

Web-based Collaborative Correction Support System for Experiment Report

Xiaoyong Li¹, Shingo Nakagawa², Yuji Muramatsu¹, Sanshiro Sakai³

¹Shizuoka Univ. Graduate School of Informatics, ²Shizuoka Univ. Graduate School of Science and Engineering, ³Shizuoka Univ. Faculty of Informatics

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

実験レポートに対するウェブ・ベース協調添削支援システム

李曉永¹, 中川晋吾², 村松裕次¹, 酒井三四郎³

¹ 静岡大学大学院情報学研究科, ² 静岡大学大学院理工学研究科, ³ 静岡大学情報学部

あらまし 本稿ではウェブ・ベースの協調作業の理念を基盤とした実験レポート添削支援システムを提案する。このシステムは教員と学生の負担の軽減と協調作業の推進のために設計された。学生はウェブページを作成するような形態で実験レポートを作成し、教師がオンラインでレポートに対してコメントをつける。レポートは版管理されて、修正の履歴が保存され、修正の差分を表示することができる。学生と教員はコメントの箇所とレポート修正箇所を容易に把握できる。また、教員はどのようなコメントをつけたのか、さかのぼって把握することができる。学生と教師の協調作業によってレポートを完成する。また、ソフトウェア実験のレポート添削に適応する評価実験を行って、その結果、システムの有効性を示す結果が得られたので報告する。

1 Introduction

Experiment is very important course for undergraduate students of engineering science during their academic years. At each experiment, students should submit experiment report to teachers to receive proper advice. This process will help students deepening their understanding about experiments and also improving their writing skill. However, the traditional method that is used for writing and commenting on report brings great burden to both students and teachers. Students should

print their report out and submit them to teachers. Teachers then read and comment on each report and return the reports to students. According to comments, students will modify their report and resubmit to teachers for re-comment. These processes will be continued until teachers think that the report is ok and there is no necessary for students to modify their report again. Finding where teachers write comments, where students modify their report and what comments the modification is corresponding to are very monotonous and onerous works. It is necessary to find such a

way that will not only reduce the amount of work for teachers and students, but also effectively promote their collaboration.

To realize this purpose, we designed a web-based collaborative correction support system for experiment report. In the following sections, we will introduce the related works of this system, design and implementation of the system and system evaluation.

2 Related works

As we know, the development of computer science brings great benefit into all trades and professions. To some extent, work efficiency is increased and work burden is greatly released. In school, the traditional limit of time and space is broken with the popularization of the Internet too.

An area where open collaboration and exchange of ideas is both natural and important is education[1]. Lots of collaborative systems have been developed to enhance the communication and collaborative work between students and teachers. CoWeb[2] is one of these systems. It is a clone Wiki system that was developed by Georgia Institute of Technology. CoWeb is successfully brought into classes. The case of CoWeb in Georgia Tech illustrates that collaborative tool like Wiki is feasible and useful to promote the collaboration in education.

There are also some collaborative correction systems[3, 4, 5] for report or composition that is wrote in foreign language. These correction systems have some common characteristics. Compositions or reports are exchanged using e-mail or ftp. Doing correction needs extra tools like electric pen, voice input device or special viewer and editor. After correction is made, compositions or reports have no necessary to be modified by students.

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

- The system looks like a traditional web site. Users can use a ordinary web browser to access the system.

- The contents of report are dealt as Wiki text that can be edited in an HTML text area without special applets and plug-ins. Because figure and table are important component part of experiment report, the system support figure and table display.
- Considering that there is a potential ethical problem of invading the privacy of students if students' report can be publicly available to other students, we add user certification function into our system. To access the system, users must input user name and password and pass the system certification. This system is not open to all visitors and does not give every students exactly the same capabilities as teachers, students can only view and edit their own report pages in this system.
- Using of correction and scoring criteria template, teachers do not have to write comments for each experiment report of students which should be done when students use papers to write report. Adding comments into report is simplified to several clicks of checking the items in comment template.
- Report is managed by revision control system. Difference between two version reports can be displayed. Teachers can check easily whether students make a good modification according to their comments. The original comments will be remained on the report page if modification based on them is not satisfied teachers.

3 System design

Based on the web-based collaboration conception, we designed this support system to solve the problems that students and teachers faced when they wrote and commented on experiment report using traditional way. This section will introduce the design and implementation of this system. It includes four parts: basic structure of the system, basic conception, correction and scoring, and samples

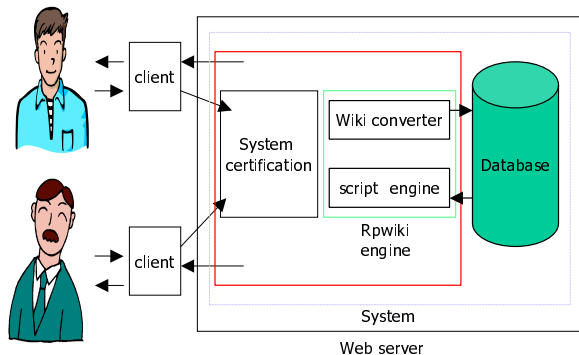


Figure 1: System structure

of system usage.

3.1 Basic structure of the system

The structure of the system that we developed is shown as figure 1. Users use a ordinary web browser to access the system. They must first pass the user certification to access the system. Rpwiki engine (report wiki engine) is responsible for 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. This section will explain these conceptions.

Report report is referred to the experiment report. But unlike paper report, a report in this system is consisted of a serial of web pages which we call report pages.

Report page as a component of report, a report page is a web page. A serial of report pages consist of an experiment report in the system. Each page has a page title. System will generate a table of contents of the report by collecting these report pages. The titles of the pages will become items of the table of contents. They will become links which point to the related report page. The table of contents will be

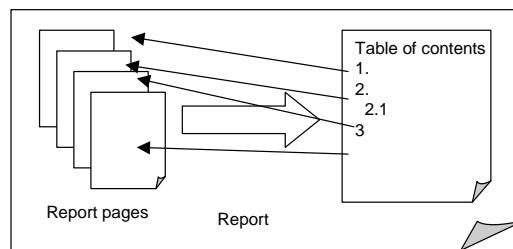


Figure 2: Report structure

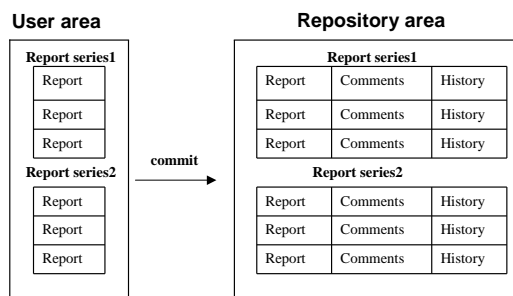


Figure 3: User area and repository area

displayed as the first page of users ' report. The report structure is illustrated as figure 2

Report version each report will have a report version number. It will begin from 1.1. When one page of the report page has been modified, the report version of this report will be updated.

User area and Repository area Figure 3 shows the two concepts. Both areas are located on web server. Students do the modification of report in user area. The report will be saved into user area first. Students should submit their report to repository area to be commented on. Teachers do the work of comment and scoring in repository area. Information about report such as report series and information of users will be saved in both areas, while comments, difference of two version reports and the history of students' modification will be saved into Repository area. The report that is in repository area is controlled by revision control.

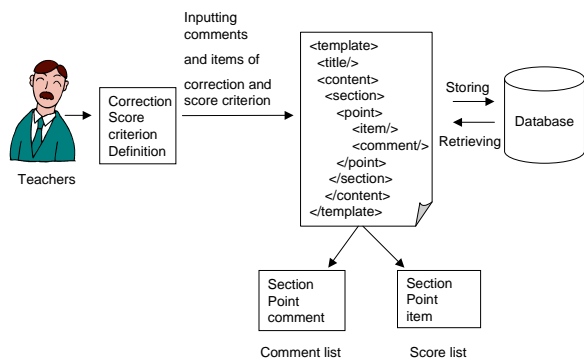


Figure 4: Correction and scoring

3.3 Correction and scoring

For teachers, commenting on report is important but the most tired work during experiments. Simplifying the work of comment is a major purpose of this system. In this system, we designed a template for teachers. Commenting on reports will be realized by checking comment items from template.

Shown as figure 4, for each experiment, teachers should first establish correction and score criteria for experiment report in advance. According to the criteria, teachers prepare comments that will be used for report correction if the report contents are not up to the criteria. Teachers then input these criteria and comments into system and 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, point and section on report page. Commenting on report and scoring report are simplified to several checks of these comments or items.

3.4 Samples of system usage

This system is a correction support system for experiment report, the most important functions should be creating report, report correction, reading report, report modification, and evaluation of modification result, which will be described respectively in this section.



Figure 5: Creating a report

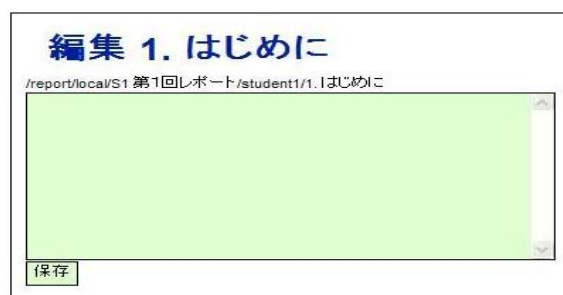


Figure 6: Editing new report page

3.4.1 Creating and submitting a report

After students log in the system, they can create report page from the edit menu provided by the system. The system then will display a page illustrated as figure 5.

Inputting page name and section number and creating “ create ” button, a new page with an empty text box will be opened as figure 6 shows. Students can write report contents into this text box. A report page will be created in the same way of creating wiki page. Table of contents will also be created automatically. Finished report can be submitted to repository area by clicking submit button.

3.4.2 Commenting on and scoring a report

Figure 7 shows the interface of correction mode. At correction mode, system will add a checkbox to each line of report contents. Comment list will be listed at the right side of the report page. Checking the lines of report

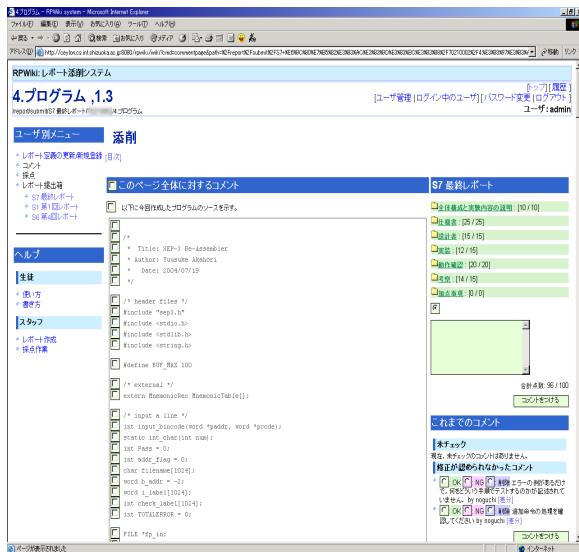


Figure 7: Commenting on and scoring a report

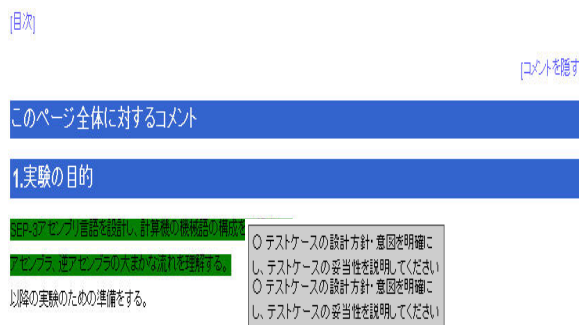


Figure 8: Comments view

contents and checking the corresponding comments, comments can be added into the page. Moreover, teachers can write extra comments into the textbox the comment list provides. When teachers score report, the comment list will be change to score list from which teachers can input score point as checking the items of correction and score criterions.

3.4.3 Reading comments and modifying a report

We have introduced that there are two areas, user area and repository area in the system. Submitted report will be saved at repository area. Students can view their submitted report from repository area.

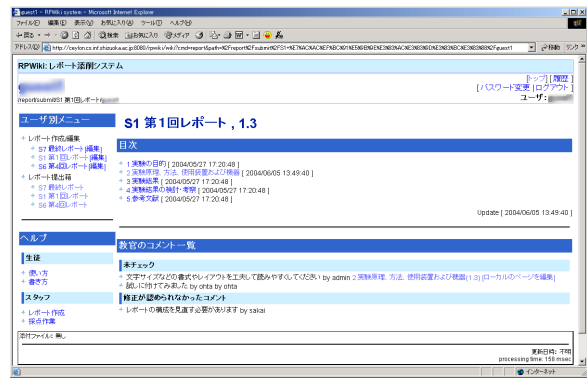


Figure 9: List of added comments

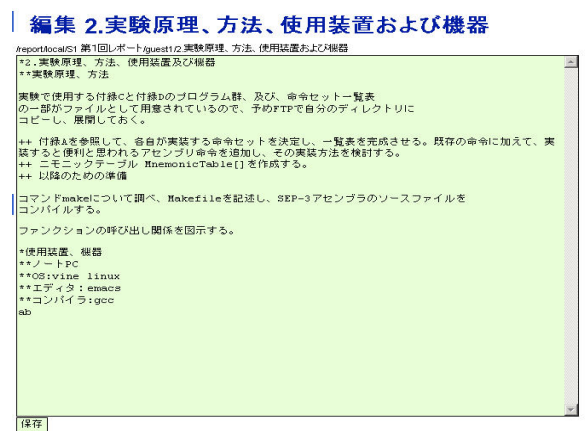


Figure 10: Editing page

Illustrated as figure 8, the comments can be displayed by clicking “ show comments ” link when students view the report at repository area. The line which has comment will be color highlight. Comment contents will be displayed on a popup menu when moving mouse pointer on the line.

Added comments will also be listed at the bottom of each page of the report that is submitted to repository area, illustrated as figure 9. Each comment of the list will be followed by a “ edit ” link which let students be able to open the related report page directly into edit mode to edit it (see figure 10).

3.4.4 Evaluating modification result

As figure 7 shows, system will list the comments that have been added by now below the

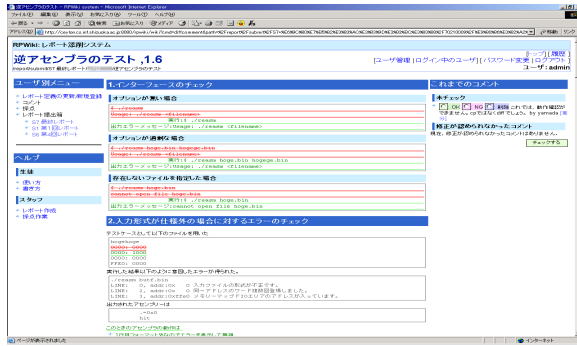


Figure 11: Difference page

comment list at correction mode. Each comment is followed by three radio buttons labeled “ ok ”, “ ng ” and “ remove ”. There is also a “ difference ” link that points to difference page (figure 11).

Teachers can grasp how the report is modified easily. Deleted contents and add contents will be displayed in different color. If teachers are satisfied with the modification, they can check the ok button, vice versa they can check “ ng ” button to students that it is necessary to modify the report again.

4 System evaluation

To see whether or not the system is effective for reducing burdens of students and teachers and promoting collaborative works between them, 15 students and 3 teachers volunteered for using this system. During the course experiment I of third grade students at the first semester, students wrote four times report about assembler and disassembler. The first two times, student used traditional way. They wrote reports on papers. The last two times volunteers 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. Because teachers and students do different operations in the system, we divided the function survey into two parts, one for students and one for teachers. They are also be asked to explain the reasons if they

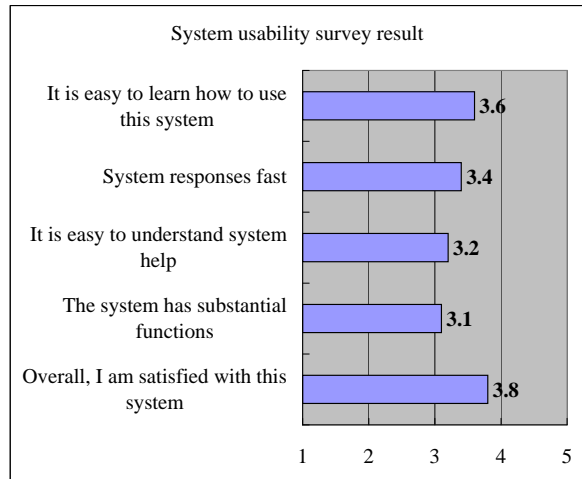


Figure 12: Result of system usability survey

give a low point for some survey items and to give some advice for the system.

Question items for functions and usability are given five answer choices that represent point from 1 to 5 respectively. For usability, the five choices are very 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 that were used to compare 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 12.

We can see from the figure 12 that all average points are not less than 3. The question of “ Overall, I am satisfied with the system ” got 3.8 point. It should be said that participants are satisfied with this support system. But “ It is easy to understand system help ” got 3.2 point and “ the system has substantial functions ” got a 3.1 point. At these aspects, we still need to do some improvement.

4.2 System function evaluation

In this section, we will give and analyze the results of system function surveys that are for students and teachers.

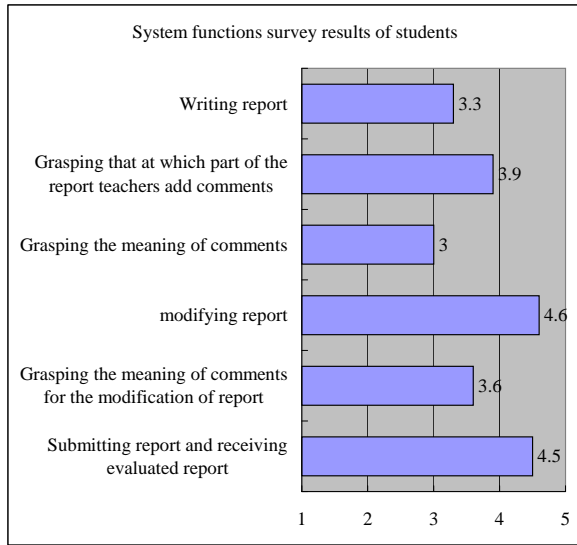


Figure 13: Function survey results of students

4.2.1 Function survey results of students

Figure 13 shows the function survey results of students. We can see that functions of report submitting and receiving, grasp that at which part of the report teachers add comments and modifying report received high points, 4.5, 3.9 and 4.6 respectively. These function achieved good effects that we expected. However, the point of grasp the meaning of comments is 3, the lowest point. The problem is that when students do not understand the meaning of the comments as they read them, they can not ask or discuss with teachers about them immediately by using this system. The function of grasping the meaning of comments for the modification of report has the same problems.

The function of writing report has a 3.3 point. 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 students into three groups like figure 14. Group 1 has 7 students who have no experience of using wiki and only have 1 or 2 times experience of using HTML. Group 2 has 4 students who often use HTML but have 1 or 2 times or no experience with wiki. Group 3 has 3 students who often

		Wiki experience			
		NO	1-2 times	Several times	frequent
HTML experience	NO				
	1-2 times	7			
	Several times				
	frequent	3	1	1	2

Group1 (NO HTML, NO Wiki), Group2 (1-2 HTML, NO Wiki), Group3 (Several HTML, Several Wiki)

Figure 14: Students group

use HTML and Wiki.

Among the three groups, group 2 gives the lowest point 2.75 to report writing(see table 1). This group has no or a few of times Wiki experience but often use HTML. Like Wiki, this system uses interactive page mode. Report is written into Wiki text and then system changes the text into HTML to display. This decides that report page cannot support as rich design format as HTML does. Most of advice of this group is about writing report, such as creating and editing tables or figures. Report Writing will be one of main subject of our future works.

Table 1: Survey results of students groups

Items	Group 1	Group 2	Group 3
Writing report	3.6	2.75	3.3
Grasping that at which part of the report teachers add 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 the meaning of comments for the modification of report	4	3.3	3.3
Submitting report and receiving evaluated report	4.4	4.8	4.3

4.2.2 Function survey results of teachers

The function survey results of teachers is illustrated as figure 15. Reading report, writing comment and scoring report only got 2.3,3

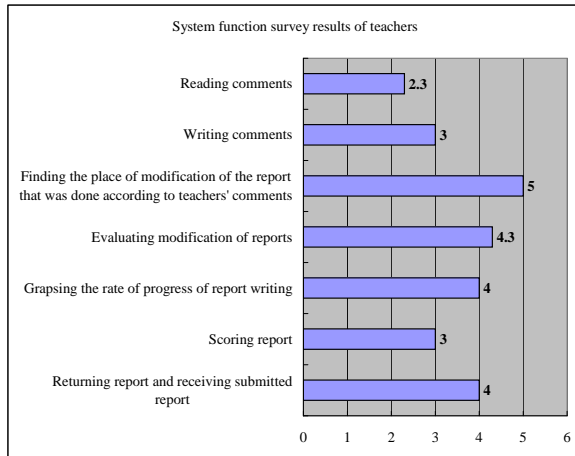


Figure 15: Functions survey results of teachers

and 3 point. From the teachers explains, we know that there exists some problems about these functions. For example, it is difficult to read the page that has long contents and commenting on such kind of page becomes difficult too. When score the report, teachers can not check how they comment on the report.

The low evaluations of students and teachers that was made for 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”. The existing problems will be solved in near future.

5 Conclusions

From the survey for the students and teachers 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, it seems that functions like writing report, writing comment, grasping the meaning of comment and scoring report are same or a little superior compared with traditional method. Function of reading report is even worse than traditional method. The improvement of these functions will be a subject that we will do in the near future.

Besides the improvements of existing functions, we will also add some new functions to enhance the correction effects. For example, discussion between teachers and students, searching contents of report and multiple students write one report. These will be our future works.

References

- [1] Bo Leuf, Ward Cunningham: The Wiki Way Quick Collaboration on the Web, ADDISON-WESLEY, p. 14, 2001.
- [2] Mark Guzdial: Swiki/CoWeb, Georgia Tech College of Computing, <http://coweb.cc.gatech.edu/csl/9/> .
- [3] Ogata, H. and Yano, Y.: CoCoA: Communicative Correction Assisting System for Composition Studies, Proc. of ICCE 97, pp.461-468, Malaysia, Dec., 1997.
- [4] Hirokazu Bandoh, Yoko Otsuki, Shin-ichi Sawasa: The correcting tool by handwriting and voice inputting, IPSJ SIG CE-66-2, pp.9-16, 2002.
- [5] Takeharu Ishizuka: Design of a system for providing corrections and comments on students' reports with internet, the 27th annual conference of JSISE, pp.55-56, 2002.