A Subjective Evaluation of Web-based Programming Grading Assistant: harnessing digital footprints from paper-based assessments

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Introduction

In a blended learning environment, paper-based evaluation has still played essential role of academic learning. However, it has its own drawbacks:

1. the inconsistency on grading(Hsiao, 2016),
2. the high turnaround time before students receive a feedback (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010).
3. Failing to catch feedback in learning process (Mattie & Timperley, 2007).

To address drawbacks, we developed Web-based Programming Grading Assistant (WPGA) which has features:

1. Connects paper-based exams to digital space.
2. Enhances graders’ grading coherence
3. Delivers efficient feedback to students
4. Captures multi-dimensional learning analytics
5. Enables longitudinal studies.

Paper-based vs. WPGA

- Past: Teachers make paper exams → proctor exams in class → collect them back (Distribute to graders) → grading → (collect them back) → deliver to students → (collect them back)
  (missing advanced learning analytics)

- Current: Teachers make paper exams → proctor exams in class → collect them back → scan papers, upload scanned paper images to WPGA → (Distribute to graders) → grading → deliver to students by publishing graded results on system (harnessed advanced learning analytics)

Current Usage

- 6 CS professors
- 35 graders
- ~1200 students (up to ~2300 until today)
- CSE 100–400 level courses. (CSE 110, 205, 310, 434)

Design and Implementation of Web Programming Grading Assistant (WPGA)

A web-based system was developed to help in grading paper-based exams and in providing direct feedback online. The name of the system is Web Programming Grading Assistant (WPGA). It connects paper-based assessments to the cyber world and ensures instructors that they can still have paper-based exams without having to learn new tools.

Digitalization of paper-based assessments

WPGA utilizes quick response (QR) codes to label and identify paper exam. Instructors upload their student rosters and scan all the paper exams of the students. Afterwards, these images are uploaded to the online system. The digital exam shows in Figure 1.

Augmented grading platform

The grading interface is shown in Figure 1. The system allows multiple types of feedback through its interactive buttons. The blue is default and show full score, which mean full understanding of the concept, red is partial understanding or grey is missing the concept. The grader can even write on the question image. According to a previous study (Hsiao, 2016; Hsiao, Govindarajan, & Lin, 2016), graders prefer on typing their feedback rather than physically writing them on paper because of reusing earlier comments is a common scenario.

Reflective feedback delivery

In the student’s interface, there are two levels of view: exam level and question level. In the exam level (Figure 2), a general result of the exam is played which shows overall score. In the question level, a detailed feedback is displayed. Student could see what concept they misunderstand or take notes to reflect on particular question. There is also a checkbox to signify whether they have already known how to solve the problem. They can also use a star bookmark to indicate the importance of the problem. These features allow them to filter questions for targeted review.

User Feedback

All students who used WPGA in Fall2016 were invited to fill the feedback form. A total of 199 respondents answered the WPGA survey.

Role in learning

Figure 3 illustrates that 48.49% of the students responded that WPGA was able to help them learn the class material. When asked whether they will use WPGA in future study, 42.7 responded positively.

Ease of using the system

In terms of using the WPGA system, 56% of the students found it easy to use. Majority of the students felt comfortable using the system after taking 1-2 quizzes. One drawback is that only few students know how to use the advanced features.

Suggestion for WPGA

1. Make analytics available to students
2. Including Social and peer learning features

Future Work

Using the feedback form student, new version of WPGA will improve with following features:

- Visual learning analytics support for both teacher and students.
- AI-assisted grading/feedback methods
- Personalized learning experience

WPGA Overview

https://cidsewpga.fulton.asu.edu/about/

References


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