

Using the Multi-Mouse Quiz System for Quiz Making Activities in an Elementary School

Juan Zhou
Graduate School of Informatics
Kyoto University
Kyoto, Japan
Email: juan.z.kt@gmail.com

Mikihiko Mori, Hajime Kita
Academic Center for Computing and Media Studies
Kyoto University
Kyoto, Japan
miki@media.kyoto-u.ac.jp, kita@media.kyoto-u.ac.jp

Abstract—Multi-Mouse Quiz System is an application set to treat quizzes in a classroom or other learning opportunities. It consists of Multi-Mouse Quiz (MMQ) and MMQEditor. The MMQ is an application of Single Display Groupware(SDG) which enables multiple users to answer quizzes by connecting several mice to an ordinary PC. The MMQEditor is an PC application designed to edit quizzes for MMQ. In this paper, we describe an activity of 6 grade children in an elementary school that asked them to make quizzes with MMQEditor and then evaluate the quizzes mutually using MMQ. The results of the activity showed that with the combination of using MMQEditor and MMQ, children were engaged in the activities, the operation of MMQEditor for children was easily-handled, most of the children could learn the basic operation of the MMQEditor.

Keywords—Face-to-face collaborative learning, quiz, create quiz questions

I. INTRODUCTION

Most of the conventional ICT systems for education are based on the concept of personal computers (PCs). That is, the ICT systems are supposed to support collaborative learning by connecting PCs with a network, and each student has to use his or her own seat and computer in a classroom. When a student is going to discuss with his classmates, he or she has to move to other's seat leaving from his or her computer. Considering face to face collaborative learning, such inconvenience in activities is a disadvantage to the education in elementary schools. In other words, making each child use his or her computer may inhibit some important aspects of the collaborative process such as the development of mutual understanding through face-to-face discussion sharing information in a virtual workspace.

To share one display with multiple users having separate input devices are the important issue to support face-to-face collaborative learning. This issue is named Single Display Groupware(SDG) proposed by Stewart[1]. The Multi Mouse Quiz (MMQ) system[2] was developed as a concrete application of SDG, and with MMQ, we have conducted four experiments in the social studies classes through collaboration with two elementary schools. The results showed that most of the students were motivated in learning and their communication were encouraged with

use of the MMQ system[3]. Further, these experiments also showed that MMQ and the MMQEditor, a quiz editor for MMQ, could be operated by the school teachers themselves with minimal assistance by the researchers.

Among the previous practices, there was a request to let children create the quiz questions so as to engage them learning with the MMQ. This paper describes another activity of using MMQ in an elementary school. In this case, children were asked to create quiz questions using MMQEditor by themselves, and then appreciate quizzes made by other children with MMQ. We report this practice mainly from a view point of usability of the MMQEditor for children.

II. RELATED WORK

The desire to develop technologies that enhance richness of collaboration in a face-to-face setting by ICT has spurred researchers to investigate a variety of multi-user environments. The SDG model refers to systems with which each of collocating users uses an input device such as a mouse sharing a display. SDGtoolkit was a middle ware that provides multiple users interaction environment through multiple mice and keyboards handled independently (Tse et al., 2002)[4]. Mischief proposed by Moraveji et al. is a system to support traditional classroom practices between a remote instructor and a group of collocated students with SDG[5][6]. While most of the SDG researches assumed small number of interacting users, they tried to make all students in a class use their own mice. In these researches of SDG, the multiple mice have been shown to lead users higher engagement, a positive impact on collaboration and motivation.

Quiz provides students an opportunity to self-assess their current level of knowledge. It also provides feedback that helps students determine how to adjust their behavior to ensure that acquisition of the missing knowledge is successful. Study by quiz was widely used with a variety of methods, such as amuse children to maintain the attention as well as to encourage the enthusiasm to learn. Pollard, J.K. used a Web-based Quiz to let student to reflect their studies[7].

Yokomoto, C.F. used the on-line quiz system to encourage students in active learning in group([8]). Not only systems to answer quizzes, quiz editing system is also studied. Yuuichi, S. have made a prototype tool enabling rapid creation of quiz data importable to Moodle, a popular web-based open source LMS[9].

III. MULTI-MOUSE QUIZ SYSTEM

Multi-Mouse Quiz System is an application set to treat quizzes in a classroom or other learning opportunities. It consists of the Multi-Mouse Quiz (MMQ) and MMQEditor.

A. Multi-Mouse Quiz (MMQ)

MMQ is implemented with the SDGtoolkit, and by connecting several mice to one PC, up to four player can answer quizzes simultaneously. As shown in Fig.1, MMQ can treat quizzes with 2 through 4 choices. One picture can be shown with a question sentence, and one picture with explanation sentence. As well as score of each player, total of scores of all the player is shown on screen aiming at collaboratively answer the quizzes. Quizzes are posed to players automatically with a timer, but the teacher can suspend it with key operation so as to facilitate the learning. That is, with suspension of quiz, the teacher add some words for hints, or give children time to think deeply.



Figure 1. Interface of MMQ



Figure 2. Interface of MMQEditor

B. MMQEditor

MMQEditor is a quiz editor for MMQ. A screen shot of MMQEditor is shown in Fig.2. For easy-to-understanding of operation, we designed the interface of MMQEditor similar to MMQ as far as possible. As well as quiz question, choices and explanation, the user can set the number of choices, score of the answers, the time limit to answer with the MMQEditor. Functions of MMQEditor are summarized as follows:

- Set question sentence and select a picture for question.
- Choose number of choices.
- Set choice sentences and its correctness.
- Set time limit of each question.
- Set score of each question.
- Set explanation sentence to a quiz and select a picture for explanation.

IV. QUIZ ACTIVITY IN AN ELEMENTARY SCHOOL

The quiz making activity with the Multi-Mouse Quiz System is held an elementary school (say School F) in Kyoto in February 2012. It was held in two 6 grade classes of the school as a part of the course ‘Social Studies’. The numbers of the children in the classes are 25 and 27, and totally 52 children participated in the activity. The activity was held in the computer room of the school. The activity consists of 3 class hours held in 3 days in each class.

The schedule of the activity was as follows:

- At the 1st day, every child used MMQEditor by him or herself to create quiz questions(Fig.3).
- In the 2nd day, the whole class is divided into several groups of 3, 4 children. They showed the created questions each other and exchange opinions to improve the quizzes.

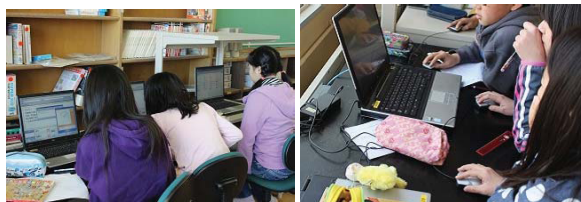


Figure 3. Creating quiz questions Figure 4. Answer quiz questions

In ClassA, they revised their questions. In ClassB, they merged the created questions into a one quiz file of group’s name.

- In the 3rd day, all the children used the MMQ to answer the questions they created by groups of 3 or 4 children(Fig.4). In ClassA, children answered the questions made by each children, and in ClassB, they answered the questions made by the groups.

In this paper, so as to focus on evaluation of MMQEditor, details of the experiment at the 1st day were described as follows:

- The homeroom teacher started the lesson
- Teacher explained the summarize of lesson
- Self-introduction are made by the research(2 people)
- Teacher used the center computer to explain the usage of MMQEditor
- Question time
- Children started to use the MMQEditor. Researchers looked around the classroom to support children who stumbled
- Homeroom teacher closed lesson

V. RESULTS OF THE ACTIVITY

For analysis of the activity quantitatively and qualitatively, we recorded the activity in video. Questionnaire survey to children was also conducted after the activity. Further, we

made interviews to the teachers. Analysis of videotapes, questionnaire and interview revealed that children were positively engaged in the quiz making activity. In the following, we discuss mainly focusing of the usability of MMQEditor for children.

A. Possibility of MMQEditor Usage

Through participant observation by the researcher operation of MMQEditor by children seemed not to be difficult. In these two classes, children asked several questions concerning the software. That is,

- 1) Place to save the file
- 2) Naming rule of the file
- 3) Difference between file menus “save” and “save as”
- 4) Way to change font size of question text

The first two questions need clearer instruction by teacher, the third one is common to windows GUI. The last one has no choice because of the specification of the MMQEditor, and we asked the children to summarize sentences within the space limit.

In the interview to one of the teachers, he said “Children were familiar with the operation of the MMQEditor. I didn’t think they feel anything difficult.”

After the activity, children answered the questionnaire about the MMQEditor. We asked some questions about possibility of MMQEditor usage. The answer to the question “Can you use the MMQEditor yourself from now?”, more than 70% children answered that they can use it in the both classes. However, we also observed some difference in the two classes. Answers in ClassA are a little more positive than those in ClassB. It is maybe influenced by the time spend operation of MMQEditor, that is, ClassA spend longer time for make quiz questions using MMQEditor individually than ClassB in the three days(ClassA: 66’30”; ClassB: 33’29”). In ClassB, MMQEditor was used both personally and in group. Also more than 90% of children evaluate the MMQEditor was easy to operate in the question of “Was the MMQEditor easy to use?”.

B. Usefulness of Functions of MMQEditor

We put a lot of functions to the MMQEditor. To evaluate these functions, we ask children in the questionnaire. The answer to the question “What did you do to make the questions better?”In the multiple selection answers, many children answered that they made the commonly-confused choices and let text of question to easy to understand. In addition, there were some children choose the answers “Read the textbook carefully” and “Make the text of explanation page easy to read”. Thus, the children tried to make the questions better in their own ways.

One of the author observed that children went back to their classroom to pickup their textbooks when the teacher told that they had to put the content on explanation page. That is, to write the explanation page encourage to increasing

in chance to read their textbooks. A teacher evaluated it as “This activity was related to engagement of creating quiz questions”.

We can also evaluate the functions of “time table setting” and “score setting” through the quiz files children created. Some children set different time lengths and scores to quiz questions. However, there was also observed a problem that children can not estimate how long the player needed in reading.

C. Engagement of Children

Children’s engagement in the activity was assessed by analyses of videotapes, questionnaires and interview to a teacher. We asked children “Did you enjoyed creating the quiz questions using MMQEditor?” on the questionnaire. Almost all of the children answered “Enjoyed it very much” or “Enjoyed it somewhat”. Also more than 80% children of both classes want to use the MMQEditor again.

In the interview, the teacher said “Almost all children liked to work on computer. In this activity of using MMQEditor to create quiz questions, the children with high scholastic ability had been made quiz questions one after another. The children with low scholastic ability or low writing ability also had been work faster than usual. I think children obtained the sense of satisfaction absolutely in the different way. Specially for children with low scholastic ability, MMQEditor supports them to create quiz questions at the same start line to the other children. They felt satisfied when they finished complete works”.

TableI shows the statistics of the numbers of questions. Many children made questions more than one. The highest number was 8 questions. All of the children created at least one question.

Table I
THE NUMBER OF QUESTIONS CHILDREN MADE

	ClassA	ClassB	ClassA&B
Total	57	90	147
Mean	2.28	3.33	2.83
Standard Deviation	0.92	1.28	1.17
Max	5	8	
Min	1	1	

1) *Engagement in the Activity*: Children’s engagement in the activity can be discussed also by the amount of off-task behaviour they exhibited, gathered from the videotapes. Because of space limit of the computer room and request from the teachers, we recorded the classes only with three cameras through the activity. We extract the behavior of three children each class from the video.

The children of the both classes, spend more than 20 minutes to use the MMQEditor, the time of off task is 11.85% in classA, 7.46% in classB. Off-task behaviour was considered to be not associated to the lesson actions (e.g. looking around the room, or taking short break) and not

associated to the lesson discourse. Video analyses revealed that after asking some questions to friends, they looked up the screen nearby, and borrowed textbooks appeared to be the main reasons for off-task behaviour. These behaviors of children exhibited their engagement in the quiz making activity.

D. Behaviors Observed in Using MMQEditor

At the 1st day, each child puts their own quiz questions using MMQEditor in original schedule. While the activity on the 1st day didn't include group work, we observed there are a lot of interactions among the children.

We also analysed the behaviours of children exceptional off-task time and time spend at MMQEditor. We found children liked to talk each other and were used to watch screen each other. Also when they faced with difficulties, they also take a look of another screen nearby. They also pointed their own screen to friends asking some feedback from them. Some groups of 3 or 4 children shared one screen and discuss about the questions. They also talked about how to create quiz questions. The questions about the system, lesson, or textbook were also be talked.

We also asked "What did you do if you are stuck when you creating the quiz questions?(multiple selection)" in the questionnaire, the most chosen options are "ask friends" and "ask teacher". In this questionnaire, we also can said ask classmate were the best choice of children who faced problems.

VI. CONCLUSION

We studied an activity with the Multi-Mouse Quiz System to support collaborative learning in two classes in an elementary schools in Japan. We mainly focused on the activity of quiz making with the MMQEditor. The practice showed that MMQEditor could be operated by children themselves without special assistance by the researchers. According to the data, the teacher and children all think MMQEditor was easy to operate. Furthermore, they also had confidence of ability of operating MMQEditor alone in the future.

The function of describing explanation page is an important matter to engage children to read the textbook. In writing of explanation, children also tried make document easy to read, increased the chance to examine the document. It also could let children to find importance of considering the reader when they made a document. Meanwhile, the function of "time table setting" and "score table setting" were also worked.

Using MMQEditor to create quiz questions, children showed activity more than usual. In general, children can concentrate their work in this study. They made achievements more than usual. For children's study, using MMQEditor bring the good influence to their learning. We also observed children like to talk to each other looking at the

friend's screen. Hence, to support the face-to-face collaborative learning, shared screen is the important issue. Good effects and important hints have been obtained for future study.

As future work of this study, authors are planing to evaluate the effects of the MMQ system used in this study, to continue evaluation of the MMQEditor in different classes, and to try to develop other applications to support the face-to-face collaborative learning. Specially, for support children's discussion.

ACKNOWLEDGMENT

The authors would like to thank to the children and the teachers in the studied elementary school, and Kyoto Municipal Board of Education for their cooperation.

REFERENCES

- [1] Stewart, J., Bederson, B.B., Druin, A. (1999). Single display groupware: a model for co-present collaboration. ACM CHI Conference. PP.286-293.
- [2] Masaki Saga, Kokolo Ikeda, Mikihiko Mori, Tetsutaro Uehara, Hajime Kita. Development of A Multiple User Quiz System on A Shared Display. Creating, Connecting and Collaborating through Computing, 2009. C5 '09. PP.103 - 110.
- [3] Juan ZHOU, Hajime KITA, "Class Design with Multi-Mouse Quiz in Elementary Schools", In Proceedings of the 19th International Conference on Computers in Education, Asia-Pacific Society for Computers in Education (ICCE 2011),pp.9-12(2011.11).
- [4] Tse, E. (2002). S. SDGtoolkit: A Toolkit for Rapidly Prototyping Single Display Groupware. Screen (London), 91,PP.79-81.
- [5] Moraveji, Neema Kim, Taemie Ge, James Pawar, Udai Singh Inkpen, Kori Mulcahy, Kathleen. Mischief: Supporting Remote Teaching in Developing Regions. 26th Annual CHI Conference on Human Factors in Computing Systems APR 05-10, 2008. PP.353-362.
- [6] Moraveji, N., Inkpen, K., Cutrell, E., Balakrishnan, R. A Mischief of Mice: Examining Children's Performance in Single Display Groupware Systems with 1 to 32 Mice. Chi2009: Proceedings of the 27th Annual Chi Conference on Human Factors in Computing Systems, Vols 1-4.
- [7] Pollard, J.K.. Student reflection using a Web-based Quiz. Information Technology Based Higher Education and Training, 2006. PP.871-874.
- [8] Yokomoto, C.F., Ware, R.. Variations of the group quiz that promote collaborative learning. Frontiers in Education Conference, 1997. 27th Annual Conference. "Teaching and Learning in an Era of Change". Proceedings. PP.552-557 vol.1.
- [9] Yuuichi Sugi, Toshihiro Kita, Seisuke Yasunami, Hiroshi Nakano. Web-based Rapid Authoring Tool for LMS Quiz Creation. Information Technology Based Higher Education and Training, 2006. 7th International Conference. PP.617-620.