**基于Web的网络教学系统**

1、导言

计算机和网络应用带来了重大变革，我们的社会生活，特别是我们的传统机制的教育得到了重大变革。计算机时代的教育使我们能够获得大量的信息，其显着特点是数字化。数字化校园建设、高质量的教育已经是大势所趋。数字化校园与远程教育的主要功能有网络课堂、课件点播、远程考试等，数字化校园信息管理系统，包括信息管理系统、办公自动化系统、管理考核制度和虚拟社区，如在线辅导、公告牌系统等。远程网络教育的集约出现，如何估算学习效果是一个很重要问题。

利用信息技术的网络进行大学课程教育，提供了网络教室，利用基本研究链接讨论，回答问题和处理作业等功能实现对教师和学生的检查。系统也应支持教育管理，如在线课程项目、滚动管理、后续的质量跟踪等，自适应考试系统是网络研究所的示范项目的一个子系统。

2、系统概况

该系统的界面是完全基于网络的，并对所有知名的浏览器几乎完全兼容。在网上学习和测试应用程序的开发是建立在友好的用户界面，用户并不需要任何技术技能就能访问，教师可以轻松地创建基于Web的教学课程、测验和考试。该系统主要由三个独立的组成部分如图1所示，客户端、服务器以及数据库管理系统（数据库）。

它的这种结构的可扩展性，可移动的数据库管理系统的主要优点是到另一个工作站，完全分开的WWW服务器，并建立一个与它通过当地的网络。系统环境可分为两大块，第一个是客户端应用程序，这是在HTML和XML，ASP和Java脚本发展起来的，第二块是服务器程序，这是在PHP和ASP.NET发展起来的,系统作为一个网关之间的数据库和客户端,该系统在不同平台上是兼容的。



教师的应用主要是对数据库问题来插入、更新和删除。服务器应用程序进行了一些额外的任务，以提高整个系统，例如，检索和打印学生的成绩。主要为学生提供的应用有网上学习和测验，客户端应用程序访问的系统，以便检索教师提供的问题。

3、网络教学系统

学生或教授要访问该网站，通过浏览器打开网页，在网站的地址栏输入例如如下的网址：http://Blackboard.lsu.edu 。如果学生正在寻找某个课程，他们必须输入他们的唯一的ID和密码。如果教授允许客户访问，访客在没有ID或密码可以进入网页进行访问，但被舍友保密的，设有限制进入的内容，也将变得明显。注意导航旗帜的说明，如课程的信息，调课，课程文件等等。只要单击一下其中一个，就相当于在要求的部分材料的范围内制定相关的网页的横幅标题。例如，课程资料通常包含的课程大纲，重要的考试日期，类别，说明如何使用讨论区论坛等等。调课的内容可以包含考试或练习等，部分内容的决定权完全在于任课老师，他想放什么内容在网页上就放可以。

以网络为基础的教育有7个重要的功能：（1）实时通知，（2）张贴的格式可以是文本， HTML格式，电子表格，视频，PowerPoint中，音频文件，（3）实时各种级别的图书，（4）外部链接，（5）讨论区和聊天室，（6）自动测验，（7）课程管理。

对于学生的通知显示在其打开的课程的首页上。教师在通知中给学生需要的课程信息的项目，作为一个学期课程的进度。学生可以浏览所有的通知或只是看最近他想了解的。通知非常有用，让老师张贴。另外，老师会保留这些通知的发

布或修改，可以避免在传统教学中，学生因错过通知说的理由“我没听到通知”。

在线或网络教育的大多数新用户使用张贴通知的功能。教师发现对于学生张贴自己的一个或多个页面教学大纲很有用。因为学生比较容易得到，可以把他们希望或想要学的内容打印出来。然而，很少有教师真正利用这一功能。例如，很少有老师发布他们自己的PowerPoint的讲义或其在黑板上的板书。

对初学者来说，实时级图书，外部链接和电子邮件功能是很好的。学生希望尽快张贴等级测试之后的结果。随着一些软件，例如黑板软件，他们在看到了教师公布的结果后，可以尽快去学习符合他们等级的图书。另外的优点是软件保护学生的隐私，允许学生只看到他或她的等级。外部链接为学生提供了更多的网络资源，在老师的观点看来这个事特别重要和有益的。电子邮件功能是非常有用的，因为它可以让教师和学生能够方便地相互通信，或作为一组使用列表服务与全班同学联系。此外，还有一个下拉框，它使学生和教师能相互发送文件，也能轻松地跟踪是什么时候发出。这对学生提交转让教师布置的任务和反馈意见是特别有用的。

对多数高级的用户，老师可以使用自动测验功能。如果测试是客观的，或使用“填空”而测试结果不是主观的，老师可以张贴测验并在互联网上自动的获得计算机等级。学生进入笔试，进入密码测验，并可以定时或不定时供应。当完成并提交，计算机告诉学生这是不正确的答案，对每个问题信息反馈提供给教师，并进入评分各年级的书。教师可以选择允许学生是否可以重考。安全是一个令人关切的问题，教师可采取要求学生在控制计算机实验室环境中在线问答，将检查身份证，学生将不能获得其他学习参考材料。教授还可以配置电脑随机载入试题库中的问题，这也有助于阻止作弊。

对多数高级的教授使用黑板，系统里有讨论区/聊天室。这使得学生能与教师和其他学生在电脑上交流。聊天室要求学生和教师同一时间在计算机上，然后通过计算机屏幕互相沟通。对于那些互动希望的学生和教员，大多数用户喜欢异步讨论板，这是在一段积极的时间内，如一个星期。在此期间，教师和学生登录，并记录他们的想法以及关于这一专题的评论。所有的想法都是在计算机上获得。讨论区的优势超过了评论的记录是因为这个在较长一段时间里，使得学生能够更加深思熟虑，发表意见。在某一论坛区活动的教师可以因为没有强有力的指导，使得学生可以把要点及重点都集中到他们的意见上去。

最高级的教授也可以使用实时播放器，苹果的Final Cut或Microsoft生产商的软件。有了这些软件，教授可以张贴发布那些记录他们的讲座和黑板讲课的视频流，所有这些产品允许教授把演讲的录像和他们的PowerPoint幻灯片（其中讲课用的幻灯片）合并。

如果教授公布了演讲视频和音频相结合的文件，学生可以在大学高速计算机

上下载视频文件和相应的音频文件或者在家里使用的电话线连接，几秒钟内也可以下载。但是，如果学生下载影片由电话线连接，正常的下载时间，视频流是慢得多和视频下载质量要小得多。因此，教授是明智的，将两个视频和音频文件都发布出来，以最低程度的沮丧来最大限度地提高学生的能力来审查讲座。

该系统是高度灵活的，用户并不需要任何编程技能。因此，教师可以在任何时刻通过网络删除和更新其课程材料。

在这些学习系统中，各种范围的功能是令人印象深刻的IT花销，已经有具体的教育和认知发展理论(Leamnson, 2001；Franklin and Peat，2001；Matuga，2001)支持着这些系统的设计。鉴于这种广泛的功能，教师如何能最大限度地利用这个软件呢？坦率地说，答案取决于创造性教学风格的教师的不同而各不相同。这里提出的方法假设在一个完整的在线体验理，几乎没有教师或其他学生的面对面的互动。对于这个做法，学生必须学会如何在一个“虚拟”的环境里学习，教师也必须保证学生在一个计算机实验室有足够的训练时间。这种培训主要是为学生第一堂在线课堂而设。

4、系统设计

4.1基于互联网的学习的标准

近年来，基于互联网的学习技术标准已被越来越多不同的国家关注，我国也已开始了制定一连串标准的工作。一个标准的系统存在价值在于实例，标准化将为教学系统在教师学生双方运作提供重要的保证，它是教学课件资源共享，提高教学质量，实现教学体制的系统的基础。

在CELTS规范标准体系，具有指导意义大部分的设计和实施的考试系统是在以下两个准则：

（1）规范学习对象元数据：需要测试和实践资源符合LOM技术规范。虽然潜在的好处是很多，但教育社区不会很快的接受元数据为技术，这一点已经变得越来越明显。LOM规范为了学习者或者教育者能够发现，评估，获取和使用教学系统，通过定义一个统一的元数据模型来提供支持。用户可以根据元数据模型进一步确认收集来说明在这个系统的基本数据元素被确认。考试系统中的资源是重要数据元素，可以根据LOM规范以元数据来管理。

（2）问题/测试互操作性：要求进行测试和检查使用的问题符合QTI规范。QTI规范咨询有关标准包括IMS 、IEEE、结果和报告信息模型和XML绑定标本，形成了三部分的文件草案。评估组，问题项目（项目） ，这三个目标构成的ASI模型在一起，问题'项目'类似'试题'可建造了一系列的应对目前的形式和结构。“组”是一个聚集的概念，它是由问题的物品或大量的“科”，“科”只是联络员“试题库”和“知识点”。

4.2系统的兼容性和可移植性

加强支持CELTS标准体系，使基于互联网系统整个数据结构极大的标准化。根据CELTS标准体系交换数据也将变得很容易，笔者开发了一系列的API ，使导入问题和提问图书都遵循CELTS标准体系。他们会研究系统之间的兼容性，为了使考试系统和其他系统更完善。

网络教育系统在使用跨平台后有一个天然优势，平台中通过大量的ASP.NET组件的设计和实施，特别是在使用了框架界面相互联系后，在选择开发环境，选择了具有良好的性能和中间件技术的应用服务器7.0，已经奠定了基础的分布式部署在今后的实施水平划分和模块明确的制度。为今后的实施水平划分和模块明确的制度奠定了基础，最大程度的保证软件重用性，充分发挥的模块技术应用，所有上述都保证了这一系统的可移植性。

4.3服务器

我们的系统中服务器机器是关键因素。它的主要组成部分如下：

（1）互联网上的服务器，它提供了访问的HTML网页。

（2）一个Oracle数据库使所有问题管理和分类。

（3）PHP和ASP.NET应用程序包括的ODBC （开放式数据库连接）驱动程序作为客户端和数据库管理系统之间的一个接口站。

客户端不直接与数据库相连，事实上是通过执行的PHP和ASP.NET来实现客户之间的沟通和服务器应用程序的。如图1所示，该系统适合接入互联网的校园的教学或使用的是本地网络的校外教学。目前，数据库和应用服务器上运行的Microsoft Windows 2000 Server 。

4.4开发工具

XML：XML （可扩展标记语言）被选定为基础的系统开发。它是由XML模式的手段，它决定了问题的结构， XML架构定义了组成各种问题考虑所有必要的领域。

数据库管理系统：该数据库储存的问题，问答比赛，学生个人资料，及一些相关统计资料。数据库访问是取得了使用Oracle ODBC驱动程序。我们选择的实体关系模型。我们采用了不同的数据库管理系统开发的数据库系统，如的MS Access 、MySQL ，使用不同的DMBS产生良好的效果，并显示出一些差异。

4.5安全控制

安全性在开发和部署Web服务上是一个最基本的方面。该用于网页上的协议传递是开放的TCP / IP协议，它的开放使系统的安全控制和系统管理有着严重的潜在危险。使用Visual Studio.NET来探讨Web服务安全方案。

一个可重用的安全格局：Web服务通常是建成一个附加的功能或作为现有ASP.NET应用程的API顶部。Web服务器可能要求中介机构来和你的数据库或N层解决方案的组成部分产生相互作用。您的Web服务器需要知道是谁在操作并知道在你的应用系统中用户有什么权利。可能用户，角色，业务规则，已经批准并实施，只是想利用现有的信息，要做到这个，Web服务器需要执行模式来确定发出请求的客户端的凭据。从理论上说，在Web服务可以通过一个用户名和密码来执行每一个方法，但更面向对象的方法是是创建一个类，扩展System.Web.Services.Protocols.SoapHeader ，这个类将成为SOAP标头，这是传递给Web服务器的，其中将包括所有需要验证的客户端。

5、网上学习和测验应用

我们的系统主要的特色是利用XML。虽然有其他系统有基于XML的课件，但不使用PHP ，XML和SQL数据库。客户端应用程序（用于访问网上学习和测试系统）被分为两个应用程序满足教师（或工作人员）和学生的应用。

5.1教师应用

工作人员或教师的应用是管理的信息，使一般学生用户能很容易的网上学习和测验。系统可以产生自动测验，改正，并提供结果，所以用户能节省了大量时间，来准备考试和纠正。以下是在教师的应用的功能：

添加，更新和删除的问题：教师可以使用网络来解决对课程添加，更新或删除的问题。这些问题是动态的插入到数据库中。例如，问题数据库中插入一个新的问题，老师只是已经进入“添加网上学习问题”的工具，输入问题，输入问题的答案，设置问题难度并指出了正确的答案。当介绍了问题后，当删除问题时老师可以修改他们的问题和答案。

打印学生分数：教师可以使用这个工具来打印成绩报告，以便学生了解哪些人做了基于Web的测验。

5.2学生的应用

使用学生应用系统可以在网上学习和测试，此应用程序允许学生采取免费的做法，选择测验。以下是不同的窗口中的学生的应用功能：

注册：学生必须登记，以便能够采取网上问答比赛。注册页面内容取决于学生登记在该课程水平。

验证：每个登记表的内容必须正确，并符合存储在数据库中相应的数据，其他的错误信息会显示出来。每当学生正确完成他的注册，验证信息将显示在屏幕上，从而使学生可以从网上问答比赛。

在线问答：获得注册的学生，他可以选择测验，测验的问题将是从数据库中

随机挑选的算法。系统包括多种类型的问题，如：多项选择，真/假，填空和平行名单。当学生完成题目并选择提交按钮或超过了预先分配的时间，笔试将结束。该系统将计算出正确答案的数目并显示结果。最后，学生评分将被保存在相应的数据库中以便以后跟踪。

免费网上学习：学生应用允许学生采取免费的网页式做法的课程，并设置若干问题作为练习，练习中问题（随机或连续）的难度取决于他们的课程难度和学习的总时间。

6、结束语

基于Web的教育方式意味着时间和地点不再是障碍。任何有计算机的学生都可以进入以网络为基础的阶级和接受教育，至少应等同于提供了一个在传统的精神创伤和痛苦程序。网络教育是一个现实，但它也是一个不断变化的现实。在许多大学，网上教育在公共行政上不是远远超过函授课程在一个网络上放置。函授课程都是有用的，但他们也有众所周知的局限性。许多在线课程共享同样的限制。技术的飞速发展，许多大学认为把文本式内容放到网页，是提供学生接受高等教育的更便宜的方式。

我们提出了一个简单易用的电子学习系统的系统是完全基于Web的，可以运行在任何平台上，并兼容最知名的浏览器。除了其管理能力的电子指南，该系统根据潜在用户的愿望采用智能算法生成不同难度测验和考试。学生们可以看到他们的考试分数及解决方案在提交答案后。该系统减少了传统教育系统的限制并节省了时间和资源。事实上，教师可以设置自己的课程，在其方便的时间考试和测验，也可以跟踪学生的活动，并引导他们掌握正确的知识，但前提是要求学生必须是在大学校园里。同样，学生可以在实验室和家庭通过网络自由和独立的使用该系统，讨论区还提供了让教师和学生在某一特定时间能够互动合作，公告栏也可被用来作为通知一些学生相关课程和测验和考试的媒介。

本网上学习和测验系统开发使用XML的， PHP ， HTML和Oracle数据库管理系统。我们提出的Oracle ODBC驱动程序的架构的利用提高了系统的灵活性，使WWW服务器和数据库服务器能够分离，因此该数据库可以分布在不同的服务器。

**A Web-Based Network education System**

**1. Introduction**

Computers and web applications bring a significant revolution in our social life and especially to our traditional mechanism of education. The era of education enable us to access mass of information whose remarkable character is digital so that computers can recognize and deal with this kind of expression of information. Digital campus construction is already on going in order to catch the new trend in quality education. The main functions of digital campus cover with distance education such as web classroom, courseware on demand, distance examination. The digital campus information management system includes information management system, office automation system, administration examination system and virtual community such as online tutoring, bulletin board system etc. With the intensification of distance web education, how to estimate learning effect locally is an important issue.

A comprehensive education system which utilizes information technology of the network to carry on college course to educate, it offers from the network classroom, essential study links discussing, answering questions, and processing homework to examination to teachers and students. This system should also support management activity of the educational administration, such as online course project, roll management, follow-up of quality, etc. The self-adapted examination system is a sub-system of the Networking Institute's demonstration project.

**2. System Overview**

The system interface is entirely web-based, and fully compatible with almost all well-known browsers. The WBT and quizzes applications are developed with a friendly user interface, which doesn’t necessitate any technical skills from the potential users. Teachers can easily create web-based tutorials, quizzes and exams.

The system consists mainly of three independent components as shown in Figure 1, the client, the server, and the database management systems (DBMS). The main advantage of this architecture is its scalability with the possibility of moving the DBMS to another workstation, totally separated from the www server, and establishing a connection with it through a local network. The system environment can be divided into two major blocks. The first one is the client side application, which is developed in HTML, XML, ASP, and Java script. The second block is the

server program, which is developed in PHP and ASP.NET. It acts as a gateway between the database and the clients. The system is compatible with different platforms.



Figure 1. System Architecture.

The teachers’ application is used to insert, update and delete questions from the database. The server application carries out some additional tasks to improve the performance of the whole system, for example, it retrieves and prints the student scores. The students’ application provides the WBT and quizzes. The client application accesses the system in order to retrieve the questions provided by the teachers.

1. **What Web-based Education Can Become**

Students or the professor could have also used Netscape to open the web page. To access the site, the person will type in the web address such as http://Blackboard.lsu.edu. If students are seeking access, they must type their unique ID and password. If the professor allows guest access, the guest enters without a unique ID or password but has limited access to the site for confidential reasons, as will become apparent later. Note the navigation banners on the right of the illustration, such as course information, assignments, course documents, and so on. A simple click

on one of them calls up the section of material on the frame developed for the web page related to the banner title. For example, the Course Information would typically contain the course syllabus, important dates in the class such as when tests are held, instructions on how to use the discussion board forums, and so on. Assignments might contain exercises and exams. The content of the sections is completely the decision of the course teacher who places the information on the web page themselves.

There are seven important functionalities in web-based education: (1) real time announcements, (2) posting of text, html, spreadsheets, videos, PowerPoint, audio files, (3) real time grade book,(4) external links, (5) discussion board and chat rooms, (6) automated quizzes, and (7) Course management.

For the student, the announcements are on the opening page of the course. The announcements allow the teacher to give the students needed information items, as the course evolves during the semester. The student can view all the announcements or only the most recent as he or she wishes. This is very useful as the announcements are available immediately to the student as the teacher makes the posting. In addition, the teacher has a record of when the announcement was posted and modified. This leaves the student without the traditional classroom argument that “I did not hear the announcement.”

Most new users of online or web-based education use the announcements and the functionality of posting materials. Teachers find that posting their one or more page syllabus useful because the students have it easily available and can print it when they wish or as often as they wish. However, few teachers really take advantage of this functionality. For example, very few post their PowerPoint lecture notes or their lectures on Blackboard.

For beginners, the real time grade book, external links, and email functions are wonderful. Students want their grades posted as soon after the test as possible. With software like Blackboard, they can go to their grade book and see the instructor’s grades as soon as they are posted. The added advantage is the software protects the privacy of the student by permitting the student to only see his or her grades. External links provide the student with Internet sources that are particularly important and useful from the teacher’s point of view. The email function is very handy as it allows the teacher and student to easily communicate with each other or with the whole class as a group using a list-serve. In addition, there is a drop box capacity, which allows the student and teacher to send files and easily keep track of what was sent and when. This is especially useful for students submitting assignments or faculty returning

assignments with their comments.

For the more advanced users, the teacher can use automated quizzes. If the test is objective or uses “fill in the blank” but not subjective questions, the teacher can post the quizzes on the Internet and have the computer grade it automatically. The student goes to the quiz, enters the password for the quiz, and takes either a timed or non-timed quiz. When finished and submitted, the computer tells the students which answers were incorrect, provides teacher feedback on each question, and enters the score in the grade book. The teacher has the option of allowing the student to retake the exam or not. If security is a concern, the teacher can ask the students to take the online quiz in a controlled computer lab environment in which IDs would be checked and students would not have access to any other materials. The professor can also configure quizzes to have the computer randomly selects questions from a large question pool, which also helps discourage cheating.

For even more advanced professors using Blackboard, there is the discussion board / chat rooms. This permits students to interact with the teacher and other students with the computer. Chat rooms require students and the teacher to get on the computer at the same time and then communicate with each other over the computer screen. For those who wish student and instructor interactions, most users prefer the asynchronous discussion board, which is active for a set period of time such as a week. During that time, the teachers and students log-on and record their thoughts on the topic plus the comments of those who spoke earlier. All thoughts are captured on the computer. The advantage of the discussion board beyond the recording of comments is the opportunity given to the students of developing more thoughtful comments over a longer period of time. The activity of the teacher in a given discussion board forum can vary from nothing to strong guidance to keep the students on point and focus their comments.

The most advanced professors can also use software produced by Real Player, Apple's Final Cut, or Microsoft Producer. With this software, professors can record their lectures and post them on Blackboard using streaming video. All of these products allow professors to merge their PowerPoint lecture slides with a video of them lecturing using the slides.

If the professor posts a combination of video and audio lecture files, students can download the video files at the university high speed computers and the corresponding audio files at home using their phone line connection in seconds. However, if the students download videos from phone line connections, the normal

download time for streaming video is much slower and the downloaded video quality is much less. Therefore, the professor is wise to post both video and audio only files of their lectures to maximize the students’ ability to review the lectures with minimum frustration.

The system is highly flexible and doesn’t necessitate any programming skills from its potential users. Thus, teachers can delete and update their course materials at any moment through the web.

In these learning systems, the range of functionalities is not just an impressive array of IT bells and whistles. They have been designed with specific pedagogical and cognitive development theories supporting them (Leamnson, 2001; Franklin and Peat, 2001; Matuga, 2001). Given this range of functionalities, how can a teacher maximize the use of this software? Frankly, the answer varies according to the creative teaching style of the teacher. The approach presented here assumes an entire online experience and almost no face to face interaction with the teacher or other students. With this approach, students must learn how to operate in a "virtual" environment and thus the teacher must make sure the students have adequate training time in a computer lab. This training is essentially only for students taking their first online class.

**4. System Design in detail**

**4.1Web-based Learning Standard**

In recent years, the Web-based Learning technical standard has been paid attention to more and more by various countries; our country has begun the formulation work of serial standards too. The value that a standard system exist lies in the instance, standardization will become important guarantee that the tutoring system operates each other, it is the sharing of resources of the courseware, study improvement of quality and realization studying the system all the life and offer the basis.

In numerous norms of CELTS standard system, having most directive significance to the designing and implementing of Examination System are the following two norms:

1. Specification for Learning Object Metadata: Require testing and practicing resource accord with LOM norm. It has become increasingly evident that the educational community will not be accepting Metadata technology for very quickly, although the potential benefits are many. LOM norm provides support for the learner or the educator to finding out, assessment, obtaining and using by defining a unified Metadata model. User can confirm the key collection according to Metadata model

further that is to say that the essential data element in this system is confirmed. Resource in examination system that expresses with these essential data elements can be managed as metadata accord with LOM norm management in unison.

(b) Question/Test Interoperability (QTI): Require the question using for testing and examination accord with QTI norm. Assessment, Section, Question Item (Item), these three targets constitute ASI model together. ‘Question Item’ is similar to ‘examination question’ which can be constructed by a series of present forms and responding structures. ‘Section’ is an aggregation concept, which is made up of question items or a lot of ‘Section’s; Concept of ‘Section’ is just correspondent to ‘examination question library’ and ‘knowledge point’ in our design. And ‘Assessment’ is correspondent to the ‘paper’ concept in our design, is the set of ‘Section’.

**4.2 System compatibility and portability**

Strengthening the support to CELTS standard system, make the whole data structure of Web-based Examination System greatly standardize. Exchanging data with a system which also follows CELTS standard system will be very easy. The author has developed a series of API, can be used for importing the questions and question library following CELTS standard system in batches. They will be consummated in order to study the compatibility between this examination system and other systems.

Web-based Education System has a natural advantage in the using in cross-platform, after adopted a large number of ASP.NET components in the design and implement, especially made every effort to adopt frame to develop with the interface with mutual outside system; When choosing develop environment , adopt Web logic 7.0 with excellent performance and middleware technology as application server, have laid the foundation for distributed deployment in the future; Dividing the implement levels and modules clearly in the system, has guaranteed to software reusing furthest, have given full play to the utility of module technology; All above ensure the portability of this system.

**4.3 The Server Machine**

The server machine is the key factor in our system. Its main components are the following:

• An Internet web server, which provides access to the HTML pages.

• A DBMS which keeps and classifies all the questions in an Oracle database.

1. • The PHP and ASP.NET applications that include the ODBC (Open Database Connectivity) driver and act as an interface between the client stations and the

DBMS.

Clients do not interact directly with the database. In fact, the communication between the clients and the server applications is performed through the PHP and ASP.NET.

As shown in Figure 1, the system is appropriate for on campus teaching, with access to the Internet, or off campus teaching using the local network. Currently the database and the server application run on Microsoft Windows 2000 Server.

**4.4 Development Tools**

XML: XML (extensible Markup Language) was chosen as a basis for system development. It is performed by means of XML Schema, which determines the question structure. The XML Schema defines the composition of each kind of question considering all the necessary fields.

Database Management System: The DBMS store the questions, the quizzes, the student profiles, and some related statistics. Database access is achieved using the Oracle ODBC driver. We have chosen the entity relationship model. We used different DBMS for developing the database of our system such as, MS Access, and MySQL. The use of different DMBS produces good results and shows some differences among these databases.

**4.5 Security Control**

Because security is one of the most fundamental aspects in the development and deployment of a Web service. The protocols used in WebPages transmitting in the network is open TCP/IP protocol, its opening will cause serious underlying danger to systematic security control and system management.

Let's explore programmatic Web service security using Visual Studio .NET to implement a custom, stateful SOAP header to authenticate a consumer before allowing a method to execute.

A reusable security pattern：Web services are typically built as an add-in functionality or as an API on top of an existing ASP.NET application. The Web service may interact directly with your database or in an N-tier solution by calling intermediary components to perform the functionality. Your Web service needs to know who is invoking it and what privileges that user has in your application.

More than likely, your users, roles, business rules, and authorizations have already been implemented, and you simply want to tap into this existing information. To do this, your Web service needs to implement a pattern for determining the requesting client's credentials. You could, in theory, pass a user ID and password to

every method in your Web service, but a more object-oriented approach is to create a class that extends System.Web.Services.Protocols.SoapHeader. This class will become your SOAP Header, which is passed to your Web service and will include everything needed to authenticate your client.

**5. WBT and Quizzes Application**

One of the main distinctive features of our system is the utilization of XML. Although there are other XML-based courseware generators, they do not use PHP, XML, and SQL database. The client application (used to access the WBT and quizzes system) is divided into two applications, called teachers (or staff members) and students applications.

**5.1 The Teachers Application**

The staff members or Teachers application is used to provide the potential users with a simple tool to manage easily the information of the WBT and the quizzes. It saves much time in exams preparation and correction as it can generate automatic quizzes, make the corrections and provide the results. The following features are available in the teachers’ application:

Add, update, and delete questions: Teachers can add, update, or delete questions and answers for courses using the web. The questions are inserted into the database dynamically, so new questions can be added during the configuration of a quiz or practice. For instance to insert a new question into the question database, the teacher simply has to access the “Add WBT Questions” tool, types in the question text, enters the answers, set the difficulty levels, and indicates the correct answers. After introducing the questions the teacher can modify their questions and answers as they can delete them.

Print students scores: The teachers can use this tool to print the scores report for the students who took the web-based quizzes.

**5.2 Students Application**

Students can access the WBT and quizzes by using the students application. This application allows the student, to take free practices and select quizzes. The following are the different set of windows in the students application:

Registration: Student must register to be able to take an on-line quiz. The contents of the registration page given in Figure 3, depends on the course level and the students registered in that course (allowed students).

Validation: Each field value in the registration form must be correct and matches with the corresponding value stored in the database; otherwise an error message will

be displayed. Whenever the student completes his registration correctly, a validation message appears on the screen and thus the student can start the on-line quiz.

On-Line Quiz: After a student gets registered he can select the quiz, where the questions will be selected randomly by our algorithm from the database. Our system covers many types of questions as mentioned before, such as: multiple choices, True/False, fill in the blank and parallel lists. The quiz will be over either whenever the student finishes it and select the submit button, or whenever a pre-allocated time will be over. The system will calculate the number of correct answers and display the result. Finally, the student score will be saved in the corresponding database for possible tracking.

Free WBT: The student application allows the student to take free web-based practices for the courses and set the number of questions in the practice as well as the questions type (random or sequential) with their difficulties levels, in addition to the total time.

**6. Conclusions**

Web-based education means that time and place are no longer barriers. Any student who can get to a computer can take a web-based class and get an education at least equal to the one offered at a traditional MPA program. Web-based education is a reality but it is also a changing reality. In many universities, online education in public administration is not much more than placing a correspondence course on the web. Correspondence courses are useful but they also have well known limitations. Many online courses share those same limitations. In the rush to technology, many universities felt that placing text on a web page was the answer and they saw a cheaper way to provide higher education to more students.

We proposed a simple and easy to use e-learning system. The system is fully web-based and can run on any platform and compatible with most known browsers. In addition to its ability to manage electronic tutorials, the system uses an intelligent algorithm to generate quizzes and exams with different levels of difficulties according to the desire of the potential users. The students can see the solutions of their exams along with their marks immediately after submitting their answerers. The system reduces the constraints of the classical education system and save time and resources. In fact, teachers can set their courses, exams and quizzes at their convenient time and can track the activities of their students and guide them to acquire correctly the requested knowledge without be obliged to be physically in the university campus. Similarly, the students can use the system freely and independently from their, labs

and home through the web. A discussion tool is also provided to allow teachers and students to interact together at a specific time. A bulletin board is also used to make some announcements to students about their courses and quizzes and exams.

The present version of our WBT and quizzes system is developed using XML, PHP, HTML and Oracle database management system. The utilization of the oracle ODBC driver with our proposed architecture has improved the flexibility of the system and enabled the separation of the www server from the database server, thus the database can be distributed in different servers.

**7. References**

[1] Crooks, S. M., Yang, Y., & Duemer, L. S. Faculty perceptions of Web-based resources in higher education. Journal of Education Technology Systems, 2003, 103-113.

[2] M. Goldberg, S. Salari, & P. Swoboda. World Wide Web course tool: An environment for

building www-based courses, computer Networks and ISDN Systems, 28, 1219-1231,

1996.

[3] Qestion Mark Computing Ltd. Question Mark Web, 2001 available at http://questionmark.com.

[4] R. Lister & P. Jerram. Design for web-based ondeman multiple choice exams using XML,

proc. of the IEEE International Conf. on Advanced Learning Technologies 2001,

Madison, WI, USA, 2001, 383-384.

[5] G. C. Fox, Initial discussion of use of XML for universal access, shared places on the web: XML for web-based collaboration and distance education. XML Developers Conf., Montreal,

Canada,1999. available at http://www.ibiblio.org /bosak/conf/xmldev99/.