Advance HE Teaching & Learning Conference 2019

Queen Mary University of London

Effective Assessment and Feedback in Software Engineering Group Project

Dr Ling Ma (ling.ma@qmul.ac.uk)

1. Background

Software Engineering is one of the core modules at the Joint Programme between Queen Mary University of London (QMUL) and Beijing University of Posts and Telecommunications (BUPT). This module has approximately **680** students every year across three degree programmes. Students work in small groups to complete a large software development project in three months. The main challenge is to assess large numbers of groups with effective feedbacks to students because traditional one-off end of project assessment and feedback does not work well in this setting.

The aim of this project is to use an innovative approach to give students **immediate**, **constructive** and **continuous** feedback, thus to improve their learning experience.

2. The approach

The approach is to use Agile project management for the assessment and feedback. The students work in small groups (6 students/group), this number falls in the golden number range of an Agile team to effectively practice Agile methods.

The assessment and feedback are divided into 3 stages to follow the Agile practice of small integration, continuous delivery, showcase and customer feedback.

- Early stage: Product backlog and software prototype
- Mid stage: Latest iteration of the working software product and unit testing
- Final stage: Final software product and integration testing

At each stage, each group is given a one-hour session assessed by an examiner through live demonstration and viva style Q/A. The examiner gives students immediate feedback to help them move on to the next iteration.

At the end of the project, the groups submit their report, code and user manual online. The groups also receive a final written feedback.

Marks are awarded on the consistency of the work, which are 30% in early stage, 20% in mid stage and 50% in final stage.

3. Implementation

This approach has been implemented for 2 years. We carefully designed the project with **emerging topics** to attract students' interests. In 2017-18, students did the project of "A smart energy management and monitoring system", in 2018-19, the project was "A campus scooter sharing system".

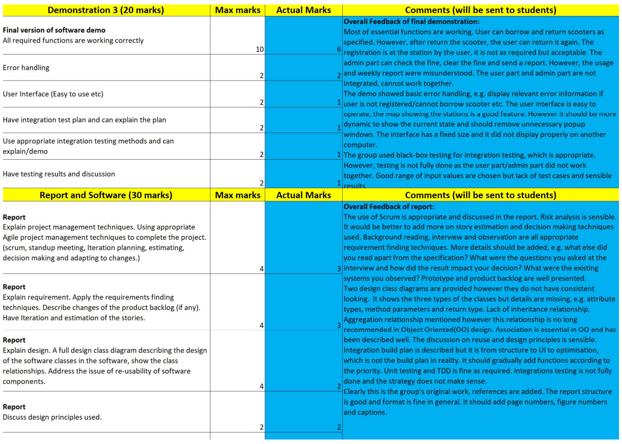
Fig 1. The assessment and feedback session

4. Challenges

To make the sessions effective, students were given clear instructions before each session about the preparation, timing and seating plan.

The big challenge was to make the marking and feedback **consistent** among 18 examiners (lecturers and teaching assistants). To achieve this:

- All of the teaching assistants must first complete the project themselves.
- The lecturers used teaching assistants' work as samples to give comprehensive marking and feedback training.
- The marking scheme was constructive with detailed marks break down.



Demonstration 3 (20 marks)	Max marks	Actual Marks	Comments (will be sent to students)
Final version of software demo All required functions are working correctly	10	6	**Overall Feedback of final demonstration:** Most of essential functions are working. User can borrow and return scooters as specified. However, after return the scooter, the user can return it again. The registration is at the station by the user, it is not as required but acceptable. The admin part can check the fine, clear the fine and send a report. However, the usage and weekly report were misunderstood. The user part and admin part are not integrated, cannot work together. The demo showed basic error handling, e.g. display relevant error information if user is not registered/cannot borrow scooter etc. The user interface is easy to operate, the map showing the stations is a good feature. However it should be more dynamic to show the current state and should remove unnecessary popup windows. The interface has a fixed size and it did not display properly on another computer. The group used black-box testing for integration testing, which is appropriate. However, testing is not fully done as the user part/admin part did not work together. Good range of input values are chosen but lack of test cases and sensible results.
Error handling	2	2	
User Interface (Easy to use etc)	2	1	
Have integration test plan and can explain the plan	2	1	
Use appropriate integration testing methods and can explain/demo	2	1	
Have testing results and discussion	2	1	
Report and Software (30 marks)	**Max marks**	**Actual Marks**	**Comments (will be sent to students)**
Report Explain project management techniques. Using appropriate Agile project management techniques to complete the project. (scrum, standup meeting, Iteration planning, estimating, decision making and adapting to changes.)	4	3	**Overall Feedback of report:** The use of Scrum is appropriate and discussed in the report. Risk analysis is sensible. It would be better to add more on story estimation and decision making techniques used. Background reading, interview and observation are all appropriate requirement finding techniques. More details should be added, e.g. what else did you read apart from the specification? What were the questions you asked at the interview and how did the result impact your decision? What were the existing systems you observed? Prototype and product backlog are well presented. Two design class diagrams are provided however they do not have consistent looking. It shows the three types of the classes but details are missing, e.g. attribute types, method parameters and return type. Lack of inheritance relationship. Aggregation relationship mentioned however this relationship is no long recommended in Object Oriented(OO) design. Association is essential in OO and has been described well. The discussion on reuse and design principles is sensible. Integration build plan is described but it is from structure to UI to optimisation, which is not the build plan in reality. It should gradually add functions according to the priority. Unit testing and TDD is fine as required. Integrations testing is not fully done and the strategy does not make sense. Clearly this is the group's original work, references are added. The report structure is good and format is fine in general. It should add page numbers, figure numbers and captions.
Report Explain requirement. Apply the requirements finding techniques. Describe changes of the product backlog (if any). Have Iteration and estimation of the stories.	4	3	
Report Explain design. A full design class diagram describing the design of the software classes in the software, show the class relationships. Address the issue of re-usability of software components.	4	2	
Report Discuss design principles used.	2	2	

Fig 2. Marksheet with feedback

5. Evaluations

We used action research method to measure their **learning gain**, through a pre and a post anonymous online test survey. The results show that this approach is highly praised by the students. They have developed their skills and become more confident through the assessment and feedback process. (Q1 Knowledge; Q2 Communication skill; Q3 Team work; Q4 Programming skill)

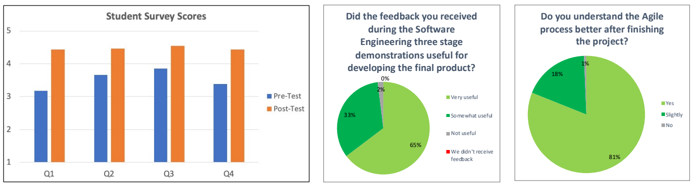


Fig 3. Survey results

Some students commented: "We received early feedback and knew what should be improved next." Our teaching assistants observed: "The students were much more engaged in the group work."

6. Results and Impact

- Students received immediate, constructive and continuous feedback throughout the project period.
- The assessment sessions were much more interactive and the feedbacks helped students move on to the next iteration
- Students had more chance to practice their presentation skills
- Individual contribution was fairly recognised and it encouraged every student to contribute towards the project
- It enhanced their team working skill
- It provided opportunities for students to engage in active learning
- It prepared students for the future career
- The assessment/feedback scheme and training method can be widely used
- The automated marksheet is efficient in dealing with large student number
- This approach can be widely adopted for large group project assessment in other institutions and other disciplines