

GALILEE: AN INTERNET WEB BASED DISTANCE LEARNING SUPPORT SYSTEM

Arthur Budiman, Resmana

Electrical Engineering Department - Petra Christian University

e-mail: athur@petra.ac.id; resmana@petra.ac.id

ABSTRACT: This paper presents a project of Web-based Distance Learning support system. The system has been built based on the Internet and World Wide Web facility. The system could be accessed with a web browser which is directed to a certain web server address so that students can do learning process just like in the real situation, such as student admissions, taking course materials, syllabus, assignments, students grades, class discussions through web, and doing online quizzes. Students could also join collaboration works by giving opinions, feedback and student produced paper/web which can be shared to the entire learning community. Therefore, it will build a collaborative learning environment where lectures together with students make constructive knowledge databases for entire learning community.

This system has been developed based on Active Server Pages (ASP) technology from Microsoft which is embedded in a web server. Web pages reside in a web server which is connected to an SQL Database Server. Database server is used to store structured data such as lectures/students personal information, course lists, syllabus and its descriptions, announcement texts from lecturers, commentaries for discussion forum, student's study evaluations, scores for each assignment, quizzes for each course, assignments text from lectures, assignments which are collected by students and students contribution/materials.

This system has been maintained by an administrator for maintaining and developing web pages using HTML. The administrator also does ASP scripts programming to convert web pages into active server pages. Lectures and students could contribute some course materials and share their ideas through their web browser.

This web-based collaborative learning system gives the students more active role in the information gathering and learning process, making the distance students feel part of a learning community, therefore increasing motivation, comprehension and interaction with other students.

Keywords: Web-based collaborative learning, cooperative learning, computer-supported collaborative learning, distance learning, Internet supported learning

1. INTRODUCTION

Nowadays the Internet Web is no longer just a valuable source of information but it become an environment where collaborative learning can take place. Through the web media, collaboration between lectures and students could build an atmosphere of incremental learning which are done remotely using the Internet network. Students are not only passively accessing course materials, but also joining a collaboration work for giving contributions to the learning community.

Studies have shown that learners profit immeasurably from environment which encourage shared learning [1,2,3]. The Web presents a good environment for asynchronous collaboration in which students work together but not necessarily at the same

time. Faculties in many disciplines have found that web-based discussion forum can lead to fuller participation in class discussion by all students [2,3].

Collaborative use of instructional systems can take on a variety of forms, from two or more students working on problems at the same computer workstation, using a tutoring system that was primarily designed with an individual user in mind, to peer collaboration on systems which were specially tailored for use by multiple learners working at the same workstation or across networked machines. The latter are typically called computer-supported collaborative learning (CSCL) systems, since they are intended to support students in working together productively [3].

CSCL is focussed on study of the use of collaboration technology in education. The

collaboration among the educators and researchers should be initiated with an interest in the topic: teachers who had tried this approach in the classroom, software developers with an understanding of the important design considerations for CSCL, social scientists with expertise in evaluating technical innovation, and learning theorists who could help to define the underlying instructional philosophy that motivates its use [4].

2. BACKGROUND

When Petra University began developing its Intranet & Internet network in 1995, the campus network began to be used by students & faculties as a way to access educational materials over the web. The University use the web to disseminate administrative & marketing information to faculty, students, alumni and potential students. In the early 1997 several voluntary faculties started to disseminate course information and materials into the campus web. We saw that web technology in combination with other Internet tools such as Usenet Newsgroups, Email, FTP and Telnet could be an interactive learning environment as well. And the creative implementation of these tools makes the web an ideal environment for distance and collaborative learning.

Many technical and logistic challenges has been faced by faculties during creating web course materials. Faculties dealt with the operational issues: HTML (hypertext markup language) programming, web hosting and another challenge could exist if they wish to restrict access to only students in their class.

HTML is the basic "programming language" of the web. All web documents are created using HTML. But we don't necessarily to know anything about HTML in order to create web documents. Recently there are many new software products have been developed (i.e. MS-FrontPage, Hotdog, etc.) which make the creation of HTML documents almost as easy as using standard word processing. The usage of these software has spurred the growth of web-

based course creation dedicated to delivery of instructional resources.

In the spirit of making online course become easier for instructors to create, serve and administer it, we have been developing a project on web-based distance learning system. The system is developed through an ASP (active server page) program that provides dynamic web page for entire web courses reside on a web server. It provides dynamic data-driven web pages which are produced from combination of web page templates and course database. Interaction between users (faculties/students) and the system is using a single interface: World Wide Web. It makes users easier to access the system even they don't understand HTML programming.

3. DESCRIPTION OF THE PROJECT

3.1 System Architecture

This system is using internet web pages as a media in learning process and interactive communications between students and instructors. Most of web pages are static that means the contents of that web page have not changed until the webmaster update the contents, therefore, it will depend on the webmaster in updating web pages which it could takes time. Another problem is that webmasters or web designers have to create a bunch of web pages for each course and this can be a problem if the system will serve many courses offered by a department/university. It will spend a lot of time in creating and updating web pages for each course. In this case, this system needs dynamic web pages approach. A dynamic web page is a web page which is its contents change dynamically without updating process by web masters.

The system architecture of this project was built using Active Server Pages (ASP) technology from Microsoft [5]. Web pages can be manipulated into dynamic web pages by scripting HTML files with ASP script and save as .asp files. Using web browsers such as Internet Explorer and Netscape, users (client side) request .asp files by choosing them. These requests are sent to a

Web Server through Internet Hyper Text Transfer Protocol (HTTP) and then web server read the file. After reading all documents of the file, web server calls ASP Engine that interprets ASP script. In the .asp file, ASP Engine find connection requests to a Database Server to get data from the fields of tables in the database server. ODBC (open database connectivity) define the connection between web server and database server. Data from database server are sent back to web server through ASP Engine. Web server transform the data and ASP script into HTML and then send them to users/clients. This process can be seen at picture below [5]:

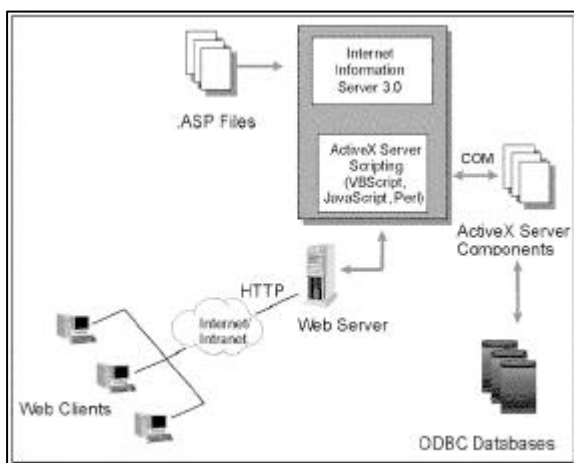


Figure 1. System Architecture

This system uses several software in its development. This system was developed on WindowsNT as the operating system which was installed in a server. This server is used as a web server by installing Internet Information Server (IIS) and also ASP Engine to interpret ASP script. Database server was built in this server machine too by installing MS-SQL Server. Database server is used to store structured data such as lectures/students personal information, course lists, syllabus and its descriptions, announcement texts from lecturers, commentaries for discussion forum, student's study evaluations, scores for each assignment, quizzes for each course, assignments text from lectures, assignments which are collected by students and students contribution/materials. The editor for ASP

scripting is Microsoft Visual Interdev [6]. The specifications of our server are:

- Pentium Pro 200 Mhz Double Processor
- RAM 128Mb, cache 256K
- HDD SCSI Micropolis 4345WS (4.3 GB)
- CDROM Plextor PX-12CS
- VGA onboard cl5430
- Ethernet Intel 82557 10/100 (onboard)
- SCSI adapter, Adaptec AIC7880 Ultra Wide
- FDD 1.44
- Operating System: Windows NT 4.0

3.2 Web-based Learning Model

The Web by its very nature distributes resources and information, making the web the tool of choice for those interested in delivering instruction using a Distributed Learning Model suggested by [7]. Use of the Web for instruction ranges from basic information delivery to development of sophisticated virtual learning environments. We have initiated of using Web with the course supplement model, which exploits the Web's most basic features. Later we are moving with the approach of the virtual classroom model, showing the Web at its most sophisticated.

The Course Supplement Model

In the beginning, the majority of our faculties who use the Web for instruction, use their Web pages as an information delivery media: standard course materials. In this model, faculty and students meet in the traditional classroom where the lecture is delivered, while lecture notes, assignments, calendars, course syllabus, and other related materials are made available to students via the Web. In this model, much of the instruction continues to be delivered synchronously (i.e., at a given time and place), though some asynchronous components are added - for example, electronic email communication among instructor and students. This model is an excellent way for faculty to be introduced to Web technology and to the concepts of Distributed and Collaborative Learning; and then to experiment by linking to other Web sites and using asynchronous components.

The Virtual Classroom Model

As a virtual class, there are many facilities that are built just like in the real class. Students can access this virtual class using web browser and have connections to Internet and then they connect to the web server. Opening page of this site can be seen below.

There are several items on the opening page and each item provides access to facilities in this system like in the real class.

- **Create Instructor's UserID:** All instructors who teach in this virtual class must be the lectures of a university. New Instructors fill in the registration form and give their personal data. This registration form will send to the administrator of this system. If the required data match to lectures database then they will be added as instructors.
- **Create Student's UserID:** Students have to fill in the registration form first before they come into classes. If their data have not registered yet in database then the system will give them userid.
- **New Class:** It's only instructors can access this site. In this site, instructors make their new classes.
- **Join Class:** There is a list of courses that are offered to students. Students can choose courses they are interested in.

- **Administration:** This site provides informations about academic and administration for both students and instructors. They can access the results of each courses, editing personal data, lists of courses they are taking, contact instructors.
- **In Class:** This is the site where instructors and students meet. They can collaborate in learning process and have discussion forum through this site. It requires login name and password to enter this site. Login name will define what courses they are related to and show a list of courses. When they choose the name of a course, they will enter the virtual classroom. Facilities, which are provided in this virtual classroom, are explained below.
- **Online lectures and instructional materials.** A web page can incorporate hypertext, images and the delivery of binary versions of spreadsheets, presentations and other documents. For example, the instructor can make available a PowerPoint presentation or an Excel Spreadsheet from a Web Page, and it can be viewed at every student's desktop; and this capability is transparent (the 'download' from the web server to the desktop occurs at the click of a button).



Figure 2. Galilee Homepage

You are teaching in these classes:

No.	Class ID	Course	Credit	Students
1	TE4472	<u>Komunikasi Data</u>	3	20
2	TE4484	<u>Jaringan Komputer</u>	3	15
3	TE4497	<u>Komputer Grafik</u>	3	8
4	TE4331	<u>Sistem Operasi</u>	3	10

Logout

Figure 3. Courses List on Instructors Site

You are joining these classes:

No.	Class ID	Course	Credit	Instructor
1	TE4484	<u>Jaringan Komputer</u>	3	Ir. Resmana, M.Eng
2	TE3524	<u>Basis Data</u>	3	Ir. K. Gunadi, M.T.
3	TE4472	<u>Komunikasi Data</u>	3	Ir. Resmana, M.Eng
4	TE3598	<u>Sistem Informasi Manajemen</u>	3	Ir. Djoni. H.S, M.Eng

Logout

Figure 4. Courses List on Students Site

- **One-to-One Communications.** Email between faculty and students can be integrated into the Web environment. The Web page allows email to be sent to faculty and classmates.
- **Discussion Forum.** The primary tool for interactive dialog is provided by Usenet news/discussion forums (similar to Bulletin Boards). This asynchronous tool allows faculty to post assignments, students to submit homework, and groups to work collaboratively on projects.
- **Virtual Chat.** Chat areas are virtual meeting places where students and faculty meet both formally and informally to discuss assignments, or accomplish group projects. They offer a great way to simulate a brainstorming session where all participants are actually (rather than virtually) present.

- **Course and Content Management.** The course's instructional content can be closely controlled, and involvement monitored using the flexible tools available on the WWW.
- **Online Testing.** The Forms capability on the Web allows faculty to create and grade tests online.
- **Online Assignment.** The capability of continually monitoring both the academic and technical abilities of the student can be built-in by establishing a standard query section.

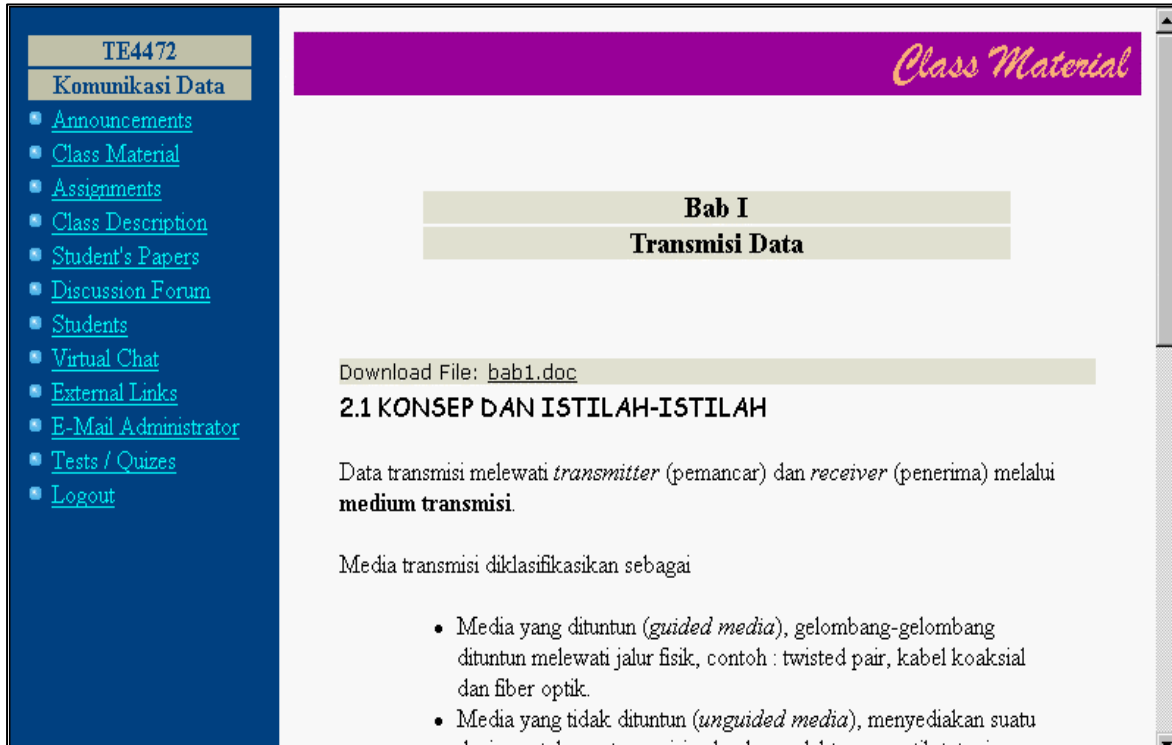


Figure 5. On-line Course Materials

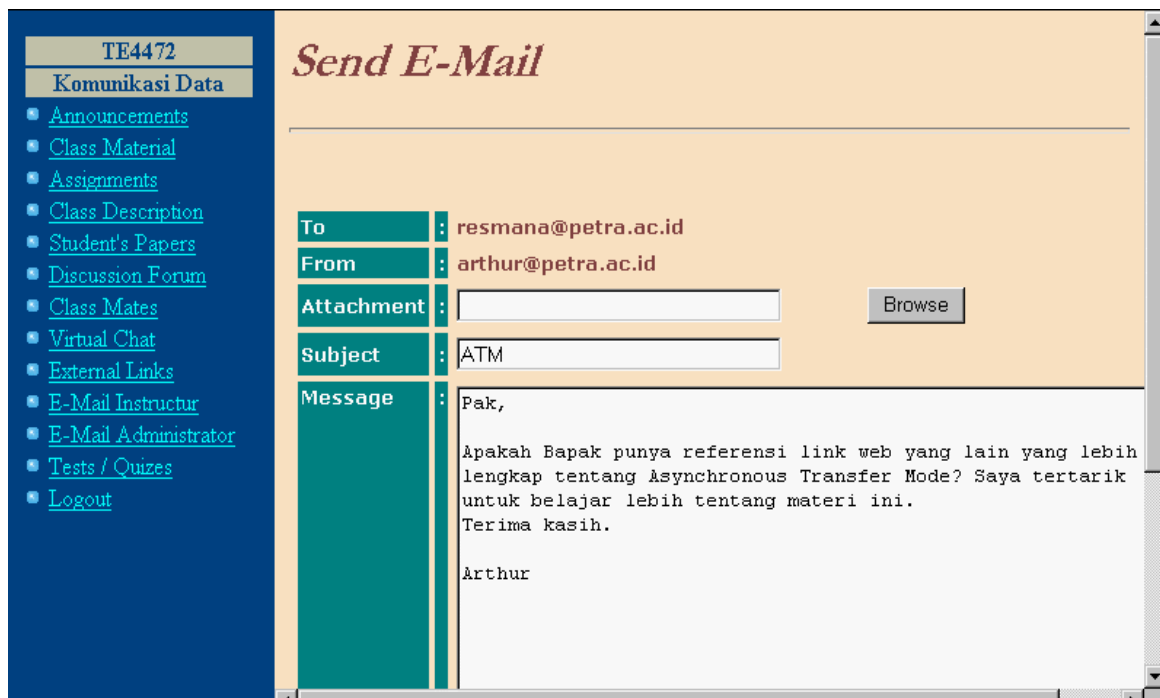


Figure 6. One-to-One Communications

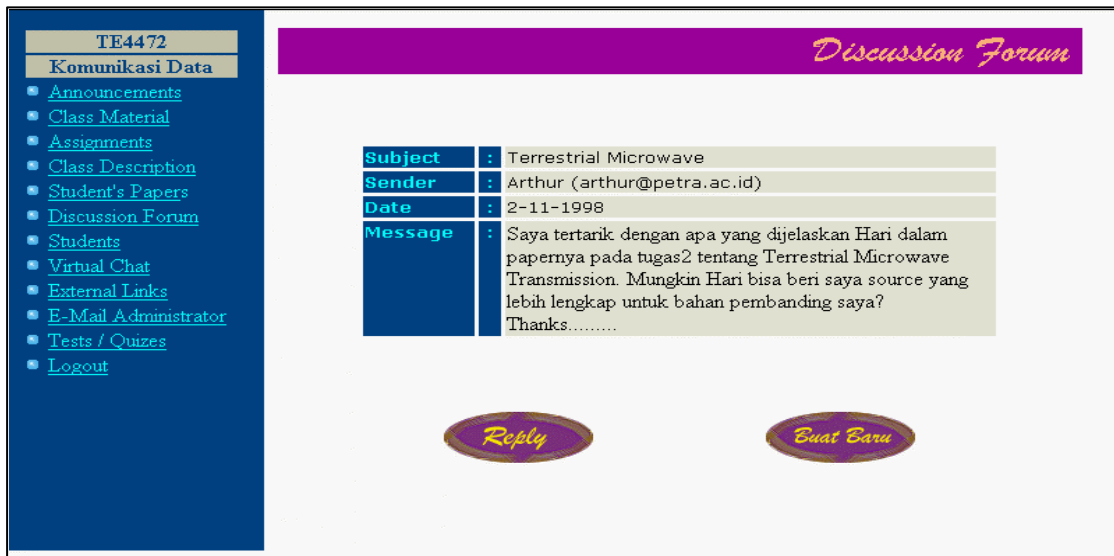


Figure 7. Discussion Forum

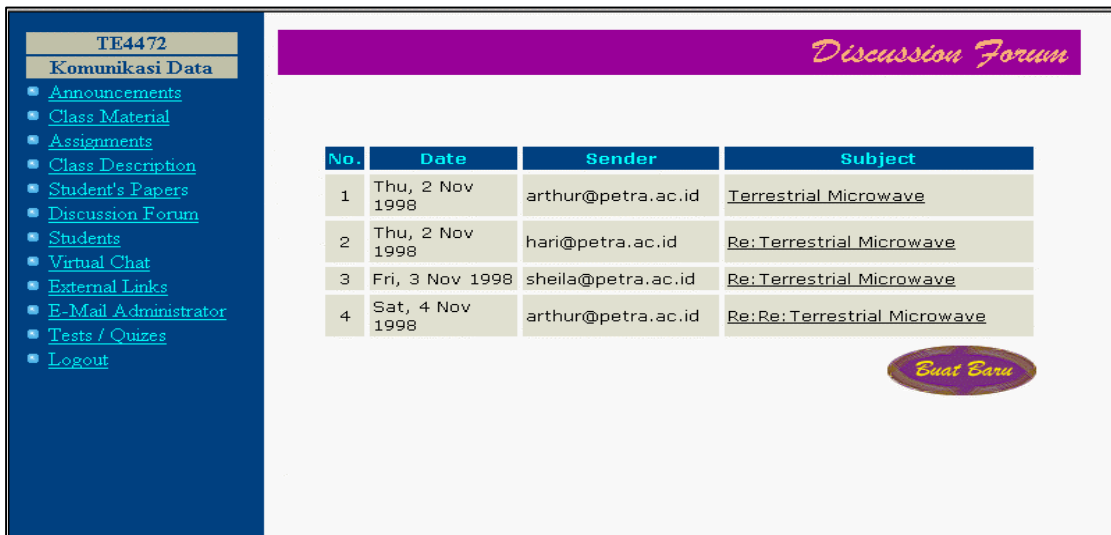


Figure 8. Read Discussion Forum

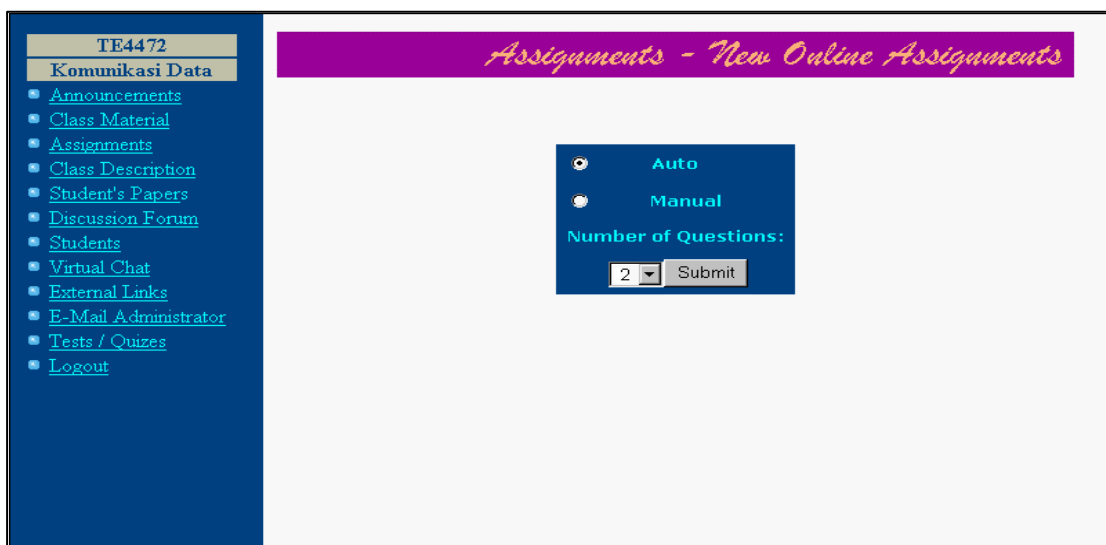
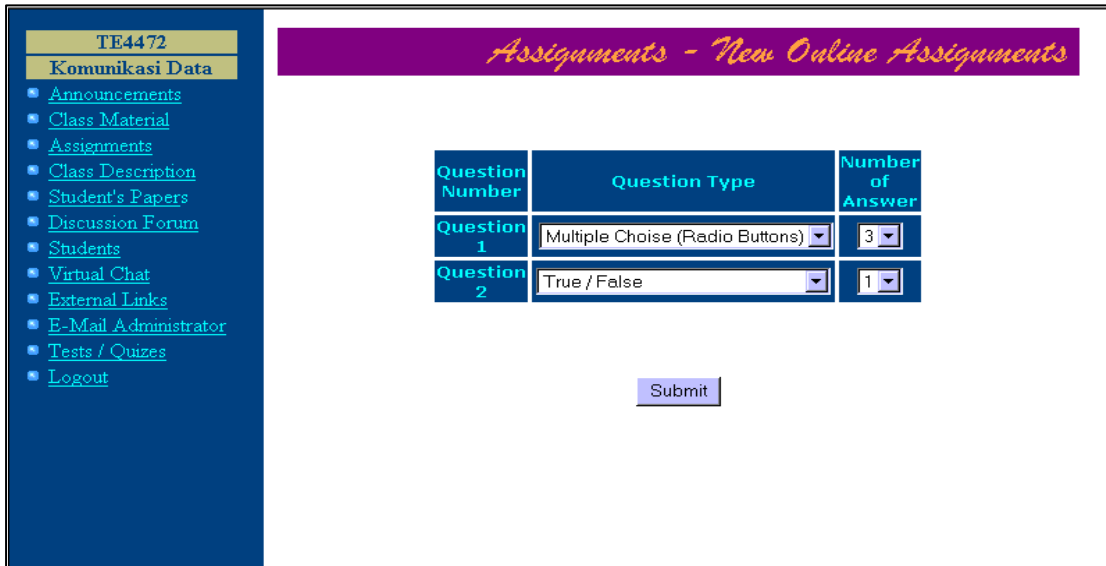
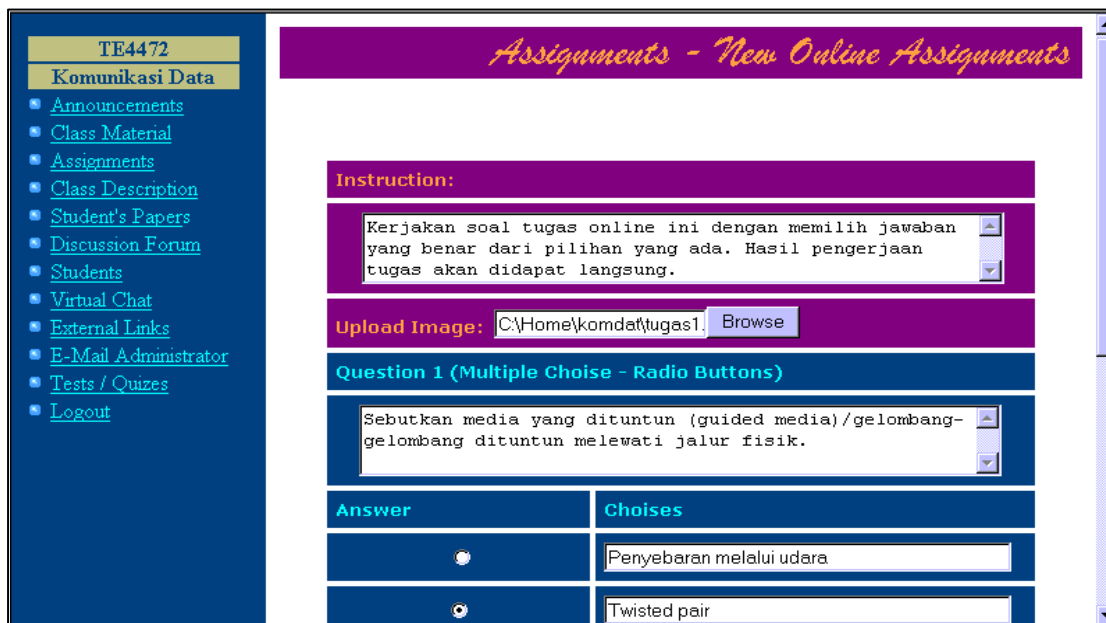


Figure 9. Step1-Make New Online Assignments



Picture 10. Step2-Make New Online Assignment



Picture 11. Step3-Make New Online Assignment

In some cases, all aspects of the course or program are delivered asynchronously-faculty and students never meet at the same time or in the same physical space.

As the WWW technologies become more sophisticated and as the bandwidth of the Internet increases, there will be more tools, and more ways to develop creative Distance and Collaborative Learning environments. In a very brief two years, the Web has shown that it has the potential to be the premier vehicle for Distributed Learning which can enable and enhance both classroom instruction and distance learning.

4. DISCUSSION

We encountered several issues while developing Galilee that we believe to be problems in using Internet technology and World Wide Web facilities as distance & collaboration learning media:

Internet Connection:

The only way to access the class and material of courses is by using Internet connection through web browser. If the connection fails, both of students and instructors will lose their access to classes

and materials. It can be a big problem while students doing their online assignments or tests.

Connection efficiency:

Type of course materials in this project require not one, but several files containing various types of information (e.g., powerpoint presentation, e-book, sound, pictures, program code, etc.). Participants have a low tolerance for files that require many minutes to be downloaded successfully. To address this problem in this project, we are using file compression technique. The students and faculties are encourage to compress their files (in the format of .zip) before uploading them into the system.

Institutional Collaboration:

This collaboration system will meet its purpose if there is collaboration between several institution which will be involved in designing learning roles in this system. The technology will provide merely the media but it also needs policy on web-based education, achievement for the quality of studies, curriculum development and faculties participation. For the further development of the project, a collaboration work among the educators and researchers should be initiated with an interest in the topic: faculties who had tried this approach in the classroom, software developers with an understanding of the important design considerations for web programming, social scientists with expertise in evaluating technical innovation, and learning theorists who could help to define the underlying instructional philosophy that motivates its use.

5. FUTURE WORKS

Our future research will explore the technical issues of how to develop collaboration tools among the faculties/instructors. We realized that the instructors need to communicate each other, not only by sending e-mail but also having discussion session or net meeting. Through

this discussion, they will able to improve theirself in teaching and knowledge which will support students progressions.

Other research that we plan is an issue in developing collaboration through searching facilities. Both of students and instructors have a need in finding resources that can help them to improve and support the learning process.

We also will explore the possibilities of broadcasting of online teaching materials using multimedia (i.e. video clips). This online teaching will bring instructors to meet their students through video broadcasting or conferencing.

6. CONCLUSION

We have been developing a project on web-based distance learning support system. The system is developed through an ASP (active server page) program that provides dynamic web page for entire web courses reside on a web server. It provides dynamic data-driven web pages which are produced from combination of web page templates and course database. Interaction between users (faculties/students) and the system is using a single interface: World Wide Web. It makes users easier to access the system even they don't understand HTML programming.

This web-based distance learning support system gives the students more active role in the information gathering and learning process, making the distance students feel part of a learning community, therefore increasing motivation, comprehension and interaction with other students.

For the further development of the project, a collaboration work among the educators, administrator and researchers should be initiated with an interest in the topic: faculties who had tried this approach in the classroom, software developers with an understanding of the important design considerations for web programming, social scientists with expertise in evaluating technical innovation, and learning theorists who could help to define the underlying instructional philosophy that motivates its use.

ACKNOWLEDGEMENT

The project is under development at the Electrical Engineering Department with support from Computing Center of Petra Christian University. The authors wish to acknowledge the encouragement and feedback from administrators and lecturers of the Electrical Engineering Department. Special thanks go to Arlinah, Sukanto, Djoni Setiabudi, Gunadi for their support in developing the project and to Sammy, Gunawan Hadi, Wie Siong, Irwan, Budita, Justinus, Fanny and the staffs of Computing Center for their help in preparing the project.

with the World Wide Web, Syllabus Magazine, September 1996.

8. Rosenblum, J., Healy, Eamonn, *Developing an Educational Intranet*, Proceeding of North American Web Developers Conference, 1996.
9. Solomon, David, *Microsoft SQL Server 6 Unleashed*, Sams Publishing, 1996.
10. Microsoft Corp, *Microsoft Visual Interdev v1.0 Help Manual*, 1997.

REFERENCES

1. Brush, T., Knapczyk, D., & Hubbard, L., *Developing a Collaborative Performance Support System for Practicing Teachers*. Educational Technology, 1993.
2. Honey, M., & McMillan, K. *Case Studies of K-12 Educators' Use of the Internet: Exploring the Relationship between Metaphor and Practice*. Machine-Mediated Learning, 1994.
3. Shotsberger, Paul G., Smith, Karan B., & Spell Christopher G., *Collaborative Distance Education on the World Wide Web: What Would That Look Like*, Proceeding of Computer Supported Collaborative Learning Conference, Bloomington, 1995.
4. Koschmann T., *Computer Support for Collaborative Learning: Design, Theory and Research Issues*, Proceeding of ACM-Computer Supported Collaborative Learning Conference, 1992.
5. Microsoft Corp., *Microsoft Technet CD*, 1998.
6. Morrison, Mike, *Special Edition Using Microsoft Visual Interdev*, Que Corporation, 1997.
7. Polyson, S., Saltzberg S., & Jones, R. Godwin, *A Practical Guide to Teaching*