Undergraduate Project Report
2014/15

[An Exam Revision Tool That Supports Collaborative Learning]

Name:	[Haoyan Su]
Programme:	[Implementation]
Class:	[2011215112]
QM Student No.	[110660785]
BUPT Student No.	[2011213112]
Project No.	[IC_3112]

Date [2015.05.17]

Table of Contents

Abstract

My project is an implementation project which aims to build a tool that can help students revise their exams by adopting the theory of collaborative learning. Collaborative learning is a joint problem-solving activity which is studying course material or sharing course assignments within the group. When it was used into the purpose of revision, students should have more chances to practice the exam questions together and what's more, students should revise the exam by sharing ideas and knowledge.

Web is a kind of internet technology that is popular in the society. It has a large number of users and can provide a good performance for learners to study together. Therefore, I have tried to build up a revision system by making use of the technology of internet web, and taking the advantages of collaborative learning.

With my continuous efforts, I've built a system that achieved the goal. The main point of my system is that students are automatically divided into three groups which are easy, medium and hard. Students with high level have the right and responsibility to lower level's answers to the question. Teachers have the highest authority to control the behaviours of students and learning resources in the whole system. Students can contribute the knowledge and compensate the holes in the question board part. Through this system, students can enjoy the process of revision.

[CI_3112] [An Exam Revision Tool That Supports Collaborative Learning]

摘要 (Chinese translation of the Abstract)
我的项目是一个关于帮助学生进行考试复习的编程类项目。它的核心是要采用协作学习的方式，让学生更好的复习考试。协作学习是一种让学生联合起来解决问题的学习方式，它包含了一起进行材料学习，或者课业问题交流等活动。对于我的项目来说，目的是要复习考试，因此，学生需要更多的机会去一起模拟考试。更重要的是，他们可以在模拟考试之后交流彼此的知识点和经验想法。
网站是网络技术的一个代表，流行于当今社会。它有着广泛的用户基础并且能够给学习者提供高性能的学习平台。因此，我尽力将当下流行的网络技术和协作学习相结合，来构建一个具有优势的学生复习系统。
在我的不断努力下，我成功的完成了符合预期目标的网站。我的系统亮点在于，学生们被系统自动划分为了三个组别，分别为：容易、适中和困难。高等级的学生将享有为低等级学生评判他们的答案的权利，同时，这也是他们作为高等级者的责任。老师在系统中扮演的是最高权利者，他们能够掌控整个系统中的题目资源以及观测学生的答题表现。在“问题板”这个部分中，老师、学生之间有机会将自己知道的知识和经验分享给其他人，而对于知识掌握有欠缺的同学则可以通过这种分享来弥补自己的弱项。
通过这个系统，学生们将享受复习考试的过程。

[CI_3112] [An Exam Revision Tool That Supports Collaborative Learning]

Chapter 1: Introduction

As more and more students fighting to get high score in their exams, how to review exams becomes a heated question. Since collaborative learning theory has its outstanding advantageous on knowledge sharing and problem-solving, it will also impact on exam revision positively. With this learning theory, students can collaborate with each other to handle with all of the problems they face and grades for each other on performance of revision. In this way, students may have the sense of responsibility to see other students' answers to certain questions so that students in the lower level can get enough help. At the same time, students can be encouraged or criticized by students from higher level which lead them to know the quality of their answers.

In this project, I developed an online revision tool that supports collaborative learning.

Collaborative learning is a learning strategy which has a long history achieved by forming teams and concentrating on students themselves. The main elements of collaborative learning are collaborative team, members, tutor and environment. The team in my system refers to three levels of students, members are students, tutor is the teacher of the certain course and the environment is the internet Web system.

In my specification, the system includes a formative and peer assessment functions where students answer past exam questions and grade or comment each other answers. Students should not be able to see other students' work before attempting automatically select questions in relation to that topic. According to the initial requirement of the project, my system should contain an authority function for lecturers to input questions.

Depends on the purpose and specifications of my project, I've built an initial analysis of both teacher's subsystem and student's subsystem. With the draft of these initial functionalities, I carried out a survey in order to know the true needs of my users. I adopt the method of questionnaire. The questionnaires contain two versions which are students' version and teachers' version. In the student's version, the questions are focused on the students' interests towards collaborative learning, interests of using online tool to do revisions, the habits of revisions and preference of web page design. Meanwhile, in the teacher's version, questions are mainly focused on how well teachers can

do to contribute their resources and time on this online revision tool. Fortunately, I've received 104 responses from students and 12 responses from teachers. Most of their answers showed high interests toward this system and some of their opinions are useful.

By analyzing the statistics, I drew detailed control diagrams of the system and formed many suggestions that promote the performance of the system and made some modifications of the functions of the system. What's more, in order to understand deeper about the characteristics of collaborative learning, I searched and read many papers and journals about collaborative learning theory as well as its relevant learning theory.

The implementation of this system uses the technique of dynamic web programming connecting with MySQL database. Users can interact with the website and make use of information resources in database. Programming languages that are used includes java, jsp and SQL. Java is a stable, safe and wide-used programming language, when it runs with JSP and JavaBean, the functions of the system can be run in a fast, stable and safer way. Information that input into the web pages or output on the web pages can be operated by codes embedded in JSP. JSP is the short form of java servlet page. When it is compiled, it will generate a servlet file first and run the functions on it. With only one file, the system can realize the whole process of the function. Software to be used in the system includes MyEclipse8.0, Adobe Dreamweaver CS6, and Apache Tomcat. MyEclipse is mainly responsible for the codes running backwards the web page and Dreamwever will use CSS and HTML language to decorate the web pages.

After the implementation of the whole part, I've designed a questionnaire to collect the feedback to my system.

The structure of my following report will be concluded in four chapters.

The first chapter is the background part. In this chapter, I would like to give an explanation of some academic terms appeared in my projects, such as "collaborative learning" and "online system". I will give fully detailed knowledge about the methods and main characteristics of online collaborative learning so that it can be well prepared to provide a clear clue to the further design of my system.

The second chapter is the design and implementation. In this part, I would like to show the process

that I designed my system, including the analysis of user requirements, initial design and final specification. And the design of the webpage will also be showed in this part.

The third chapter is about the results and discussion. Firstly, in the results part, I will show the screenshots and words explanations to my existing system. In the discussion part, I would like to show the design of the questionnaire, response of testers and the analysis of evaluations. What's more, I will put forwards the deficiencies as well as advantages of this system.

The final chapter is the conclusion and further work. In this chapter, I would like to conclude the whole system by analysing the methodology that I adopt and its positive influences on my system. Then, I will give the ideas about the improvements of this system according to the results of user evaluations and the relevant knowledge of myself.

Chapter 2: Background

21st century is an internet booming century which causes big influence to people's life style, thinking style and learning style. The wide spread of web tools make it possible for the concept of WEB was accepted by most of the humans gradually. WEB tools focus more on the participating, sharing, and collaboration. The users who view the web page can also become the creator of the web information. The trend of the era also requires people to update their knowledge database from time to time in order to meet the needs of the society.

Collaborative learning is a kind of learning style which is focus on the learners. The dominate meaning of this term refers to the joint problem-solving activity which is studying course material or sharing course assignments within the group [1]. It is made up with study groups. The groups usually contain several members. Members in the same teams can corporate with each other and share the same learning materials within the team and even with other teams [2]. To achieve the learning goals, students will be encouraged to adopt all kinds of communication skills. In this process, students will develop not only the ability to learn knowledge, but also critical and innovative thinking. With the process of collaborative learning, members will not only be equipped with a better communication skill, base of knowledge and task skills but also acquire the self-esteem, and get to know the importance of respecting others' ideas.

In this way, collaborative learning will play an important role in the future education. And when collaborative learning combines with collaborative learning, which is the topic of my system, is a new-born field and has its own characteristics.

2.1 Development of the collaborative learning

With the development of internet technology, collaborative learning has a long and rapid evolution.
The first version of collaborative learning originates in 1970s in America. And it achieved substantial progress between late 1970s and 1980s while largely influenced current education as an important education theory and strategy [3]. The most important representative is Professor Slavin who taught in The Johns Hopkins University. He did the research to students from lower grades to higher grades. His research varied from the aspects of society and natural science, and demonstrated that collaborative learning can do great contribution to those questions which are difficult to answer, such as creative writing, reading comprehension and math problems [4].
The second version of collaborative learning which is also called "Computer Supported Collaborative Learning" (CSCL) appeared because of the rapid development of media technology [4]. Different kinds of computer and media technology were used into the practice of collaborative learning. However, CSCL was adored by both teachers and students because the virtual learning environment has avoided some disadvantages the old version got and achieved the amazing effects which the former version can't have. The creative new learning environment makes students become more passionate to study the certain subject, and it also help students to study more interactively in collaborative learning.

The third version, which is widely used currently, is called Web-Based Cooperative Learning (WBCL). The main characteristic of the third version is that it makes use of the advantageous of web. Web technology has strong functionality which can let students create their own virtual environment and devote themselves into the participation of collaborative learning. To be strictly, WBCL is a sub-branch of CSCL, however, WBCL has better performance in resources, openness, collaboration, flexibility, and virtuality. In this way, WBCL is the upgrade of CSCL from both technology and field. WBCL is another new era in the collaborative learning.

2.2 Main element of collaborative learning

The main elements in collaborative learning system are collaborative team, members, tutor and environment [5].

Collaborative team aims to divide students into small groups according to different attributes. Intuitively, a situation is termed “collaborative” is peers are more or less at the same level, can perform the same actions, have a common goal and work together. In the learning system, collaborative team may refer to students with different backgrounds but share the same range of actions, knowledge and similar status. The utility of collaborative team may largely encourage students to discuss with each other and debate about the questions in their learning process.

Members refer to the students in different collaborative teams. Members with different knowledge structure, cognitive ability, cognitive style and cognitive methods will do well to the final effect of collaborative learning. Students may learn specific methods to compensate their disadvantages and improve the learning skills.

Tutor plays an important role in the collaborative learning. Though students learned knowledge motivating by themselves, tutor is the one to control the whole process of collaborative learning. Tutor would provide proper solutions to students’ questions and instruct students to deal with their debates and set up a proper learning goal.

Collaborative learning always conducted in the certain environment which includes organization, space, hardware and resource. Organization means the structure of a collaborative team. Space refers to sites of learning, including the classroom and internet. In my system, the space is internet system. Hardware includes the hardware components, such as the internet components and computer hardware, which support the function of collaborative learning. Resources mean the materials that learners could make use of, including virtual library and internet information.

2.3 Basic theory of collaborative learning

Web-based collaborative learning, which represents the important direction of future development, is a new-born product which combines collaborative learning and internet technology. Therefore, it

is necessary to study its basic theory in order to make a better practice.

2.3.1 Constructivism learning theory

Constructivism is a theory of knowledge that argues that humans generate knowledge and meaning from an interaction between their experiences and their ideas. [6] Constructivism is a fundamental theory in web-based collaborative learning, and has been developed by congnitivism learning theory. Constructivism learning theory focuses on not only knowledge itself and learning purpose, but also the environment which may cause impact to learners. According to constructivism learning theory, learners were not leaded by teachers to learn something, but construct an inert mental representation through interactive activities under the certain circumstances [7]. Meanwhile, with the help of other learners, they can share resources and communicate with each other, achieving the knowledge through meaning constructivism. During the process of constructing the sense of learning, the experience, background knowledge, recognition structure that the learner possessed play an very important role. The constructivism thought that situation, conversation, collaboration and meaning construction influenced the effect of learning of every learner [8].

2.3.2 Humanism learning theory

Another important learning theory in web-based collaborative learning is the humanism learning theory which is offered by Rutgers. Humanistic learning theory is based on humanistic psychology, relying on the basic theoretical framework of humanistic psychology, the knowledge of the purpose of a unified concept of teaching and meaningful concept of freedom of learning, student-centered teaching concept, which is the basic point of humanistic learning theory [9]. According to humanism learning theory, learning was divided into two parts which are nonsense syllable learning and meaningful learning. Nonsense syllable learning was regarded as the knowledge accumulation that it only refers the mental and has no relationship with emotion while the meaningful learning was regarded as the opposite one. Meaningful learning requires learners' behaviors, attitudes, personality and may have an important impact to the future. Humanism learning theory advocates that a person should be educated in all aspects including the knowledge itself and personality [10].

Everyone can be a learner and the process of learning will be more meaningful if the content which was learned in accordance with the initial purpose. When a learner devotes him in the learning, his study will be simulated and encouraged and form a last-long and deep learning. Team-work will promote the learning effect of the learners. Therefore, similar with Contructivism, Humanism thought the learner is the most important part in the learning process, and environment has also played a vital role [11]. Nowadays, collaborative learning, acting as a humanism learning method, focus on the group-work which encourage learners to develop in a comprehensive way and was influenced deeply by the humanism learning theory.

2.3.3 Group dynamics

Group dynamics means the “resources” which come from the inner group. It provides a vital tip for the collaborative learning that is team members who possess different intelligence, knowledge, thinking style and cognition may compensate with each other [12]. The collaborative team may do help to students with their self-esteem and stimulate them to learn more so that they could contribute more to the group. From the perspective of group dynamics, collaborative learning could be concluded into three points: when the whole group come together to fight for the common goal, working in unity and helping one another seems more important. Unity motivates the individual:

(1) Encouragement. Members may do everything that may benefit the group. When the group get down, members are the best companions to each other, and encourage each other to become more confident to get rid of the obstacle.

(2) Help. Members may help each other within the group, because they may treat other members in the same group as their companions. Every member may use their advantages to compensate others’ shortcomings.

(3) Love. Everyone wants there’s someone that can instruct and help them to achieve the goal. And obviously, one also enjoys the sense of the achievement when they help others to succeed. The collaboration within a team is the best practice of such a situation. Members will love each other and be friendly to help other members within the team and acquire the corresponding fulfilment from it.

In this way, collaborative learning's core notion is working in a unity. Members in a team may encourage, help, and love each other.

2.4 Web Technology

Computer-based internet is an effective and multifunctional media which provides the information channel for the learners to communicate with each other. Under the circumstances of web, learners can make use of the internet to exchange information and study in a collaborative way. Meanwhile, students can communicate with teachers and classmates through the internet. Information technology and internet technology‘s booming break the traditional concept of time and space and make it possible for internet to become a more useful and stronger tool for learners to carry out their learning activity. The openness and convenience brings a brand new method for learners to learn better. Every learner share the fair chance to talk to anyone they like and formed their own communication space. In this space, different learners have various age, sex, cognition and knowledge, these differences help them show their advantages and compensate others' shortcomings within the group. Therefore, web provides learners a free space which has a deep impact of the way of education.

2.4.1 Comparison between different collaborative learning platforms

◎Collaborative learning based on E-mail

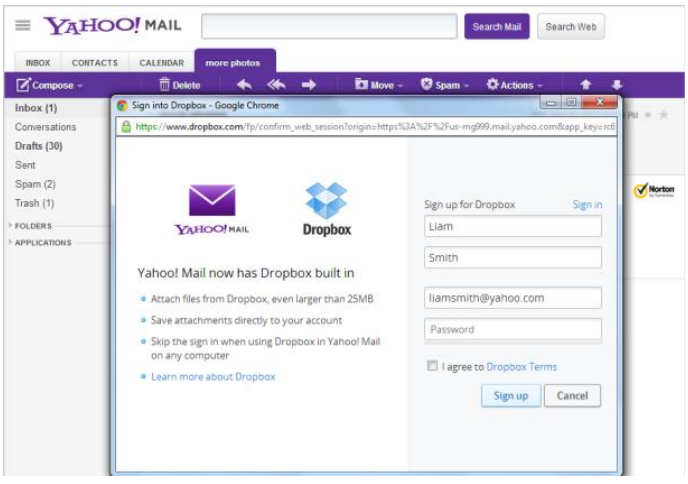


Figure 1 Yahoo E-mail System

[CI_3112] [An Exam Revision Tool That Supports Collaborative Learning]

E-mail, which is the short form of Electronic mail, is the most common service in the internet. It makes use of electronic to send the mails and information resources, providing the easiest, fastest and economical communication method which contains words, images and voices [13]. Email is a typical asynchronous interaction platform. Learners in this platform can complete different kinds of communication, the information can be sent to others correctly. What's more, email is a mature, stable and maintenance-free technology. However, when it comes to the collaborative learning, Email also has its own shortcomings. First of all, it has the time-delay. It means that when learners send or receive the mails, it exists time-delay. The worse the quality of the internet, the longer the delta T is. Secondly, Email can only be sent from one person, it can't make the atmosphere of heated discussion as a team. Thirdly, the mail box will always receive the trash mail which will raise the risk of information leak and information block which would finally lead to a bad effect of learning. Fourthly, Email is lack of learning resources. Email itself can't contain learning resources; it is only a tool that delivers the information.

◎Collaborative learning based on BBS

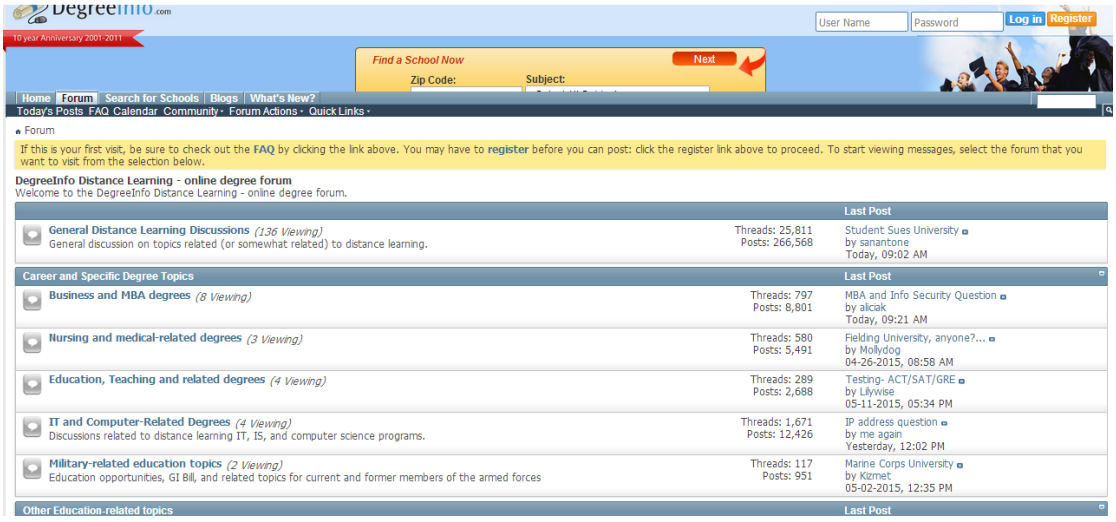


Figure 2 An example of BBS System

BBS is the short form of Bulletin Board System serving as an electronic forum on the internet. It provides users authority of anonymous remote visit, making it possible for public to discuss through internet using electronic information [14]. BBS provides learners a free platform because it has fair and wide-range of content; the anonymous identity also gives users a space to say what they really want. BBS can help the learners learning collaboratively on the internet, and achieve the maximum

benefit. However, BBS also has its disadvantages. First of all, time-delay makes the discussion lack of the atmosphere. Learners can only submit their opinions on the bulletin board; others may reply that posts however, at other time. BBS just represents the asynchronous education. Secondly, BBS not has resources for learners. The knowledge must come from the search results of internet or the learners themselves. Thirdly, the way of interaction is unique. During the discussion, students has the only way to communication with each other, and it is especially not convenient when learners want to talk to the certain learner. Fourthly, the method of sharing resources is unique. Learners can only sharing the resources through the bulletin board. Finally, it is complex to build a BBS forum.

◎Collaborative learning based on video meeting

Figure 3 Illustration of Video Meeting System

Video meeting system refers to two or more learners who are in the separate places make instant communication by using media devices, sending the voices, images and files to each other [15]. It provides a visual and fast communication for learners in different places. Video meeting system can provide learners real emotion exchanges while some holes existing. Firstly, it is not convenient to record the information in a file. The information that transmits during the talk can't be written down and saved. In this way, the information will be hard to pass down. Secondly, there exist many

operational problems. Though the government are planning the standard for the operation of video meeting system which is used for education, current problems block the development of this technology. Thirdly, the current internet technology can't guarantee that every learner can enjoy the best experience of video online collaborative learning. The interaction may face obstacle unless the technology has more breakthroughs. Fourthly, it is expensive to pay for the circuits and e-communication including the initial investment and maintenance. What's more, this system has a high standard for the broadband; however, many schools can't meet this standard nowadays.

◎Collaborative learning based on blog

Figure 4 Example of Blog System

Blog is an internet service which mainly provides users a space to publish their own notes [16]. The content on the blog usually displayed by the order of time, the newest information will be showed in the front. It has many advantages. Firstly, blog is easy to use because everyone can apply the account and has the private space. Secondly, this system is open because everyone can create and publish their blogs. Thirdly, the knowledge published on the blog can be viewed by every learner, so it has the maximum authority for learners to view others' "knowledge". Fourthly, blog can contain words, images, and links of other resources which make the content abundant and do well to the knowledge accumulation. All of these advantages makes blog become a good choice of collaborative learning. However, blog also has shortcomings. Firstly, learners in the blogs

communicate with each other in an asynchronous way. Secondly, blog is a platform for learner to publish their private opinions, and not focus on the collaboration. Thirdly, the way learners communicate is unique, because learners can only exchange their opinions by making comments or leaving messages. Fourthly, the channel of sharing resources is only the blog board. Learners have no other way to share their knowledge and resource. Finally, the knowledge on the blog is hard to be regulated and sorted. Blog is easy to become useless because of its useless content. The information on blog may be repeated and inflated which will be hard for learners to search the useful information they want.

◎Collaborative learning based on QQ

Figure 5 Interface of QQ from Tecent

Tencent QQ, which is the representative of IM software, provides users a convenient and satisfactory communication platform. QQ has been used by most of the public in China, so it has a large base of users. With the development of WEB2.0, QQ has also developed its own functionalities in order to meet the needs of the public. Its merit of communication, sharing and collaboration supports the collaborative learning very well [17]. However, as a tool of chatting, QQ always has a large amount of record which may contain much useless information. For learners, it is

not convenient for them to search for the certain knowledge through the history record.

2.4.2 Principle of java & jsp web programming

Java is the object-oriented programming language [18]. There're two ways when use java to develop a web: one is to use servlet, the other is to use jsp. Servlet is widely used in the past web development, it needs embedding large amount of HTML codes in order to show a web page [19]. With the development of internet technology, JSP gradually took place of servlet because JSP can be embedded with HTML codes conveniently. When the JSP file was run on the server, it will be converted into servlet at first, and then it will be compiled. JSP can hold powerful functionality by combining the advantageous of servlet and JavaBean. JavaBean is a reusable software component across different platforms. JavaBean can help separate the Java codes and HTML codes. In this way, the system will have a high reusability and the performance will also be promoted at the same time.
Java can use JDBC to access the database easily. The interface is similar between different kinds of database, so it will be convenient if the database is changed. Java can be used to implement the wide-used web which can be run under different operating systems including Linux and Windows. There are free web server can be used for Java web, including Tomcat and JBoss, so it is convenient to implement the java web. Java has big advantages in distributed architecture because it can have multi-layer architecture [18]. The different layers are separate from each other, and each of them has mature structure to be implemented which help programmers to develop the web in an effective, reasonable and scientific way. From the perspective of safety, the users can only see the compiled documents instead of the source codes, so java software has a safer performance.

Chapter 3: Design and Implementation

3.1 Design the system

3.1.1 Design the initial specifications

According to the aim of this project and background knowledge of collaborative learning, initial

specifications were determined first. The main function of this system is to help students review their courses by adopting the characteristics of collaborative learning. This initial specification aims to settle down the basic structure of the system so that the additional requirements could be added easily.

The initial analysis of students' requirements includes: be able to answer the problems through the tool, have chances to be scored by the lecturer, be able to see other students' answers, be able to comment on others' answers. The initial analysis of lecturers' requirements includes: be able to input more exam items, be able to see students ‘answers, and be able to delete any exam items.

3.1.2 Design the questionnaires for potential users

At the beginning of the design, I need to know more user requirements to decide the specific functions of the system. Requirement analysis is basic to learn how to design the system so that the waste can be avoided. The first step is to identify what functionalities that users need. I adopt the method of online questionnaire, and designed the questions to collect responses of users to the basic functions that I designed.

My questionnaires constitute with two different parts. One is for teachers of class while the other is designed for students. In December 2014, I published the questionnaires and sent out the links of questionnaires to students and teachers by emails (including 65 teachers and all of the students in International School of BUPT).

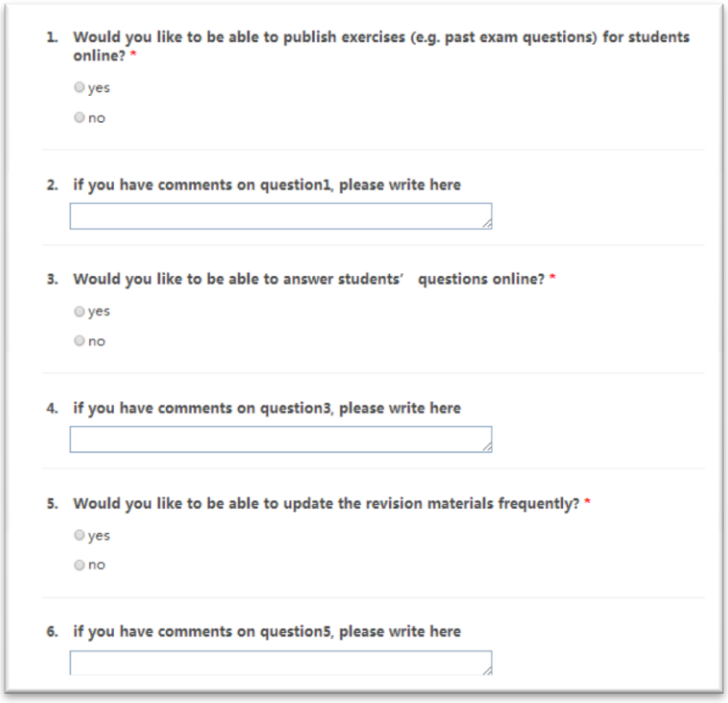


Figure 6 Screenshots of Teacher's Questionnaire from Question 1 to 6

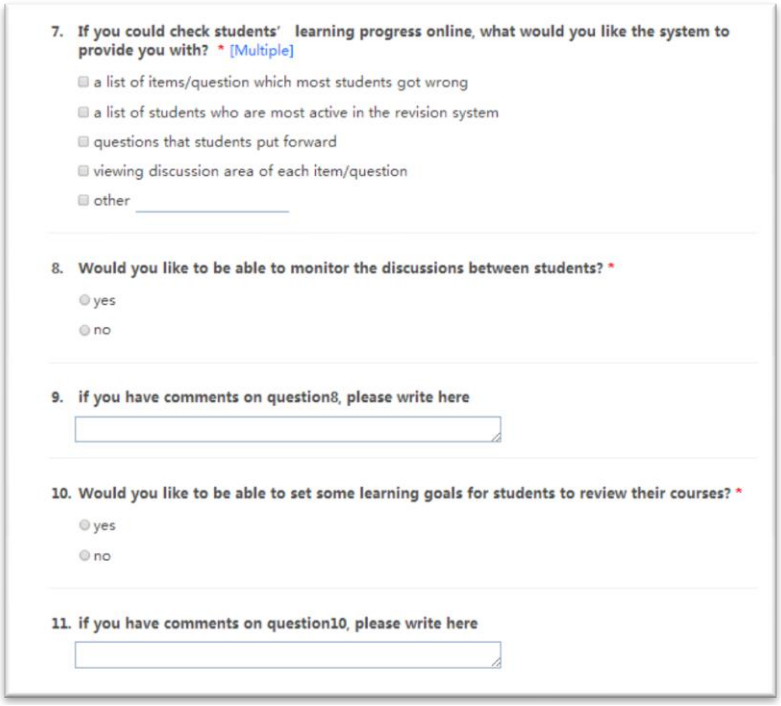


Figure 7 Screenshots of Teacher's Questionnaire from Question 7 to 11

[CI_3112] [An Exam Revision Tool That Supports Collaborative Learning]

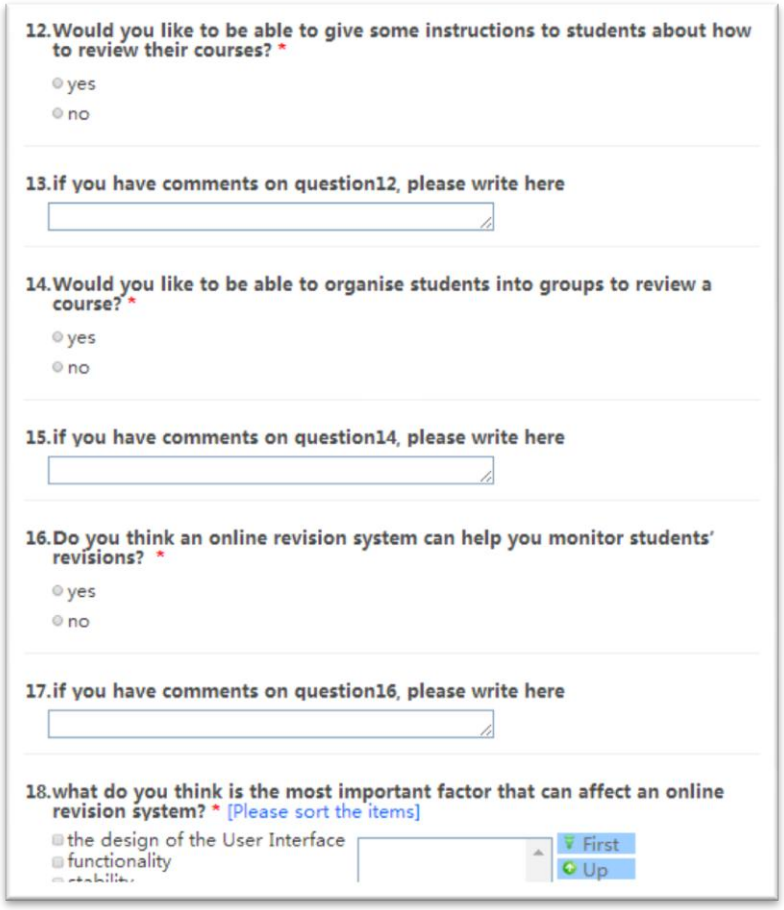


Figure 8 Screenshots of Teacher's Questionnaire from Question 12 to 18

In the teachers' questionnaires, questions are around four topics including the interests of participating into this system, interests of instructing students through this system, opinions toward the effectiveness of this system and important factors that affect the system. Teachers will act as tutors in the collaborative teams and they have the responsibilities of controlling the process of collaborative learning and instruct the students to set the right learning goals. Therefore, the participation of teachers will largely influence the function of this system. If teachers could share materials or give useful instructions to students through the system frequently, it will do well for students to revise better for the course. However, participation cost of teacher's time. Although through the internet, teachers may be more flexible to control their time because they can log into the system and know the status of the members anywhere, they still need to show enough interests toward doing that. Besides uploading resources and sharing tips, tutors has significant responsibility to organize students including organize students into groups to review a course.

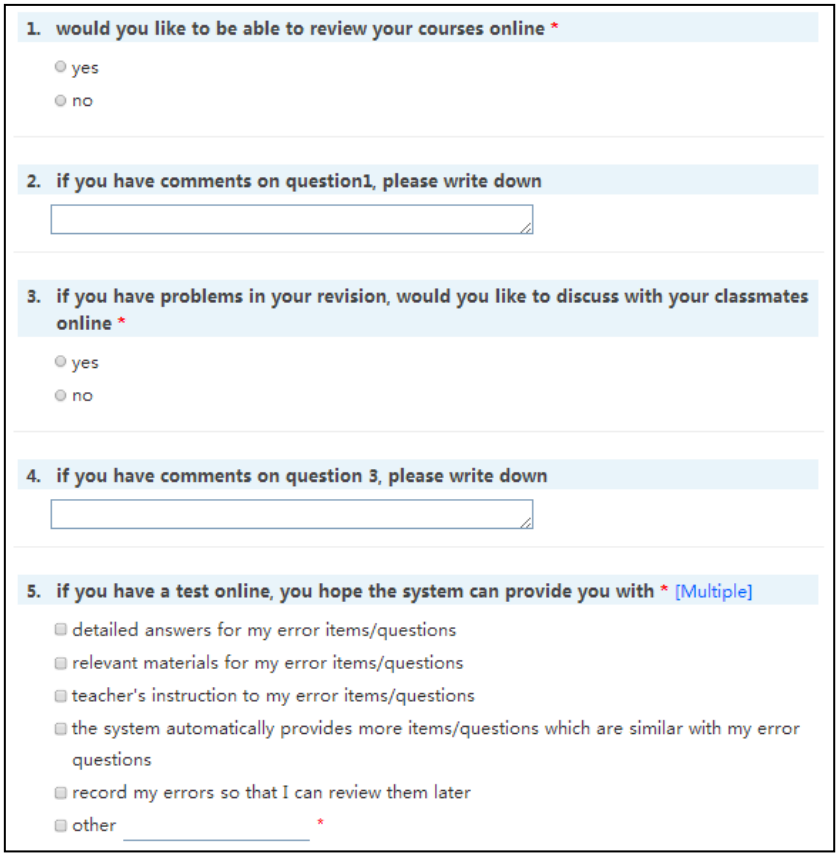


Figure 9 Screenshots of Student's Questionnaire from Question 1 to 5

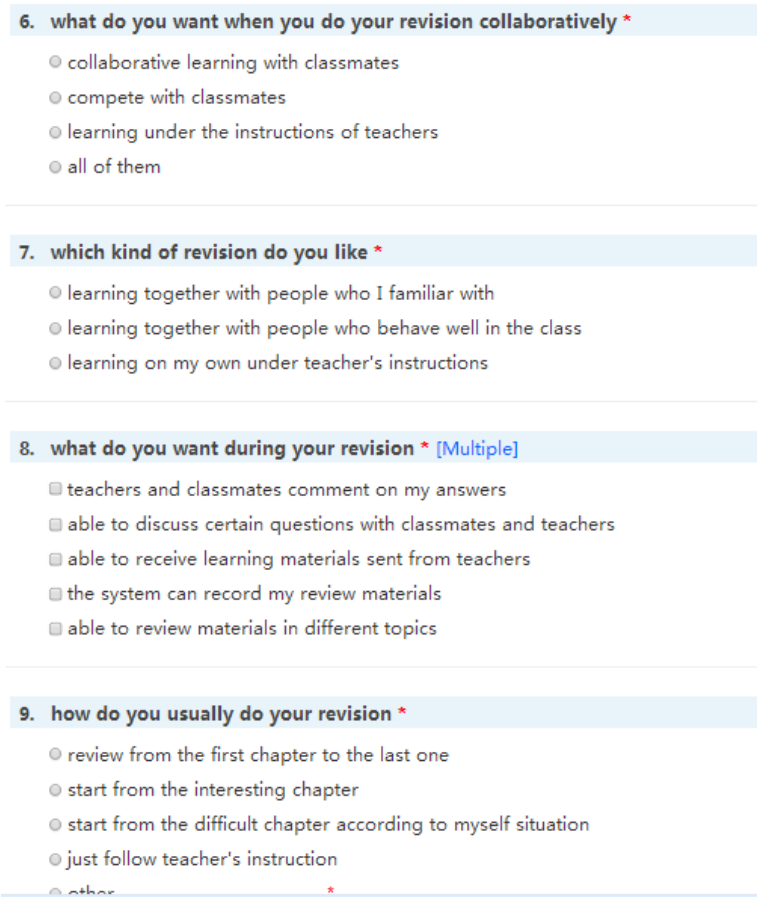


Figure 10 Screenshots of Student's Questionnaire from Question 6 to 9

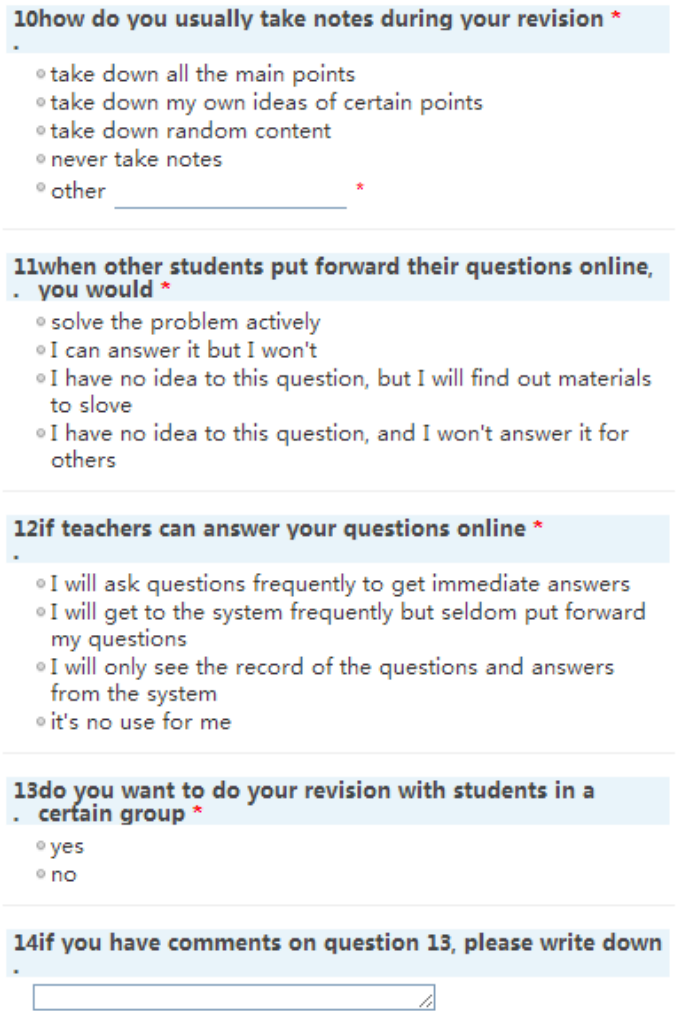


Figure 11 Screenshots of Student's Questionnaire from Question 10 to 14

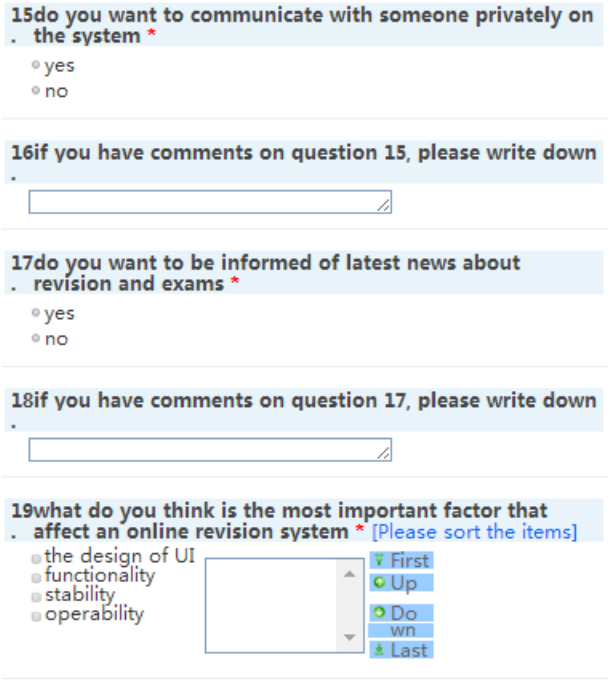


Figure 12 Screenshots of Student's Questionnaire from Question 15 to 19

In student's questionnaire, I designed 19 questions to know requirements of students toward this system. These questions mainly aim to know students' interests toward using internet to review their courses by cooperating with other students. The learning habit of students will largely influence their learning effectiveness through this system. The questionnaire also includes an important part which is to know what resources students want to get during their revision. Internet always has its unique advantage of possessing large information and easy to be shared. During students' revision, all of the information seems to be important, especially those from their supervisors. The requirements collected from students can be integrated with the responses of teachers. In this way, the system would offer more useful information to students.

3.1.3 Analysis of the specifications according to responses of the questionnaires

After publishing the questionnaires to both teachers and students, I received 12 responses from teachers and 104 responses from students.

- **Teachers' questionnaire:**

By analysing the responses of teachers, the statistics shows that, there're 91.67% teachers would like to publish exercises (e.g. past exam questions) for students online and answer students'

questions online, nearly 92% teachers also showed that they hope the system could show them a list of items/question which most students got wrong during their revision. And one teacher comments that he would like to use some questions focussed on particular topics rather than past exam questions. This result demonstrates that the function of uploading materials is feasible. What's more, teachers will be able to know more about situation of students' study by looking up the results of online test. In this way, teachers can give students more appropriate revision tips and class.

There're nearly 75% teachers showed that they would like to update the revision materials frequently through this system and organize students into groups to review a course. However, some teachers comments that the groups should not be large groups and whether the group learning will benefit the weaker students. This figure shows that most teachers are happy to share the useful materials for students but the most concerned thing is whether every student can get benefits through the system during revision process. It requires the system had better be able to make groups for students automatically and largely involve every student in.

In the question about which aspect should be provided to teachers to check students' learning situations, most teachers chose "a list of items/questions which most students got wrong". It demonstrates that teachers want to know what the difficult point is for students in their study. These difficult points may also benefit teachers to improve their teaching skills or spend more time to focus on the study of certain topic. There are nearly 58.33% teachers thought a list of students who are active in the system and questions that students put forward should be provided through this system. In this way, teachers should be given the power to view the "question board" and answer questions to students. The system should also publish the rank of students by calculating the participation times of each student. However, there're only 16.67% teachers want to review discussion area of each question. Thus, this function can be cancelled for now.

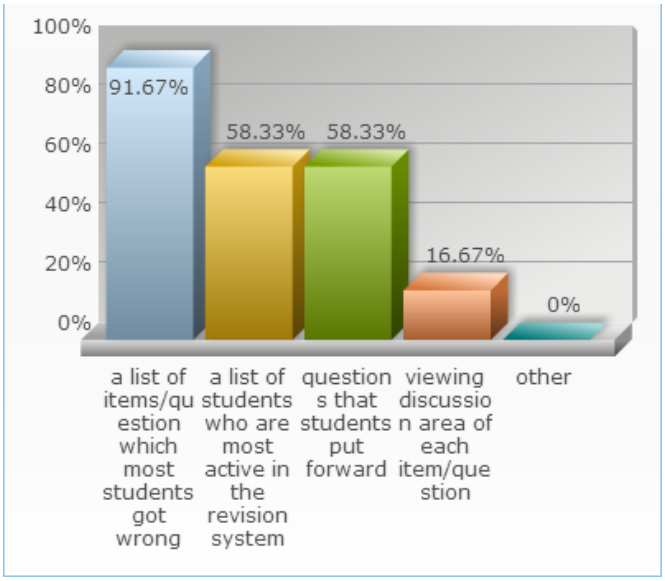


Figure 13 teachers' response to question "Would you like to be able to answer students' questions online?".

Nearly 67% teachers thought the online revision system can help monitor students' revision and would like to monitor the discussion between students. There're 83.33% teachers shows that they would like to set some learning goals as well as give instruction to students to help them review their courses. This figure demonstrates that, the online review system could largely accumulate the learning resources provided by teachers and help students to plan a better revision. However, one teacher also pointed out that students with higher grade should also be able to plan their own revision well rather than depend on teachers' materials. Since more than half of the teachers would like to involve in the online revision discussion with students, teachers should be given the power to submit sentences through students' discussion on the bulletin board.

•Students' questionnaire:

By analyzing the responses of students, the statistics show that students are pleased to review their courses through internet system. Besides some of the students say that computer is not convenient or does harm to eyes on the comment part, some students also point out if they can take notes online. At the same time, there're 67.31% of the students says that they hope the system can record their errors so that they can review them later. Therefore, the function of collecting the certain questions of the exam seems to be important for students.

Nearly 70% of the students would like to use online system to discuss with classmates. However, some students pointed out a worry that students may use the discussion board as their "chatting

room". To solve this problem, the system will not have the specific discussion space. Students can only comments or put forward their questions under the certain question after they have finished doing that question. Additionally, there are more than half of the students hope that they system can provide with the relevant materials or questions to their error questions.

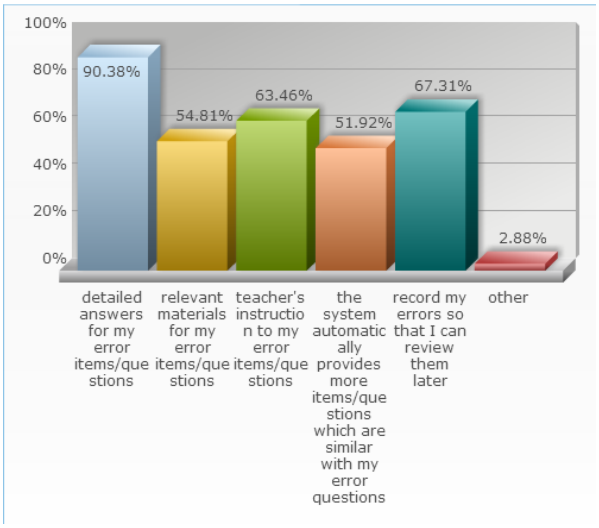


Figure 14 students' response to question "if you have a test online, you hope the system can provide you with".

Students voted for different learning style includes learning with familiar people, best students or alone equally. The same situation occurs on the question about learning collaboratively or under competition. Therefore, the formation of learning style will not be restricted by the system; students will choose what they like. In the question of learning ways, most of students say that they would like to review from first chapter to the last one and they would like to take down the main points. Thus, the system should be able to allow them to record something into their personal account so that they can look up when they want.

Through the questionnaire, most students hope that they can be able to discuss certain questions with classmates and teachers. About 72% students show that they would like to do their revision in the certain groups and nearly 53% of the students say that they will ask questions frequently if the teachers are available to answer their questions. It demonstrates that they have the desire to solve the problems by cooperating with others. And more than half of the students also pointed out that they hope they can receive learning materials sent from teachers. In this way, their requirements can be met by sharing resources through this online system. What's more, nearly 80% of the students

are pleased to help others solve their problems or search the materials for them. And, more than 80% students have the requirement to be able to chat with certain student and to be informed if there's latest news about revision or exam. So, the functionality of leaving message should also be added.

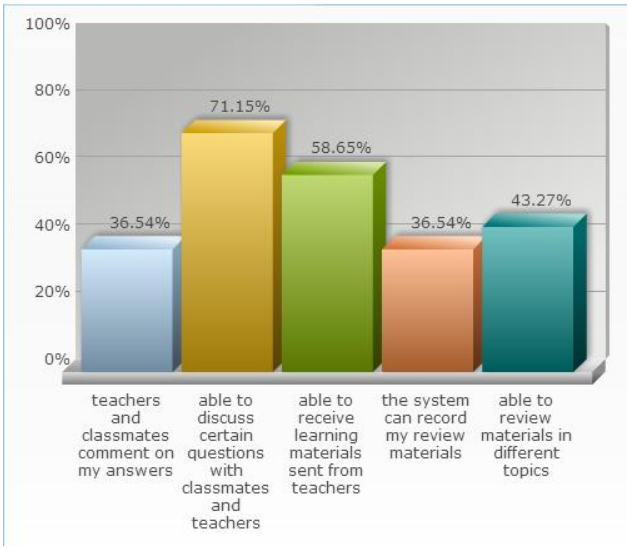


Figure 15 students' response to question "what do you want during your revision".

Both teachers and students thought the most important factor of this online system is its functionality. Therefore, the functionality must be practical enough to meet most of users' requirements.

3.1.4 System Functionality Diagram

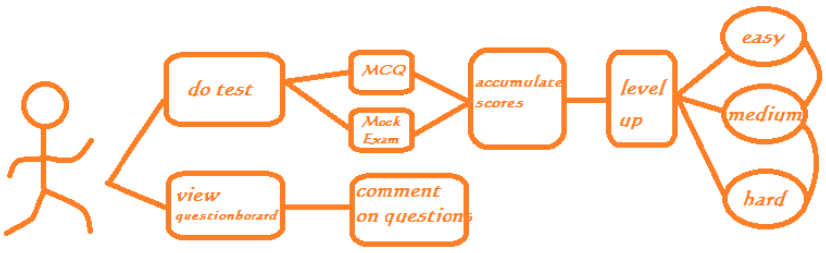


Figure 16 Functionality of student's subsystem

As is shown in this diagram, the diagram of student's subsystem demonstrates the main functionalities that students can use. There're two main parts for students.

One is about doing the online test. The test module contains two different kinds of test which are MCQ (Multiple Choice Question) and Mock Exam. When students do the test and answer the

questions correctly, they can get the corresponding scores as a bonus. All of the students must start from the easy level which means that questions in this level are relatively easy. When the accumulated scores rise, students can level up. And the students in the higher level have the right to give score to lower level's answers. Students in higher level are forced to see the answers and judge the answers three times a week in order to guarantee that every student in this system try their best to contribute their knowledge.

The other part is that students can put forward the questions and view other students' questions from the question board. At the same time, they can publish their comments under the certain question.

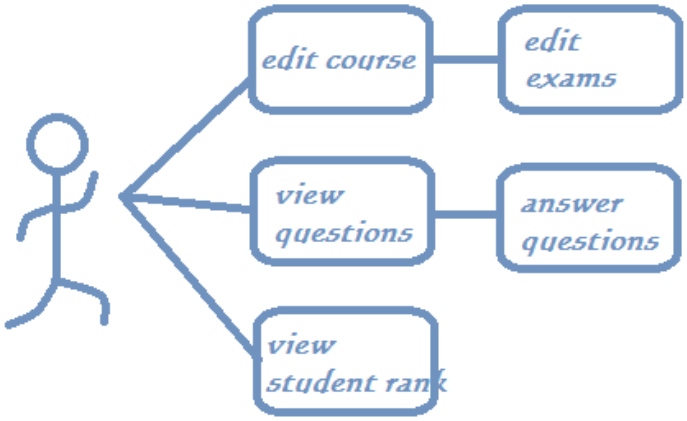


Figure 17 Functionality of teacher's subsystem

At the same time, they can publish their comments under the certain question. Teachers play an important role in the collaborative learning system, especially in editing course and question information and controlling the behaviours of students by viewing their questions and the answers of exam. Teachers also have the authority to view the rank of students according to students' accumulated scores. By knowing the ranks, teachers can encourage students to do more practice of exam through this system.

3.2 Implementation

3.2.1 Implement Doing Test Sub-System

Table 1: Doing Test Sub-System

Design Model Design Class	Implementation Model Implementation Components
Choose MCQ topic_UI	chooseMCQtopic.jsp
MCQ Topic_ Control	chooseMCQtopic.jsp
MCQ test_UI	onlineMCQ.jsp
ChooseMockExam_UI	choosenumber.jsp
Mock Exam_UI	mockexam.jsp
Mock Exam_Control	mockexam.java, Item.java

In the file “chooseMCQtopic.jsp”, the system will operate with the data which is used to choose a certain topic of questions and submit it to the database to search the matched results. Then, the results will be forwarded to the “onlineMCQ.jsp” and are printed out all of the questions through the codes in this file. In the mock exam part, it is the “mockexam.jsp” which handles with the input data that is used to choose a certain number of questions, and send the data back to the “mockexam.java” to operate; the “mockexam.java” contains the codes that can connect to database to select the matched ones. “Item.java” helps with set up the “class” which give definitions to the course and questions.

3.2.2 Implement Evaluating Test Sub-System

Table 2: Evaluating Test Sub-System

Design Model Design Class	Implementation Model Implementation Components
MCQ result_Control	MCQresult.jsp
Mock Exam result_UI	submitmock.jsp
Student Grade Other Answer_UI	examiner.jsp
Student Grade Other Answer_Control	submitexaminer.jsp
Teacher View MockExam Answer_UI	viewmock.jsp
Teacher Grade Answer_Control	submitexaminer2.jsp

In the evaluating test sub-system, students can give grades to the lower level students while teachers can view the results of all grades and change the grades. “MCQresult.jsp” is the file that deals with the answers of students and stored them into the database. In the mock exam, students can through “submitmock.jsp” to submit and stored their answers. The “examiner.jsp” aims to provide functions to higher level students to view the answers and give their decisions. When the higher level students submit their decisions, the system will post the data generated in the “examiner.jsp” to the “submitexaminer.jsp” so that the decision and other data can be stored in the database. As teachers, they can view all of the answers and their grades through the “viewmock.jsp” by showing their identity information, this file will handle with the ID information and submit the data to the database and finally retrieve the results that are matched the teachers’ courses. If teachers want to modify the grades, their changes will generate from “viewmock.jsp” and be handled in the “submitexaminer2.jsp” and then stored into the database through this file.

3.2.3 Implement Viewing QuestionBoard Sub-System

Table 3: Viewing QuestionBoard Sub-System

Design Model Design Class	Implementation Model Implementation Components
Student View Question_UI	questionboard.jsp
Student See Comment_ Control	seecomment.jsp
Student Submit Question_Control	raisequestion.jsp
Student Submit Comment_Control	seecomment2.jsp
Teacher View Question_UI	studentQuestion.jsp
TeacherViewStudent’sComment_Control	replyquestion.jsp
Teacher Submit Reply_Control	replyq2.jsp

Both students and teachers have the right to view question board. As a student, one can view all the questions by visiting the file “questionboard.jsp”, this file will retrieve the matched data from database and print the corresponding content on the webpage. Meanwhile, teachers can view questions by accessing the file “studnetQuestion.jsp”. When the students want to see the comments of the certain question, they can get access to the comments with the help of “seecomment.jsp”. This file will search in the database about the certain question, and get back the comments. If

students want to leave their own comments under certain question, they can leave their comments at “seecomment.jsp”, and the data will be delivered to the file named “seecomment2.jsp” which can stored the comments to the certain question in the database. Students can put forward question by inputting into the file named “raisequestion.jsp”, this page can store the questions into the database. If teachers want to review students’ comments, they can access to the file “replyquestion.jsp”. Teachers can also generate their comments on this file, and this file will delivered the data to the file called “replyq2.jsp” and store the data into the database.

3.2.4 Implement Editing Course Sub-System

Table 4: Editing Course Sub-System

Design Model Design Class	Implementation Model Implementation Components
Add Course_UI	welcometeacher.jsp
Add Course_ Control	addCourse.java
Delete Course_UI	welcometeacher.jsp
Delete Course_ Control	deleteCourse.jsp
Edit Exam Questions _UI	adItem.jsp
Edit Exam Questions _Control	finishedit.jsp

Teachers have right the edit both course information and exam questions. They can add/delete the course through the file “welcometeacher.jsp”, and the information generated from this file will be delivered to the corresponding files to execute different functions, for example, ”addCourse.java” means add the data into the database and “deletecourse.jsp” means delete matched data from database. In the same vein, teachers can also edit the exam questions through “adItem.jsp”, this file can operate both adding and deleting the exam questions. And the corresponding orders and data will be operated in the file “finishedit.jsp” and connected with database.

Chapter 4: Results and Discussion

4.1 Web Results

4.1.1 Result of MCQ Test Sub-System

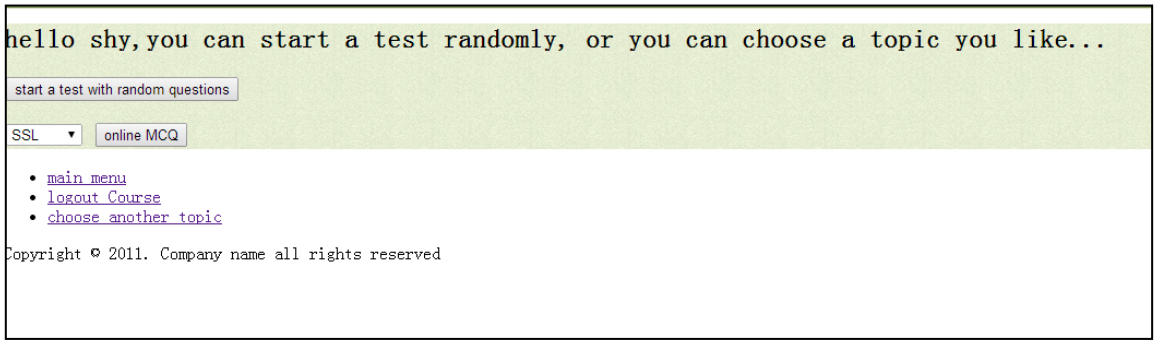


Figure 18 Before Starting the MCQ test

When students want to start an MCQ test, they have two choices to restrict the range of the questions. Students are given a chance to select questions under a certain topics. And these topics were given by teachers when these questions were added to the database. If students want to do the questions under a certain topic, they can choose a topic by select from the menu, and then click on the “online MCQ” button. If students don’t want to refine the topic, they can start the test by clicking “start a test with random questions” button.

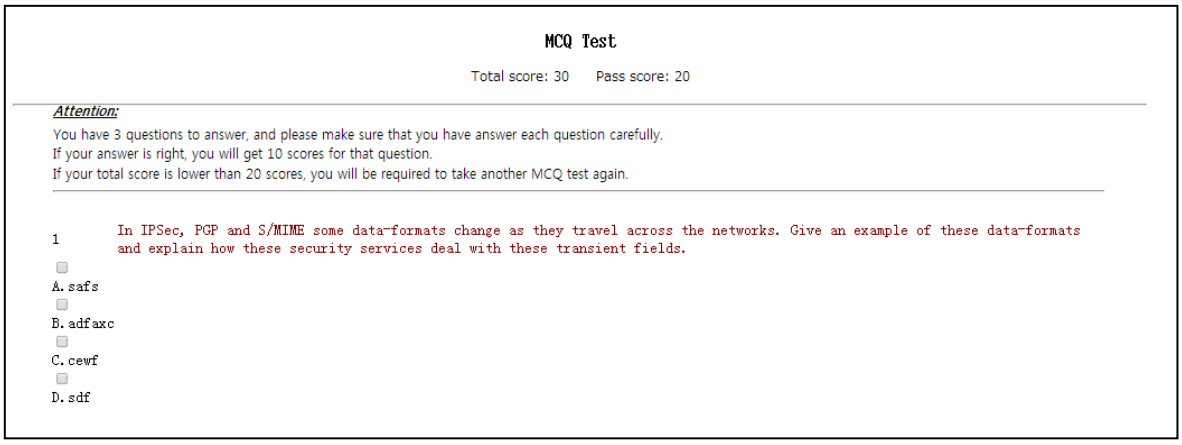


Figure 19 MCQ test

When students enter the MCQ test page, they should read carefully about the “attentions” in order to know the rules of the test. The test contains three questions at a time, students must finished all

questions and then, click the “submit” button to submit the answers. One question is worth 10 scores. However, if the student’s score is less than 20, he will be forced to do the test again, or he can’t use other functionalities. That is shown in figure20.

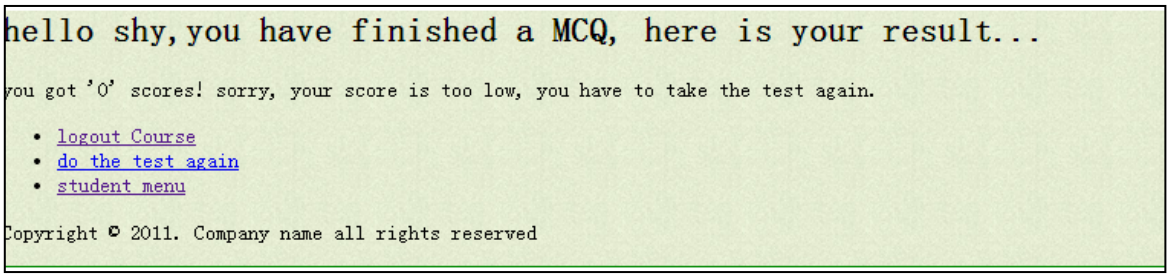


Figure 20 The MCQ test score is too low to do other thing

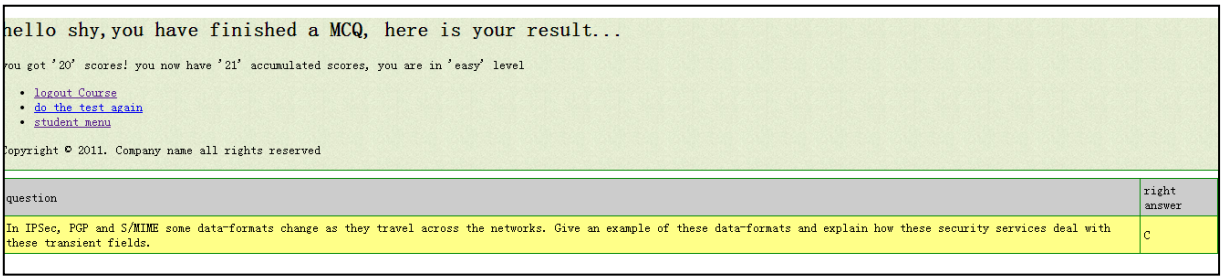


Figure 21 MCQ test Result

When students finish the MCQ test, they will see their scores of this test as well as their accumulated score and the level they are in. If they have a wrong answer, that question will appear below, and the right answer will be showed as well.

4.1.2 Result of Mock Exam Sub-System

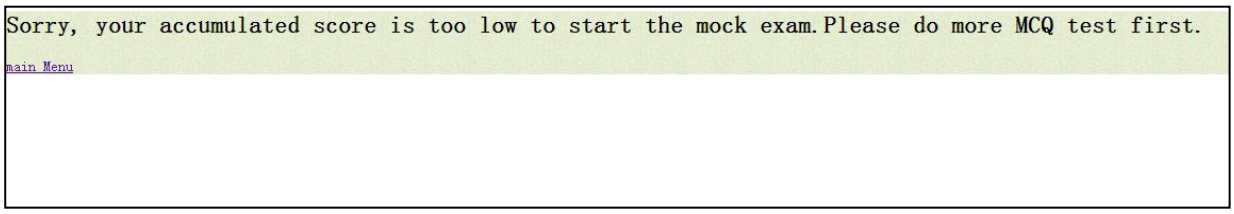


Figure 22 Fail to start a Mock Exam

If student’s accumulated score is less than 200, the student will have no right to start a mock exam. Students must do MCQ test first and answer a certain number of questions correctly.

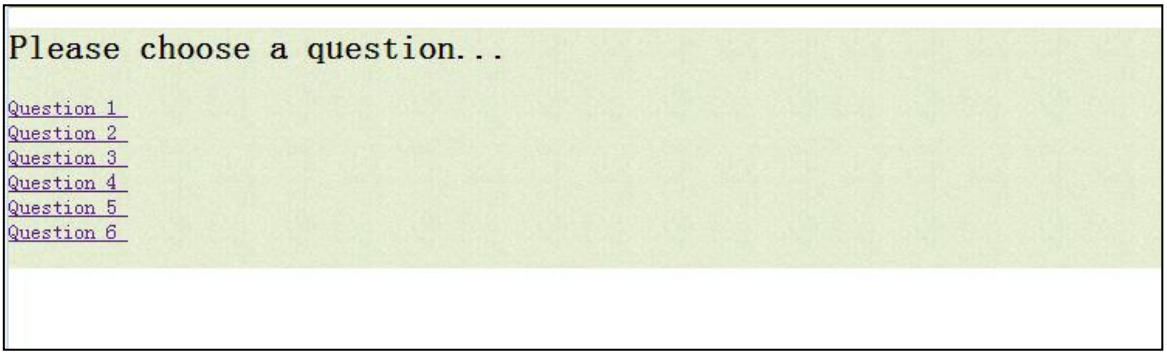


Figure 23 Choose the Number of Question for your Mock Exam

When students enter the part of Mock Exam, they will be given a choice to choose the number of questions under their level. If they have answered question 1, they may have chance to do it again, or they can choose other number of questions.

Figure 24 Answer the question of Mock Exam

When students start to answer the question, they can see the question and input their answer in the text area. If the size of the text area does not meet students' needs, they can adjust the area by dragging the corner. And, when they finish the answer, they can submit their answers by clicking "submit my answer".

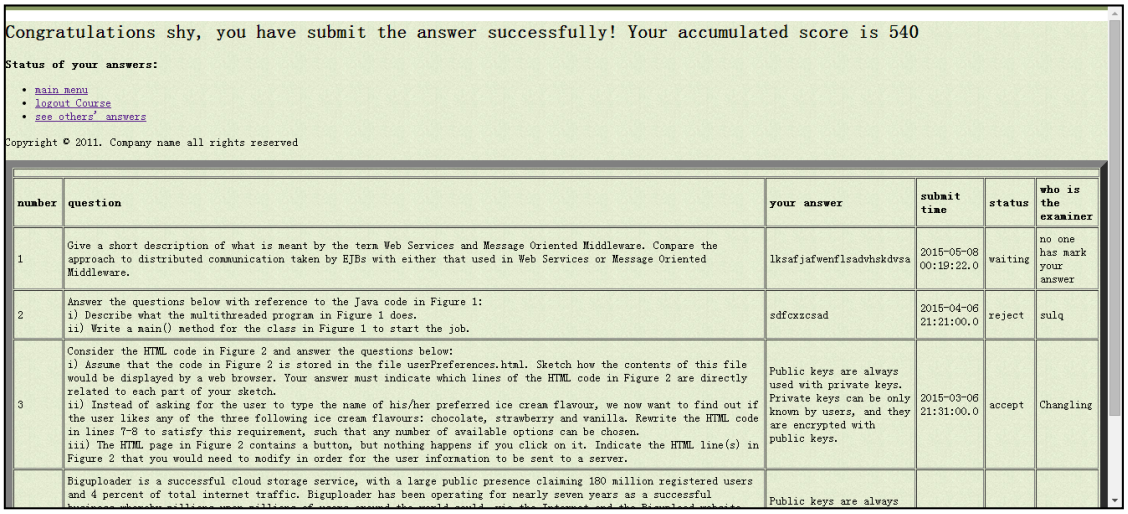


Figure 25 After submitting the answer of Mock Exam

If the student has submitted the answer successfully, he will see the congratulations page. And from that page, students can see all of the answers that they have submitted by time descendant, and the status these answers are. If the status shows "waiting", it means that the answer is waiting to be marked by other students. If the status shows "accept", it means that someone from higher level thought the answer is good. If the status shows "reject", it means that someone from higher level thought the answer is too bad to pass. And students can also see who give the grade from the "examiner" column.

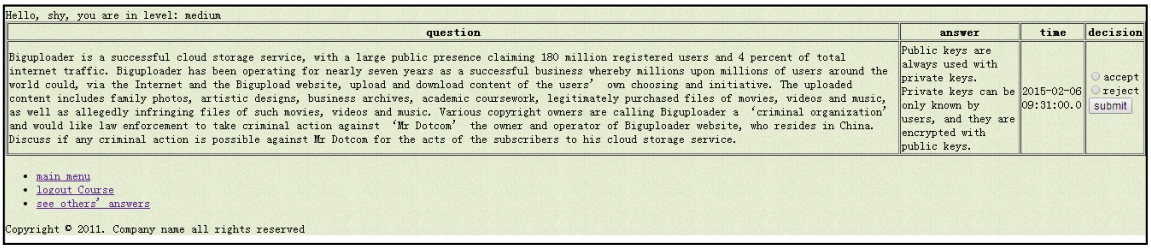
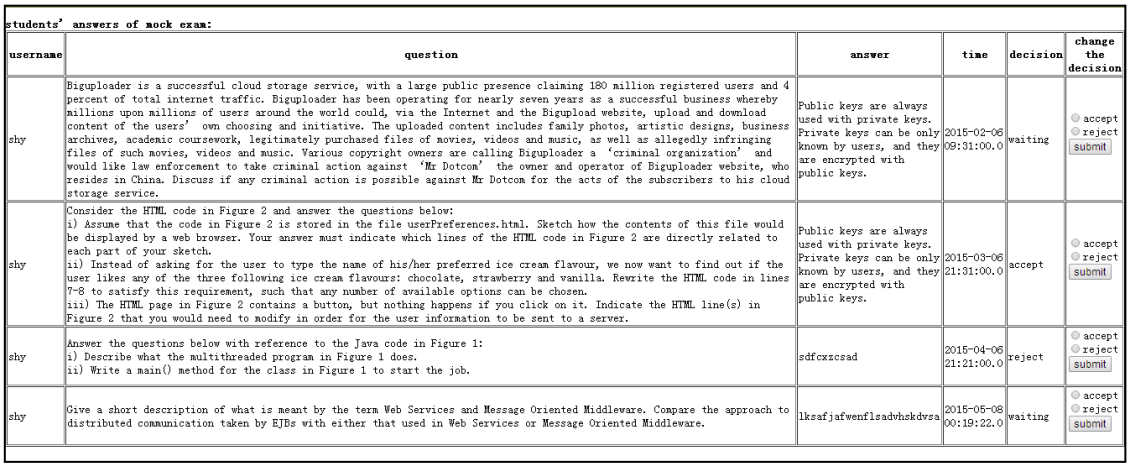


Figure 26 Grades other answer of Mock Exam

Students can grade lower level students' answers. Obviously, students from easy level have no right to judge other students' answers. When students are in the marking page, they will have right to reject or accept other students' answers by selecting on the radio button and clicking "submit".



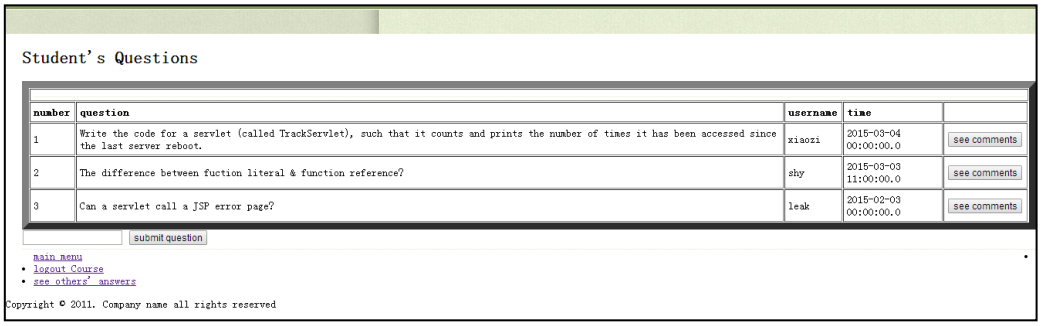
students' answers of mock exam:

username	question	answer	time	decision	change the decision
shy	Biguploader is a successful cloud storage service, with a large public presence claiming 180 million registered users and 4 percent of total internet traffic. Biguploader has been operating for nearly seven years as a successful business whereby millions upon millions of users around the world could, via the Internet and the Bigupload website, upload and download content of the users' own choosing and initiative. The uploaded content includes family photos, artistic designs, business archives, academic coursework, legitimately purchased files of movies, videos and music, as well as allegedly infringing files of such movies, videos and music. Various copyright owners are calling Biguploader a 'criminal organization' and would like law enforcement to take criminal action against 'Mr Dotcom' the owner and operator of Biguploader website, who resides in China. Discuss if any criminal action is possible against Mr Dotcom for the acts of the subscribers to his cloud storage service.	Public keys are always used with private keys. Private keys can be only known by users, and they are encrypted with public keys.	2015-02-06 09:31:00.0	waiting	accept reject submit
shy	Consider the HTML code in Figure 2 and answer the questions below: i) Assume that the code in Figure 2 is stored in the file userPreferences.html. Sketch how the contents of this file would be displayed by a web browser. Your answer must indicate which lines of the HTML code in Figure 2 are directly related to each part of your sketch. ii) Instead of asking for the user to type the name of his/her preferred ice cream flavour, we now want to find out if the user likes any of the three following ice cream flavours: chocolate, strawberry and vanilla. Rewrite the HTML code in lines 7-8 to satisfy this requirement, such that any number of available options can be chosen. iii) The HTML page in Figure 2 contains a button, but nothing happens if you click on it. Indicate the HTML line(s) in Figure 2 that you would need to modify in order for the user information to be sent to a server.	Public keys are always used with private keys. Private keys can be only known by users, and they are encrypted with public keys.	2015-03-06 21:31:00.0	accept	accept reject submit
shy	Answer the questions below with reference to the Java code in Figure 1: i) Describe what the multithreaded program in Figure 1 does. ii) Write a main() method for the class in Figure 1 to start the job.	sdfcxzcsad	2015-04-06 21:21:00.0	reject	accept reject submit
shy	Give a short description of what is meant by the term Web Services and Message Oriented Middleware. Compare the approach to distributed communication taken by EJBs with either that used in Web Services or Message Oriented Middleware.	lksafjafwenflsadvhskdvsa	2015-05-08 00:19:22.0	waiting	accept reject submit

Figure 27 Teachers can view answers of students and change the decision of answers

Teachers can view answers of students from Mock Exam. In this way, teachers can knoetter about the situation of students. And if teachers think the decision for certain answer is not fair enough, they have the final right to change the decision.

4.1.3 Result of QuestionBoard Sub-System



Student's Questions

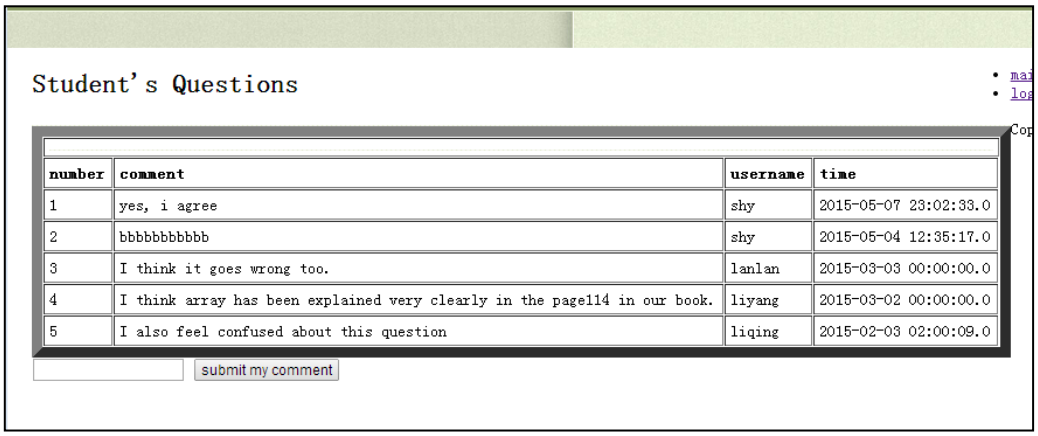
number	question	username	time	
1	Write the code for a servlet (called TrackServlet), such that it counts and prints the number of times it has been accessed since the last server reboot.	xiaozi	2015-03-04 00:00:00.0	see comments
2	The difference between fuction literal & function reference?	shy	2015-03-03 11:00:00.0	see comments
3	Can a servlet call a JSP error page?	leak	2015-02-03 00:00:00.0	see comments

submit question

main menu
- logout Course
- see others' answers

Copyright © 2011. Company name all rights reserved

Figure 28 Students can view questions put forward by other students or submit their questions



Student's Questions

number	comment	username	time
1	yes, i agree	shy	2015-05-07 23:02:33.0
2	bbbbbbbbbbb	shy	2015-05-04 12:35:17.0
3	I think it goes wrong too.	lanlan	2015-03-03 00:00:00.0
4	I think array has been explained very clearly in the page114 in our book.	liyang	2015-03-02 00:00:00.0
5	I also feel confused about this question	liqing	2015-02-03 02:00:09.0

submit my comment

Figure 29 Students can view comments and submit their comments

If students have question during their study, they can enter the question board part. Firstly, they can view what questions that other students have put forward and see the detailed comments by clicking on “see comments”. They can put forward their own questions by inputting the question into the text area and submitting. If they have any comment during the viewing of comments, they can also submit their own opinions by clicking “submit my comment”.

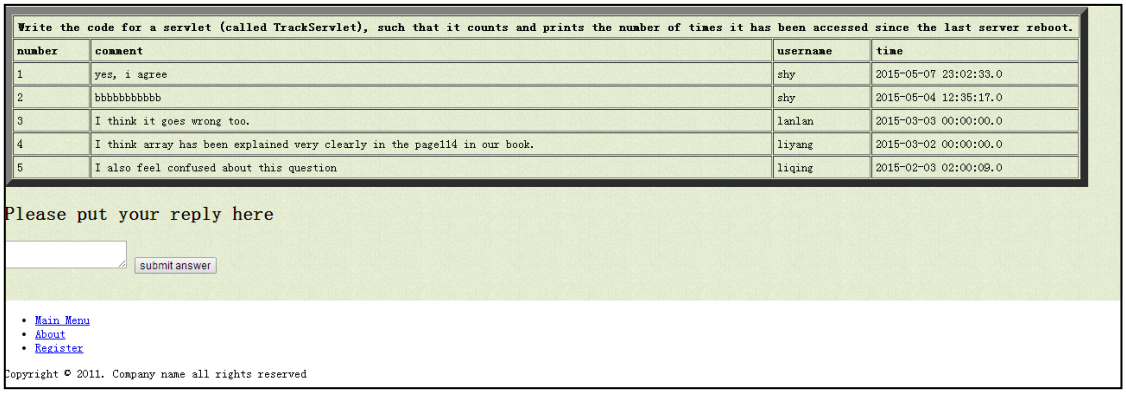


Figure 30 Teacher can view questions and their comments and submit a response

As a teacher, when he enters the question board, he can view questions list put forward by students. And when a question is clicked, the teacher can see the detailed comments for this question. At that time, teacher has the right to input justice reply by clicking “submit answer”.

4.1.4 Result of Editing Course Sub-System

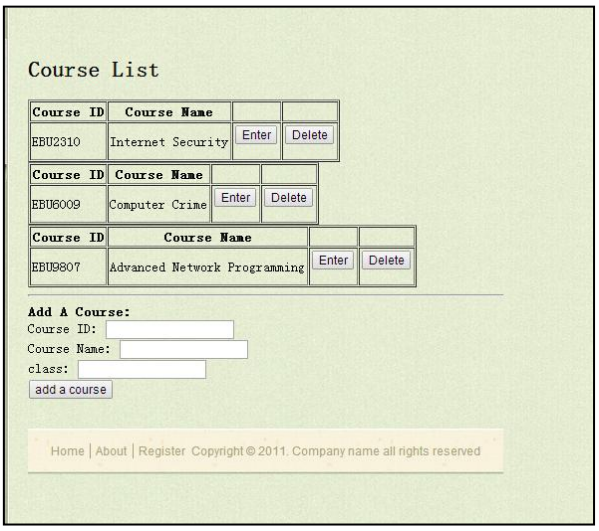


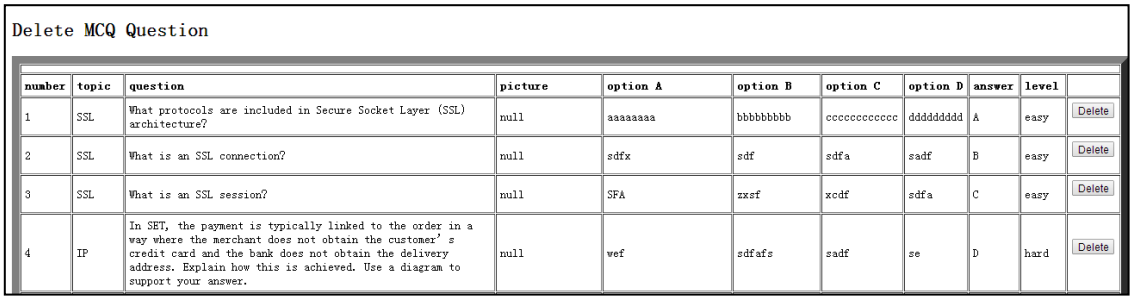
Figure 31 Teacher can add a course

Teacher can add a course before he can log into a course at the course list page. The teacher has to input course ID, course Name and the class information to create a new course.

At the same time, the teacher can also delete a course by clicking the button behind every course.

4.1.5 Result of Editing Exam Questions Sub-System

Figure 32 Teacher can add a MCQ question



number	topic	question	picture	option A	option B	option C	option D	answer	level	
1	SSL	What protocols are included in Secure Socket Layer (SSL) architecture?	null	aaaaaaaa	bbbbbbbbb	ccccccccccc	ddddddddd	A	easy	Delete
2	SSL	What is an SSL connection?	null	sdfx	sdf	sdfa	sadf	B	easy	Delete
3	SSL	What is an SSL session?	null	SFA	zxsf	xcdf	sdfa	C	easy	Delete
4	IP	In SET, the payment is typically linked to the order in a way where the merchant does not obtain the customer's credit card and the bank does not obtain the delivery address. Explain how this is achieved. Use a diagram to support your answer.	null	wef	sdfafs	sadf	se	D	hard	Delete

Figure 33 Teacher can delete a MCQ question

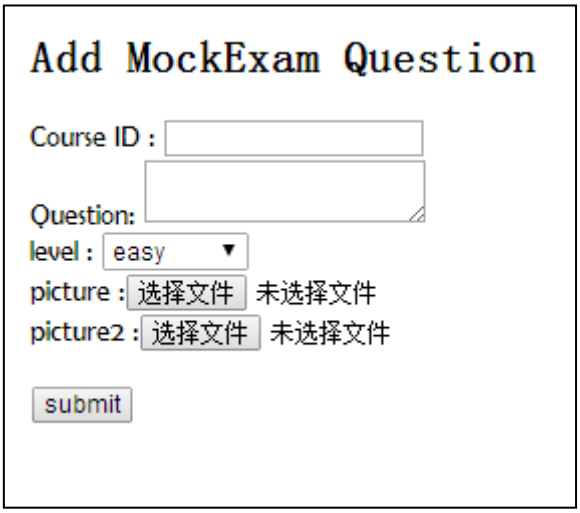


Figure 34 Teacher can add a Mock Exam question

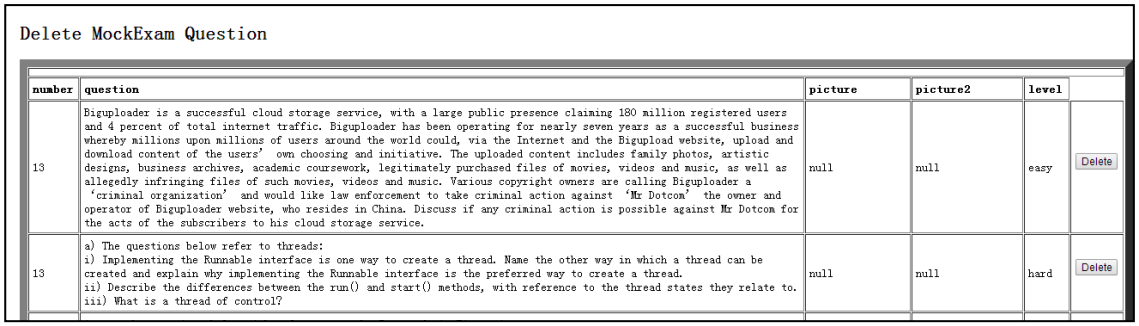


Figure 35 Teacher can delete a Mock Exam question

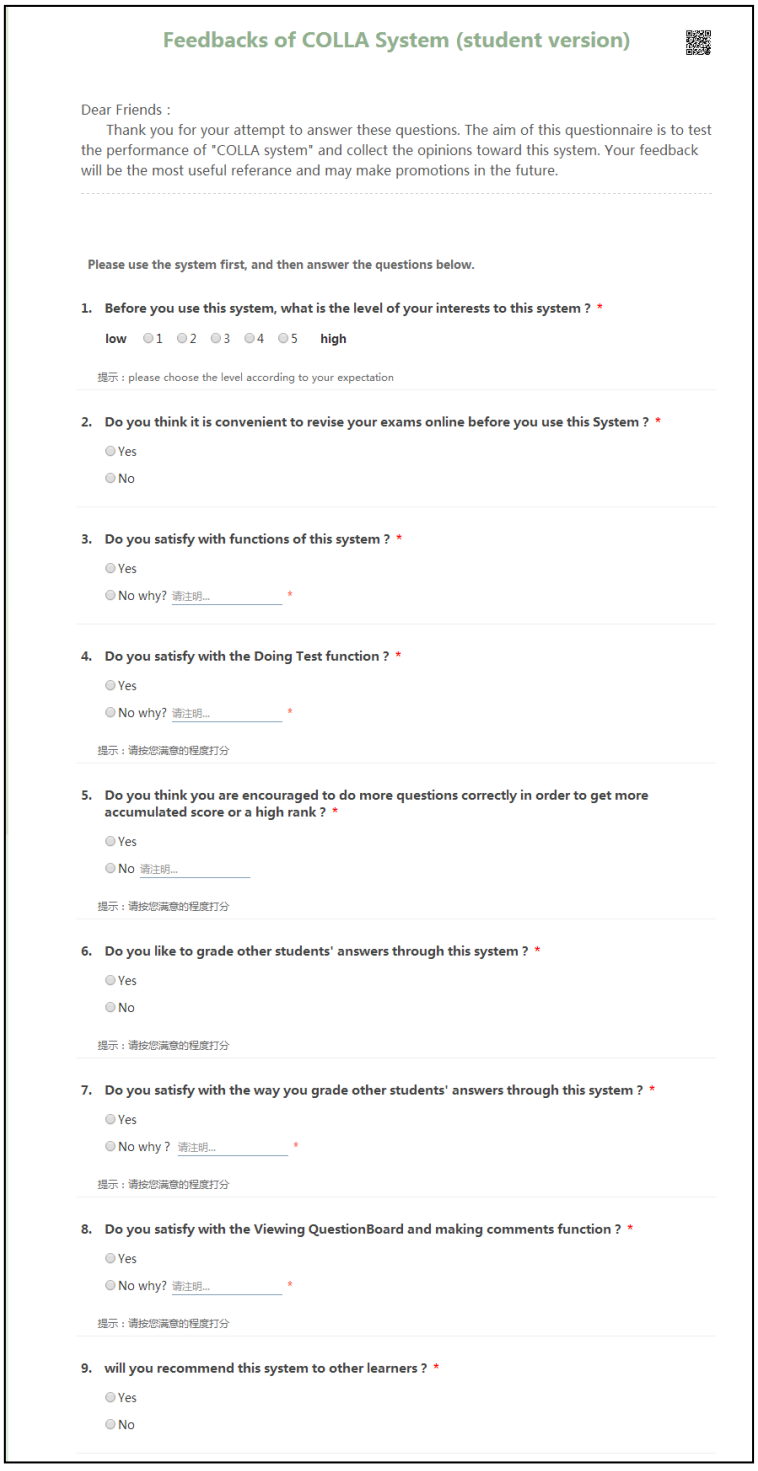
4.2 Results Evaluation

In the discussion part, I would like to show the design of the questionnaire, response of testers and the analysis of evaluations. What's more, I will put forwards the deficiencies as well as advantages of this system.

The evaluation part is very important for my system because my system just serves to help students revise better. I planned to adopt the method of questionnaire, and invited some students and teachers to have a try on my system. After they experienced all of the functionalities of the system, they can give me a feedback through questionnaire.

The questionnaire is mainly focused on their expectations of the system and feedbacks to the functions of the system.

Fortunately, I've received 3 teachers' responses and 10 students' responses.



Feedbacks of COLLA System (student version)

Dear Friends :

Thank you for your attempt to answer these questions. The aim of this questionnaire is to test the performance of "COLLA system" and collect the opinions toward this system. Your feedback will be the most useful referance and may make promotions in the future.

Please use the system first, and then answer the questions below.

1. Before you use this system, what is the level of your interests to this system ? *

low ○1 ○2 ○3 ○4 ○5 high

提示：please choose the level according to your expectation

2. Do you think it is convenient to revise your exams online before you use this System ? *

○Yes
○No

3. Do you satisfy with functions of this system ? *

○Yes
○No why? 请注明... *

4. Do you satisfy with the Doing Test function ? *

○Yes
○No why? 请注明... *

提示：请按您满意的程度打分

5. Do you think you are encouraged to do more questions correctly in order to get more accumulated score or a high rank ? *

○Yes
○No 请注明...

提示：请按您满意的程度打分

6. Do you like to grade other students' answers through this system ? *

○Yes
○No

提示：请按您满意的程度打分

7. Do you satisfy with the way you grade other students' answers through this system ? *

○Yes
○No why ? 请注明... *

提示：请按您满意的程度打分

8. Do you satisfy with the Viewing QuestionBoard and making comments function ? *

○Yes
○No why? 请注明... *

提示：请按您满意的程度打分

9. will you recommend this system to other learners ? *

○Yes
○No

Figure 36 Evaluation Questionnaire (student version)

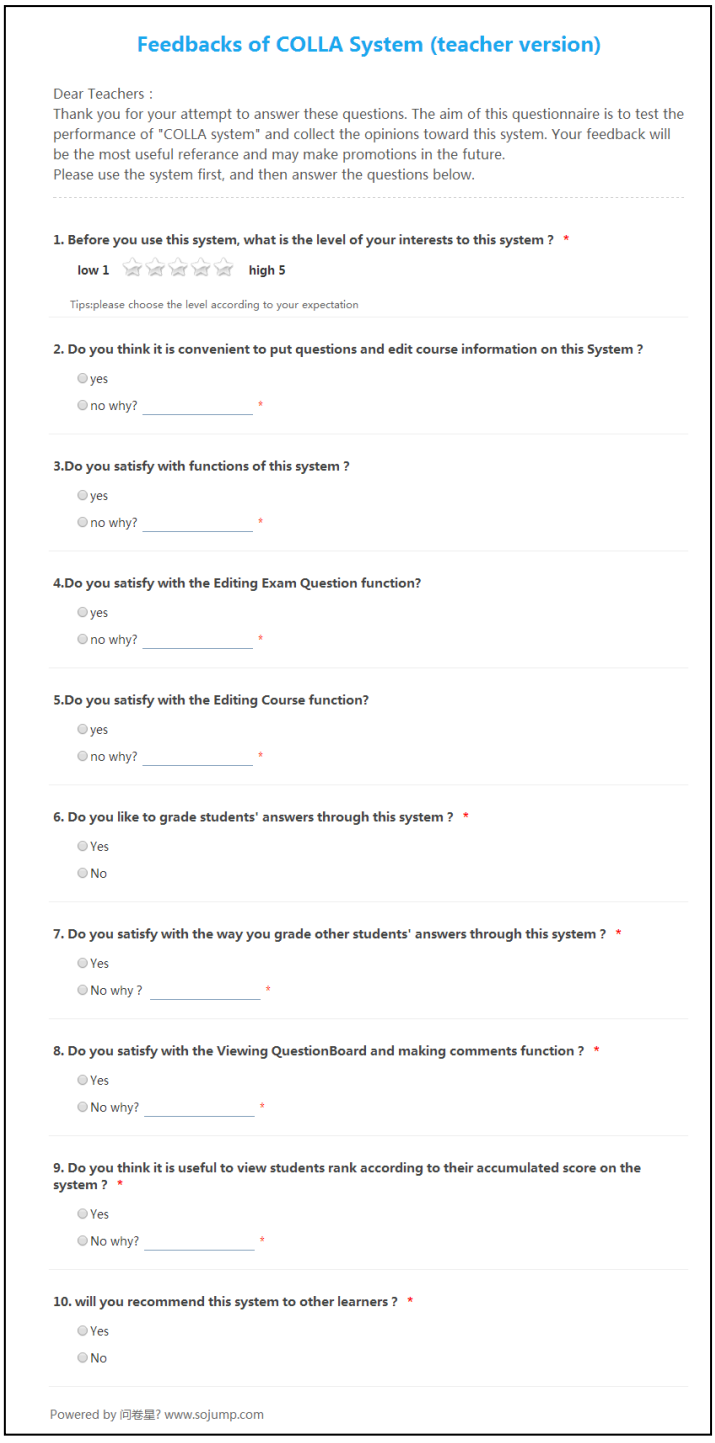
The student version contains three parts. The first part is to test the level of expectations of students who are going to use this system. Almost of the student testers say that they have the highest level of expectations to use this online system to revision their exams by choosing level 5 at question one. And all of the students thought they do hope that online collaborative learning system could bring

them convenience for their exam revision by choosing “yes” at the question 2:” Do you think it is convenient to revise your exams online before you use this System？”.

The second part is about the evaluations of the existing functions. Question 3 asks for the whole evaluation from testers by asking:” Do you satisfy with functions of this system”. There are nearly 70% students say that they are satisfied with the functions, and 30% say totally not. The following questions go details of the functions of each sub-system.

First sub-system is Doing Test part. All of the students say that they are satisfying with the Doing Test function. There are 20% of students choose “no” at question:” Do you think you are encouraged to do more questions correctly in order to get more accumulated score or a high rank？” They give the reason that they don’t think the accumulated score has any significance for them. There is only one student show that he does not like to grade other students' answers through this system because he thinks it will take his own revision time while all of the students thought the way they give judgments to other students’ answers are fine. The second sub-system is Viewing QuestionBoard. All of the students say that this sub-system are easy to use by choose “yes” at question: “Do you satisfy with the Viewing QuestionBoard and making comments function？”

In all, there are 60% students who show that they would like to recommend this system to other students.



Feedbacks of COLLA System (teacher version)

Dear Teachers :
Thank you for your attempt to answer these questions. The aim of this questionnaire is to test the performance of "COLLA system" and collect the opinions toward this system. Your feedback will be the most useful referance and may make promotions in the future.
Please use the system first, and then answer the questions below.

1. Before you use this system, what is the level of your interests to this system ? *

low 1 high 5

Tips:please choose the level according to your expectation

2. Do you think it is convenient to put questions and edit course information on this System ?

yes
no why? _____ *

3.Do you satisfy with functions of this system ?

yes
no why? _____ *

4.Do you satisfy with the Editing Exam Question function?

yes
no why? _____ *

5.Do you satisfy with the Editing Course function?

yes
no why? _____ *

6. Do you like to grade students' answers through this system ? *

Yes
No

7. Do you satisfy with the way you grade other students' answers through this system ? *

Yes
No why ? _____ *

8. Do you satisfy with the Viewing QuestionBoard and making comments function ? *

Yes
No why? _____ *

9. Do you think it is useful to view students rank according to their accumulated score on the system ? *

Yes
No why? _____ *

10. will you recommend this system to other learners ? *

Yes
No

Powered by 问卷星? www.sojump.com

Figure 37 Evaluation Questionnaire (teacher version)

Similar with the student version, teacher's questionnaire also test the expectations of the teachers before they use this system. There're 3 responses from teachers in all. All of the teachers showed that they have the highest interest to have a try on this system. There are two teachers showed that they are satisfied with the editing course and exam questions part, while one teacher commented

that he thought it is a little waste of time to input exam questions one by one. All of the teachers thought it is convenient to comment on students' answers and one of them gave me an advice that to give students a more specific grade may be better than a "reject", what's more, they hope that they can make some comments on those "bad answers" to instruct students. There are two teachers said that they do not care much about the rank of student which is related to students' accumulated score. And all of them showed that they would like to recommend this system to students in the future.

Chapter 5: Conclusion and Further Work

5.1 Conclusion

To achieve the goal of implementing a tool that supports collaborative learning, the things all I've done were around two parts: one is the concept of collaborative learning and the other is the implementation.

Collaborative learning is a learning theory that should be put into practice through my system. In order to have a better understanding of the core meaning of this theory, I've read several relevant papers to conclude the main characteristics of collaborative learning. By comparing the current systems as I stated in the background part which contains the theory of collaborative learning, I chose the web as my tool and designed the initial functionalities similar with BBS. Since BBS can largely make use of collaboration within a group, and the process of revision requires less about either instant message exchange or one-to-one communication, BBS should be the best prototype to build my system. According to Humanism learning theory, the sense of responsibility may urge students learn more actively. So I divided students into three levels, and order the higher level students help with lower level's revision.

Since it is the system that serves for students and teachers, I decided to carry out the survey of user requirements to know what the users really need. I adopt the method of questionnaire, and published them online. According to their feedbacks, I modified some functionalities of my system in order to give them more flexibility and space to interact with each other and make it easier to make use of collaborative learning.

With the system design, I started my implementation part. In this part, I firstly chose the language and software that I would use in my system by comparing their advantages and disadvantages. I found that java and jsp have their unique merits for my system because they are stable and reusable. Then, I designed the structure of database according to my system design. After studying how to use Dreamweaver and how to use JSP to program the web, I started to design the functions and logic between each file. Every JSP file will generate a servlet when they are complied. It will connect with the mySQL database to fetch or store data, and java codes of the JSP always handled with the fetched data. At the same time, HTML codes and CSS are also used to build the visual structure of the web page, and made the page seems more beautiful.

When I finished a subsystem, I tested it at once, and fixed the bugs. At the mid-term of the project, I have modified some functionalities and User Interfaces according to some users' comments.

5.2 Further Work

First of all, the work in the future may focus more on making the web pages more beautiful and lovely. As it is a website that helps students revises exams, the interface of the website should be bright and convenient. I could use some beautiful CSS to design the website and decorate the web pages with more colors and pictures by using HTML codes.

Secondly, it can be easier and faster to submit comments on question board. Now, students and teachers have to click the button and jump to anther page when they reply to the students' question, and this method to publish comments can be replaced by using AJAX technique. With AJAX, students and teachers and view and submit their replies and comments through the same page, and never jump to other pages. Not jump to other page may make the operation faster and clearer.

Thirdly, in order to make it more interesting and attractive for students to practice the exams, students may get more interesting bonus instead of accumulated scores. The ranks of this system is set to encourage students try harder at this system, however, may be a little dull for them. So, the way of the bonus can be changed, for example, students may have more rights to choose their virtual photos, or change the color of the system. If the bonus is attractive enough, there will be more students active on this system and sharing their knowledge.

Fourthly, since this is a system for students to study collaboratively, there should be more ways for learners to share their knowledge. The system should give authority for students to upload learning materials and share with certain students. However, the administrator or teacher will be responsible for examining the content that students upload and make sure that these materials are related to the course.

Finally, the evaluating system to grade students' answer can be modified. Teachers should have chance to use specific grades to comment students' answers, and even give them their opinions.

References

[1]. Dillenbourg, P. (1999). *Collaborative Learning: Cognitive and Computational Approaches. Advances in Learning and Instruction Series.* New York, NY: Elsevier Science, Inc.

[2]. Chiu, M. M. (2008). *Effects of argumentation on group micro-creativity. Contemporary Educational Psychology*, 33, 383 – 402.

[3]. Smith, B. L., & MacGregor, J. T. (1992). *"What Is Collaborative Learning?".* National Center on Postsecondary Teaching, Learning, and Assessment at Pennsylvania State University

[4]. Bruffee, Kenneth (1993). *Collaborative Learning*. Baltimore: The Johns Hopkins University Press. pp. 28–51.

[5]. Harding-Smith, T. (1993). *Learning together: An introduction to collaborative learning.* New York, NY: HarperCollins College Publishers.

[6]. Liu & Matthews, International Education Journal (2005). Vygotsky's philosophy: Constructivism and its criticisms examined, 6, no.3, 386-399.

[7]. Kirschner, P. A.; Sweller, J.; Clark, R. E. (2006). "Why minimal guidance during instruction does not work: an analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching". Educational Psychologist 41 (2): 75–86.

[8]. Kim (2005). "The Effects of a Constructivist Teaching Approach on Student Academic Achievement, Self-Concept, and Learning Strategies"(PDF). Asia Pacific Education Review 6 (1): 7–19.

[9]. Ying J. The Transformation of Teacher's Role under the Influence of Learning Theory of Humanism[J]. Education & Teaching Research, 2009.

[10]. Jason, K. (2011, November). Retrieved November 12, 2011, from Web stie: http://www.51test.net/show/1869989.html.

[11]. Chen, G., & Chiu, M. M. (2008). Online discussion processes. Computers and Education, 50, 678 – 692.

[12]. Marsha Egan, *"Inbox Detox and The Habit of Email Excellence"*, Acanthus Publishing(ISBN 978-0-9815589-8-1).

[13]. Michaels, David R.(2007, October). *Listening Benefits of Internet Radio Stations.* Retrieved October 28,2007, from Yahoo Voices.

[14]. John, J.(2014, June). *Virtual Team Methodology supports virtual team training, assessment, and technology.* Retrieved June 25, 2014, from Netage.com: http://www. netage.com.

[15].Groupware - Communication, Collaboration and Coordination. Lotus Development Corporation. 1995.

[16]. Blood, Rebecca (September 7, 2000). *Weblogs: A History And Perspective*, no.12, 439-90.

[17]. Michael, F.(2012, April). *What is QQ?*. Retrieved April 14, 2012, from Tecent Web site:http://www.qWhatIs.com.

[18]. Gosling, James; Joy, Bill; Steele, Guy; Bracha, Gilad; Buckley, Alex (2014). *The Java® Language Specification.*

[19]. Kim, S. (2005, December). *Servlet History.* Retrieved June 14, 2013, from Web blog: http:// Weblogs.java.net.

Acknowledgement

First of all, I want to appreciate my tutor who has given my large help during my whole project. She is so kind and careful to instruct me with my project design and implementation. Her tips could always give me a light when I was in the dark. At the final period, she spent her spare time listening our presentation rehearsal and sharing her advice with us. Her comments toward my report were detailed and useful. Thank you for her generous help.

Secondly, I want to say thanks to my roommates who companied with me when I got trouble in the project. They tried their best to devote their wisdoms in giving me suggestions about my system and were enthusiastic to be the testers at the evaluation part.

Finally, I want to appreciate my parents, who supported my work when I could not go back home and stayed with them. They show their best tolerance and understanding to me which lead me to the final success.

[CI_3112] [An Exam Revision Tool That Supports Collaborative Learning]

Appendix

- Specification
- Early-term Progress Report
- Mid-term Check Form

[CI_3112] [An Exam Revision Tool That Supports Collaborative Learning]

北京邮电大学
本科毕业设计（论文）任务书
Project Specification Form

学院 School	International Schoo	专业 Programme	E-Commerce (H6NF)	班级Class	2011215112
学生姓名 Name	SU Haoyan	学号 BUPT student no	2011213112	学号 QM student no	110660785
设计（论文）编号 Project No.	IC_3112				
设计（论文）题目 Project Title	An exam revision tool that supports collaborative learning				
题目分类 Scope	Implementation	Computer Software	Software		

主要任务及目标Main tasks and target:	By
Task 1: Research collaborative learning theory and practice and existing tools	December 2014
Task 2: Collect and analyse user requirements (both students and lecturers)	January 2014
Task 3: Specify, design and implement the collaborative tool	April 2014
Task 4: User testing and evaluation	May 2014

Measurable outcomes
1) Detailed design of the collaborative tool including detailed storyboard
2) An authoring system that allows lecturers to easily input revision questions
3) System that allows students to collaboratively answer revision questions

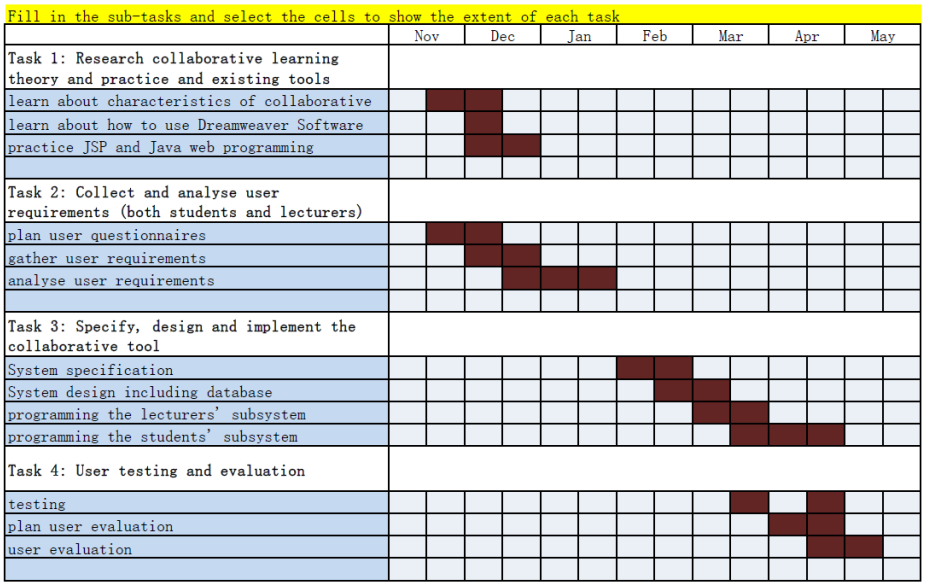
主要内容Project description:

In this project, you will develop an online revision tool that supports collaborative learning. The aim of the tool is to help students in their exam revisions by supporting their active engagement and collaborative learning styles. The system will include a formative and peer assessment function where students answer past exam questions and grade or comment each other answers. Students should not be able to see other students' work before attempting to answer questions themselves. The students should also be able to select a topic and the system will automatically select questions in relation to that topic. The system should contain an authoring function for lecturers to input questions.

Project outline

*This project will develop an online revision tool that supports collaborative learning.
*The initial analysis of students' requirements includes: be able to answer the problems through the tool, have chances to be scored by the lecturer, be able to see other students' answers, be able to comment on others' answers. The initial analysis of lecturers' requirements includes: be able to input more exam items, be able to see students' answers, and be able to delete any exam items.
The data will be collected by giving out questionnaires online to students and lectures. And I will collect the returned information to improve the system.
*I will use the technique of dynamic web programming connecting with SQL database. Users can interact with the website and make use of information resources in database.
*For a student: He can enter the home page and choose a subject of course. He can choose any topic he wants to exercise. After finishing the test, he can hand in his answers and save his record. Then, he can view other students' answers of these items.
For lecturers: lectures can create an account by using course name and held year. After logging into the website, lecturers can choose to score&comment on students' answers or view students' discussing questions. Lectures can also see the list of exam items which shows how many students has involved for each course. Lectures can add or delete the exam questions into the database and label each item.
*Programming to be used includes java, jsp and SQL. Database is MySql.
Software to be used includes MyEclipse8.0, Adobe Dreamweaver CS6, and Tomcat
*background material:
-JSP Dynamic Website Development Course of the Case. 1st ed. N.p.: Mechanical Industry, n.d. Print. National Higher

[CI_3112] [An Exam Revision Tool That Supports Collaborative Learning]



[CI_3112] [An Exam Revision Tool That Supports Collaborative Learning]

北京邮电大学

BBC6521 Project 毕业设计 2014/15

Early-term Progress Report

初期进度报告

学院 School	International School	专业 Programme	E-commerce Engineering with Law	班级 Class	2011215112
学生姓名 Student Name	Haoyan Su	学号 BUPT Student No.	2011213112	学号 QM Student No.	110660785
设计（论文）编号 Project No.	QMLB4	电子邮件 Email	shy@bupt.edu.cn		
设计（论文）题目 Project Title	An exam revision tool that supports collaborative learning				

已完成工作：
Finished Work：

1. Research collaborative learning theory and practice and existing tools including:

(1) learn about the characteristics of collaborative learning by reading papers through Internet

e.g. [1].Beckman M, M B, Beckman M, et al. Collaborative Learning[J]. College Teaching, 1990, 38(4):128-133.

[2]. Macdonald J, J M, Macdonald J, et al. Assessing online collaborative learning: process and product[J]. Computers & Education, 2003, 40:377–391.

[3]. Resta P, P R, Resta P. Technology in Support of Collaborative Learning[J]. Educational Psychology Review, 2007, 19:65-83. DOI:10.1007/s10648-007-9042-7.

[4]. Akiko Inaba T S M I R M A J, Toyoda I, I T, et al. How Can We Form Effective Collaborative Learning Groups?[J]. Lecture Notes in Computer Science, 2000:282-291.

(2) learn about how to use Dreamweaver Software by downloading the Adobe Dreamweaver CS6 and searching relevant instructions through Internet

(3) practice JSP and Java web programming skills by taking EBU6042 Advanced Networking Programming course and writing several pieces of codes

2. Collect and analyse user requirements (both students and teachers)

(1) plan user questionnaires (writing the first version and then emailed it to the supervisor to asked for opinions, finally, through making corrections, got the satisfied final version of questionnaires)

(2) published the questionnaires and send out the links of questionnaires to students and teachers by emails(including 65 teachers and all of the students in International School of BUPT)

(3) collect the responses of students and teachers (there're 12 teachers' responses and 104 students' responses)

(4) analyse user requirements according to the replied questionnaires and form a report of analysis of user requirements	
是否符合进度？On schedule as per GANTT chart?	[YES/NO] yes
下一步： Next steps: 1. finish the system specification and initial design of the whole system according to the analysis of user requirements 2. programming part of the lecturers' subsystems according to the system design 3. programming the database according to the system design 4. write up the first chapter of final report (background)	

[CI_3112] [An Exam Revision Tool That Supports Collaborative Learning]

北京邮电大学
本科毕业设计（论文）中期进展情况检查表
Mid Term Check Form

学院 School	International Schoo	专业 Programme	E-Commerce (H6NF)	班级 Class	2011215112
学生姓名 Name	SU Haoyan	学号 BUPT student no	2011213112	学号QM student no.	110660785
设计（论文）编号 Project No.	IC_3112				
设计（论文）题目 Project Title	An exam revision tool that supports collaborative learning				
题目分类 Scope	Implementation	Computer Software	Software		

主要内容：（毕业设计（论文）进展情况，字数一般不少于1000字）
Main body: The progress of the research on the project. Total number of words is no less than 1000.

目标任务 Targets set at initiation	in the mid-term oral, I can offer my analysis of requirements and design of my website. When it comes to the implementation of the website, I can complete part of the lecturer's subsystem and build up the initial database.
是否完成目标 Targets met? Yes/No	yes
目前已完成任务 Finished Work	1. Research collaborative learning theory and practice and existing tools including: (1) learn about the characteristics of collaborative learning by reading papers through Internet e.g. [1].Beckman M, M B, Beckman M, et al. Collaborative Learning[J]. College Teaching, 1990, 38(4):128-133. [2]. Macdonald J, J M, Macdonald J, et al. Assessing online collaborative learning: process and product[J]. Computers & Education, 2003, 40:377–391. [3]. Resta P, P R, Resta P. Technology in Support of Collaborative Learning[J]. Educational Psychology Review, 2007, 19:65-83. DOI:10.1007/s10648-007-9042-7. [4]. Akiko Inaba T S M I R M A J, Toyoda I, I T, et al. How Can We Form Effective Collaborative Learning Groups?[J]. Lecture Notes in Computer Science, 2000:282-291. (2) learn about how to use Dreamweaver Software by downloading the Adobe Dreamweaver CS6 and searching relevant instructions through Internet (3) practice JSP and Java web programming skills by taking EBU6042 Advanced Networking Programming course and writing several pieces of codes 2. Collect and analyse user requirements (both students and teachers) (1) plan user questionnaires (writing the first version and then emailed it to the supervisor to asked for opinions, finally, through making corrections, got the satisfied final version of questionnaires) (2) published the questionnaires and send out the links of questionnaires to students and teachers by emails(including 65 teachers and all of the students in International School of BUPT) (3) collect the responses of students and teachers (there're 12 teachers' responses and 104 students' responses) (4) analyse user requirements according to the replied questionnaires and form a report of analysis of user requirements 3. Design the system specification 4. Design and finish building the database 5. Design webpage of lectures' subsystem and start programming part functionality of lecturer's subsystem

[CI_3112] [An Exam Revision Tool That Supports Collaborative Learning]

<table>
<tr><td>尚需完成的任务
Work to do</td><td colspan="2">1. Programming the lecturer’s subsystem
2. Programming the student’s subsystem
3. Testing the whole system
4. Plan user evaluation
5. Complete user evaluation</td></tr>
<tr><td></td><td>能否按期完成设计（论文）
Can finish the project on time or not:</td><td>yes</td></tr>
<tr><td rowspan="2">存在问题和解决办法
Problems and Solutions</td><td>存在
问题
Problems</td><td>The problems of my project may exist in several parts:
1. Problems that I will meet in the programming part. During the process of programming this online system, I may face to bugs and obstacles. Since some of the functionalities in my design, such as the part of leaving message by students and allowing students to take notes, are challenging for me to implement. Therefore, the problems during the programming should be a big obstacle.
2. Problems that I will meet in the testing part. During the testing part, I need objective and large-based evaluations from both teachers and students. However, to publish the website needs time as well as money. How to invite users and send out the access of my online system will be a problem. What’s more, how to get an objective and detailed reply is also a challenge.</td></tr>
<tr><td>拟采取
的办法
Solutions</td><td>My initial solutions to the problems I may face:
1. If I meet bugs or puzzles in my programming process, I have several ways to solve them. Firstly, I can search the solutions through Internet. The CSDN.com and W3C School will help with my website programming. Secondly, I may turn to the friends who are experts in network programming for help.
2. For the question of how to spread out the access of my online system, I would like to apply for the free domain name for my website. As far as I concern, there’re some free servers and agents who offer free domain name. And in order to get more objective responses, I would like to design a questionnaire for testers to answer, so that I can get a comprehensive evaluation.</td></tr>
<tr><td>最终论文结构
Structure of the final report</td><td colspan="2">The structure of my final report will be concluded in five chapters.
The first chapter is the introduction of my project. I would like to give a summary of the main functionalities of my system and the techniques that used to build this system.
The second chapter is the background part. In this chapter, I would like to give an explanation of some academic terms appeared in my projects, such as “collaborative learning” and “online system”. I will give fully detailed knowledge about the methods and main characteristics of online collaborative learning so that it can be well prepared to provide a clear clue to the further design of my system.
The third chapter is the design and implementation. In this part, I would like to show the process that I designed my system, including the analysis of user requirements, initial design and final specification. And the design of the webpage and database will also be showed in this part.
The fourth chapter is about the results and discussion. In this part, I would like to show the process that I test my system, including the design of the questionnaire, response of testers and the analysis of evaluations. What’s more, I will put forwards the deficiencies as well as advantages of this system.
The final chapter is the conclusion and further work. In this chapter, I would like to conclude the whole system by introducing the meaning and functionalities that my project will provide for both students and teachers. Then, I will give the ideas about the improvements of this system according to the results of user evaluations and the relevant knowledge of myself.
What’s more :</td></tr>
</table>

	1. Reference: I will write every reference that used to finish my project report here. 2. Acknowledgement: I will give the names of people who have helped me during my project. 3. Appendix: I will attach the files including specification, preliminary report, early-report, mid-term check form, my questionnaires, raw data of questionnaires' results, design of the webpage, and other important files in the appendix part. 4. Risk Assessment
日期 Date	2015.03.05

[CI_3112] [An Exam Revision Tool That Supports Collaborative Learning]

Fill in the sub-tasks and select the cells to show the extent of each task

	Nov		Dec		Jan		Feb		Mar		Apr		May	
Task 1: Research collaborative learning theory and practice and existing tools														
learn about characteristics of collaborative														
learn about how to use Dreamweaver Software														
practice JSP and Java web programming														
Task 2: Collect and analyse user requirements (both students and lecturers)														
plan user questionnaires														
gather user requirements														
analyse user requirements														
Task 3: Specify, design and implement the collaborative tool														
System specification														
System design including database														
programming the lecturers' subsystem														
programming the students' subsystem														
Task 4: User testing and evaluation														
testing														
plan user evaluation														
user evaluation														

Risk Assessment

Rating Standards:

Rating of Risk

Score	Rating	Action
0	No Risk	No action
1 - 3	Low Risk	Action if easy to implement
4 - 6	Moderate Risk	Action if Cost Effective
8 - 12	Significant Risk	Urgent Action
15 - 25	High Risk	Immediate Action

Figure 38 Rating of Risk

Scoring the Likelihood

Level	Description	Meaning
0	Impossible	Cannot happen
1	Rare	May happen in exceptional circumstances
2	Unlikely	Could happen at some time
3	Moderate	Should happen at some time
4	Likely	Will happen often
5	Certain	Expected to happen

Figure 39 Scoring the Likelihood

Scoring the Consequences:

Level	Description
0	Negligible
1	Minor
2	Serious
3	Very Serious
4	Major
5	Catastrophic

Figure 40 Scoring the Consequences

My Possible risks:

Description of Risk	Description of Impact	Likelihood Rating	Impact Rating	Preventative Actions
The system could not hold too many users operating on the system at the same time.	If there are too many users operating on the system, the system may break down and goes wrong.	3	4	Test the capacity before start to use this system
The database may be out of space.	If there're too many users register or store files through the system, the database may have no space to store.	1	3	To improve the capacity of database if it is necessary