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Design and Realization of General Teaching Platform for Teachers' Self-built Online Courses

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ABSTRACT

Network teaching platform provides a supporting environment for teachers and students to carry out distance education. Based on Windows 2003+, NET Framework+SQL Server+IIS environment, by adopting three main technologies including synchronous update of file catalog, dynamic tree directory and Ajax asynchronous communication, the study develops general network course teaching platform which possesses autonomous construction function. The advantage of this teaching platform is that, teachers don't need to modify the source program of network course platform but only by adding teaching contents to the general network course teaching platform according to teaching needs, they may create personalized network course which can also be used by multi discipline. The experimental result indicates that, the research system can help the teachers to design network course more effectively and solve the bottlenecks in network course creation.

Key words: Online courses, independent build, teaching platform

INTRODUCTION

Along with the development of network communication technology and the application of information technology in educational field, use has been made of information technology to improve teaching quality and management level. But while conducting online teaching activities, teachers find that online teaching doesn't achieve the desired result (Wang *et al.*, 2009). After a comprehensive view of those online courses, we find that most of the online courses are customized for certain disciplines and due to the difficulty of the development technology for online courses, disciplinary faculties can hardly finish development tasks alone and they need the help of a computer. However, because of such a development mode, disciplinary faculties become dependent on technical personnel. Once an online course is developed, its content becomes changeless and the course teachers can't update the content dynamically online, neither can they update the content according to teaching needs (Li *et al.*, 2007). It's special to carry out teaching activities on the network, where a teacher is separated from his students spatially. The teacher communicates with his students through the network, so he is no long a teacher in a traditional classroom but a maintainer and administrator of the online course and an organizer of the teaching activity (Li, 2006); the teaching platform for online courses is the key to carrying out online teaching activities. To develop an online course platform convenient for a teacher to instruct his students, to sort instructional resources and to communicate with his students is a key to the improvement of network teaching quality.

The general teaching platform for teachers' self-built online courses is mainly used to solve the bottleneck problem that teachers can hardly update course content online after a traditional online course is developed. By the use of modular online course design method, teachers can update the content of an online course dynamically without needing to modify the source code of the online course or operate the backend database (Tong *et al.*, 2007). The general online course teaching platform proposed and designed in this study is a self-buildable platform based on network environment. This platform can provide teachers with a standardized and easy-to-use interface for online course construction and course teachers can build and manage the teaching contents dynamically through the friendly visual interface. Not only so but the users needn't modify any program in the system and they can build an online course for themselves as long as they input the teaching information they need, so as to devise an excellent online course rapidly and expediently (Qiao *et al.*, 2009).

METHODOLOGY

Structural design of a general teaching platform for self-buildable online courses: The overall structure of self-built general online course platform falls into three modules which are course learning, teaching management and system management (Liu, 2011), as shown in Fig. 1.

This "general online course learning platform" is designed based on the core idea of modern teaching. The core idea is known as "letting teachers play a guiding role and learners play a leading role". Students are still the learning subject and they can study independently online after entering the course learning module. After logging in as a teacher, teachers update the teaching content in real time according to the actual teaching needs, to meet the teaching demand.

Functional design of student learning module: After students log into the system, the course learning homepage will first appear on the system. Then, the students can edit personal

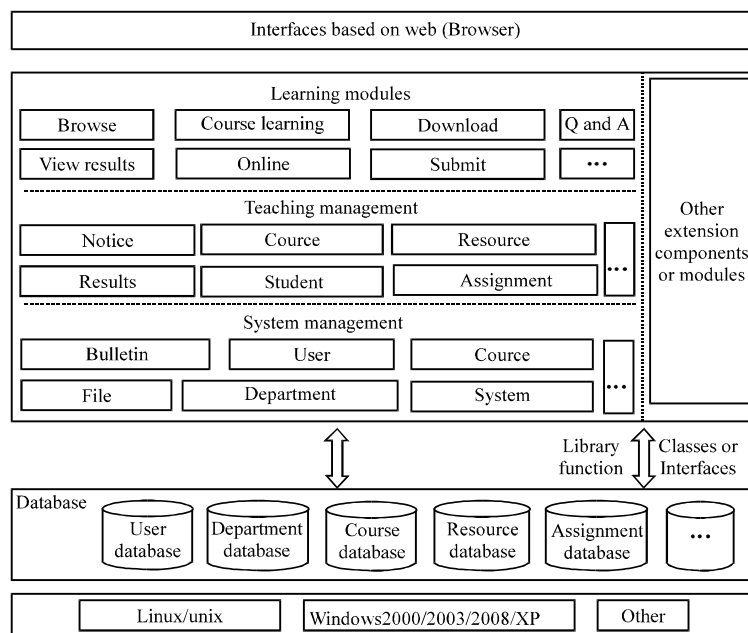


Fig. 1: Overall structure of general online course teaching platform

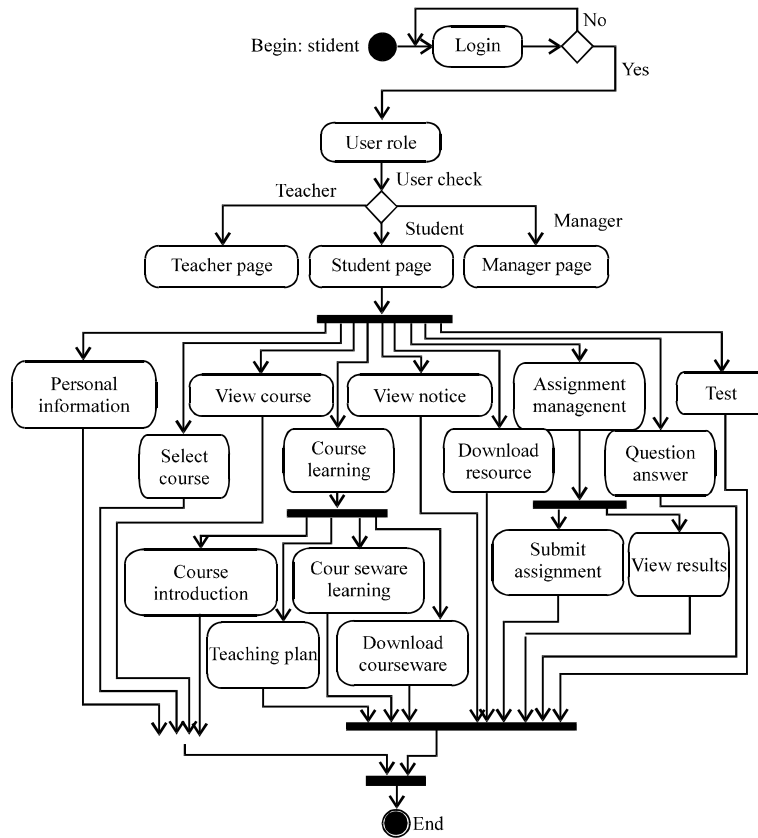


Fig. 2: Learning flow chart for students

information, browse course information, select courses and learn the course selected; after entering a certain course, students can participate in various learning activities. For instance, they can browse courseware online, download resources, submit assignments, take a test online and answer questions interactively. Students can visit the platform as per the following flow, as shown in Fig. 2.

Functional design of course management module: As the designer of learning environment, teachers have the most fundamental right to design and manage their own course. In the meantime, they can examine and manage some discussions, assignments and tests of students. Its core function is that course teachers can update teaching contents in real time and maintain the course data in later period according to the service condition and effect of the course only needing to build online course content independently instead of needing to modify the program of the online course. In this way, the core idea of modern teaching “letting teachers play a guiding role and learners play a leading role” can be fully embodied in online teaching activates (Li and Li, 2004). The systematic and specific operation flow is shown below: When a teacher logs into this platform, the system needs to first judge his identity (role). If he is a teacher, the system will show him the homepage for teacher. In the meantime, his personal course information will be displayed; after the teacher chooses his course, the system needs to show the corresponding functional module on the page according to his authorization, such as course editing, course announcement adding, plan

making, assignment management and test management. Teachers can visit the platform according to the following flow, as shown in Fig. 3. The detailed structure design of teaching management module is shown in Fig. 4.

Personal information editing. After logging in, teachers can modify and improve their basic data such as login name, password, name, job No., college or department, professional title, phone, contact No., email address, postal address and personal profile.

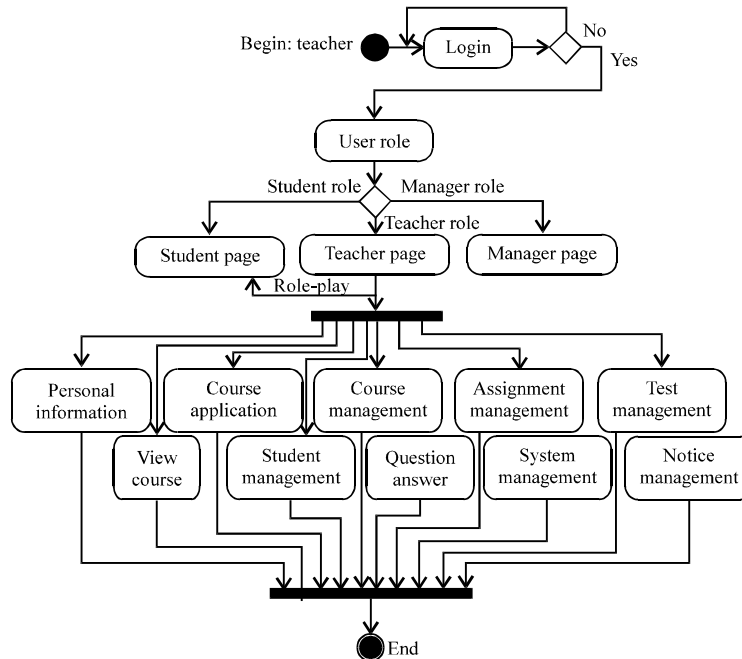


Fig. 3: Operational flowchart for teachers

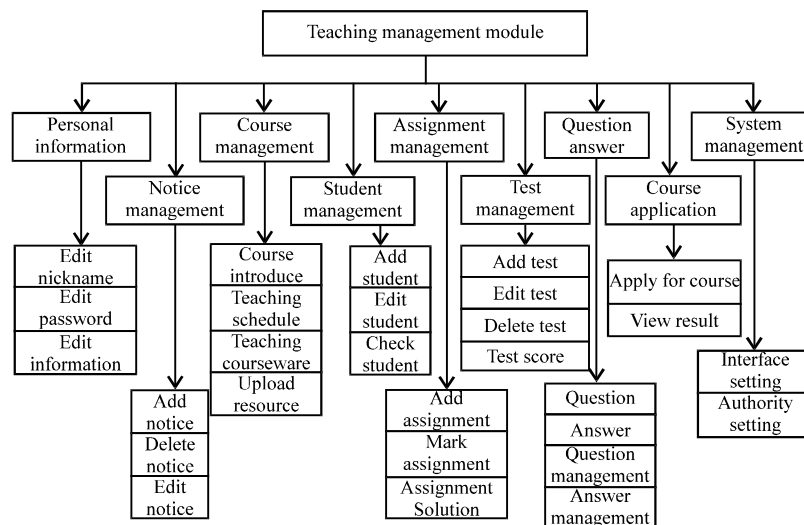


Fig. 4: Detailed structural design drawing of teaching management module

Course application: There are two ways to add courses to this online teaching platform. The first way is that academic administrator adds courses directly and then assigns a new course to a course teacher; the second way is that course teachers apply for a course independently. After successful application, academic administrator needs to make a check before teachers can choose a new course to manage.

Course management: Course management module is not only the core of teaching resources but also the focus of teacher management. By use of this module, course teachers can edit and manage their course contents detailedly: Course introduction, teaching programme, teaching method, course directory, teaching plan, teaching courseware and related curriculum resources.

Student management: Course teachers can not only add and edit students in the course but also add the students who select the course to the class by way of “student review”. In particular, they can add the students that have signed in successfully to their course in the process of student adding; they can edit the personal information of the students in the class in the process of student editing; they can add the students that have applied for the course to the course in the process of student review.

Assignment and test management: Course teachers can add and edit assignments, comment and reply the assignments submitted by students and upload answers. Course teachers can also make up test questions and papers for their own course and set test date and time. While drawing up a test paper, they can use the old test questions or set new test questions. In the meantime, teachers can edit and manage their test questions.

Management over question answering: Interactive answer module is a good platform for students to make learning communication with teachers or with each other, where teachers can raise some specific questions to students and students can also publish their questions about course learning; teachers can answer students’ questions in real time, can do other students; students can answer the questions raised by teachers online. Meanwhile, teachers can manage all the questions and answers.

Course announcement: After logging into the system, course teachers can add, edit and manage their course announcement through the module of “announcement management”; after entering the page of course learning, students can view the course announcement in real time.

Technological realization of teachers’ self-built online course function

Development environment: This online teaching platform is developed based on the environment of Windows 2003+. NET Framework+SQL Server+IIS. Specifically speaking, Windows 2003 Server is used as an operating system, NET Framework is used as an operating environment for Web application, relational database SQL Server is used as a backend database for the system and C#’C’ Vbscript and JavaScript are mainly used as a development language.

Key development technologies: Synchronous updating technique is used for file directory. There are lots of courses on the online teaching platform. It’s unavoidable that there should be a chaos in the huge course group if conventional file storage method is adopted. In order that this problem should be solved, “department-major-course”, the form of dynamic file directory, is used for

this online course platform to store data and information. In the meantime, back-stage management and server file directory can be updated synchronously.

Dynamic tree directory technique: The teaching plan, courseware and learning materials for each course on this online teaching platform are presented in the form of dynamic file directory (Wang, 2006). Tree directory can make page navigation and course content and structure clear at a glance and the structure can be updated in real time through the database. Course teachers can add, edit, delete and update course directory through course management background while the system can generate a corresponding tree directory automatically; Students can unfold the directory on the pate of course learning according to the order of chapters, to search the courseware they need.

Ajax asynchronous technology: Ajax is a development technology used to create a better and faster and more interactive Web application. As a technology supporting asynchronous request, its core is JavaScript XmlHttpRequest. Most user interfaces on this online teaching platform are developed by the use of Ajax technology and the data on the client-side Web page can be updated without refreshing when teachers and students request system data. In this way, not only can user experience be improved but guarantees can be offered for the implementation of online teaching activities in an orderly way (Dong, 2007).

Platform implementation: Some pages implementation effect of the platform are as follows.

Students' learning module: After students log in, the homepage of course learning center looks like this, as shown in Fig. 5.

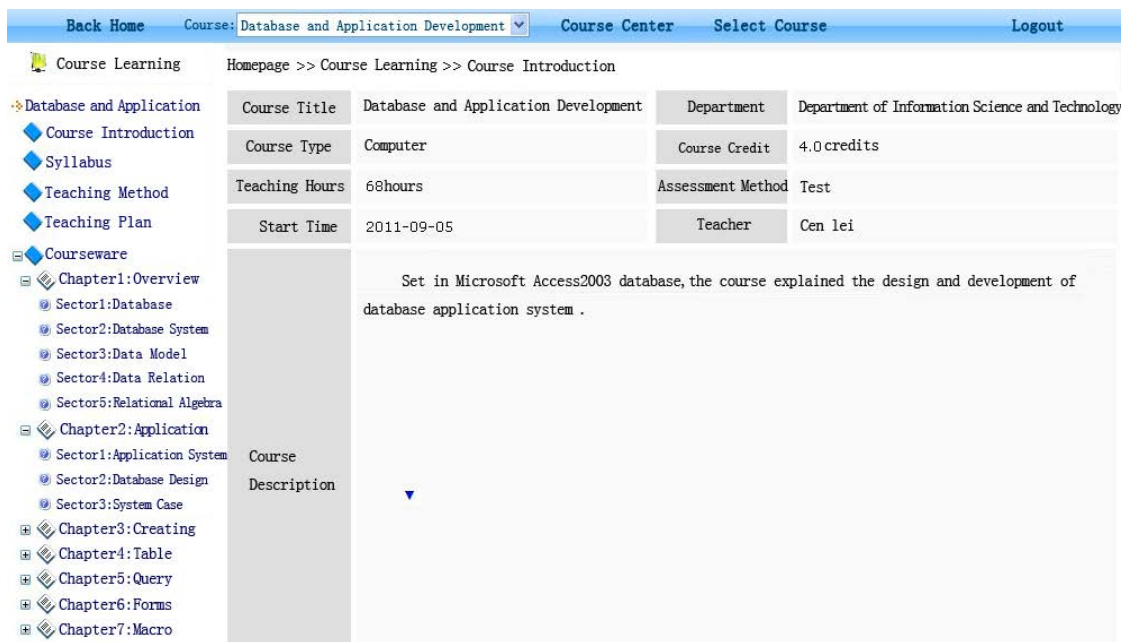


Fig. 5: Homepage of course learning

Teaching management module: After teachers log in, the homepage of course management center looks like this, as shown in Fig. 6.

Course management is the kernel module of teaching management background. In this module, course teachers can edit and manage the content of all their courses, such as course description, teaching programme, teaching program, course directory, teaching courseware and course materials. The implementation effect of course management module is shown in Fig. 7 and 8.

The implemented critical codes are shown in Table 1.

Table 1: Critical codes for the course catalog page

```
public void TreeViewInit(){//Acquisition of chapter and section directory
    DbManage tv = new DbManage();
    TreeView_chapter.NodeStyle.Width
System.Web.UI.WebControls.Unit.Pixel(250);
    TreeView_chapter.NodeWrap = true;
    TreeView_chapter.Nodes.Clear();
    TreeNode tree_chapter = new TreeNode(cname.Text);
    this.TreeView_chapter.Nodes.Add(tree_chapter);
    DataTable chapterTable = tv.GetDataTable("select
chapter_title,chapter_num from course_chapter where courseid=" +
Request.QueryString["courseid"].ToString() + " order by chapter_num");
    if (chapterTable.Rows.Count > 0){
        for (int i = 0; i < chapterTable.Rows.Count; i++){
            TreeNode newnode = new TreeNode("No" +
chapterTable.Rows[i][1].ToString() + "chapter" + " " +
chapterTable.Rows[i][0].ToString(), chapterTable.Rows[i][1].ToString());
            tree_chapter.ChildNodes.Add(newnode);
            BandingAddressOne(newnode, chapterTable.Rows[i][1].ToString());
        }
    }
}

public void BandingAddressOne(TreeNode node,string chapter_id){//section
header adding
    TreeView_chapter.ExpandAll();
    DbManage jieDbManage = new DbManage();
    DataTable jieTable = jieDbManage.GetDataTable("select jie_title,jie_num
from course_chapter2 where courseid=" + Request.QueryString["courseid"] + " and
zhang_id=" + chapter_id + "order by jie_num");
    if (jieTable.Rows.Count > 0){
        for (int i = 0; i <jieTable.Rows.Count; i++){
            TreeNode newnode = new TreeNode("No" +
jieTable.Rows[i][1].ToString() + "section" + " " + jieTable.Rows[i][0].ToString(),
jieTable.Rows[i][1].ToString());
            node.ChildNodes.Add(newnode);
        }
    }
}
}
```

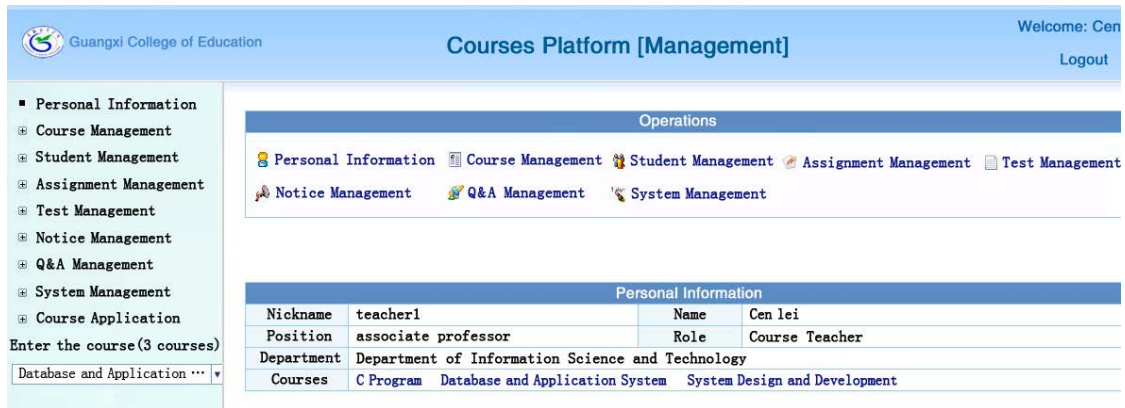


Fig. 6: Main page of teaching management background (for teachers)

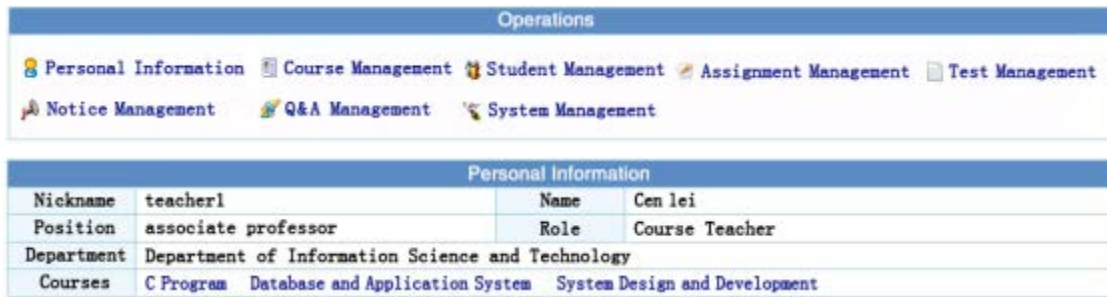


Fig. 7: Curriculum management page

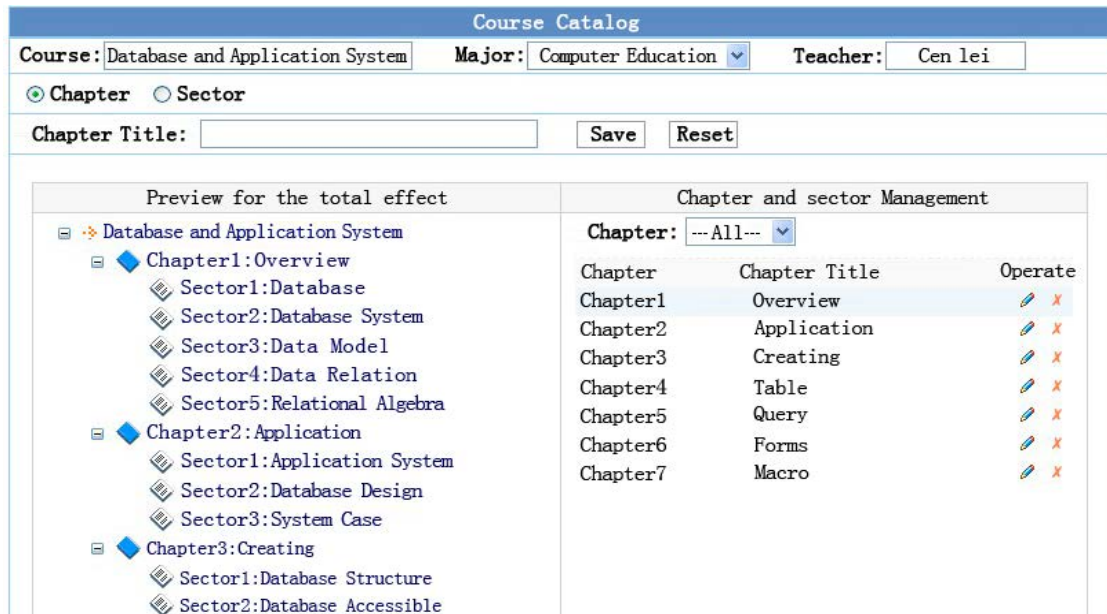


Fig. 8: Course content management page

Experiment: After finishing the system prototype, we designed and implemented a series of experiments to test its effectiveness and randomly selected 20 teachers who major in computer as the experimental subject and conducted the experiment in two rounds. In the first round, teachers are asked to design online network course by using the system which was developed by our research, whereas the second round adopted traditional network teaching system. The network course design contents include the structure of course catalog, course introduction, teaching program and coursewares according to teaching needs. The test time of both rounds was 60 min and teachers were asked to complete online questionnaire to give a comprehensive score for these two teaching systems respectively. At last, we collected the score data of every teacher from the system and analyzed them by using related tools.

RESULT

The Experimental results are shown as follow in Fig. 9.

Figure 9 indicates that, the test scores are generally concentrated from 80 to 90 and the first round scores (shown as solid line in the figure) are generally higher than the second round scores (shown as dotted line in the figure). In order to further analyze the difference between the two data, we conducted paired sample t-test by using SPSS. The results are show as follow in Table 2.

Table 2 illustrates that, the average test score of round 1 is 84.7 and the standard deviation is 5.202, whereas the average test score of round 2 is 82.45 and the standard deviation is 6.074 (higher than 5.202 in round 1) which indicates that scores of round 1 are generally higher than round 2. T-test value of paired sample is 2.172, Sig = P = 0.043<0.05 which indicates that there

Table 2: Results of paired sample t-test

Parameters	Group statistics					t-test for equality of means	
	Group	N	Mean	Std. deviation	Std. error mean	t	Sig.(2-tailed)
First round	First round	20	84.70	5.202	1.481	2.172	0.043
Second round	Second round	20	82.45	6.074	1.769		

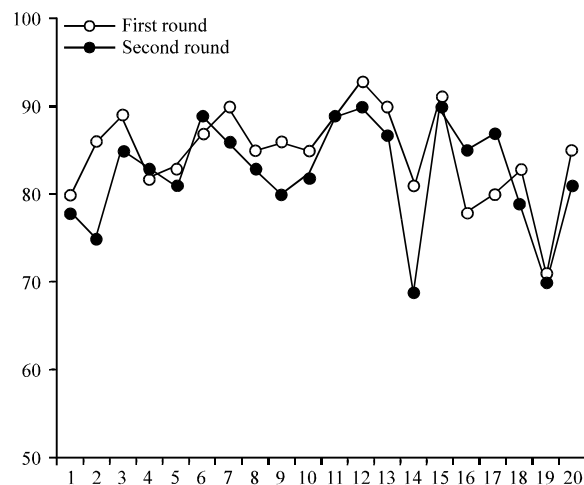


Fig. 9: Distribution diagram of systems score data from teachers participated in the experiment

exist difference between the two round test scores. Therefore, based on overall consideration, this system can help teachers to design network course more effectively to some extent.

DISCUSSION

The current online course system there are many problems with system working, such as fussy operating for curricular teacher, cumbersome maintaining for the system administrator and the system running instability. However, three technologies are used in the system of our research, including synchronous updating of file catalog, dynamic tree directory (Wang, 2006) and Ajax asynchronous communication technology. Where, Ajax asynchronous (Dong, 2007) communication can improve the security and stability of system running, synchronous updating and dynamic tree directory technologies can make it easier to maintain system for curricular teacher or system administrator. Meanwhile, the system using guiders make it easier to manage courses for teachers. By above experiments data, it can also be seen that the new-type online course system plays an important role in course teaching and course managing which help the teachers to design network course more effectively and solve the bottlenecks in network course creation.

The innovation point of the general teaching platform for teachers' self-built online courses is that a viewpoint is proposed about teachers' self-built online courses and the core idea of modern teaching "letting teachers play a guiding role and learners play a leading role" is used to design the general teaching platform for online courses (Ren and Xia, 2010). By using the general teaching platform for online courses, teachers can build online courses independently according to their own teaching style and update teaching content online in real time according to teaching needs; At last, in order to test the effectiveness of the research system, we designed and implemented a series of experiments and analyzed the results by using professional data analysis tools. The experimental result indicates that, the research system can help the teachers to design network course more effectively and solve the bottlenecks in network course creation.

At present, the general teaching platform for teachers' self-built online courses is still in the exploratory stage. This platform can make it easy for various subject teachers to build online courses independently and solve the technological problem that hinders teachers from building online courses independently. However, it's weak in supporting individualized teaching. Next, some functional plug-ins will be developed on this platform for some subjects. For instance, online mathematical formula editor plug-in and calculator plug-in will be developed mathematics course and online text editor plug-in will be developed for Chinese discipline, so that course teachers should be able to build a personalized course in accordance with subject characteristics.

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