Instant Seat Mapping for Student Note Sharing Process

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Abstract—We have been experimenting with Anoto-Pens to immediately monitor the progress of all students during a lecture. In our previous experiments, the teacher had to determine, in advance, the mapping between student seat positions and his/her digital pen IDs. To resolve this issue, we propose an instant seat-mapping method utilizing student signatures. When a student writes his/her name on a mapping sheet, the system connects the student’s seating position with the pen ID. We confirmed the effectiveness of this method by conducting an experimental lecture at an elementary school. Our method was found effective even while teaching younger schoolchildren.

Keywords—Digital Pen; Note Identification; Response Analysis

I. INTRODUCTION

In order to facilitate collaborative learning in conventional classroom lectures, we developed a student note-sharing system AirTransNote (ATN) [1]. ATN is designed to realize real-time note sharing features with minimum configuration burdens for teachers and minimum cognitive load for students. To achieve that design, we utilize a Anoto-based digital pen (Anoto pen) to collect student notes. An Anoto pen can collect student note with an error of less than one millimeter, and transmit the note data via Bluetooth wireless network. The note data can be collected through the “Digital Pen Gateway System” developed by NTT Comware Corporation. Using this configuration, notes of more than 40 students can be gathered on the teacher’s PC simultaneously. The teacher can focus on the student notes and show them to other student via a projected screen display. Communication using student note is richer than conventional response analyzers. The students can participate in the enhanced class activity without any additional skills.

Through ATN can provide an advanced lecture with minimum configuration and effort, it still requires some advanced settings before starting lectures. In this paper, we explain the setting needed, and propose a method to mitigate for inputting student ID; the pen ID is used for identifying the notes of different students taken during the course. Meanwhile, the teacher expects the collected note layout to match the student seating positions in the classroom. In the former ATN process, the teacher gave the students pens with preset, sequentially numbered IDs. Association between pen ID and student position was described beforehand by a configuration file. ATN read the configuration file (ID, name and position for each student) and showed the corresponding information on a printed page.

The “configuration file” method works well in a typical lecture, but it is not useful enough for unexpected problems such as pen malfunctions and non-sequential distribution of pens. When such an event occurred, the teacher had to fix the configuration file during the lecture. Moreover, the preset method only covered “reserved seats” or “pre-determined seats”, and so it is not feasible for higher education courses with random seating.

III. AD-HOC BINDING UTILIZING STUDENT SIGNATURE

In order to resolve the problems, we proposed an ad-hoc post binding method that utilizes student signatures. This method requires each student to write down his/her name on the section of the sheet that represents the student’s seat position. Since a pen ID is included in each student note, the ATN can associate the pen ID with the position. Also, the signature can be used to label the seat buttons.

With this method, a teacher prepares a seat-mapping grid for the classroom (Figure 1 above). At the beginning of the course, students are asked to write their names on the table cells corresponding to their seating positions. The ATN handles the signatures on the seating grid as “mapping data of pen ID and seat position.” The student’s name drawings are displayed on an ATN seat-map controller as button labels. Thus the teacher can focus on the student’s notes by pressing the controller.

Merits: The teacher only has to prepare for the lecture by printing the seat-mapping sheet in advance. The sheet can be easily generated by the lecture sheet editor of ATN. The teacher specifies the region and the numbers of the rows/columns, and the lecture sheet editor prints the
mapping sheet. The specified data are also used to perform seat mapping.

Thanks to the post-binding method, no prior assignment of pen IDs with students is necessary; the teacher can dynamically assign the pens to students. The dynamic assignment contributes to the following two benefits.

(1) Improving anonymity of notes: In the former ATN session, the teacher often assigned pens using sequential IDs. However, the serial ID enabled the students to infer the author of specific notes. We do not recommend anonymous sessions, but some teachers may consider hiding the student names to protect anonymity. Using the proposed method, the teacher can easily perform the session by assigning pens randomly.

(2) Quick recovery during pen malfunctions: In case of problems with the working of a pen, previously, the teacher had to fix the problem during the lecture, but had no time to determine the reason for the trouble. Thus, in most cases, the teacher offered a spare pen in exchange. In such a case, creating an association between the new pen and the student is necessary, but managing this data requires extra time for the teacher. To solve this issue, we implemented a function to assign multiple pens to each position/student. The student can add the secondary pen by writing down the same signature on the same cell. When the teacher approves the secondary signature, the notes taken by the secondary pen are now associated with the position/student. For the teacher’s benefit, the seat-map controller can rotate student button alignment in the teacher’s view.

IV. EXPERIMENTAL LECTURE

In order to validate the method, we conducted an experimental lecture at an elementary school in January 2009.

Conditions: We chose younger schoolchildren (second-class students, 7 to 8 years old) for the experimental lecture. The class consisted of 33 students, and seats were arranged in a 6×6 grid layout. Participants were asked to write down their names in the correct cells of the seating grid and send it to the ATN system. The size of signature area was 30 mm in width and 25 mm in height. The seats and participants in the class are shown in Figure 2.

Results and Discussion: Figure 3 shows the teacher’s PC displaying the results of seat mapping at the experimental lecture. During the experiment, no signatures were assigned to incorrect positions. One possible reason was that most participants could see the signatures column, and were asked to write their names below the previous student’s signature. The mapping took about 4 minutes. The time for mapping would be shortened if the students had more experience with the method. Some signatures were written untidily, but the teacher could easily identify the names as the position of the name corresponded to the seat position.

V. CONCLUSION AND FUTURE WORK

We described an instant seat-mapping method for Anoto pen lectures. The proposed method does not require teachers to prepare seat-mapping data in advance. Therefore, they do not have to input student names and positions in configuration files. The method is robust to problems with the pen, such as low battery or lack of ink in the cartridge. This method also extends the applicability to classes with random seating.

We confirmed the effectiveness of the method in an experiment at an elementary school with younger schoolchildren. We continue to conduct note collecting lectures in order to improve system usability for both teachers and students.

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REFERENCES