Understanding Student's Reviewing and Reflection Behaviors Using Web-based Programming Grading Assistant

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ABSTRACT

Paper-based assessment is still one of the most preferred methods in assessing students in a blended learning environment. However, it has several drawbacks such as having a high turnaround time before feedback is provided to the students. Furthermore, understanding how students attend to their graded papers is difficult to investigate because of the absence of empirical evidence. We describe in this paper a web-based system we developed that addresses some key issues when trying to understand the reviewing and reflection behaviors of the students. This system also aims to help instructors to efficiently and effectively grade paper-based assessments.

Keywords

Reviewing Behavior, Paper-Based Assessment, Educational Technology

1. INTRODUCTION

Paper-based assessment is still one of the most preferred methods in assessing students in a blended learning environment. Aside from being convenient to prepare, the possibility of students committing academic dishonesty is lower. However, it also has its drawbacks. Evaluating large amounts of test paper gives rise to the possibility of inconsistency among or even within graders [2]. Additionally, the feedback is limited [5]. Moreover, there is a high turnaround time before students receive their graded papers [1]. In terms of understanding the reviewing and reflecting behaviors of the students, it is difficult to systematically estimate how students review their paper-based assessments because of the absence of empirical evidence. It is not possible to determine whether students really do review their graded test papers. Thus, it is challenging to estimate the impacts of reviewing on learning.

2. WEB-BASED PROGRAMMING GRADING ASSISTANT (WPGA)

A web-based system was developed to address the above-mentioned issues. More specifically, it is designed to help students

to review effectively. In addition, it aims to help instructors to efficiently and effectively grade paper-based assessments. The name of the system is Web-based Programming Grading Assistant (WPGA). The system is capable of capturing all activities performed by the users, which is mostly comprised of students' clickstream.

2.1 Documentation of Paper-Based Assessments

WPGA uses quick response (QR) codes to label the paper exam of a student. These generated codes are manually placed on the students' papers prior to scanning. Using an automatic document feeder, all the papers are scanned and uploaded to the system. The system automatically associates the scanned image to the corresponding student and the corresponding assessment. There are instances where the system may not accurately associate an image to a student. One possible reason would be due to the QR code being not readable. It could also be because the student is not registered in the system. When this happens, the instructor can just manually label the images.

2.2 Interface for Grading Assessments

After the exams are digitized, instructors can distribute the questions to be evaluated by different graders. The system allows multiple graders to work on the same assessment simultaneously. In effect, the turnaround time in the distribution of grades is reduced. The grading coherence will improve since graders will only be working on the question assigned to him or her.
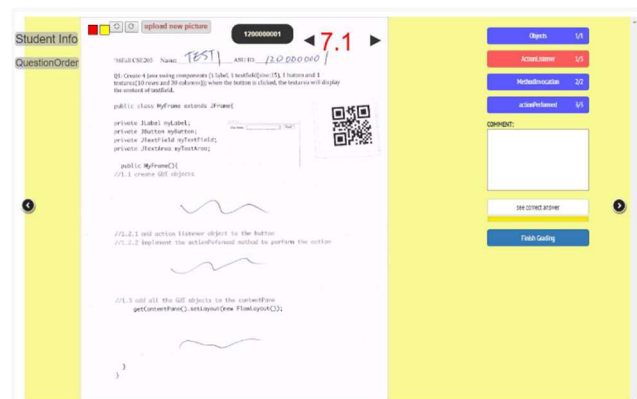

Figure 1. The grading interface of WPGA

The grading interface is shown in Figure 1. Buttons on the upper right portion represent a learning concept or a rubric that is used to evaluate a question. Every rubric default to a perfect score, which

translates to a full understanding of the concept. Whenever the button is clicked, the grade for the rubric is decremented and the overall score is recalculated. Also, the color of the button changes depending on the grade for the rubric. It could be blue (full understanding), red (partial understanding), or grey (missed the concept). The overall score can also be overridden, if necessary. The graders can also add markings on top of the student's paper. This will enable them to highlight the mistakes. Lastly, using the comment section, the graders can provide free form feedback. In previous studies [2,3], we found out that graders prefer to type their feedback rather than physically writing them on paper. One advantage of this over the traditional way of checking is the ability to copy and paste feedbacks of common and similar mistakes.

2.3 Interface to Encourage Student Reflection

After the instructor publishes the results of an assessment, the students can log in to the system and review it. There are two levels how the students can view the results: assessment level and question level. In the assessment level (shown in Figure 2), the general result is displayed. This includes the overall score obtained by the student along with the individual scores for each question. In the question level (shown in Figure 3), a detailed feedback for the particular question is provided. This includes the scores for all the rubrics, the markings on the student's paper, and the free form text provided by the grader.
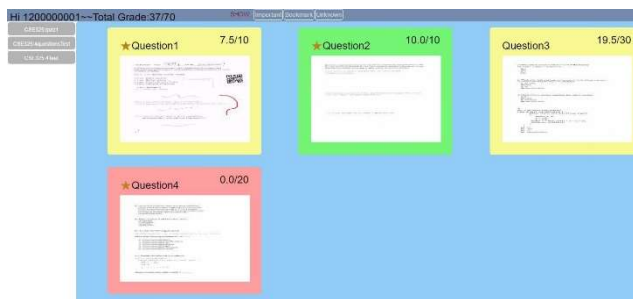

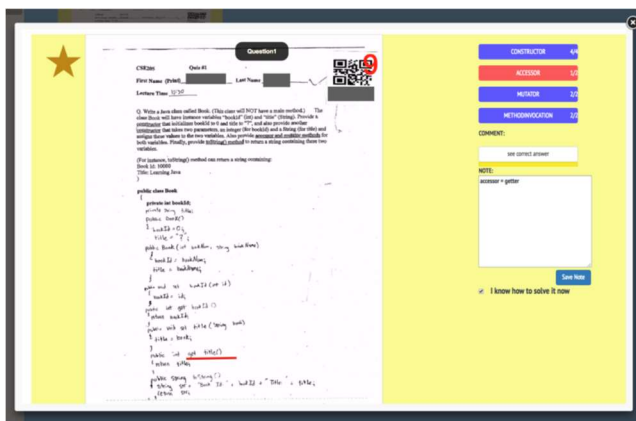**Figure 2. The assessment level view of the student interface**

Figure 3. The question level view of the student interface

In addition to letting the students access a digital copy of their paper assessments, the system also allows them to reflect on the feedback given to them by the graders. We incorporated some features that help students track and monitor their learning. For example, in the question level, there is a checkbox that the students can tick to indicate whether they already know how to solve the problem after reviewing it. This is particularly useful for questions where they committed mistakes. Another feature is the bookmark which enables students to highlight the importance of a question. This could be used in future targeted reviews along with the use of filters. We also provided a free form text area to allow the students to type in his or her personal notes. The collection of these bookmarks, checkbox ticks, and notes are externalization of what the student knows. Through these features, it is hoped that students will be encouraged to reflect on their answers.

3. CASE STUDY

Using the system, we designed a classroom study and analyzed the logs collected from an *Object-Oriented Programming and Data Structures* class. We tracked and modeled students' reviewing and reflecting behaviors. Results show that students demonstrated an effort and desire to review assessments regardless whether they are graded or not [4].

4. FUTURE WORK

We intend to improve the system by using the feedback obtained from the users. For the next iteration, we are integrating the analytics module that will enable the instructors to quickly see a snapshot of the class performance and will enable them to gain insight on the assessments they gave to the students. Furthermore, we intend to do more research in understanding the reviewing behaviors of the students. This would allow us to create personalized review sessions that will help students do effective reviews.

5. REFERENCES

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