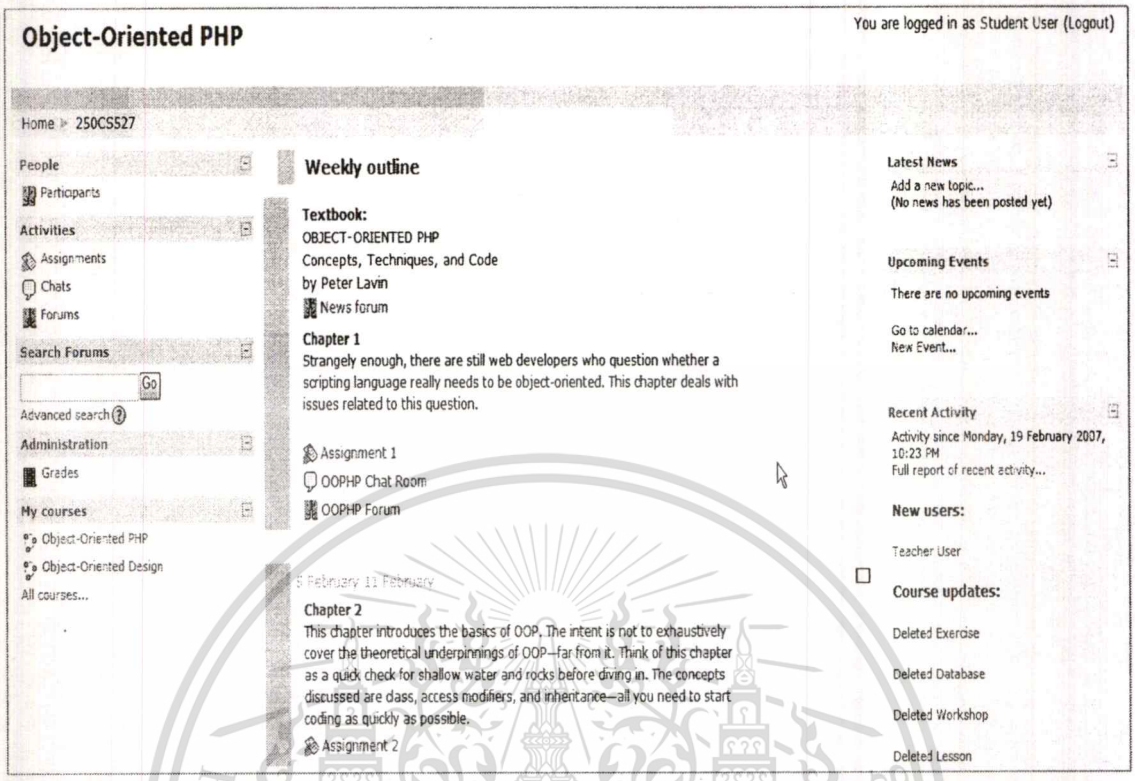

Fig. 2.3. This page allows a student to access the course

If a user is a teacher (Figure 2.4)

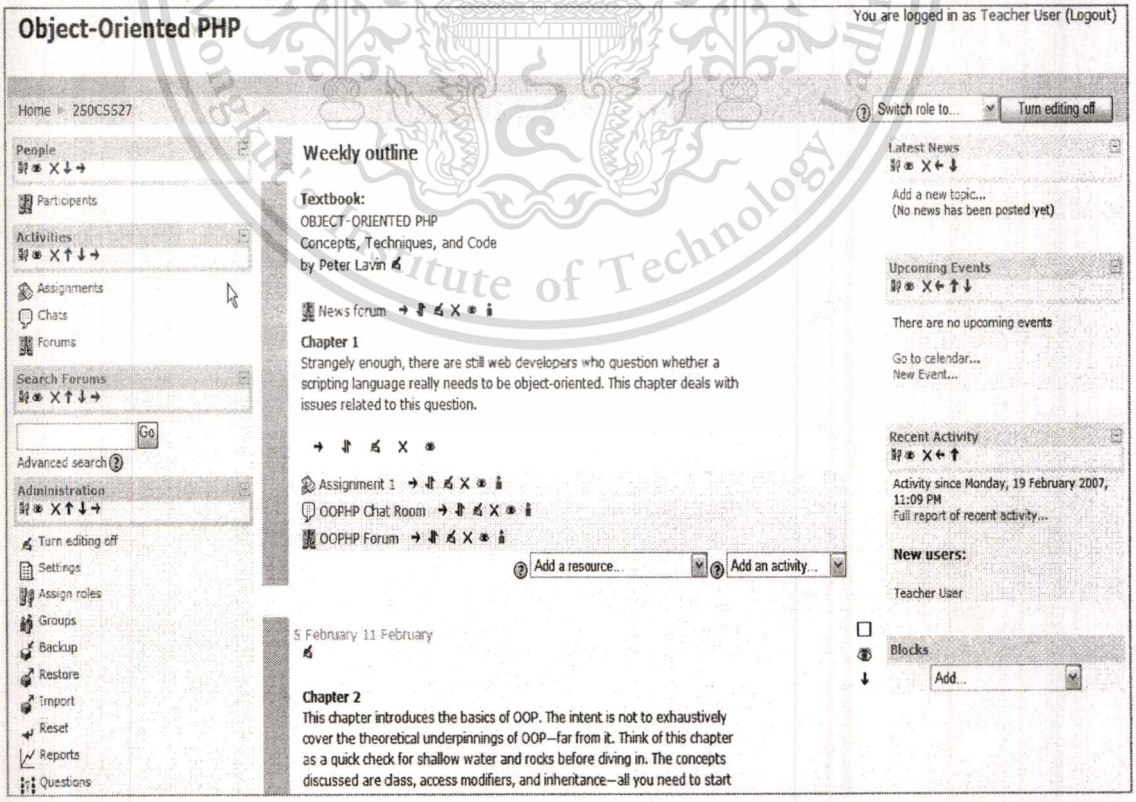

Fig. 2.4. The teacher enters to the course

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If a user is an administrator (Figure 2.5)

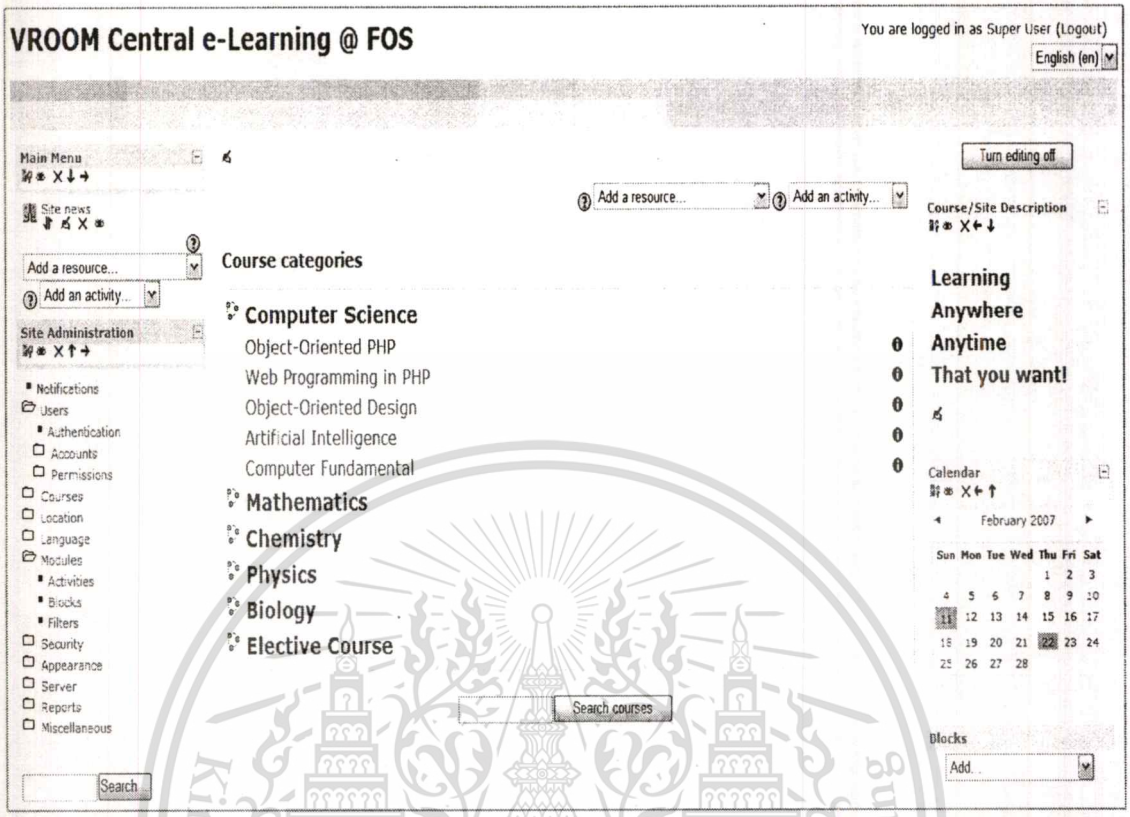

Fig. 2.5. The administrator's manager

Moodle users are divided into six groups, Administrator, Course creator, Student, Teacher, and Guest. Permissions and roles for each group as shown in figure 2.6 and can described as follows.

Administrator

Administrative user will be assigned the default admin role in Moodle system (site). They can usually have unlimited permissions to perform such as, install modules, backup Moodle file system, create courses, and etc.

Course creator

Users in this group can create new courses and teach[2]

Teacher

Users in this group can teach, add activities, backup courses, grade, and etc.

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[2] Teachers need to be online such as, reply email, forum, and chat.

Non-editing teacher

Users in this group can teach and grade but cannot alter any activity in the course.

Student

Normally, new registered users will be assigned into this group, which can access to the course, view grades, perform activities, and etc.

Guest

Guest user can only view contents.

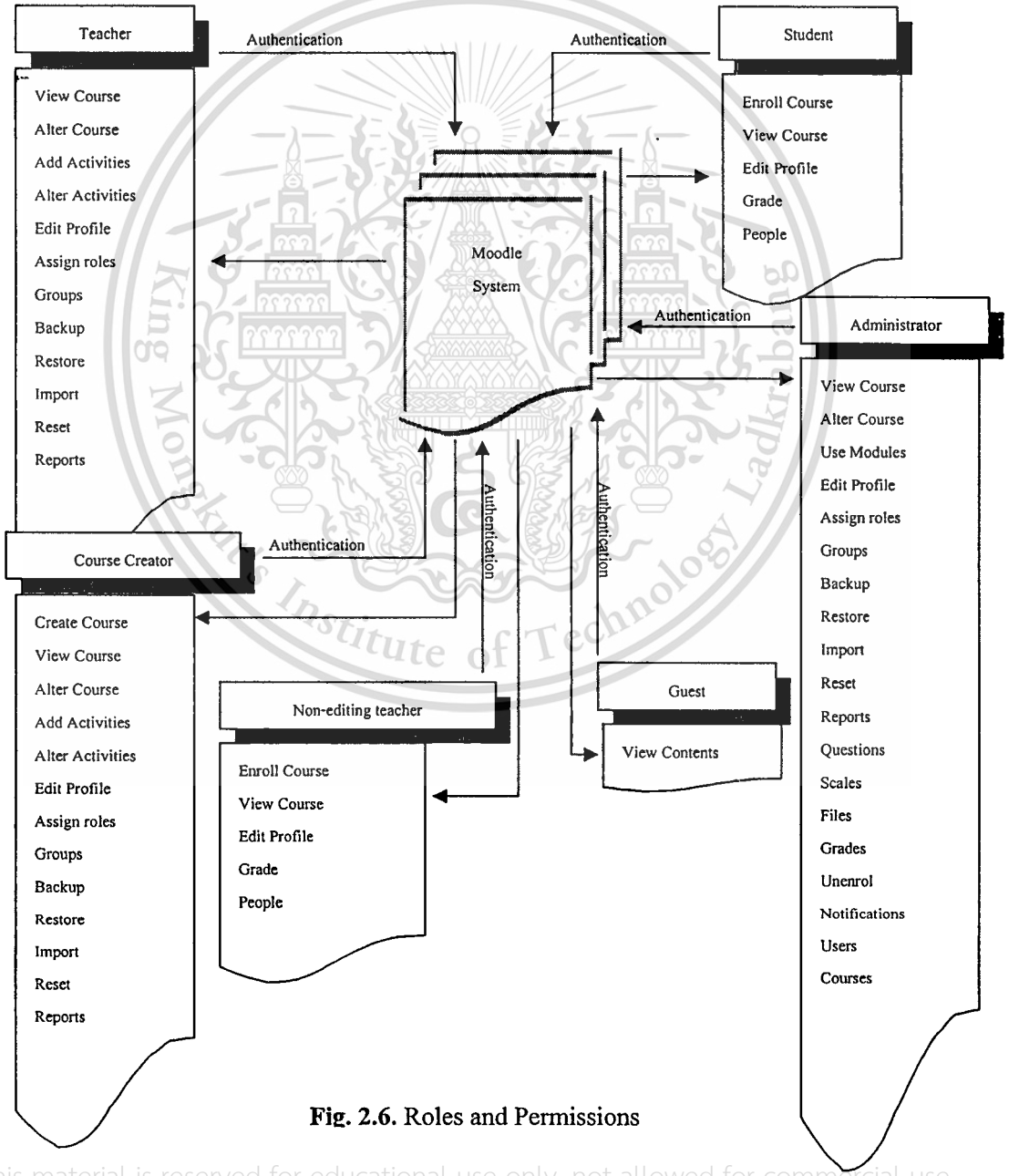

Fig. 2.6. Roles and Permissions

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2.1.2 Modules and plug-ins

Moodle has files and directories structure as shown in Figure 2.7. Among them, blocks, filter, and mod are core directories that contain both standard[3] and third-party[4] modules.

Moodle	Descriptions
admin/	This comprises all functions for admin access only
auth/	To embed login system with external database types
backup/	To store all courses and system configuration
blocks/	Contain all block modules
blog/	Allows a shared on-line journal
calendar/	Calendar concerns
course/	All functions concern such create category, course etc.
enrol/	To control users for enrollment
error/	Error reporter
files/	To manage all uploaded files in a course file area
filter/	Filter module
grade/	Grade exception
install/	All files for installation concern
iplookup/	Shows about an IP address for each client remote in
lang/	Supports localization
lib/	All function library in Moodle framework
login/	Authentication function for Moodle login system

Fig. 2.7. Moodle's files and directory structure

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[3] Standard was built by Moodle Team; Martin Dougiamas

[4] Third-party was developed by Moodle's community or other developers

message/	Provides private message instant
mod/	Stores all activity modules
my/	The 'my Moodle' page
pix/	Stores all images and icons for Moodle
question/	provides the layout of the manual grading form
rss/	(Really Simple Syndication) A syndication format
search/	To support an enquiry as free text
sso/	To manage session ID in Moodle session
theme/	Provides colorful style such text, page, block and etc.
user/	To keep all users' data
userpix/	To save all users' image
README.txt	The instruction for quick install Moodle
config-dist.php	Configured file template
file.php	To handle fetching files from the data root directory
help.php	Displays help page.
index.php	The front page.
install.php	Installed file
version.php	Moodle version

Fig. 2.7. Moodle's files and directory structure (Cont.)

Since this research focuses on the activity module, therefore the detail discussion is on the mod directory only. There are eighteen standard components currently available in this directory as shown in figure 2.8; the detail of each component can be discussed as follows:

Assignment

The teacher can specify homework that students are required to complete and submit. After that teacher will correct submissions and grade.

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Chat

Student and teacher can have a real-time discussion through the web

Choice

The teacher uses this function to make multiple choice questions

Exercise

This module extends the assignment module and creates more conditions for students to work towards.

Forum

This module is a community for all participants, especially student and teacher, to have discussions by posting.

Glossary

This module allows users to define their own vocabulary.

Journal

The teacher composes topic questions which needs students provide feedback on.

Label

This module allows teachers to be able to put text and graphics into the course.

Lesson

This extends the facilities to teacher to provide external contents (Import questions from a file, add a branch table, and etc.)

Quiz

This module can be helpful for teachers to evaluate students in the course.

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Resource

Teacher can import information from CD-Rom; or any other share resources into the course.

SCORM (Shareable Content Object Reference Model)

This module allowed teachers to import SCORM packages in Zip or Pif format

Survey

This helps teachers to make a number of verified survey instruments to improve learning & teaching online.

Wiki

All participants can share their ideas using Wiki as a Quest Book (any one can post, edit and alter contents in webpage)

Workshop

The teacher can deploy this function for students to have an assessment online.

Database

This allows students to input any kind of data information (text, images, etc.) in a form. The entries can then be sorted, searched etc.

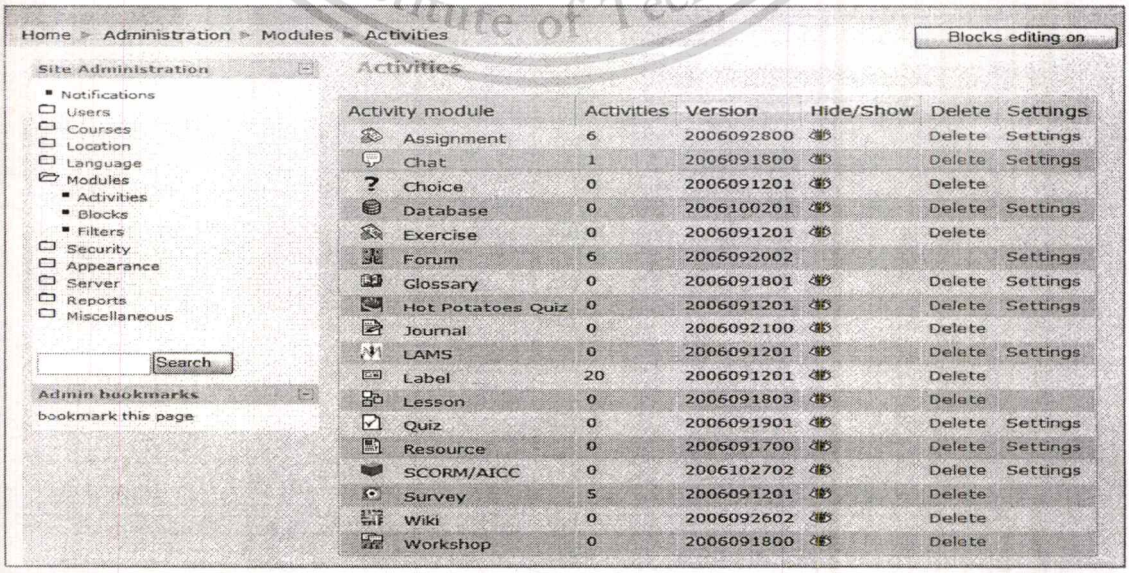

Fig. 2.8. Standard components of activity module

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A component can be added easily as shown in figure 2.9 and 2.10 where chat module is added.

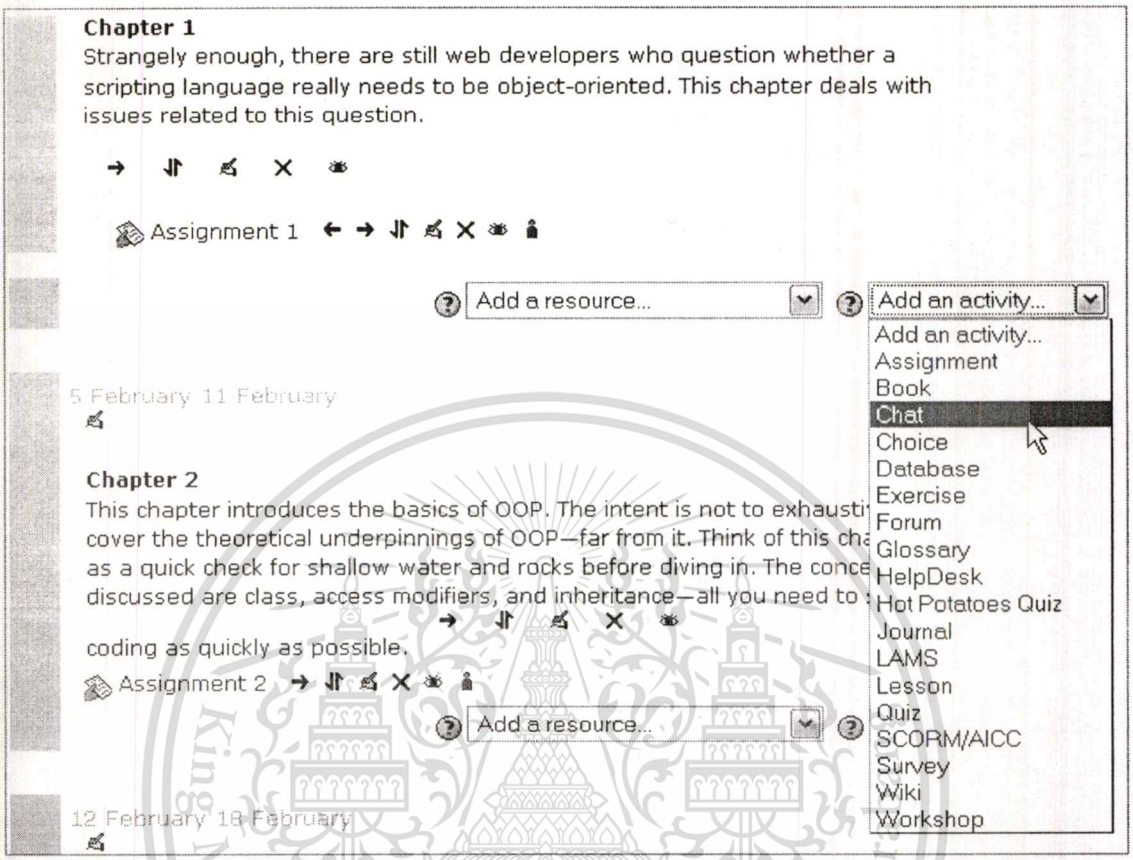

Fig. 2.9. Teacher assigns an activity (Chat) to students

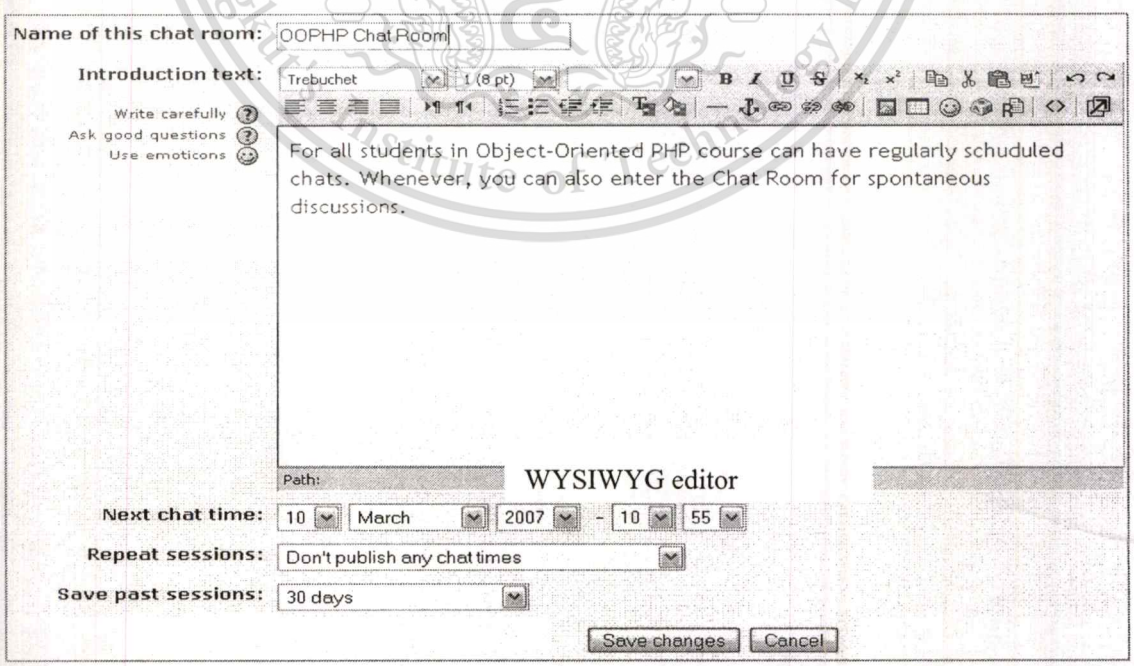

Fig. 2.10. Chat's title and description

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Both students and teachers can see the newly added module as shown in figure 2.10 and 2.11.

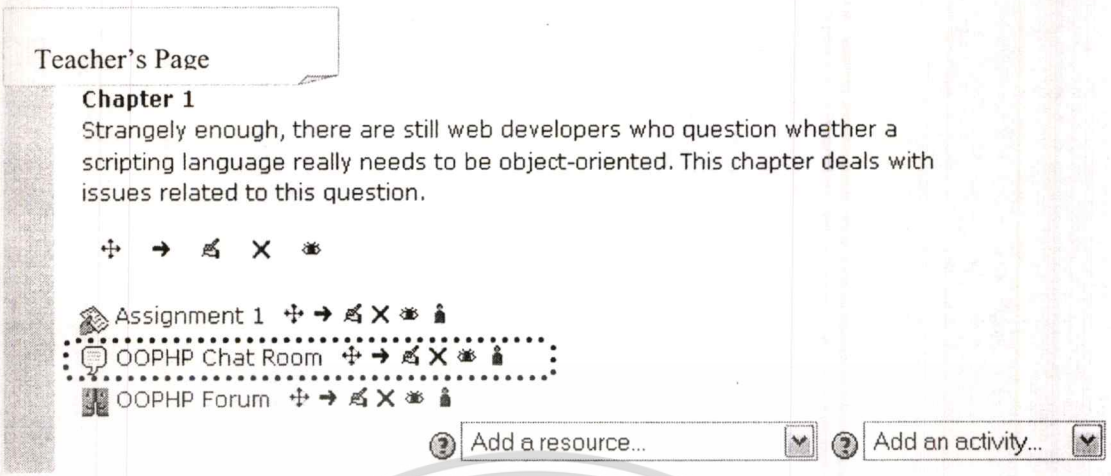

Fig. 2.11. An activity (Chat) has been added

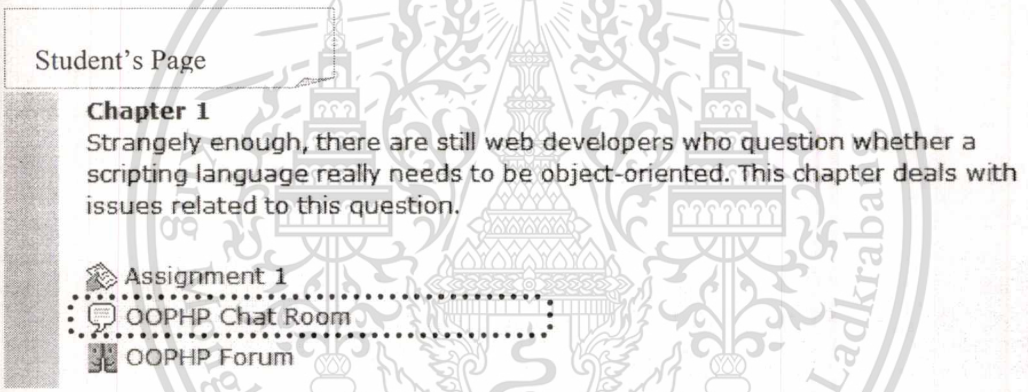

Fig. 2.12. Student is assigned an activity (Chat) to perform

Although the student's and teacher's page may look similar, teacher can perform more functions such as add, alter, delete, hide/unhide, and assign groups.

2.1.3 Plug-in development

Moodle defines three options that allow:

- Developers to develop the components that can be plugged into Moodle, as shown in table 2.1.

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- Contributors to translate, make database schemas, and build theme.
- Subscribers to test and report bugs.

Table 2.1. Lists of category that can be extendable

Activity modules	Question engine
Authentication methods	Question import/export formats
Blocks	Question bank teacher docs
Course formats	Question types developer docs
Database fields	Quiz reports
tabase presets	Resource types
Enrolment plug-ins	SSO plug-ins
Filters	.

Particularly activity modules, Moodle provides some mandatory files[5] for developers who need to develop new module into mod directory, as shown in table 2.2.

Table 2.2. The mandatory files for new module to extend the active modules

File name	Description
icon.gif	Icon size for the module must be 16x16 pixel
index.php	This file will display all module instances in the course page
lib.php	The library file contains all functions to be use in module such as create and delete the instance of module in the course
mod.html	This file is a form to take over in creation & altering the instance of module in the course
readme	This file keeps the instructions, comments, logs, and author
version.php	This file saves all versions of module (It has built) and next updating.

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[5] This can be found at http://docs.moodle.org/en/Modules_%28developer%29

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Table 2.2. The mandatory files for new module to extend the active modules (Cont.)

view.php	This will allow students to view a particular instance in the course (It normally works in Front-end)
db/mysql.php	This file concerns upgrading and changing module
db/mysql.sql	This file stores all tables schema that must be in SQL syntax

And some important files are to contain most used functions in the lib folders as follows:

- *dmllib.php* file under lib directory is to contain all the data manipulation language functions that use to interact with the Moodle's Database, such as *get_record_select* function.

- *weblib.php* file under lib directory is to contain all general-purpose Moodle PHP functions that produce HTML output, such as *print_textarea* function this prints textarea field with WYIWYG editor

2.2 Helpdesk background

Helpdesk is a service that provides knowledge based information and solution assistance to the users via telephone, traditional media, internet, and etc. Depending on how the companies or organizations are setup and what their objectives are. Helpdesk provides the company or organization with tools to streamline productivity while assisting users with their problems and enquiries, as shown in Figure 2.13 [3].

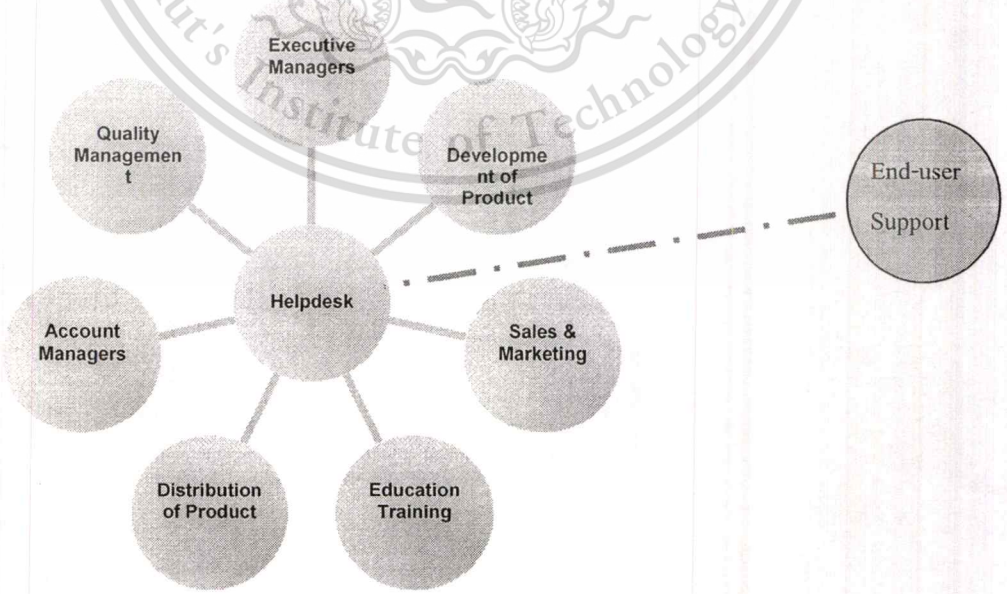

Fig. 2.13. Business and organization that concern helpdesk

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สำนักหอสมุดกลาง พระจอมเกล้าลาดกระบัง

Currently, with the progress of innovations in hardware, software, methodologies and internet, helpdesk is either handled fully automatically without human intervention or as a combination of both automatic system and some level of human involvement. So, there are numerous software tools have built as web-base and non-web-base to support the companies and organizations. [3]

MS Help and Support Center is a non-web-based tool that supports Microsoft's products for MS Windows OS, as shown in Figure 2.14.

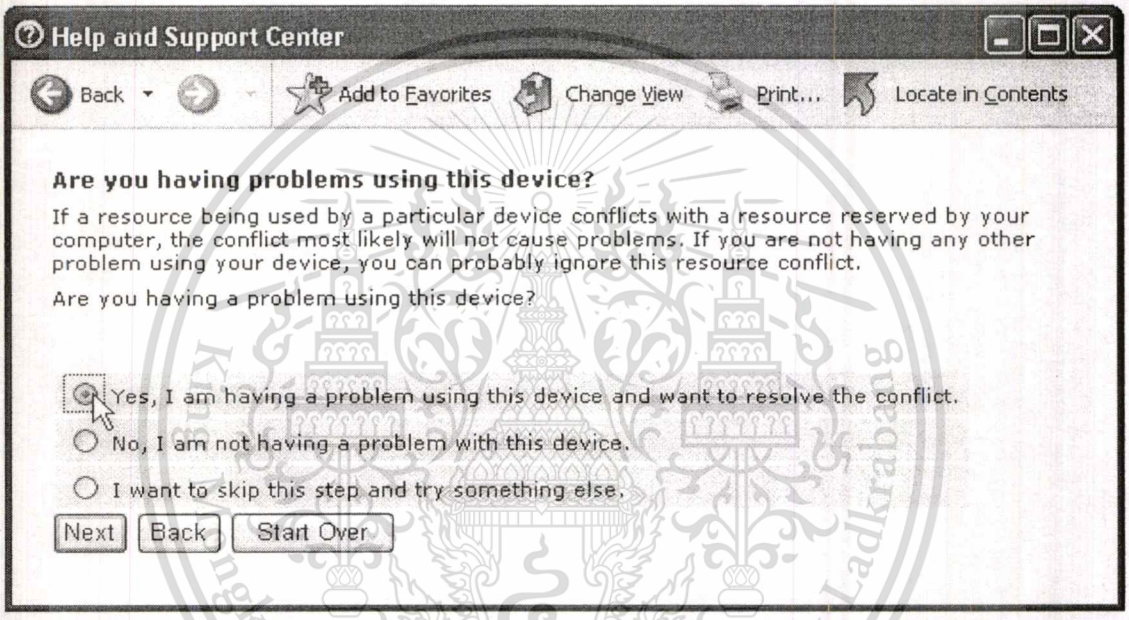

Fig. 2.14. An example of troubleshooter Hardware device for MS Windows XP

ServiceDesk Plus is "a completely web-based Help Desk and Asset Management Software. It offers an integrated package with Request management (Trouble Ticketing), Asset Tracking, Purchasing, Contract Management, Self-Service Portal, and Knowledge Base at an affordable price point. ServiceDesk Plus provides all that you need to have a full-fledged IT Help Desk and a productive Help Desk staff". [4]

F2w Helpdesk is "a helpdesk support system based on requests (some people call them tickets), with a simple web interface. Requests can be classified into categories and assigned a priority. Categories are associated with specific well-defined problem areas, and f2w helpdesk provides a way to maintain an expert knowledge base of problems and solutions based on request

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categories. The emphasis is on quickly identifying problems, assigning them to the best person for the job, and helping that person keeps track of what needs to be done."[5]

Alsedo Support Desk is "a web-based helpdesk application that allows for the exchange of information between users and their service provider (for example an IT helpdesk and their end-users)."[6]

Sciret is "an advanced knowledge based system. In the further development, Sciret will be extended to a full helpdesk system which will be including also a trouble ticket system, document management, bookmark management and more."[7]

OpenIT is "a free IT management web application written in PHP which tracks Employees, Computers, Software, Peripherals, Support Issues, Knowledge Base articles, Out of Office notices, and more."[8]

KnowledgebasePublisher is knowledgebase and FAQ software that allows users to publish their contents of knowledgebase or FAQ through web-base. [9]

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CHAPTER 3

DESIGN OF HELPDESK SYSTEM

This chapter is conducted into two parts. First part is Design of HelpDesk system and second part is HelpDesk file and directory structure.

3.1 Design of HelpDesk system

3.1.1 Requirement of HelpDesk system

In the figure 3.1 illustrates Use Case for HelpDesk system, there are six major parts of functionality that are required for three actors, as follows.

- Admin has abilities to install HelpDesk system, login, add, alter, delete, and hide/unhide HelpDesk in the course.
- Teacher has abilities to login, add, edit, delete, and hide/unhide HelpDesk in the course.
- Student can login to the system and view the HelpDesk instance in the course.

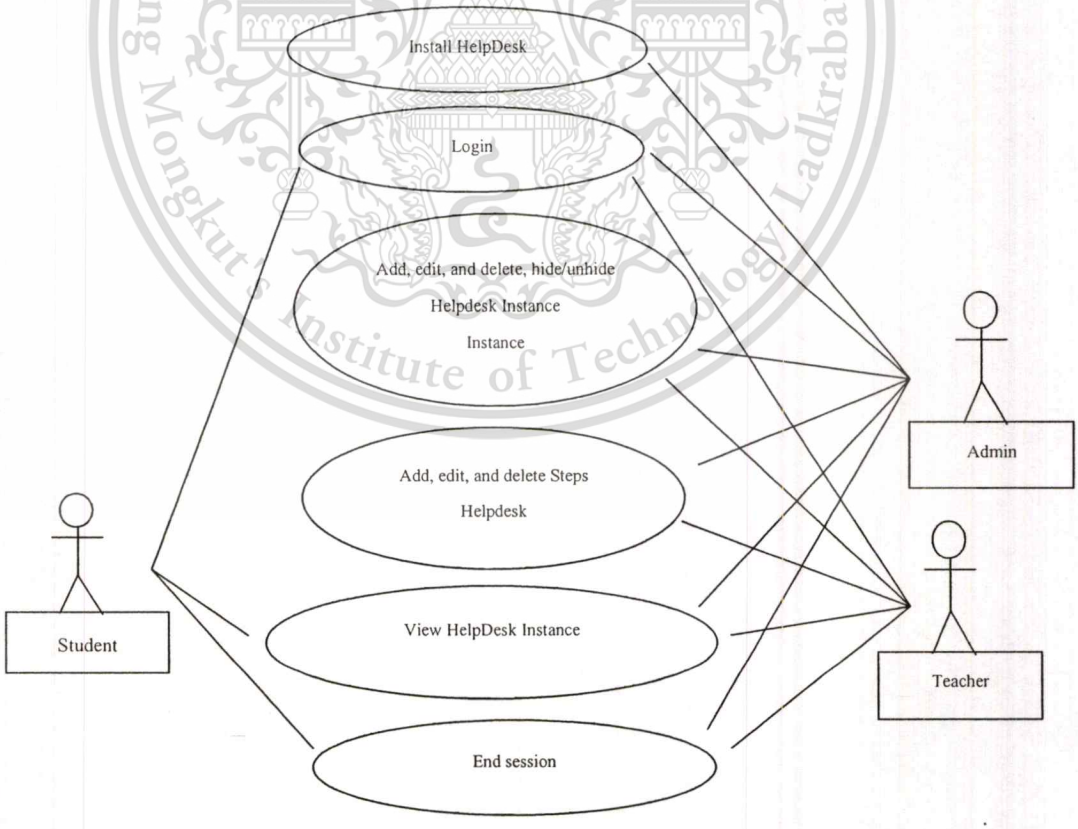

Fig. 3.1. Use Case for HelpDesk System

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3.1.2 User Interface Design

Based on framework of Moodle's components, the HelpDesk system is designed to have a front-end and back-end. The first one is for students to access, and the second one can be used by admin, teachers, course creator, and non-editing teacher. There is an authenticated check for each user login that can be adapted to Moodle features and roles, as shown in figure 3.2.

Students can view and interact with Helpdesk instance via front-end, teachers can use back-end to add HelpDesk instance into courses.

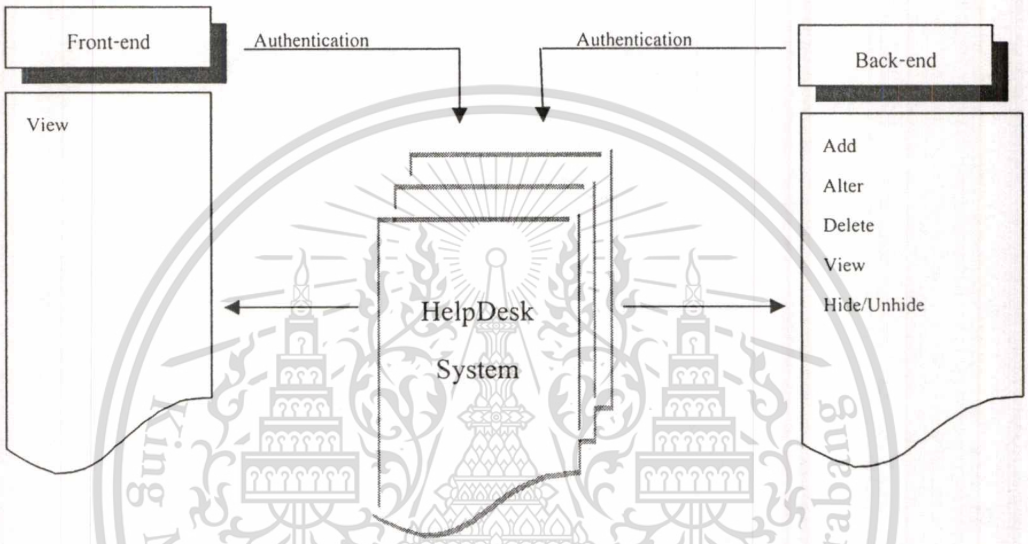

Fig. 3.2. User Interface for HelpDesk system

Front-end user interface:

Front-end is designed to retrieve and display HelpDesk instances from database. It comprises of a title, description, and all steps of HelpDesk that can be interacted. Students access to the course and view HelpDesk instances, as shown in figure 3.3.

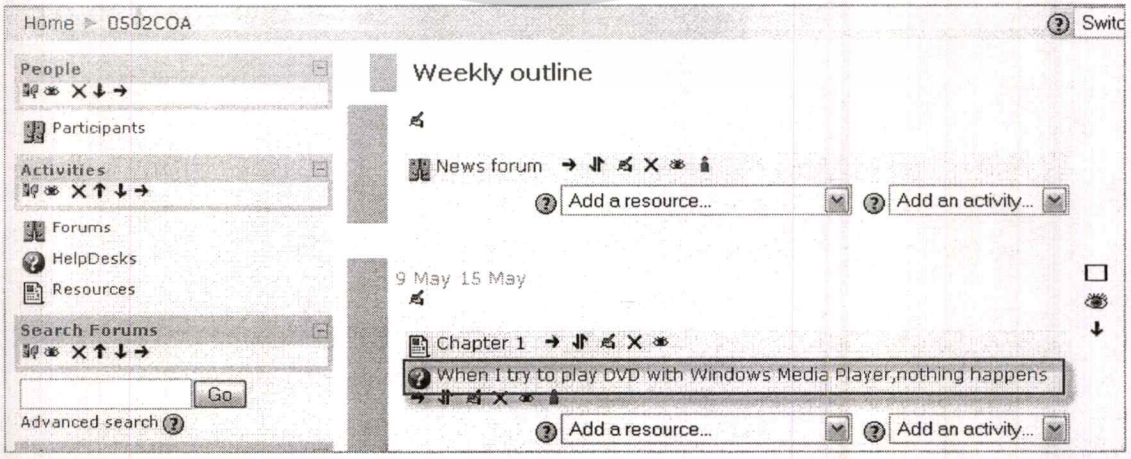

Fig. 3.3. HelpDesk instances on a course' page

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Students can determine inquiries that can solve their problems by interacting and following instructions, as shown in figure 3.4.

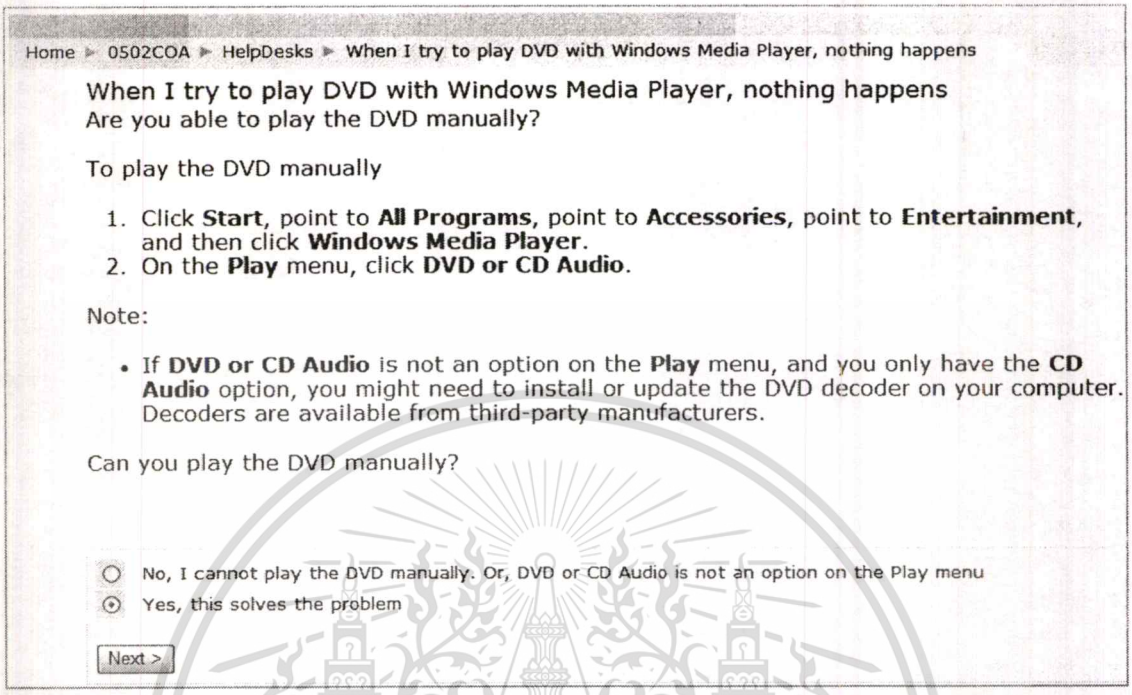

Fig. 3.4. Problem title and enquiries on student's page

Back-end user interface:

This is a HelpDesk instance which comprises of a builder form and tree menu form that can handle teachers to compose question-answer or tutorial knowledgebase, as shown in figure 3.5, 3.6.

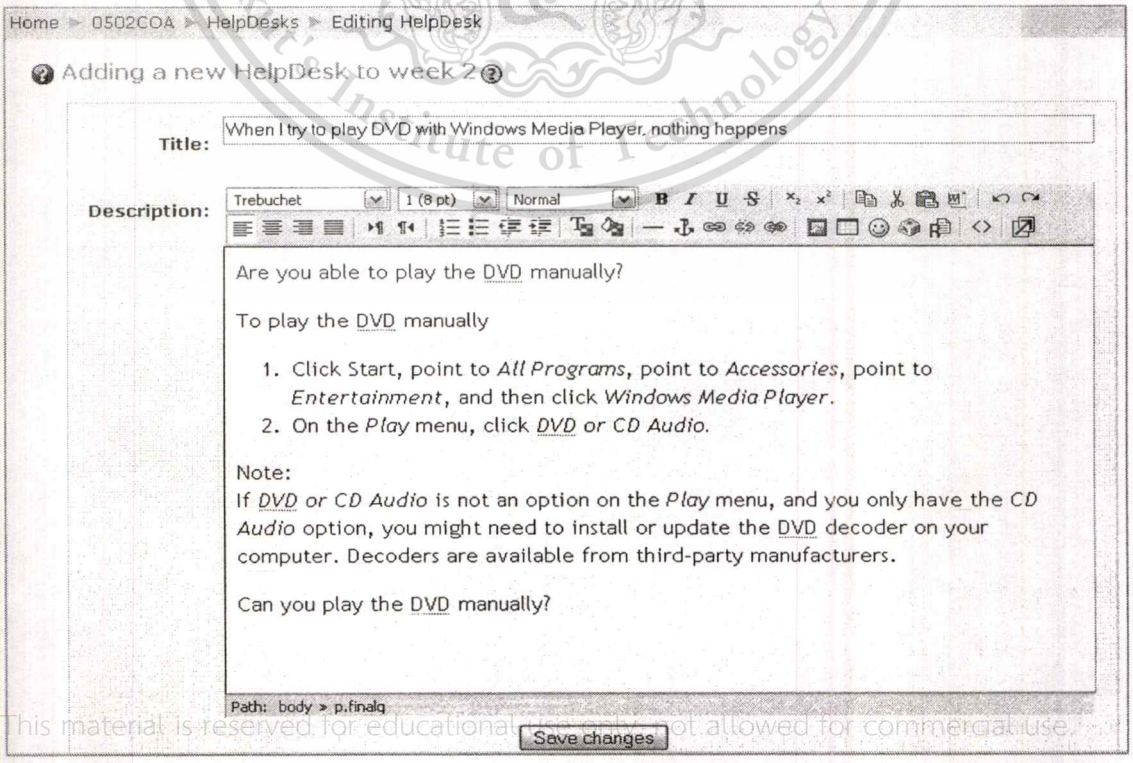

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Fig. 3.5. HelpDesk instance builder form

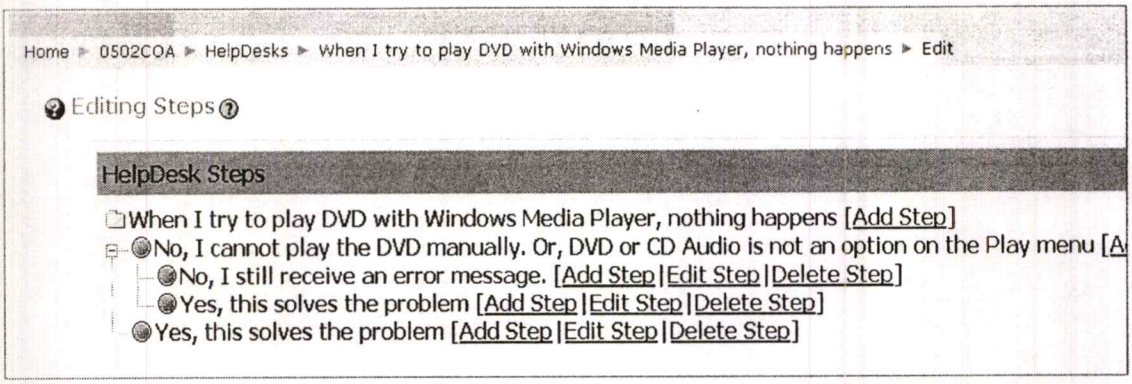

Fig. 3.6. HelpDesk step builder form using tree structure

3.1.3 Database Design

An example of HelpDesk instance is on both the student page and teacher's page. It contains a problem title and number of multiple choices followed by sub-levels of further number of multiple choices for each of the original choices, as shown in figure 3.7 and 3.8.

Fig. 3.7. HelpDesk Title instance and enquired options on front-end

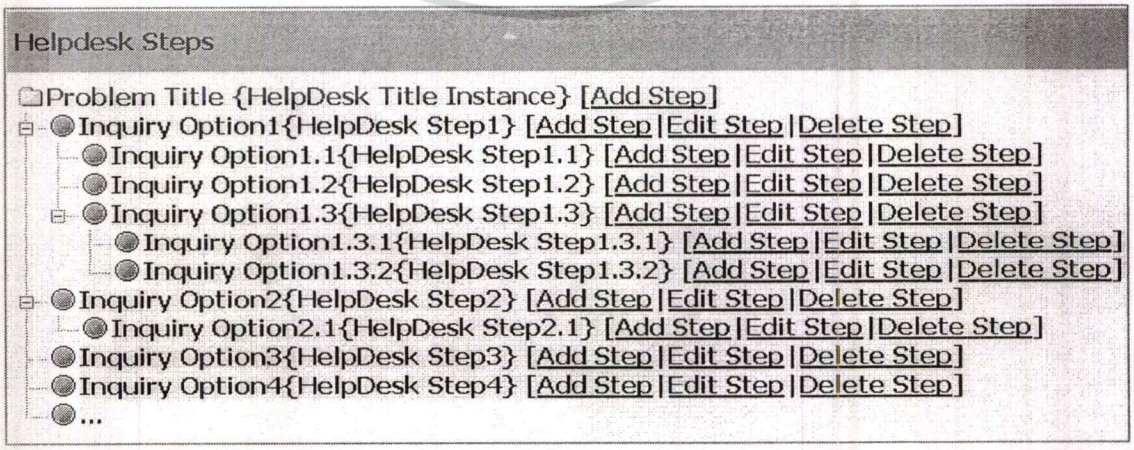

Fig. 3.8. HelpDesk Title instance and enquired options on back-end

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Figure 3.8 illustrates HelpDesk Title instance and enquired options on back-end that is similar to the tree structure, as follows.

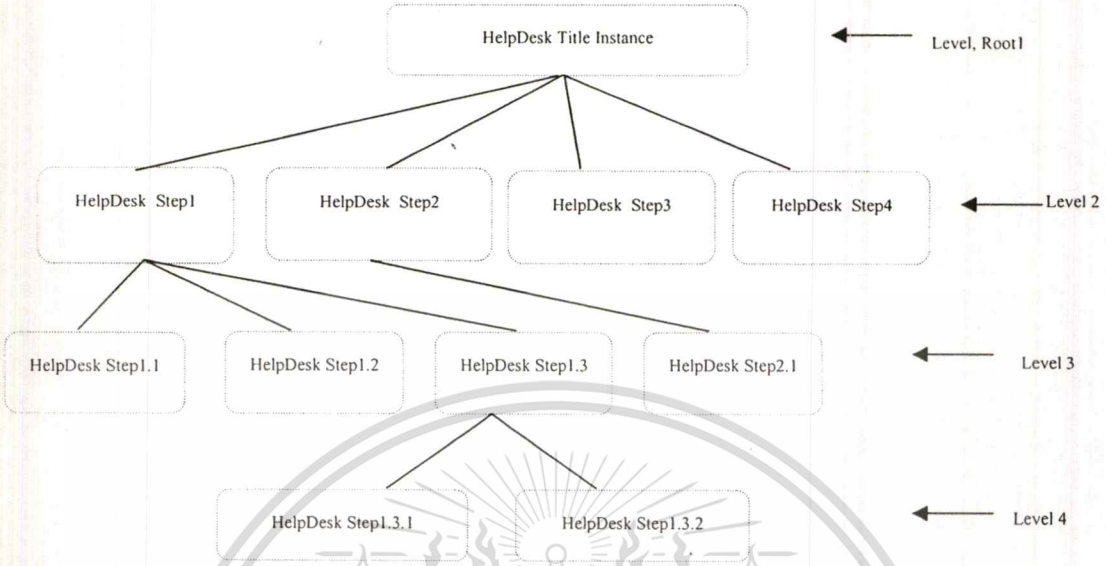

Fig. 3.9. HelpDesk Tile instance and steps in tree structure

In the figure 3.9, HelpDesk Title Instance represents 1, HelpDesk Step1 represents 2, HelpDesk Step2 represents 3, HelpDesk Step3 represents 4, HelpDesk Step4 represents 5, HelpDesk Step1.1 represents 6, HelpDesk Step1.2 represents 7, HelpDesk Step1.3 represents 8, HelpDesk Step2.1 represents 9, HelpDesk Step1.3.1 represents 10, and HelpDesk Step1.3.2 represents 11. These can convert to Table 3.1.

Table 3.1. The value of nodes, parents, and levels.

Node	Parent	Level
1	1	1
2	1	2
3	1	2
4	1	2
5	1	2
6	2	3
7	2	3
8	2	3
9	3	2
10	8	4
11	8	4

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In the table 3.1, first row denotes HelpDesk Tile instance that always comprises of Node 1, Parent 1, Level 1 and the rest of rows of values are children of Node 1, so HelpDesk system's database can decompose into two tables. The *Helpdesk table* is to store all HelpDesk title instances, and *helpdeskstep table* is to store all remaining HelpDesk Steps, as follows:

- *Helpdesk table* comprises of six fields including HelpDesk ID(id*), Course ID(course*), HelpDesk Title instance(name*), Inquiry Description(description), Time Created(timecreated*), and Time Modified(timemodified*), as shown in figure 3.10(left).
- *Helpdeskstep table* comprises of nine fields including HelpDeskStep ID(id*), HelpDesk ID(helpdeskid), Root(rootid), Level(leveled), Parent(parented), HelpDesk Step Title(name*), Instruction Content(content), Time Create(timecreated*), and Time Modify(timemodified*) as shown in figure 3.10(right).

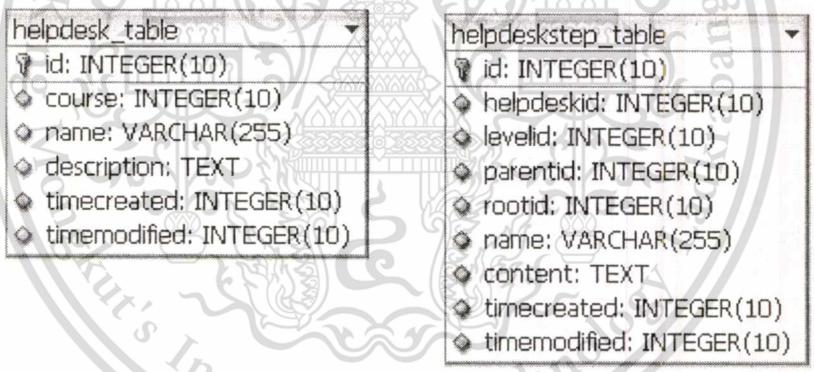

Fig. 3.10. HelpDesk system's database

3.1.4 Database relation

The relationship between Moodle and helpdesk tables is shown in figure 3.11. The helpdesk table contains a field called "course" that is foreign key of *moodle_course* table, which means that a course can have many HelpDesk instances. And the *helpdeskstep* table contains a field called *helpdeskid* that is a foreign key of helpdesk table, which can have many HelpDesk steps in a course.

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*These are required for Moodle Framework

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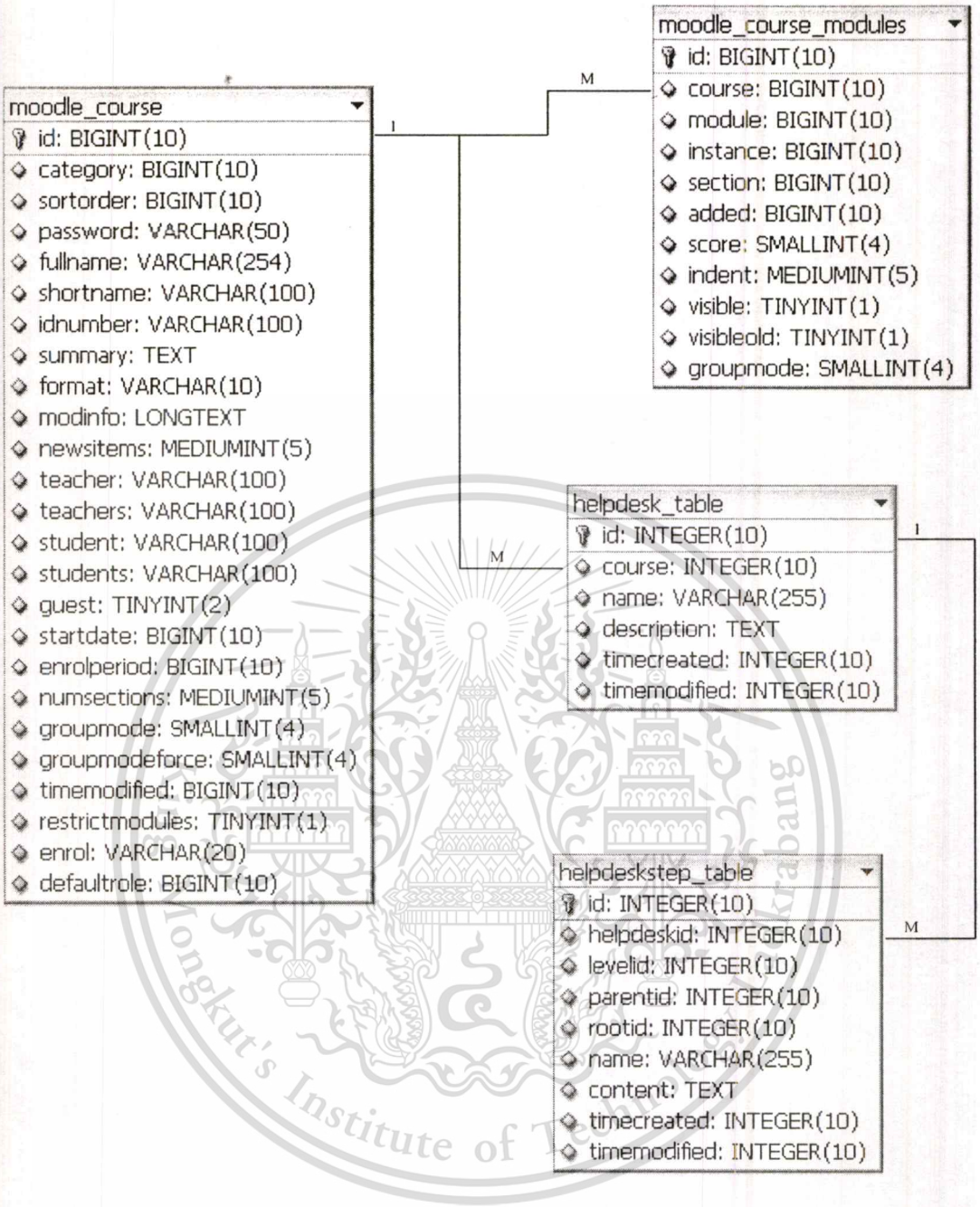

Fig. 3.11. The relation of Moodle and HelpDesk system

moodle_course_modules table is to handle *helpdesk* table through *moodle_course* table when Moodle system requests HelpDesk system to create, edit, and view HelpDesk instance in the course.

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3.1.5 Table schema

The *helpdesk* and *helpdeskstep* table contain data schema, as shown in table 3.2 and 3.3.

Table 3.2. The *helpdesk* table schema

index	Field	Data Type	Length	Description	Remark
1	id	integer	10	HelpDesk ID	Primary key
2	course	integer	10	Course ID	
3	name	varchar	255	HelpDesk Title instance	
4	description	text		Inquiry Description	
5	timecreated	integer	10	Time Created	
6	timemodified	integer	10	Time Modified	

Table 3.3. The *helpdeskstep* table schema

Index	Field	Data Type	Length	Description	Remark
1	id	integer	10	HelpDeskStep ID	Primary key
2	helpdeskid	integer	10	HelpDesk ID	Foreign key
3	rootid	integer	10	Root ID	Refers to Row
4	levelid	integer	10	Level	Refers to Column
5	parentid	integer	10	Parent	
6	name	varchar	255	HelpDesk Step Title	
7	content	text		Instruction Content	
8	timecreated	integer	10	Time Created	
9	timemodified	integer	10	Time Modified	

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3.2 HelpDesk file and directory structure

To adapt Moodle framework, HelpDesk system needs to have functionalities and mandatory files such index.php, lib.php, steplib.php, view.php, edit.php, and etc, as shown in figure 3.12

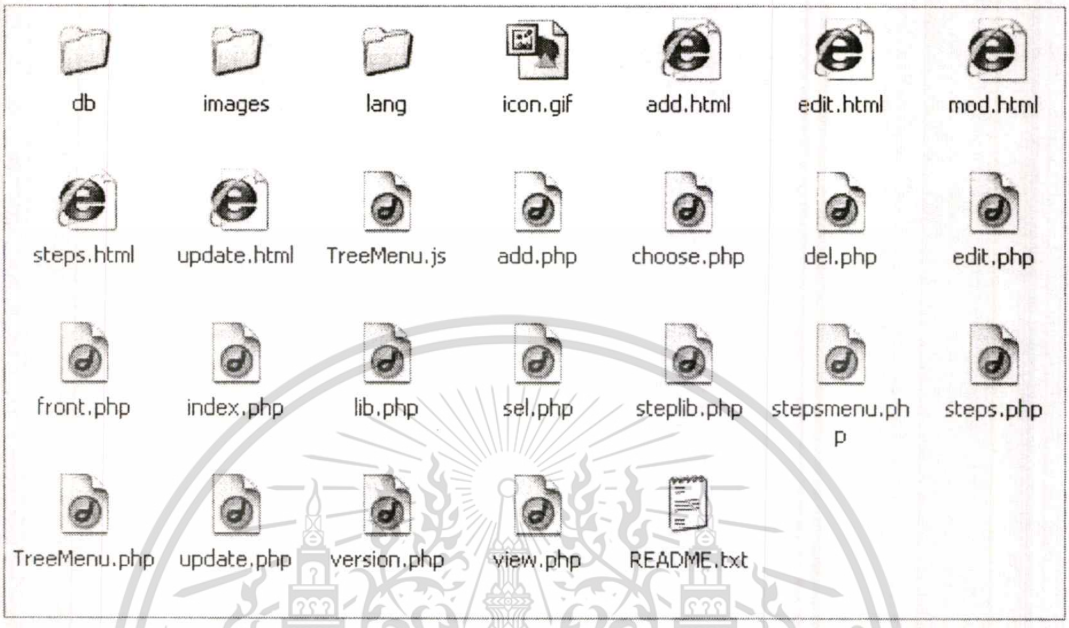

Fig. 3.12. HelpDesk system's files and directories

In the figure 3.12, each file has functionalities as describes below:

- The Lang directory contains language files to use for HelpDesk system.
- The lib.php file contains functions *helpdesk_add_instance($helpdesk), helpdesk_update_instance($helpdesk),and helpdesk_delete_instance($id)* (See in appendix A). These are handled adding, updating and deleting HelpDesk Instance when a course of Moodle to have requests on teacher's page.
- The mod.html and edit.php are cabinet files to handle adding and modify HelpDesk instance on teacher's page.
- The steplib.php file contains functions *helpdesk_add_step($helpdesk), helpdesk_update_step($helpdesk),and helpdesk_delete_step($id)(*See in appendix B*)* for adding, updating and deleting HelpDesk Step on teacher's page. These can execute when requested by add.php, add.html, steps.html, update.html, del.php, and update.php file.

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- The sel.php is to share all HelpDesk instances from the course on teacher's pages.
- The front.php and choose.php are cabinet files to handle view.php which displays all HelpDesk instances and HelpDesk steps on student's page.
- TreeMenu.php, TreeMenu.js, and all files in images folder are cabinet files to handle Tree View on teacher's page.

Figure 3.13 shows HelpDesk system's file structure which each file is a sequence from top to down position such as index.php file is a main request file for Moodle to display HelpDesk Instance in a course. To view a Helpdesk Instance, index.php will call functions in the view.php file. To create, update, and delete HelpDesk instance, index.php file will call the mod.html file, and it sends a request to lib.php file. To add, edit, delete HelpDesk Step, index.php file will call the edit.php file, and it sends requests to add.php, update.php, and del.php file in logical order.

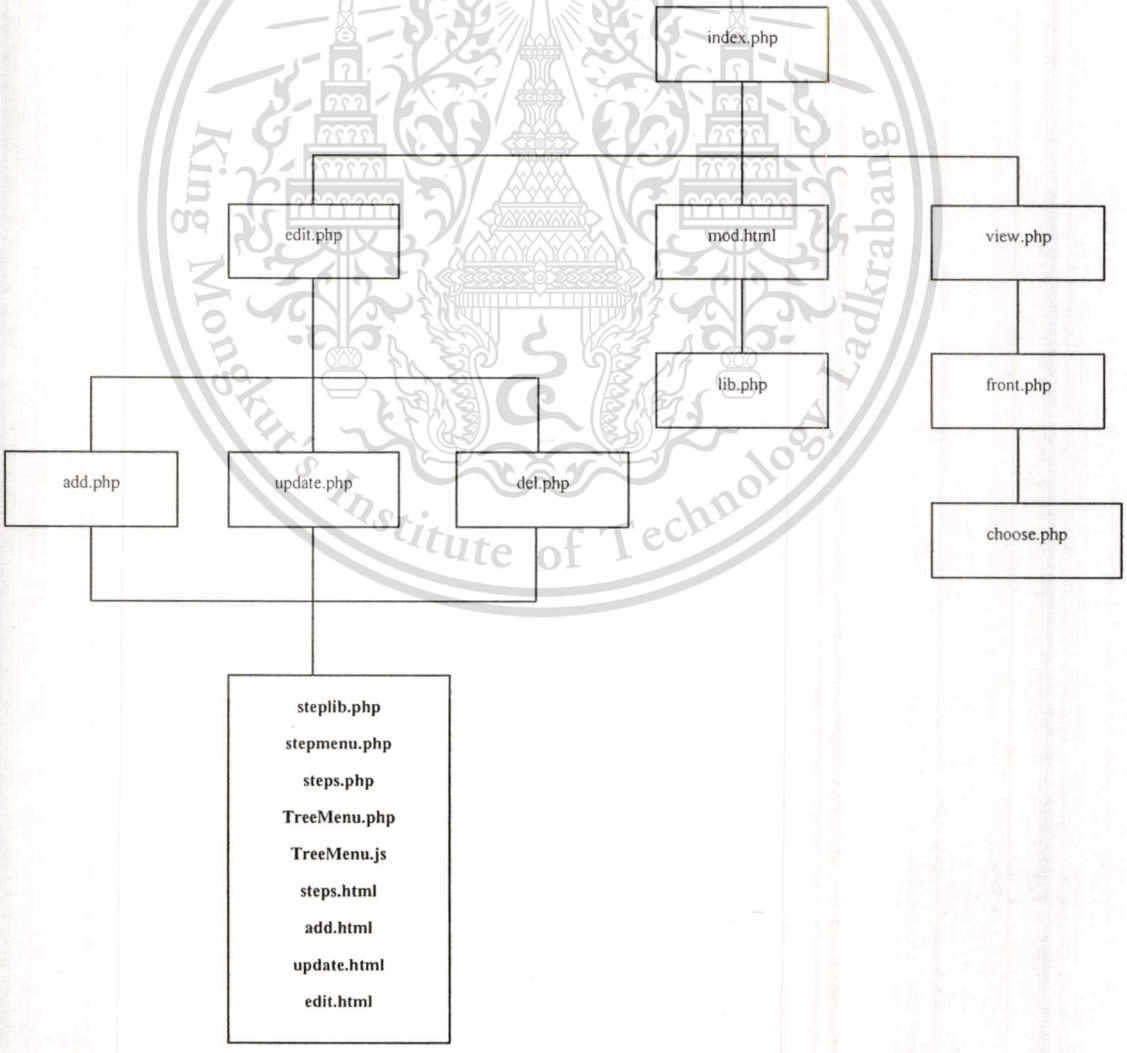

Fig. 3.13. HelpDesk file structure chart

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CHAPTER 4

EXPERIMENT AND RESULTS

This chapter is organized into three parts. The first part is HelpDesk system installation with Moodle, the second part is HelpDesk system deployment, and the last is results of experiment

4.1 HelpDesk System Installation with Moodle

To install HelpDesk with Moodle, which can be done by adding HelpDesk folder into mod folder which is located in Moodle' root directory and then type /admin at the end of URL of domain or server name in web browser, for instance http://yourdomain/yourmoodle/admin or http://yourdomin/admin , as shown in figure 4.1

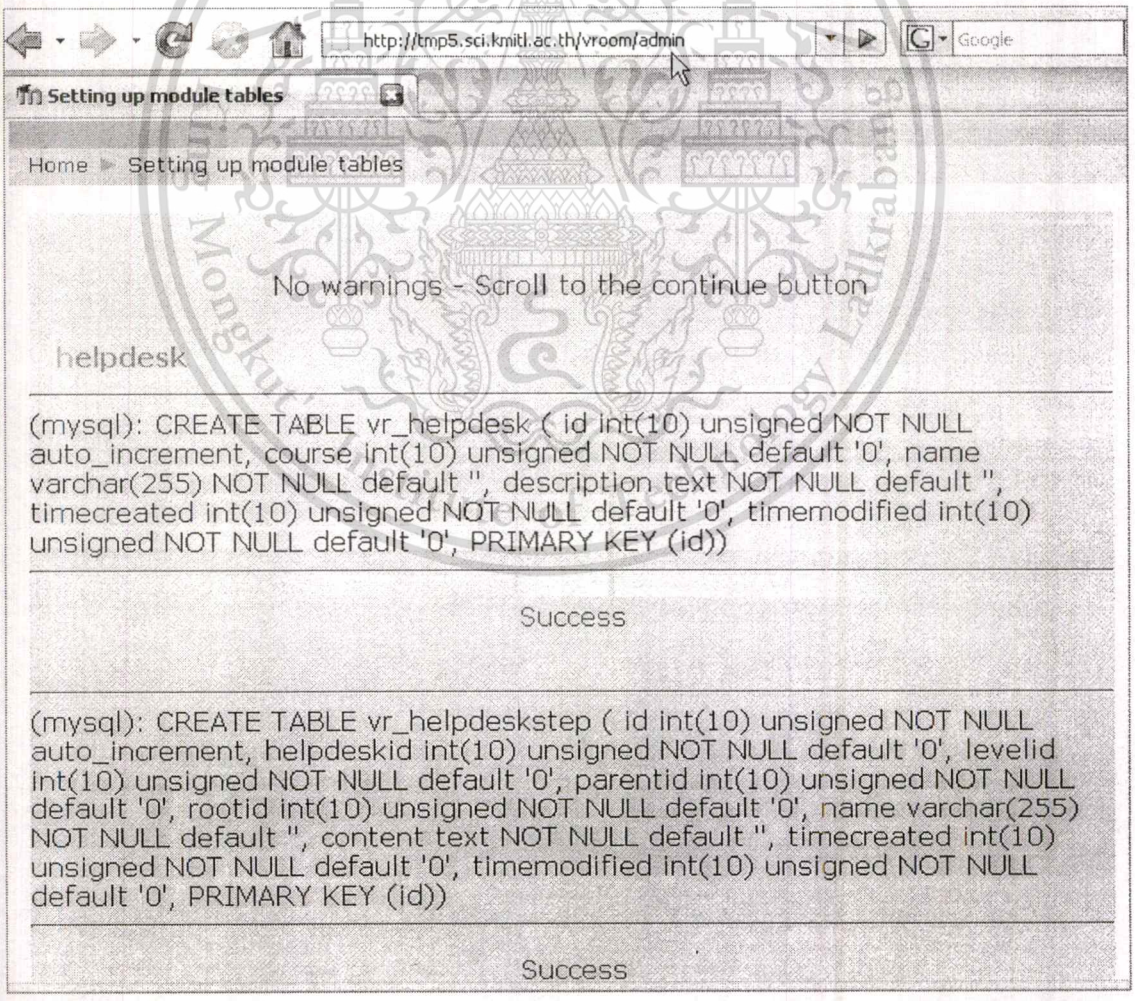

Fig. 4.1. Launch HelpDesk system with Moodle Framework

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4.2 HelpDesk System Deployment

For teachers:

The purpose of this section is to add "The computer doesn't start" HelpDesk instance into the course "Computer Organization and Architectures", which teacher logins to system and considers what lesson or week is concerned to add HelpDesk instance. This can be added by selecting from the drop-down list of "Add an activity…" as shown in figure 4.2.

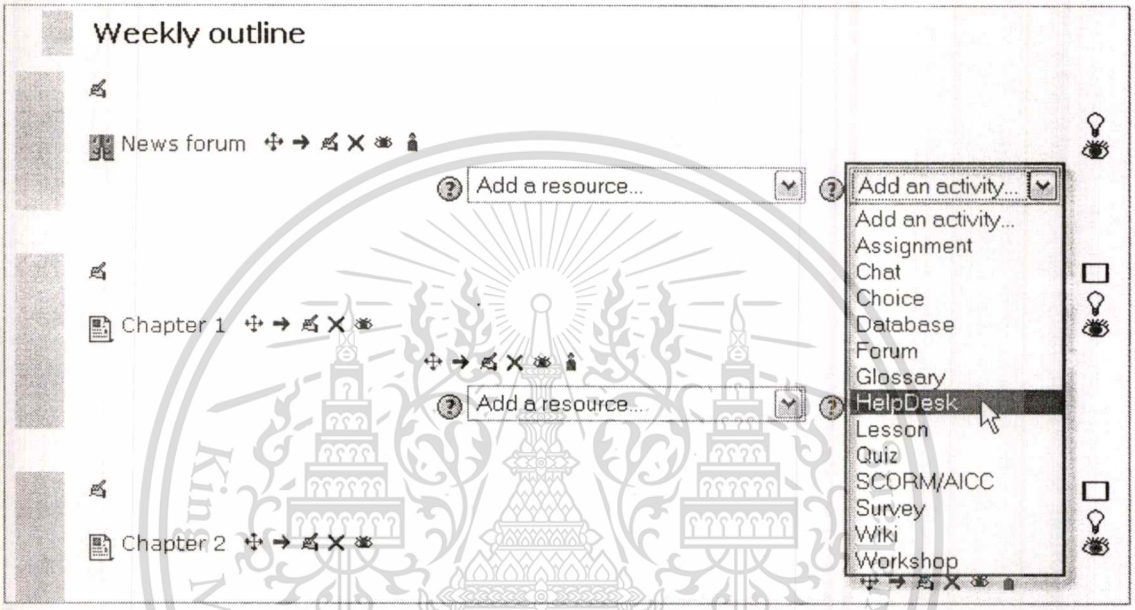

Fig. 4.2. Adding a Helpdesk instance in a course

When HelpDesk is selected, it opens up a form that allows teacher to input the title and description of HelpDesk instance, as shown in figure 4.3.

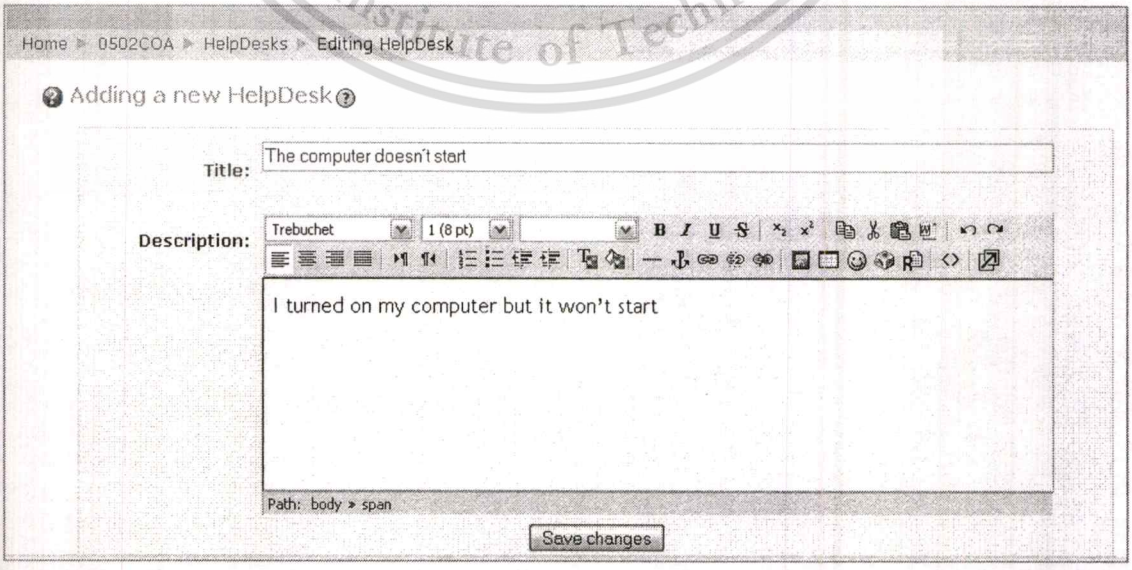

Fig. 4.3. A form for adding a Helpdesk instance

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After clicking on "Save changes", the adding step form will open up as follows.

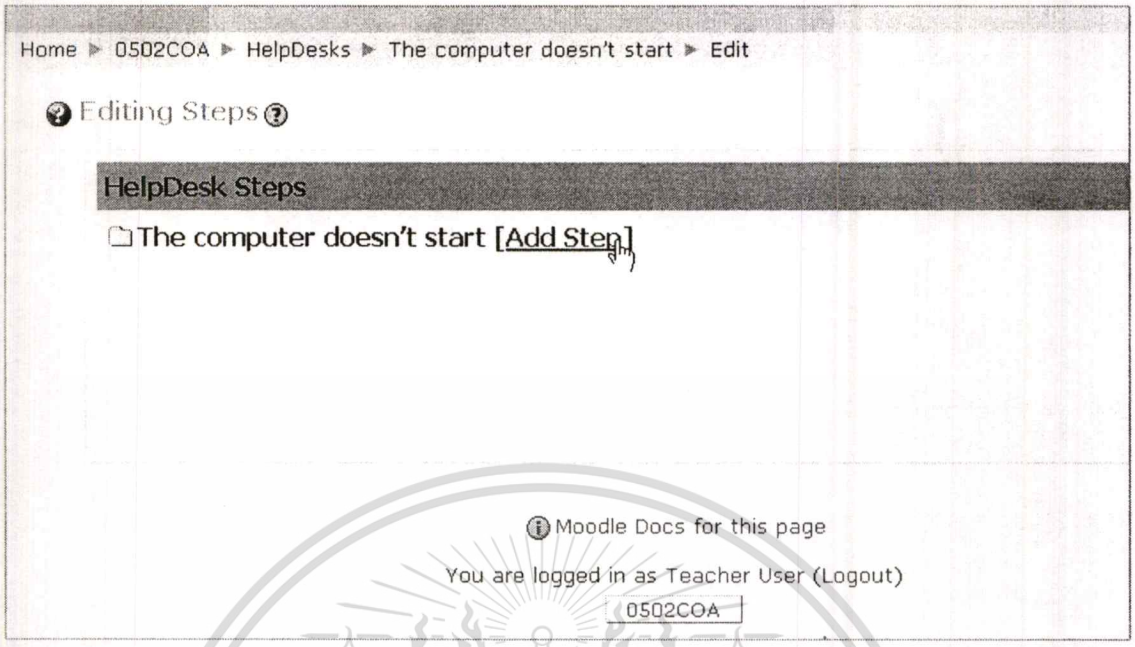

Fig. 4.4. A tree menu form for adding Helpdesk step

Next step is to add HelpDesk step which is related HelpDesk's title by click on Add Step link, as shown in figure 4.5.

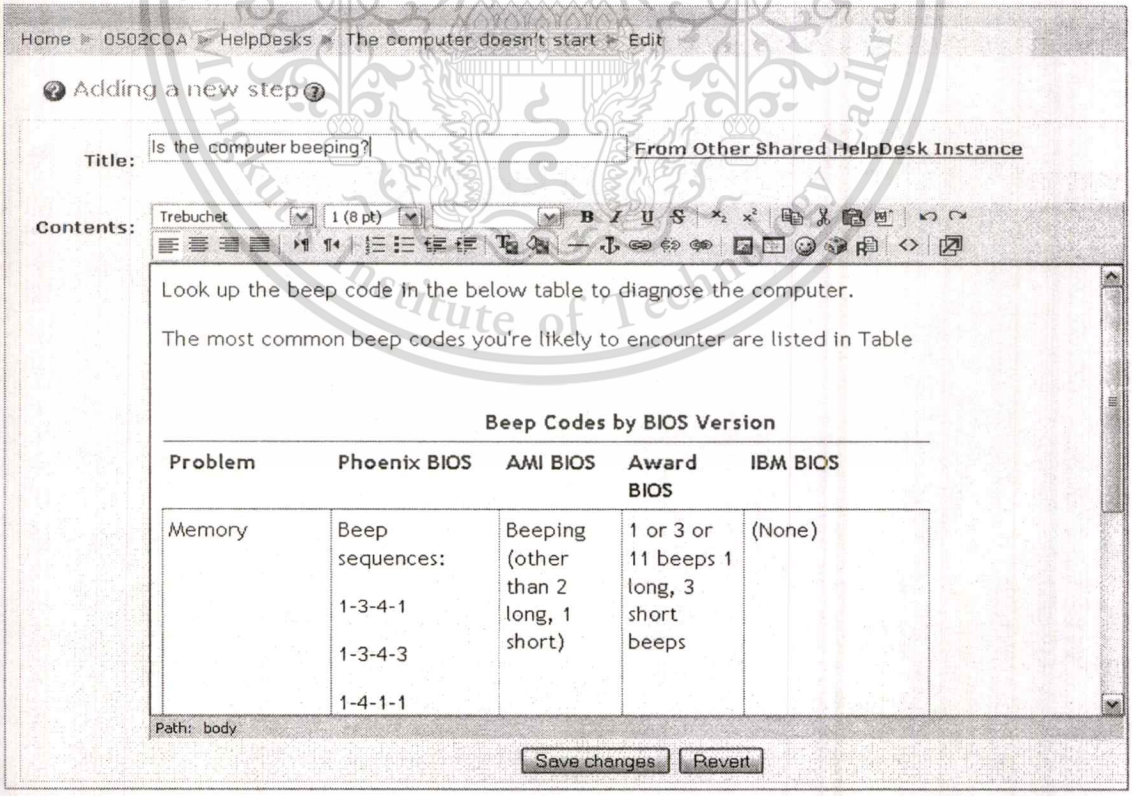

Fig. 4.5. Adding HelpDesk step

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Using the tree structure to perform adding other steps concern, as shown in figure 4.6

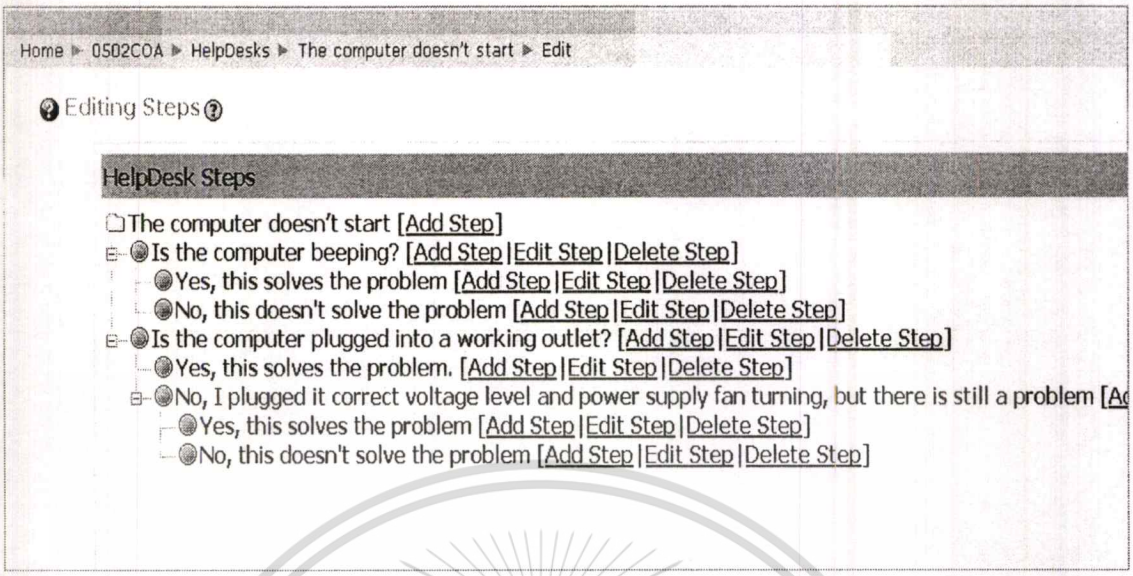

Fig. 4.6. Adding HelpDesk steps using Tree structure

For Students:

If enrolled students login to the course, HelpDesk links appear under lesson of the week on the course's page as shown in figure 4.7

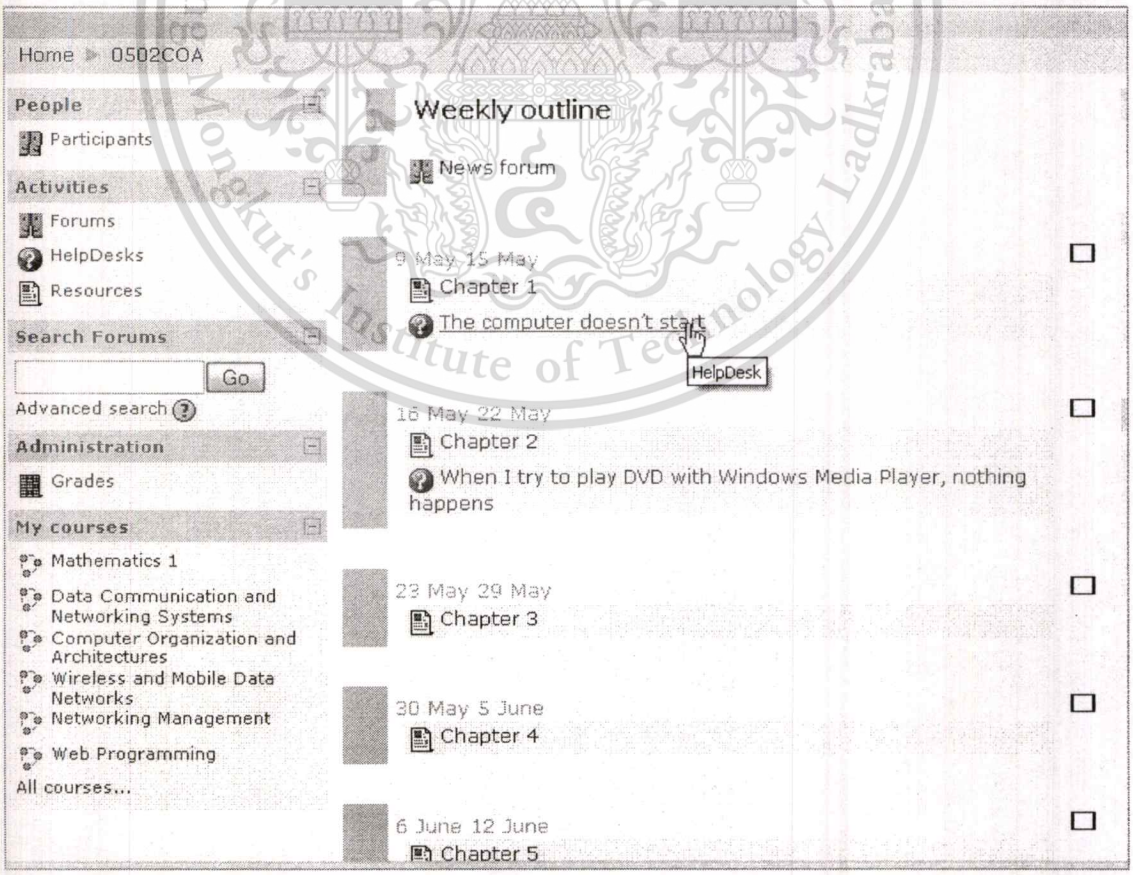

Fig. 4.7. HelpDesk instances on student' page

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Now, they can view and interact with each HelpDesk instance that is helpful to solve the problems by click on the link "The computer doesn't start" then it opens up to display the problem title and enquired options, as shown in figure 4.8.

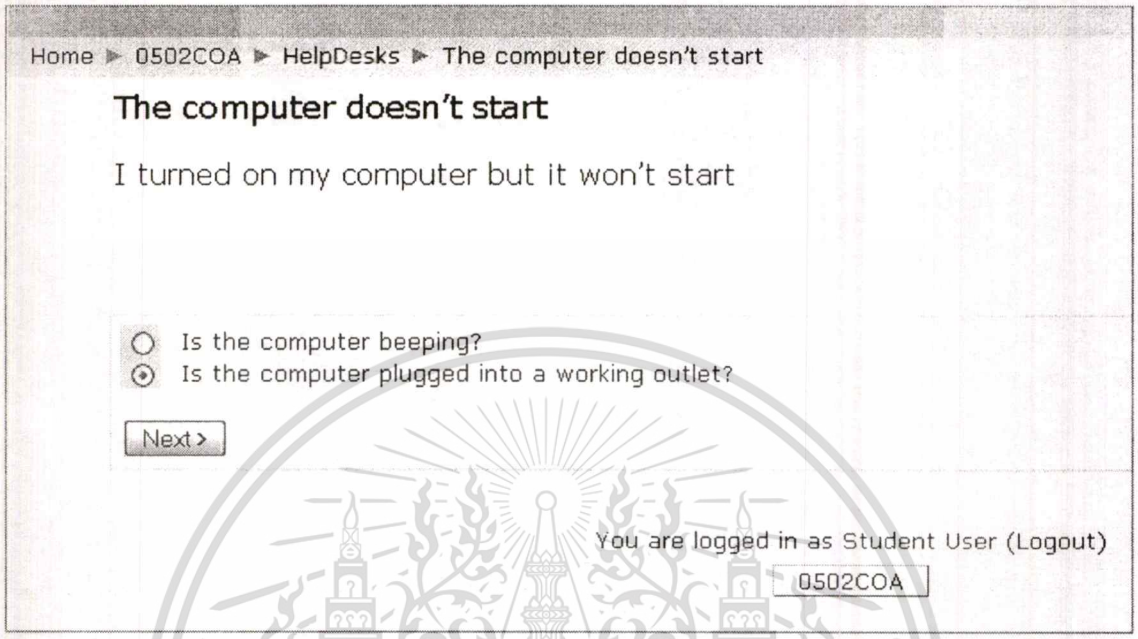

Fig. 4.8. Problem title and enquiries

In the figure 4.8, students can determine the enquired options that can solve their problems by click on option button "Is the computer plugged into a working outlet?" and then click next, as shown in figure 4.9.

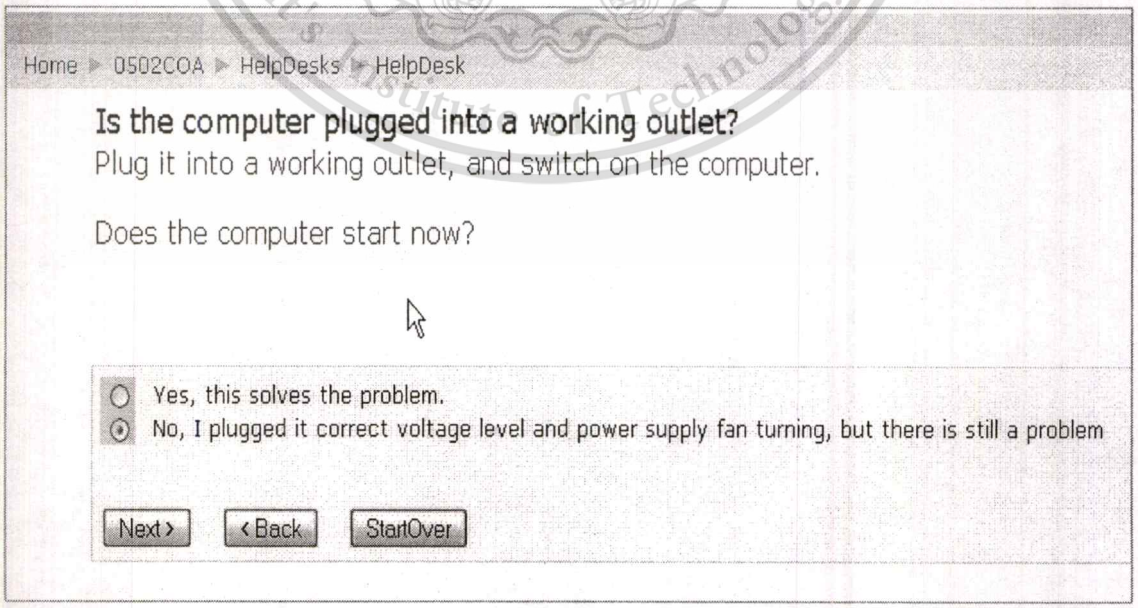

Fig. 4.9. HelpDesk flow steps

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Students can follow the instructions to solve their problems. If not, select "No, I plugged it correct voltage level and power supply fan turning, but there is still a problem" as follows:

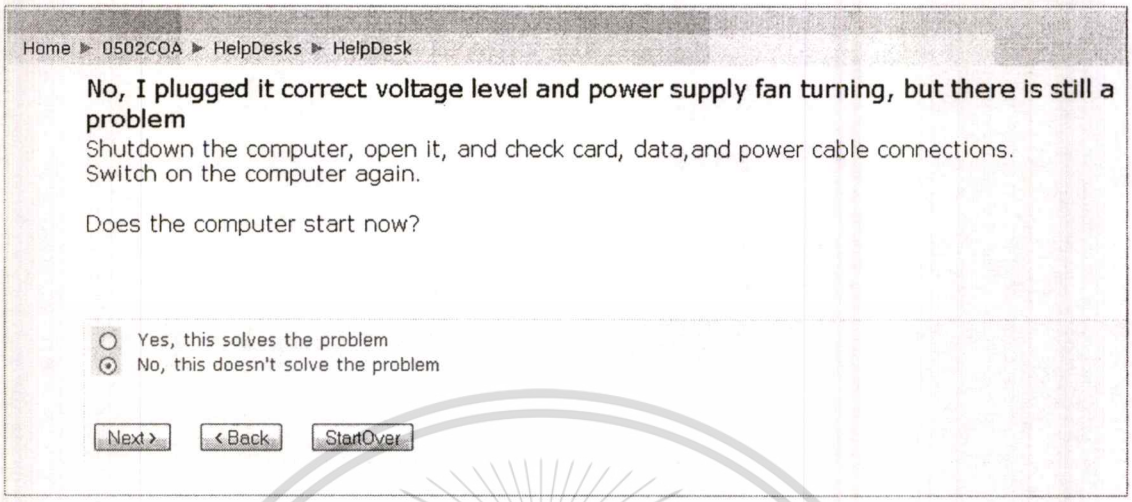

Fig. 4.10. HelpDesk interaction step

Students can switch to previous enquired options by using "Back" navigator or click on "StartOver" to go back to starting point of HelpDesk.

4.3 Results of Experiment

In this experiment which has occurred when installed HelpDesk system with under Moodle version 1.7, and used MS Internet explorer (IE) version 7 to display HelpDesk instances on student's page. So, Moodle version 1.7 and Mozilla FireFox are required to use for HelpDesk system without occurrence.

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CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

E-learning enables the expansion of education beyond the limits of a normal classroom. Teachers can prepare the learning material once and students, with the support of the internet, can access to those materials from anywhere and whenever they want. However, the communication between students and teachers is still necessary. Almost all e-learning programs available today provide only three basic communication channels namely e-mail, chat, and forum. These channels, unfortunately, are not sufficient. This research proposes a new communication channel by applying helpdesk as a complement to the existing channels. The proposed helpdesk system is developed as an added feature to an e-learning product called Moodle. Teachers can create a new helpdesk topic from scratch or import some materials from forum or other helpdesk topics. Students can search for the topics they want and follow the steps provided by the helpdesk to solve their problems interactively. Although this helpdesk system is implemented for Moodle, the concept and design can be easily applied to almost all of e-learning products. In addition, the implementation of the helpdesk system can be considered as a guideline for the development of additional features into Moodle.

5.2 Recommendations

This introductory research focuses mainly on applying the helpdesk feature as a new communication channel to show that it can make better communication between students and teachers. However, the helpdesk contents are static, which means that students may not be able to find the answers for the topics that may be related but are not exactly the same as the solutions previously provided by teachers. Therefore, one solution to this problem is to apply the idea of an expert system into the proposed helpdesk system.

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[2] WebCT or Blackboard: Report of the Course Management Task Force. Dec. 5 2002. On the internet, http://www.wcu.edu/it/cio/planning/cmsfinalreport.pdf

[3] Help desk encyclopedia's URL http://en.wikipedia.org/wiki/Category:Help_desk, last accessed 29/4/2007 10:35 AM

[4] ServiceDesk Plus's URL http://manageengine.adventnet.com/products/service-desk/help-desk-features.html, last accessed 4/5/2007 9:09 PM

[5] F2w Helpdesk's URL http://f2w.sourceforge.net, last accessed 30/04/2007 8:05 PM

[6] Alsedo Support Desk's URL http://alsedo-sd.sourceforge.net, last accessed 30/04/2007 8:07 PM

[7] Sciret's URL http://sciret.sourceforge.net, last accessed 30/04/2007 8:13 PM

[8] OpenIT's URL http://sourceforge.net/projects/openit, last accessed 30/04/2007 8:20 PM

[9] KnowledgebasePublisher's URL http://sourceforge.net/projects/kbpublisher, last accessed 30/04/2007 8:29 PM

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Appendix A

The core function of add, update, and delete HelpDesk instance

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lib.php

```
1       <?php
2        // Add HelpDesk Instance Function
3        function helpdesk_add_instance($helpdesk) {
4
5       $helpdesk->timecreated = time();
6       $helpdesk->timemodified = $helpdesk->timecreated;
7        return insert_record("Helpdesk", $helpdesk);
8       }
9       //Update HelpDesk Instance Function
10       function helpdesk_update_instance($helpdesk) {
11
12       $helpdesk->timemodified = time();
13       $helpdesk->id = $helpdesk->instance;
14      return update_record("Helpdesk", $helpdesk);
15 }
16       //Delete HelpDesk Instance Function
17       function helpdesk_delete_instance($id) {
18
19      if (! $helpdesk = get_record("Helpdesk", "id", $id)) {
20      return false;
21       }
22       $result = true;
23
24              //Delete any dependent records here
25
26      if (!delete_records("Helpdesk", "id", $helpdesk->id))
27      { $result = false; }
28
29       if (!delete_records_select("Helpdeskstep", "helpdeskid = $helpdesk->id"))
30       { $result = false; }
31
32      return $result;
33
34 }
35
36      /**
37       * Return a small object with summary information about what a
38       * user has done with a given particular instance of this module
39       * Used for user activity reports.
40       * $return->time = the time they did it
41      * $return->info = a short text description
42       *
43      * @return null
44       * @todo Finish documenting this function
45       **/
46       function helpdesk_user_outline($course, $user, $mod, $helpdesk) {
47       return $return;
48       }
```

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```
49
50      /**
51       * Print a detailed representation of what a user has done with
52       * a given particular instance of this module, for user activity reports.
53       *
54      * @return boolean
55       * @todo Finish documenting this function
56       **/
57      function helpdesk_user_complete($course, $user, $mod, $helpdesk) {
58       return true;
59      }
60
61      /**
62       * Given a course and a time, this module should find recent activity
63       * that has occurred in helpdesk activities and print it out.
64       * Return true if there was output, or false is there was none.
65       *
66       * @uses $CFG
67       * @return boolean
68       * @todo Finish documenting this function
69       **/
70       function helpdesk_print_recent_activity($course, $isteacher, $timestart) {
71      global $CFG;
72
73       return false; // True if anything was printed, otherwise false
74       }
75
76       /**
77      * Function to be run periodically according to the moodle cron
78       * This function searches for things that need to be done, such
79       * as sending out mail, toggling flags etc ...
80       *
81      * @uses $CFG
82      * @return boolean
83       * @todo Finish documenting this function
84      **/
85       function helpdesk_cron () {
86       global $CFG;
87
88       return true;
89       }
90
91      /**
92      * Must return an array of grades for a given instance of this module,
93       * indexed by user. It also returns a maximum allowed grade.
94      *
95       * Example:
96       * $return->grades = array of grades;
97       * $return->maxgrade = maximum allowed grade;
98       *
```

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```
99      * return $return;
100     *
101     * @param int $helpdeskid ID of an instance of this module
102     * @return mixed Null or object with an array of grades and with the maximum grade
103     **/
104     function helpdesk_grades($helpdeskid) {
105      return NULL;
106     }
107
108     /**
109     * Must return an array of user records (all data) who are participants
110     * for a given instance of helpdesk. Must include every user involved
111     * in the instance, independient of his role (student, teacher, admin...)
112     * See other modules as example.
113     *
114     * @param int $helpdeskid ID of an instance of this module
115     * @return mixed boolean/array of students
116     **/
117     function helpdesk_get_participants($helpdeskid) {
118     return false;
119     }
120
121     /**
122     * This function returns if a scale is being used by one helpdesk
123     * it it has support for grading and scales. Commented code should be
124     * modified if necessary. See forum, glossary or journal modules
125     * as reference.
126     *
127     * @param int $helpdeskid ID of an instance of this module
128     * @return mixed
129     * @todo Finish documenting this function
130     **/
131     function helpdesk_scale_used ($helpdeskid,$scaleid) {
132     $return = false;
133
134      return $return;
135     }
136
137     ////////////////////////////////////////////////////////////////////////////
138     /// Any other helpdesk functions go here. Each of them must have a name that
139     ?>
```

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Appendix B

The core function of add, update, and delete

HelpDesk Step

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steplib.php

```
1   <?php
2   //Add HelpDesk Step Function
3    function helpdesk_add_step($helpdesk) {
4
5   $helpdesk->timecreated = time();
6   $helpdesk->timemodified = $helpdesk->timecreated;
7
8    return insert_record("Helpdesk", $helpdesk);
9    }
10  //Update HelpDesk Step Function
11   function helpdesk_update_step($helpdesk) {
12
13  $helpdesk->timemodified = time();
14  $helpdesk->id = $helpdesk->instance;
15
16   # May have to add extra stuff in here #
17
18   return update_record("Helpdesk", $helpdesk);
19   }
20
21   /**
22   * Given an ID of an instance of this module,
23   * this function will permanently delete the instance
24   * and any data that depends on it.
25   *
26  * @param int $id Id of the module instance
27   * @return boolean Success/Failure
28   **/
29   function helpdesk_delete_step($id) {
30
31   if (! $helpdesk = get_record("Helpdesk", "id", $id)) {
32  return false;
33   }
34
35   $result = true;
36
37   # Delete any dependent records here #
38
39   if (! delete_records("Helpdesk", "id", $helpdesk->id)) {
40  $result = false;
41  }
42
43  return $result;
44
45  }
46
47  ?>
```

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BIOGRAPHY

Name and Surname: Somsack Inthasone

Sex: Male

Date of Birth: 09/05/1974

Nationality: Lao

Current Address: Computer Science Department, Faculty of Science
National University of Laos (NUOL), Dongdok Campus.
Vientiane capital, Lao P.D.R

Education Background:

1992 -1996 Studied at the University of Laos (NUOL), Faculty of Education

1996 -1997 Bachelor in Education (Mathematics).

Other Training:

22/11/ 1999 - 03/12/1999 Trained at the NECTEC, Bangkok, THAILAND
Topic: UNIX for System Administrator and
CISCO Configuration

30/10/ 2002 - 05/07/2003 Built an e-Learning project for Great Mekong Sub Region
At Groept-T, 3000 Leven, BELGIUM.

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