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Using Internet and Multimedia Technology to Develop an Integrated E-Learning Media that can Guide, Facilitate and Improve the Quality of Cooperative Learning Activities

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Abstract

Cooperative learning is an effective, powerful and exciting way to improve students understanding of a subject. Students are divided into or organize themselves in small teams, each with students of different levels of ability, use a variety of learning activities to improve their understanding of a subject. Each member of a team is responsible not only for learning what is taught but also for helping team mates learn, thus creating an atmosphere of achievement. Students work through the assignment until all group members successfully understand and complete it. The results show that students who have opportunities to work collaboratively, learn faster and more efficiently, have greater retention, and feel more positive about the learning experience.

The rapid development of internet and multimedia technology from time to time has changed the way we do our learning activities. Today is the era of e-learning, online learning, multimedia (integrating audio, video and animation), multiple sensory stimulation, collaborative work and information exchange.

The problem is that today, many e-learning materials and media is not “Cooperative Learning Ready”. The e-learning materials and media do not facilitate or guide students to master the learning subject in a cooperative learning environment.

This paper will discuss how to utilize internet technology (computer internet networking system, internet DNS (domain name service) and web server (apache server), internet database server(My SQL server), e-learning content management system(Joomla, Moodle and A-Tutor), blog and instant messaging system) to create online web based distance e-learning education system that can provide necessary guidance system and facility for students to improve Student Teams Achievement Division (STAD) cooperative learning activity.

The multimedia based e-learning material is a very important element in supporting STAD cooperative learning activity. This paper will also discuss how to create multimedia based e-learning material that contains guidance, resources and tools necessary to support students in the cooperative learning activity.

Giving a certain reward to the successful team is very important in the STAD cooperative learning activity. The online web based distance e-learning education system should be able to reward the successful team in the STAD cooperative learning activity. In order to do that, the distance e-learning education system should be able to provide and manage a “professional assignment center” where people or professionals from various business institution worldwide can post a certain assignment (to help them support their business process) for student teams in a the STAD cooperative learning environment, and be willing to give a certain reward or compensation to the successful team (mutual benefit) to be able to complete the assignment and producing a good quality product .

Discussion in the paper can become a guidance for teachers or lecturers to create or develop an integrated e-learning material and media that can guide and facilitate and also improve the quality of

student cooperative learning activity, so that student understanding on the subject can be improved significantly.

Introduction

Cooperative learning is an effective, powerful and exciting way to improve students understanding of a subject. Students are divided into or organize themselves in small teams, each with students of different levels of ability, use a variety of learning activities to improve their understanding of a subject. Each member of a team is responsible not only for learning what is taught but also for helping team members learn, thus creating an atmosphere of achievement. Students work through the assignment until all group members successfully understand and complete it. The results show that students who have opportunities to work collaboratively, learn faster and more efficiently, have greater retention, and feel more positive about the learning experience.

Student team achievement division (STAD) cooperative learning model

The rapid development of internet and multimedia technology from time to time has changed the way we do our learning activities. Today is the era of e-learning, on-line learning, multimedia (integrating audio, video and animation), multiple sensory stimulation, collaborative work and information exchange.

Today, the implementation of STAD Cooperative Learning model in a virtual class cannot be separated with the utilization of multimedia and internet technology. Students are organized into teams in a virtual class and they can learn in a rich multimedia environment, interact with their team members and teacher, support their team members and exchange information, in an online web based distance e-learning education system.

Today, the internet and multimedia technology has enabled students and teacher to conduct effective interaction and information exchange process during STAD cooperative learning activities. Students are able to share and communicate certain rich multimedia learning materials (contain picture, audio, video, animated process), digital documents, softwares and multimedia presentation files with their team mates or teacher in a fast, effective and efficient way.

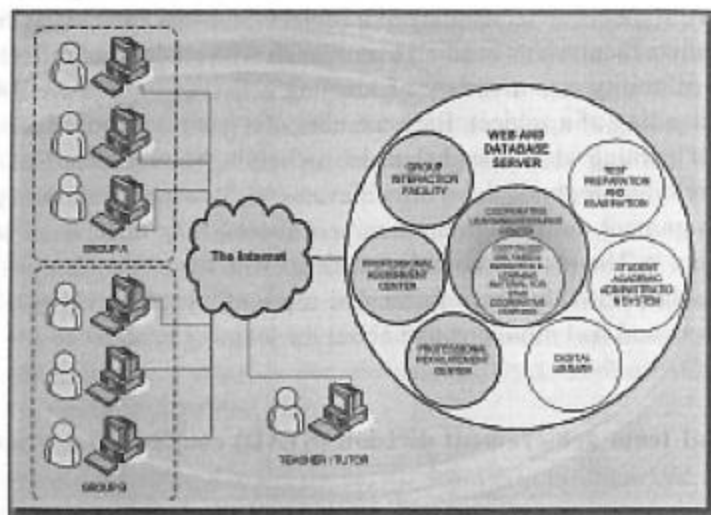


Figure 1.

Student Team Achievement Division (STAD) Cooperative Learning Activity in a web based distance e-learning education system

The use of multimedia and Internet technology has opened huge opportunities to improve the quality of the STAD cooperative learning activities. We can develop multimedia e-learning material and application softwares in the web and database server to provide a better service to the students.

Learning phases in STAD cooperative learning activity

In an ordinary class, there are 6 basic learning phases in the cooperative learning activity (Trianto. (2007)). :

1. Teacher informs the student about the main objective of the learning process.
2. Presenting the learning material and necessary information.
Teacher is conducting a teaching and learning process.
3. Organize students into cooperative groups.
Teacher helps students to organize themselves into groups.
4. Help and guide the student
Teacher helps and guide students during the cooperative learning session.
5. Evaluation
Teacher evaluates the cooperative learning activities and conducting a presentation session where students can give presentation about their product.

STAD cooperative learning phases and scenario in the online web based distance learning systems

In the online web based distance learning system, there will be 11 learning phases scenario in the cooperative learning activity :

1. Students register through the web to join a certain learning program. They will have to fill a form and give information about personal data, home address, cell phone address and available resources to be used in the STAD cooperative learning session, such as type of computer, printer, digital camera or scanner that they have at home, availability of the internet connection, email address, and yahoo messenger ID. The students will have to give information about their ability to operate computer programs, such as Microsoft Windows, Microsoft Office, Microsoft Internet Explorer and other computer programs to be able to join the STAD cooperative learning session for the selected learning program.
2. Students find information about the general objectives or specific objectives of the learning subject through the web.
3. Student find information about their learning members on the web database of the cooperative learning resources center. At the end of the registration period, the cooperative learning resource center will release a group list. Then students will organize themselves in a group.

The cooperative learning resources center will provide each student with necessary information about their learning members. They can interact one another using instant messaging system, chatting media, cellular phone, email and blogs.

4. Students participate in an online presentation of the e-learning material, download the e- learning material or order an offline version of the e learning material.
Students participate in an on-line presentation, download necessary

multimedia e-learning material or order an offline version of the e-learning material and then support each other in the cooperative learning environment to master the learning subject. Student can consult their teacher by using a number of communication facilities, such as instant messaging system (yahoo messenger, ICQ or Google talk), chatting media, email, blog or an online tutorial facility. The teacher helps and guides students during the cooperative learning session through the communication facilities.

5. Professional assignment center gives the first assignment to students. Students access the professional assignment center to get information about available assignments for them in the first period. They will select (or download) the assignment and do the assignment in group. After they have finished doing the assignment, they have to upload it to the professional assignment center. Their work will be reviewed and graded.
6. Students take the first online test in the authorized learning and testing center.
7. Professional assignment center gives the second assignment to students.

Students can access the professional assignment center to get information about available assignments for them in the second period. They will select (or download) the assignment and do the assignment in group. After they have finished doing the assignment, they have to upload it to the professional assignment center. Their work will be reviewed and graded.

8. The professional assignment center will announce the best team and reward the successful teams.

The best team will receive rewards or prizes, such as reward certificate, certificate of achievement, sponsor products, a certain amount of money, scholarships, textbooks, computer software

or electronic equipments. The prizes can come from a sponsor, a professional body/individual, a company or a business institution that has given the assignment for students through the professional assignment center. Students can receive rewards and prizes in other form. Sometimes the opportunity and the experience for being able to do and finish the assignment from respected and reputable business company and producing a recognized high quality product can be considered as a “valuable prize”.

9. Teacher evaluates the cooperative learning activities and opens a presentation session in the authorized learning and testing center, where the successful teams can give presentation about their products.
10. The names of the successful students will be promoted on the professional recruitment center website.
11. The professional recruitment center will promote the best students to many companies through the professional recruitment center official website. Essential elements in web based online distance learning system for implementing a cooperative learning model

There are 5 essential elements in the web based online distance e-learning system: community center, group interaction facility, student administration system, testing preparation and examination, digital library and additional learning material resources (Uno, 2007). To be able to support the STAD cooperative learning activity, some improvements and modification should be made to the elements.

1. Community center.

Community center is a place where students can increase their knowledge and capability, read the syllabus of the learning subjects, find information about available learning programs and courses and find many other information that they need to support their learning process.

2. Group interaction facility.

Students can interact with one another and discuss a certain learning topics or assignments. Lecturer can participate to give a necessary explanation to the discussed subjects. Blog is a form of online journal. In the web based online distance e-learning system, teacher can use web log or blog as a media for promoting or supporting group interaction activities.

Compared with mailing list service, blog is more effective and powerful media to support the interaction activity between teacher and STAD teams, because now we can integrate blog with the following elements to support the STAD cooperative learning activities. The elements can enable students and teacher to interact in a rich interactive multimedia environment.

- Multimedia instant messaging system service provider (Yahoo Messenger, Google Talk, ICQ, Skype and MSN Messenger).
- Online file sharing service provider (www.box.net and www.rapidshare.com).
- Online video sharing and streaming service provider (www.youtube.com, www.video.google.com).
- Online photo sharing service provider (flicker from www.yahoo.com and online web album sharing service provider (picasa web album from www.google.com).
- SMS (short messaging system) blog system for pooling, giving comments or posting article to blog (www.webmastersms.cardboardfish.com/smsblog.html).
- Flash swf interactive multimedia e-learning object.
- Music, picture and movie objects.
- Online mp3 music file sharing service provider (www.mp3-codes.com).
- Link to Internet search engine (www.yahoo.com and www.google.com).

Blog user should notice that blog service provider will apply a certain storage usage limitation policy to their customer. Integrating blog with online file, photo, mp3 music file, and video sharing service provider is highly recommended to overcome the storage usage limitation problems.

Teacher can use blog service from many free or paid blog service providers, such as www.blogger.com, www.wordpress.com, www.xanga.com, www.myspace.com and www.multiply.com.

3. Student academic administration system.

The student academic administration system provides students with information regarding their academic administration status, class registration status, schedules, test result and academic achievements.

4. Testing preparation and examination.

The teacher can give the necessary assignments and preparation tests for the students so that they can prepare themselves before the upcoming examination.

5. Digital library.

Students can find a lot of learning material, such as e-book and multimedia e-learning material. The learning materials are organized in a large database management system.

6. Additional learning resource.

This section maintains links to other learning resources, such as online encyclopedia, public libraries, science community and other e-learning institution.

Support for the student STAD cooperative learning activity

To be able support the STAD cooperative learning activity, the following elements should be added:

1. Cooperative learning resource center.

Student can register to join a STAD cooperative learning activity through the cooperative learning resource center. The cooperative learning resource center maintains all data related to the STAD cooperative learning activity.

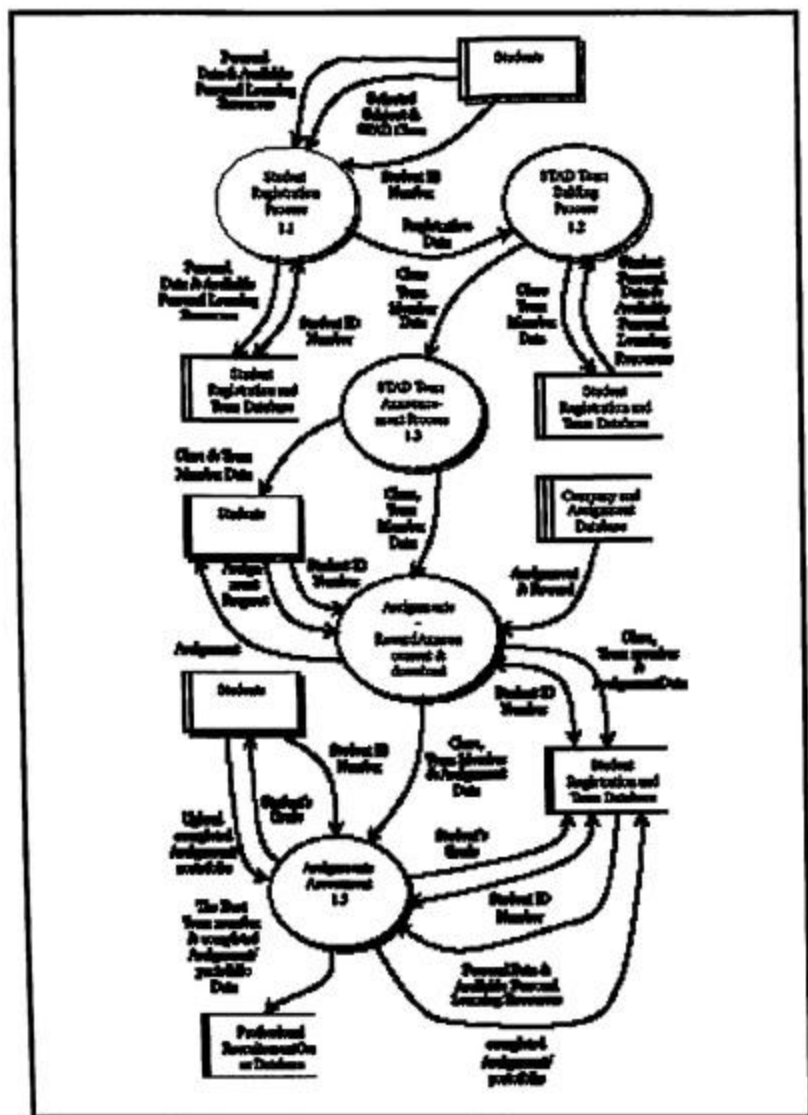


Diagram 1.

Data Flow Diagram of the Cooperative Learning Resource Center

2. Professional assignment center

Providing reward to the successful team is very important in the STAD cooperative learning activity. The online web based distance e-learning education system should be able to give a reward to the successful team in the STAD cooperative learning activity.

The distance e-learning education system should be able to provide and manage a “professional assignment center” where people or professionals from various business institution worldwide can post a certain assignment (to help them support their business process) for a group of student teams (in a the STAD cooperative learning environment.) and willing to give a certain reward or compensation to the successful team (mutual benefit) for being able to complete the assignment and producing a good quality product .

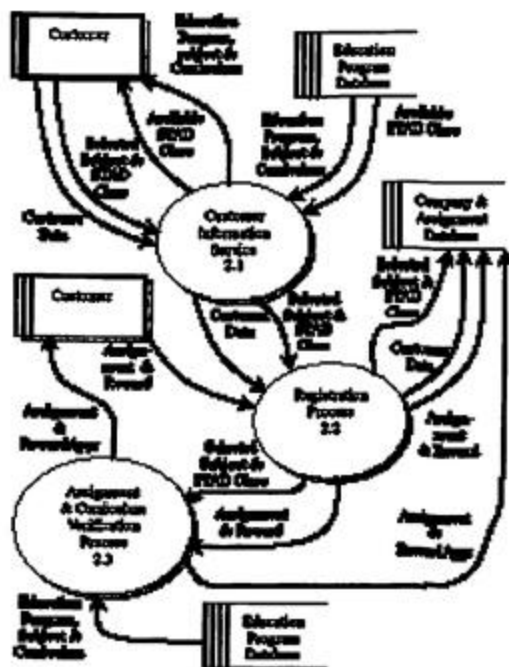


Diagram 2. Data Flow Diagram of the Professional Assignment

3. Online professional recruitment center

Online professional recruitment center is a business section that promotes qualified students to business community, maintain the student's portfolios, maintain job seekers and job opportunities data in a large database management system.

Online professional recruitment center build and maintain business relationship, cooperation and partnership with many business institution, association and community worldwide. With its vast connections to the business institution, association and community, it can promote the professional assignment center efficiently.

Creating multimedia e- learning material to support the STAD cooperative learning activity

The multimedia based e-learning material is very important element in supporting STAD cooperative learning activity. The e-learning material should be designed specifically to support the STAD cooperative learning activity.

E-learning material for supporting the STAD cooperative learning activity should contain guidance, resources and tools necessary to support students in the cooperative learning activity.

E Learning material	
Elements	Elements description
Guidance	<p>Guidance for students to</p> <ol style="list-style-type: none"> follow the STAD cooperative learning phases and scenario access the STAD cooperative learning resource center. access the professional assignment center. access the professional recruitment center. take on-line test in the authorized cooperative learning and testing center.
Learning Resources	<ol style="list-style-type: none"> Information about the general objectives or specific objectives of the learning subject. Information about learning members: <ul style="list-style-type: none"> information about personal data (home address, cell phone number). information about resources that they have (computer, printer, digital camera or scanner that they have at home, availability of the internet connection, Email address, and yahoo messenger ID) information about the ability to operate computer programs. Links to the online e-learning material download center. Links to the teacher's or tutor's blog, forum, instant messaging ID (Yahoo Messenger ID) and email address. Links to the other learning resources, such as online encyclopedia.
E Learning Material	<p>The e-learning material should be constructed based on the prepared teaching plan, teaching strategy, teaching methodology and teaching model that will be applied in the virtual class. The e-learning material should contain the following elements</p> <ol style="list-style-type: none"> video tutorial object. printable version of E - Learning Material object multimedia demonstration object. multimedia question and answer object. support for student. integrated automatic test and scoring system object.
Cooperative Learning Tools	<p>The cooperative learning tools for students may vary and depend on the subject that the students learn. The tool contains all necessary software to support the students in STAD cooperative learning process.</p> <ul style="list-style-type: none"> Free Instant messaging software. Free file compression tools software. Free portable web browser software. Free portable anti virus software. Free portable file manager software. Free Windows Live Writer software, Blog posting software. Free download manager & download accelerator software. Free word to pdf converter. Important links to cooperative learning resource center.

Table 1.
Improvements to the elements of e-learning material

The Macromedia flash (swf) multimedia technology is becoming a standard tool for developing a web based multimedia e-learning material that support the STAD cooperative learning activity. Teachers are able to create video tutorial object, interactive multimedia demonstration object, question and answer, assignments for student and integrated automatic test and scoring system, using macromedia flash technology.

Teachers can develop and create an interactive multimedia demonstration object using popular software such as Microsoft PowerPoint. A tutorial video object can easily be made using Microsoft PowerPoint and then convert the PowerPoint slide to the flash (swf) movie using PowerPoint to flash converter. The movie can be placed in the web page using Microsoft FrontPage. The tutorial video object can also be created using an easy to use web cam video recording or computer screen recorder software and video to flash converter software. The tutorial video object can also be placed in the web page using Microsoft FrontPage.

Teachers can develop and create a web based - printable version of E – Learning Material object using word processor program, such as Microsoft Word program and then save the file in a html file format. An interactive multimedia question and answer object can be created using freeware interactive flash quiz maker software, such as Question Writer Personal Edition. The flash quiz can be placed in a web page using Microsoft FrontPage.

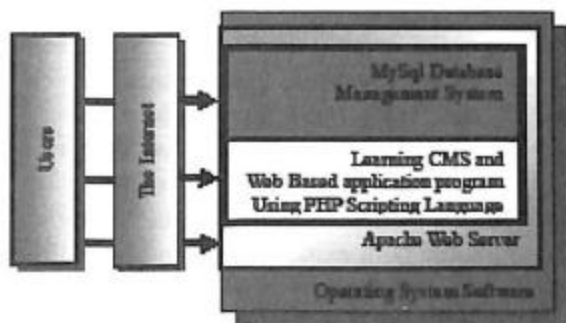
An Integrated automatic testing and scoring system object can be created using Hot potatoes, a freeware software. Hot potatoes enable you to create interactive web-based exercises of several basic types (multiple-choice, short-answer, gap-fill exercises, crossword puzzles, jumbled-sentence exercises and creates matching or ordering exercises). You don't need to know anything about XHTML or JavaScript to use the programs. All you need to do is to enter your data and the programs will create the Web pages for you. Then you can post them on your Web site.

Choosing and using learning Content Management System (CMS) software and database management system

A content management system (CMS) is computer software used to create, edit, manage, and publish content in a consistently organized fashion. CMSs are frequently used for storing, controlling, versioning, and publishing industry-specific documentation such as news articles, operators' manuals, technical manuals, sales guides, and marketing brochures. The content managed may include computer files, image media, audio files, video files, electronic, and Web content (www.wikipedia.com).

Data exchange compatibility between softwares in the web based online distance learning system is one important aspect that should be taken into consideration before choosing a Content Management System (CMS) software for supporting the STAD cooperative learning. In other word, we should be able to integrate the Content Management System (CMS) software with database management system software and other softwares used in the web based online distance learning system.

Data exchange incompatibility problems between softwares in the web based online distant learning system can be eliminated by choosing application softwares for creating a dynamic web based that can communicate with the database management system softwares and the programs can be executed in the same operating system platform.



Today, PHP scripting language, MySQL database management system and Apache Web Server are considered as the appropriate software platform for creating a web based online distance learning system because of the following reasons :

- PHP scripting language, MySQL database management system and Apache Web Server are compatible softwares so that there will be no data exchange incompatibility problems in the web based online distance learning system.
- PHP is a powerful scripting language that can be used to create an interactive dynamic multimedia e learning web page.
- PHP scripting language can be used to create an interactive dynamic web page for managing a large number of data in an online distance learning database management system. PHP can be able to support many databases, such as MySQL and Microsoft Open Database Connectivity (ODBC). MySQL is a freeware .
- PHP is a powerful scripting language that can be used to create an interactive dynamic web page application program for supporting the business processes of cooperative learning resource center, professional assignment center and on-line professional recruitment center.
- PHP is a freeware and it can be installed in many operating systems, such as Microsoft Windows and freeware Linux Operating system.
- PHP can support Apache Web Server. Apache Web Server is a freeware.
- PHP is a server side script and it is easy to access it. User can access PHP interactive dynamic multimedia e learning web page easily through a simple user friendly web browser.
- There are many freeware PHP and MySQL based learning Content Management System (CMS) softwares for supporting the STAD cooperative learning. The learning CMS softwares are compatible with existing PHP and MySQL web based e-learning program and it can easily be integrated with other PHP

and MySQL based softwares in the web based online distance learning system.

There are many services in the Learning Content Management Systems that can be used to support the STAD cooperative learning activities. Below are available services in a Moodle Learning Content Management Systems (www.moodle.org).

No	Modules / Services	Features
1	Assignment	Assignments can be specified with a due date and a maximum grade. Students can upload their assignments (any file format) to the server - they are date-stamped.
2	Web Log or Blog	By default, all site users can see all blogs. Blog visibility may be restricted so that users can only see blogs for people whom they share a course with or whom they share a group with.
3	Chat	Allows smooth, synchronous text interaction. Includes profile pictures in the chat window.
4	Choice	Like a poll. Can either be used to vote on something, or to get feedback from every student (e.g. research consent).
5	Forum	Different types of forums are available, such as teacher-only, course news, open-to-all, and one-thread-per-user. Individual forums can be subscribed to by each person so that copies are forwarded via email, or the teacher can force subscription for all.
6	Glossary	Allows participants to create and maintain a list of definitions, like a dictionary. Student entries can be previewed by instructors before publishing. Participants can comment on glossary entries.
7	Lesson	A lesson is a series of pages which can be presented in a linear fashion, like a slide show, or in a non-linear, branching manner, or in a combination of the two.
8	Resource	Supports display of any electronic content, Word, PowerPoint, Flash, Video, Sounds, etc. that are stored locally, or remotely. Files can be uploaded and managed (zipped, unzipped, renamed, moved, etc.) on the server.
9	Survey	Online survey reports always available, including many graphs. Data is downloadable as an Excel spreadsheet or CSV text file.
10	Wiki	Wiki is a web page that anyone can add to or edit. It enables documents to be authored collectively and supports collaborative learning.
11	Quiz	Quizzes are automatically graded, and can be re-graded if questions are modified. <ul style="list-style-type: none"> • Multiple-choice questions supporting single or multiple answers • Short Answer questions (words or phrases) • True-False questions • Matching questions • Random questions • Numerical questions (with allowable ranges) • Embedded-answer questions (clone style) with answers within passages of text • Embedded descriptive text and graphics
12	Workshop	Allows peer assessment of documents, and the teacher can manage and grade the assessment.

The Learning Content Management System application programs, such as Moodle and ATutor are being developed using PHP scripting language. PHP scripting language is one of the most popular and widely used scripting language in the internet.

Web based STAD Cooperative Learning Resource Center, Professional Assignment Center and Professional Recruitment Center application programs are also being developed using PHP scripting language. They are all using My Sql database management system, so they will have very good data exchange compatibility between the application programs.

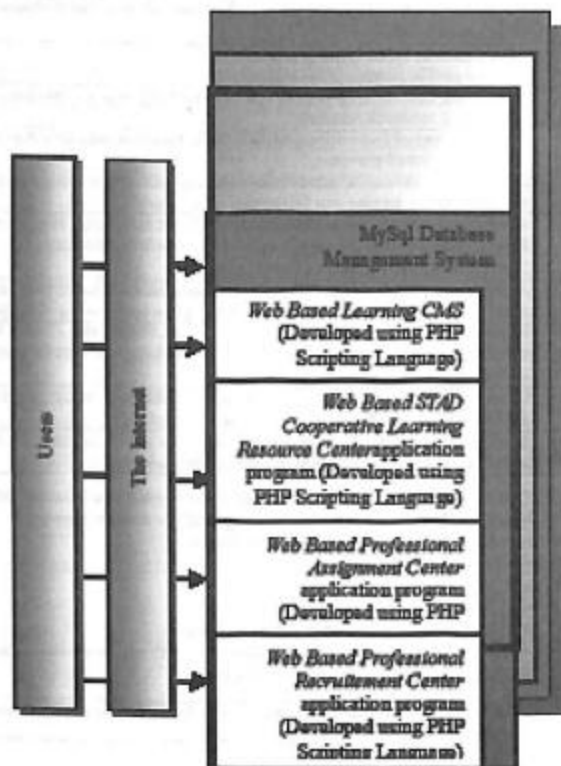


Diagram 4. Data Exchange between Web based Application Software for supporting STAD cooperative Learning Model.

Although it is possible to create STAD Cooperative Learning Resource Center, Professional Assignment Center and Professional Recruitment Center services by using the available integrated features provided by the learning Content Management System software, it is highly recommended that the services should be created separately, using web based application programs developed using PHP scripting language. The web based application programs should be designed, developed and customized specifically to meet requirements for supporting the STAD cooperative learning activities.

Utilizing internet technology

The information technology infrastructures (Computer networks and Internet) are important elements for supporting the STAD learning activity in a web based distance e-learning education system. The information technology infrastructure must be able to support the following elements:

1. web server application program.
2. the implementation a large database management system.
3. the STAD cooperative learning phases, scenario and activities in the online web based distance learning system.
4. the business process of cooperative learning resource center.
5. the business process of professional assignment center.
6. the business process of on-line professional recruitment center.
7. high speed internet connection.
8. wireless internet access.
9. 5 essential elements in the web based online distance e-learning system (community center, group interaction facility, student academic administration system, student testing preparation and examination, digital library & additional learning resource).

The main problem in providing convenient internet access to user is bandwidth problem. The solutions to this problem are

1. There should be an authorized cooperative learning resource and testing center in every strategic area.

The cooperative learning resource and testing center has a mirror web server that can be accessed by students through the internet or computer Local Area Network in the office. The mirror web center will be synchronized with the main web server and it will continuously update its contents from time to time.

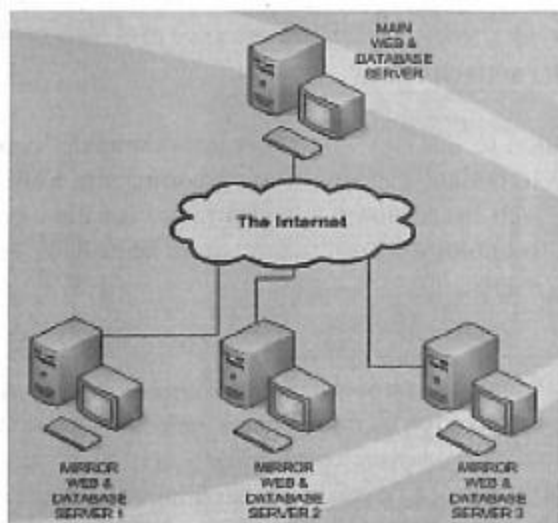


Figure 2.
Mirror Web and Database Server System

2. The authorized cooperative learning resource and testing center should be able to provide students with the off line version of the e-learning material stored in CD or DVD.
3. The authorized cooperative learning resource and testing center should be able to facilitate student with resources that they need, such as multimedia e-learning material, internet access, computers, printers word processing and spreadsheet program.

Local Area Network, Internet Connection, Web Server and Database Server at the authorized cooperative learning resource and testing center.

The following Internet and Local Area Network (LAN) configuration is a basic configuration that can be used to support the STAD cooperative learning activity in a small computer laboratory at the authorized cooperative learning resource and testing center or at school. At least, there is one computer that is set and configured as a web and database server.

All of the departments in the e-learning center, including cooperative learning resource center, professional assignment center and professional recruitment center should use a web based computer application program. The programs are created by using PHP, a freeware scripting program that can only be executed on the server computer. To be able to access the programs in the web server, user can use a web browser program in the client computer.

Users have an easy access to the web server because users only need a web browser program. A web browser program, such as Microsoft internet explorer program, is an inherent program in Microsoft Windows operating system program. Nowadays, every operating system programs has its own integrated web browser program.

All of the data are stored and maintained in the web database server, using a MySQL web database server application program.

To be able to support the business process of professional assignment center, the business process of online professional recruitment center, the server computer should be connected to the internet continuously for 24 hours a day. All of the necessary computer application programs used for supporting the student STAD cooperative learning activity are stored in the web server computer.

The advantage of this LAN configuration is that students can still

access the application programs other resources in the server even when the internet connection is down, so that the learning activity, is not being interrupted by the failing internet connection.

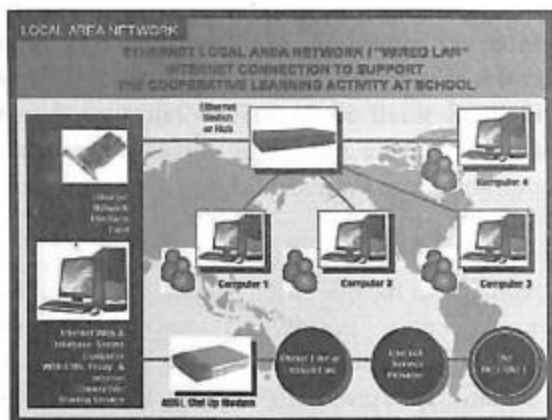


Figure 3.
Local Area Network

A Combination of Wired and Wireless Local Area Network

The following wireless Internet and Local Area Network configuration have a better support to the STAD cooperative learning activity, because it allows student to study and use the computers and the internet connection at any place outside the computer laboratory within a certain radius (over 50 to 75 meters) that is covered by the access point.

It also gives the teacher a greater flexibility to organize a class in other suitable location that can give a better support to the prepared learning scenario described in the teacher's lesson plan.

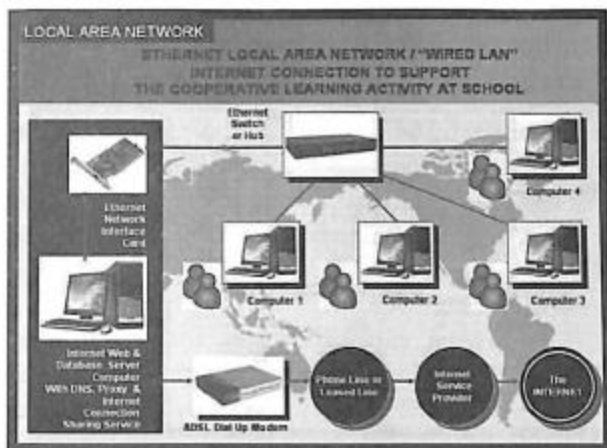


Figure 4.
Wireless Local Area Network

Web Hosting Service

The main problem with the previously described LAN and internet connection configuration is that the web server computer should be up and running for 24 hours. To support the day to day operation of the server, a 24 hours technical support is needed. If a 24 hours technical support is not available at school, this problem can be solved by placing the entire application programs and data in a web server provided by a web hosting service provider.

A problem may still occur if there is a failure in the internet connection, students at school cannot access the Internet web and database server. This problem can be solved by creating a mirror web and database server at school so that when there is a failure in the internet connection, students can access the mirror web and database server.

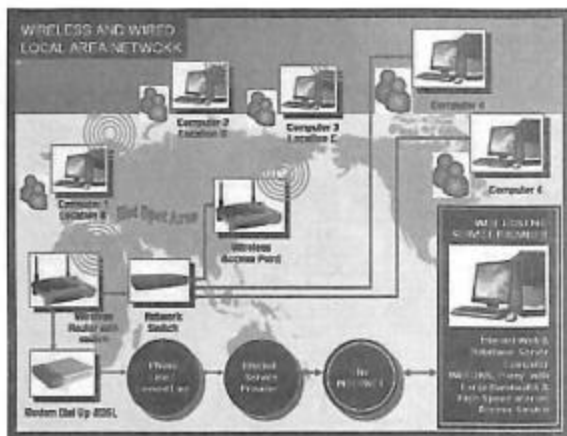


Figure 5.
Wireless LAN, Wired LAN
and Web Hosting Service

The following picture describes the computer Local Area Network Configuration that integrates a mirror web and database server into the current Local Area Network system. The students can still access the mirror web and database server, if there is an internet connection failure.

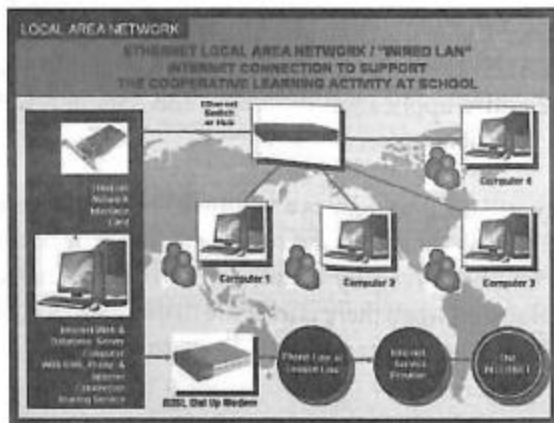


Figure 6. Mirror Web Server

Conclusion and Suggestion

The use of Internet technology has opened a huge opportunity to improve the quality of the STAD cooperative learning activities. We can use the internet technology to build an information technology infrastructure such as internet wireless LAN, internet wired LAN and internet web server to support the STAD cooperative learning activities.

The use of the internet and multimedia technology has enabled students, STAD teams, and teacher to conduct effective interaction and information exchange process during STAD cooperative learning activities. Students can be able to learn, share and communicate certain rich multimedia learning materials (contain picture, audio, video, animated process), digital documents, software and multimedia presentation files with their team mates or teacher in a fast, effective and efficient way.

Teachers or tutors can use multimedia technology to develop a customized rich multimedia e-learning material that can provide a better guidance, resources and tools to support the students STAD cooperative learning activities.

The software developer can develop learning content management system and application softwares used in the web and database server to provide a better support and services to the students STAD cooperative learning activities.

The cooperative learning resource center, professional assignment center and professional recruitment center can improve the quality of the students STAD cooperative learning activities and provide a better support and services to the students STAD cooperative learning activities.

The rewards provided by the professional assignment center and professional recruitment center for the successful STAD teams can

increase student's learning motivation to master the subject. It can also increase student's learning motivation to become competent in the subject.

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