

Web-based Collaborative Correction Supporting System for Experiment Report of Engineering Science Students

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Abstract

Based upon web-based collaboration concept, this system was designed to promote collaborative works of teachers and students during an experiment course. Using this system, students write their reports in the form of web pages. Teachers on-line comment on the report. It becomes easily for students to find teachers' comments on their reports and for teachers to find which part of the reports has been modified and according to which comments students did the modification. Report page is managed by revision control. Differences between old version and new version page can be displayed. The system was evaluated by students and teachers during a software experiment course. The effectiveness of the system is shown through experiments.

1. Introduction

The experiment course is a very important course for undergraduate students of engineering science during their academic years. At each experiment, students should submit experiment report to teachers and will receive proper advice. This process will help students deepening their understanding about

experiments and also improving their writing skill. In the traditional method, students print their report out and submit them to teachers. Teachers read, comment on each report and return the reports to students. Students then modify their report corresponding to comments and re-submit to teachers for re-comment. These processes will be continued until teachers think that there is no necessary for students to modify their report again. However, this traditional way brings great burden to them. The reasons are as followings.

- There are at most 2 or 3 teachers who are responsible for commenting reports coming from 50 to 100 students. Reports are collected all together and will be returned to students all together. It is impossible for teachers to give each student enough advice or guidance.
- For the same reason, the time between submitting report and returning report is too long to enhance learning effects.

To achieve good learning effects and make teachers be able to give sufficient advice, it is necessary to shorten the time from submitting to receiving report. One method is that each student can submit reports to teachers directly. Then and there, teachers read them, comment on them, and return it to students. After that students will rewrite their reports. But this method is

impossible in fact. If teachers are out of school or if reports waiting for evaluation become too many, teachers still can not give enough guidance for every student.

In order to solve this problem, we designed this collaborative correction support system. Using web technology, students and teachers can at their convenient submit, correct, modify and resubmit reports. Therefore, it is possible to realize a high effective education.

In the following chapters, we will introduce the related works of this system, system design, implementation of the system and system evaluation.

2. Related works

With the purpose to scaffold or support students in learning together effectively, lots of collaborative systems have been developed. For example, the CoWeb [1], a clone Wiki [2] system that was developed by Georgia Institute of Technology and was successfully brought into classes. There are also other systems such like [3][4][5] and [6] that were designed for collaboratively correcting report or composition written in foreign language.

Compared with these systems, our system has the following features.

- As a web-based application, Users need a regular web browser to use the system with no plug-in.
- The contents of report are dealt as Wiki text that can be directly edited in an HTML text area without special tools. Figures and tables can be handled too.
- Correction and score definition templates are provide to comment on the report. Adding comments into the report is simplified to several

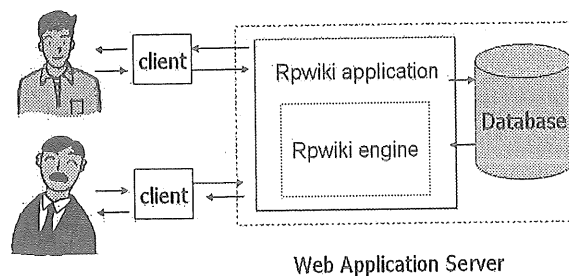


Figure 1 System Structure

clicks of checking the items in a comment template. In this system, teachers will only give comments to students' reports. We think that modifying reports by students themselves is more effective than reading modifications made by others to improve the thinking and writing abilities.

- Report is managed by revision control. Difference between two version reports can be displayed. Teachers can easily examine how students modify reports.

3. System design

In this chapter, we will introduce basic structure of the system, basic conception, correction and score, and samples of system implementation.

3.1 Basic structure of the system

The structure of the system that we developed is shown as Figure 1. Users use an ordinary web browser to access the system. Rpwiki (Report Wiki) engine, as the main part of the system, is responsible for reading and storing data and the conversion from Wiki text to HTML. The HTML result of conversion will be send back to HTTP client.

3.2 Basic concepts

We defined some basic conceptions that were used during the development of the system.

Report: report is referred to the experiment report of engineering science students. A report in this system is consisted of a serial of web pages which we call report pages.

Report page: as a component of the report, a report page is a web page. Each page has a page title. System generates a table of contents of a report by collecting these page titles.

Report version: each report will have a report version number. When one page of the report pages has been modified, the report version of this report will be updated.

User area and Repository area: Both areas are located on web server. Students edit report in the user area. Students should submit their report from the user area to the repository area to be commented on. Teachers comment on and score report in the repository area. Report and user information will be saved in both areas, while comments, difference of two version reports and the history of students' modification will only be saved into Repository area. The report that is in the repository area is managed by revision control.

3.3 Correction and scoring

In this system, commenting on reports will be realized by checking comment items from comment template. Shown as Figure 2, for each experiment, teachers first establish correction and score criterions for experiment report in advance. According to the criterions, teachers prepare comments that will be used

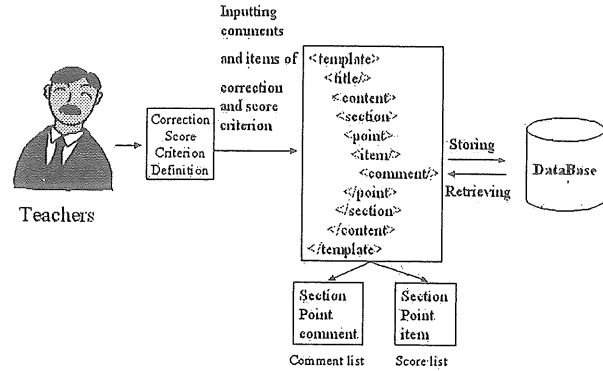


Figure 2 Correction and score report

for report correction if the report contents are not up to the criterions. Teachers input these criterions and comments into system to create a correction and score template.

At correction mode or score mode, system retrieves the template from database and displays the corresponding elements such as comments or items, score points on each report page.

3.4 Samples of system implementation

3.4.1. Students create report. To create report page, students just need input page name and section number. Created new page will have an empty text box like creating a new Wiki page. Students write report contents into this text box. Table of contents of the report can be generated automatically by collecting page name and section number of each page.

3.4.2. Commenting on and scoring report. Figure 3 shows the interface of correction mode. At correction mode, system will add a checkbox to each line of report contents. Comment check list will be listed at the right side of the report page. Checking the lines of the report contents and checking the corresponding comments, teachers can add the checked comments into the page. Moreover, teachers can write extra

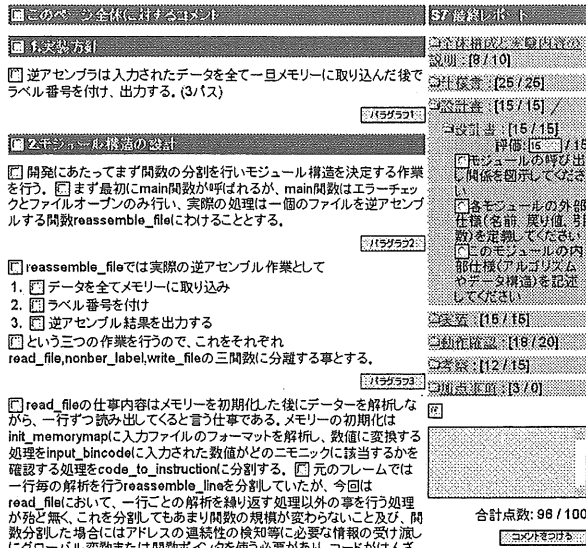


Figure 3 Commenting on and score report

comments into the textbox the comment check list provides. When teachers score report, the comment check list will be changed to score check list from which teachers can input score point as checking the items of correction and score criterions.

3.4.3. Reading comments. The comments can be displayed by clicking a “show comments” link when students view their report at repository area. The line that has comments will be color highlight. Comment contents will be displayed as a popup message when moving mouse pointer on the line.

3.4.4. Evaluating modification result. The system lists teachers’ comments below the comment check list at correction mode on difference page (see Figure 4). Each comment has three radio buttons “ok”, “ng” and “remove” before it and a “difference” link that points to difference page after it. On difference page, deleted contents and add contents will be displayed in different color. If teachers are satisfied with the modification, they can check the ok button. Comments with “ng” button means that there is still a necessary to modify

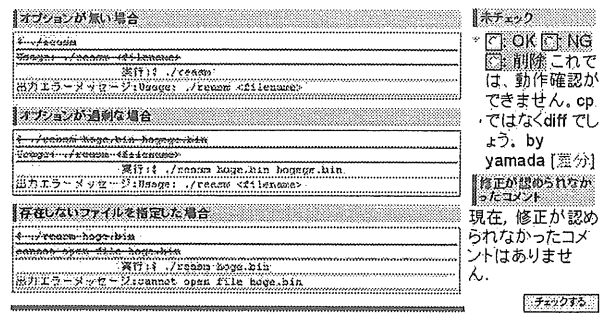


Figure 4 Difference page

the report again.

4. System evaluation

We used this system into the course Software Experiment I of the third grade student at their first semester of 2004. 15 students and 3 teachers of this course volunteered for evaluating this system. During the course, the students wrote four times report about assembler and disassembler. The first two times, student used traditional way. They wrote reports on papers using a word processor. At the last two times, they used this system.

After the experiment, 14 students and 3 teachers of the participants took a questionnaire survey about their experience of using Wiki and HTML, system usability and system functions. They are also asked to explain the reasons if they give a low point for some survey items and to give some advice for the system. Question items for functions and usability have five answer choices that are represented by point from 1 to 5 respectively. For usability, the five choices are bad, a little worse, ordinary, a little better and good. For functions, the five choices are inferior, a little inferior, same, a little superior and superior compared with the traditional way for writing and commenting on report.

4.1 System usability evaluation

Survey result for system usability of the system is shown as Figure 5. We can see that all average points are not less than 3. It should be said that participants, to some extents, are willing to use this support system. However, the highest point is not over 4. It reflects that there still are some imperfect aspects of the system that will discuss in later sections.

4.2 System function evaluation

4.2.1. Function survey results of students. As Figure 6 showing, the functions of report submitting and receiving and grasping that at which part of the report teachers add comments and modifying report received high points, 4.5, 3.9 and 4.6. These functions achieved the expected effects. However, the point of grasp the meaning of comments is 3. We analyzed the feedbacks of students. The problem is that when students do not understand the meaning of the comments, they can not ask or discuss with teachers about those comments immediately by using this system. The function of grasping the meaning of comments for modified report has the same problems. From the survey result, we also find that the experience of using Wiki and HTML has some influence on students' answers of the survey.

According to the experience, we can divide 14 Wiki students into three groups. Group 1 has 7 students who have no experience of using Wiki and 1 or 2 times experience of using HTML. Group 2 has 4 students who often use HTML but have a few or no experience with Wiki. Group 3 has 3 students. They often use HTML and Wiki. Among the three groups, group 2 gives the lowest point 2.75 to report writing (see Table 1). Report is dealt as Wiki text and system changes the text into HTML to display. This decides that report page cannot support as rich design format as HTML.

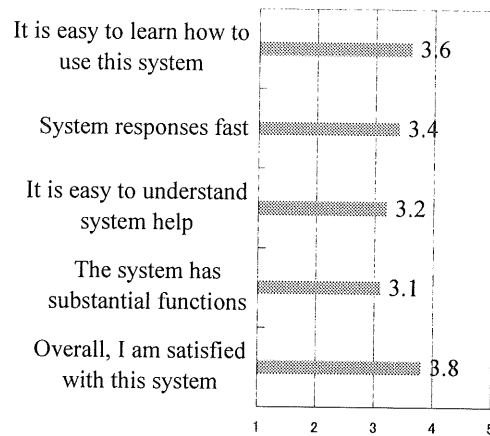


Figure 5 System usability survey result

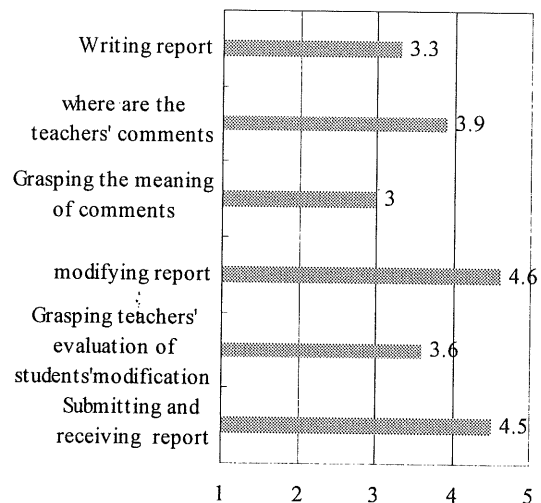


Figure 6 Survey result of students

Table 1 Survey results of students group

Item	Group1	Group2	Group3
Writing report	3.6	2.75	3.3
Where are the teachers' comments	4.1	4.25	2.7
Grasping the meaning of comments	3.1	2.75	3
Modifying report	5	4.5	4.3
Grasping teachers' evaluation of	4	3.3	3.3
Submitting	4.4	4.8	4.3

does. Most of advice of this group is about writing report, such as creating and editing tables or figures. Report Writing function will be one of main subject of our future works.

4.2.2. Function survey results of teachers. Figure 7 illustrates the function survey results of teachers. Reading report, writing comment and scoring report got 2.3, 3 and 3 point. Teachers explained that it is difficult to read the page that has long contents and to comment on such kind of page.

The low evaluations of students and teachers that were made for some system functions influenced the evaluation for system usability at certain extent. They gave 3.1 point for the question of the “system has substantial functions”.

5. Conclusions

The research field of computer supported collaborative learning attracts more and more attention. This system can be regarded as an attempt of application of computer supported collaborative learning too. From the evaluation of the participants, we can see that this system makes an obvious improvement on the works, such as finding teachers comments, finding where students modify their reports, submit and receiving report. We achieved good effects at these aspects as we expected. However functions like writing reports and comments, grasping the meaning of comment and scoring report have no obviously improvement compared with traditional method. Function of reading report is even worse than traditional method. Improving these functions will be our main subjects in the near future. We will also need to add some new functions such as online communication of participants, group writing report to

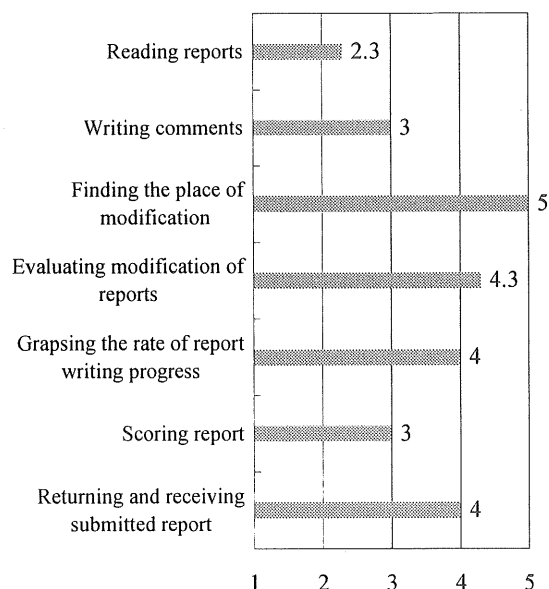


Figure 7 Survey results of teachers

enhance the collaborative correction.

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