EXPLORING STUDENTS' LEARNING JOURNALS WITH WEB-BASED INTERACTIVE REPORT TOOL

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ABSTRACT

Students' journal writings could be useful resources for teachers to grasp their understandings and to see their own teaching objectively. However, reading a large number of journals thoroughly is not always realistic for teachers. Although various automatic analysis methods have been proposed to understand learning journals, they does not necessarily fit needs of teachers and tend to overlook minor opinions. In this paper, we propose an interactive report tool for exploring journal writings. Focusing on the efficiency of reading learning journals, it employs weekly keywords extracted from journals as entry points for journal sentences. It enables us to read journal sentences selectively. The tool also provides lists of most used adjectives from week to week, which is helpful for teachers to grasp the temporal variation of opinions through a semester. We conducted a preliminary questionnaire about the usefulness of the report tool targeting teachers of the course "Information Science" in our university. Most of them evaluated our tool positively although the number of answers were small.

KEYWORDS

Learning journals, teaching support, understanding journal writings, interactive user interface.

1. INTRODUCTION

Journal writing in an educational context is an important approach for fostering writing skills, for deepening understandings of concepts (Scouller, 1998), for reflection (Boud, 2001), and so on. Students' learning journals contain their thoughts, feelings, and ideas, which come up to their mind during a class. These are useful for teachers to see their teaching activity objectively from student's perspective. By reading journals, teachers can find which topics interested students, what confused them, and how they understood concepts. Such observation gives teachers many insights that lead to improvements of course materials and their own teaching.

Reading journals thoroughly, however, takes a long time when a class is large, and it is not always possible for teachers to read journals of all students. It is also difficult to summarize a number of opinions without overlooking minor but important opinions. In recent years, text mining techniques has been employed to automatically analyze learning journals; for example, a topic modeling technique was employed

for grading reflections (Chen et al., 2016), and subjective and affective features were captured from reflective texts (Gibson and Kitto, 2015).

Although such analysis methods help us to understand journals to some extent, they only provide a fixed view of journals and does not always fit teacher's need. Therefore, it remains important to read individual entries of journals in an efficient manner. Our research question is how we could improve teachers' reading experience especially for learning journals without losing flexibility and efficiency.

In this study, we propose an interactive report tool based on web technologies, which makes it possible for teachers to explore students' journal writings without losing details of the writings. We employed weekly keywords (Taniguchi et al., 2017) as entry points to actual journal texts, which enables teachers to read journal entries selectively. We implemented our interactive reports on our Mahara e-portfolio system as a web-based tool, and conducted a preliminary questionnaire about its usefulness. In the rest of the paper, we detail the design and implementation of our proposed interactive report tool, and then discuss the result of the questionnaire.

2. METHOD

2.1 DESIGN OF INTERACTIVE REPORT

We propose a web-based interactive report tool for journal entries, which provides word-based navigation mechanism and shows patterns of word usages. We consider a kind of keyword that helps us to understand a wide variety of topics of journal entries. The graphical user interface displays such keywords as entry points of journal exploration. The keywords are shown in ranking tables for each week, and we can see how the usage of words varies from week to week. We also show most frequent adjectives for every week, which presents the temporal change in sentiment.

We employ the importance measure proposed in (Taniguchi et al., 2017), which identifies weekly keywords. Minor opinions or topics are relatively difficult to notice when we read students' journals in a limited time. Most of the journal entries usually share the common topics, and thus we can skip some redundant entries. The importance measure balances between minor and major topics by taking into account both the frequency and the week-specificity of a word, where week-specificity is computed from the week frequency of the word in a dataset. Since minor opinions highly related to particular course topics tend to include week-specific words, we can efficiently ignore redundant entries by choosing entries that includes weekly keywords.

2.2 IMPLEMENTATION DETAIL

The users of our Mahara system can use the interactive report tool as a part of the system. The tool shows an interactive report for selected classes. A report consists of three sections. The first section presents a simple statistical information about journal texts. Figure 1 shows an example of the section. It includes the

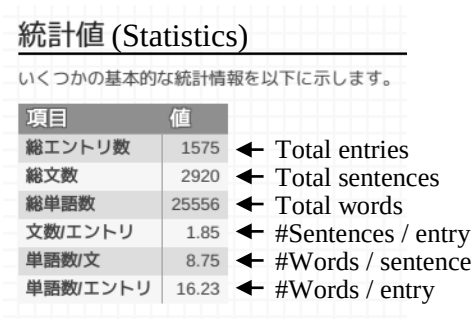

Figure 1. The first section showing statistics such as total numbers and average numbers of entries, sentences, and words

total of entries, the total of words, the average number of words per sentence, and so on. These numbers shows how much students wrote in journals.

The second section gives us the main interactive interface for journal exploration. There are four subsections corresponding to part of speeches of nouns, adjectives, verbs, and adverbs. Each subsection shows a ranking table of words of the corresponding part of speech for every week. Figure 2 shows an example table for nouns on the left hand side, and additional three dynamic features on the right hand side.

The first dynamic feature is a pop-up sentence view. When we hold a mouse cursor on a word in tables, a popup appears and it shows the sentences containing the selected word and emphasizes its occurrences. It is helpful for us to understand in what context and how the word is used in real sentences.

The second one is word highlighting feature which emphasize all occurrences of a pointed word across ranking tables. Since the ranking table presents a relative importance in a particular week, this feature makes it possible to see how the usage pattern of the word changes through a semester.

The last feature is grouping feature of adjective and verbal words by their polarity based on a dictionary. We can toggle the feature, and get *positive* and *negative* words in ranking tables colored with green and red colors, respectively. It is helpful to quickly understand journal contents from the sentimental point of view.

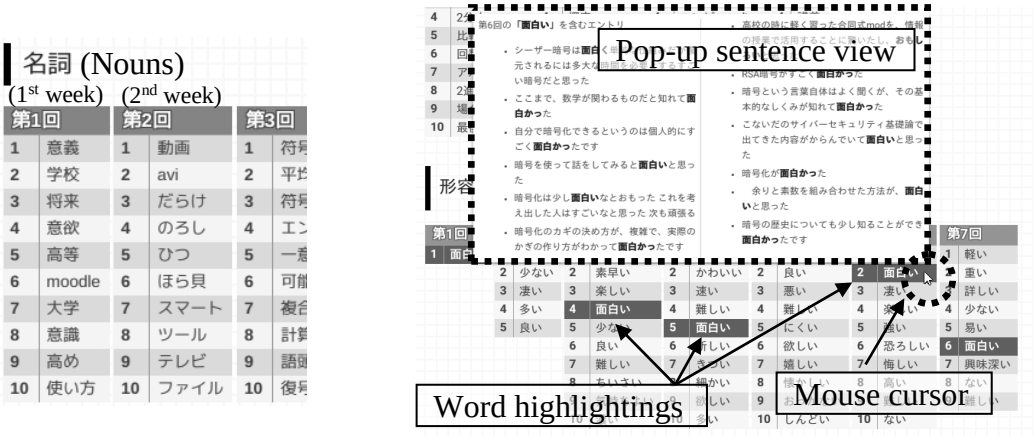

Figure 2. The second section showing weekly keyword rankings. On the left hand side, rankings of noun keywords for the first three weeks are shown. Additional dynamic features are shown on the right hand side.

The last section focuses on adjectives and includes two types of stacked bar charts as shown in Figure 3. On the left hand side of the figure, the numbers of occurrences are shown for each major adjective word. In contrast, on the right hand side, adjective words are grouped into positive ones, negative ones, and the others; and it roughly shows how opinions changes. These charts make it possible for teachers to track the temporal change in adjective word usage, which in turn helps them identify topics interesting or difficult for students.

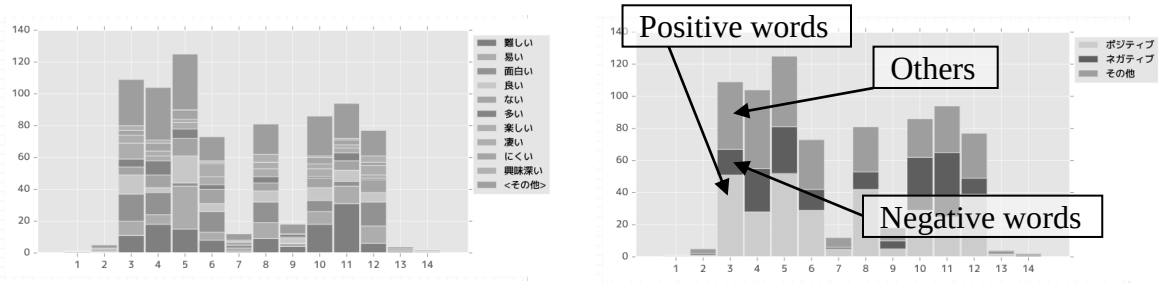

Figure 3. The third section that shows temporal changes in adjective word usage. The frequencies of individual words is shown as a stacked bar chart on the left hand side. The same for three word groups of *positive*, *negative*, and *other* is shown on the right hand side.

3. RESULT & DISCUSSION

We did a questionnaire about the use of students' journal for improving teaching and about the usefulness of our report tool. We asked ten teachers to use our interactive report tool and to answer the questionnaire, who conducted classes of Information Science course held for the first grade students during the first semester 2016 in our university. In the classes, students were instructed to write a journal entry per week after a class with the content including their impression after class, what they learned, what aspects they found interesting, and so on. All the learning journals are collected in our Mahara e-portfolio system.

Since we obtained answers from only several teachers, we abandoned to quantitatively evaluate our report tool. We only shows some of the answers in this paper. Only two out of five teachers answered they had browsed students' learning journals before, and had read journals of all students. A teacher commented that he could find what students feel difficult. Another teacher pointed that he was able to understand which weeks have many negative opinions at a glance. In comparison to the user interface of Mahara system, three persons answered it is easier to read and analyze.

4. CONCLUSION

We designed and implemented an user interface for exploring students' learning journals interactively. Based on weekly keyword rankings, our tool provides a way to access important entries efficiently without overlooking minor opinions. From the questionnaire for a preliminary evaluation, we obtained some positive feedback. However, the number of answers is very small, and thus the evaluation is very limited. In future study, we will conduct expanded survey for quantitatively evaluate our tool. Our interactive report tool can be used to promote the use of students' journals for improving teaching, and it would be useful for comparatively analyze different teaching styles.

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