Using Active (Peer) Feedback to develop Professional Software Engineers Skills

Leif Azzopardi, School of Computing Science, University of Glasgow

Professional software engineers need to be able to effectively and succinctly communicate with clients, managers and other developers through specification and design documents. Such documents contain technical writing along with explanatory diagrams. Mistakes, errors or omissions, at this point in the process, can lead to poor/wrong solutions and costly fixes. To develop the professional skills of software engineers in terms of both reporting and critically assessing such reports, we introduced active peer feedback into the assessment process.

For software engineering the design and specification document is a crucial report that connects the client, the architecture and the engineers together. Incomplete, imprecise, or incorrect specifications can lead to innumerable problems. Thus the focus for is on producing a Complete, Clear and Correct specification document where the design has been well considered. In producing such a document feedback from clients and other engineers is common and the feedback needs to be taken onboard and addressed.

Passive vs. Active Feedback

Feedback is also an important part of the learning cycle. However, it needs to be acted upon and utilized for it to be incorporated into the cycle. So by **Passive Feedback**, I mean, feedback that is given, but there is no immediate opportunity for the student to apply or act upon the given feedback. Whereas by **Active Feedback**, I mean, feedback that is given and the students have an opportunity to address the feedback, respond to the feedback, and to improve their work given the feedback, such that they can improve their marks and complete the learning cycle.

Tips when Introducing Peer Feedback

Tip 1: You need to provide the students with a strong motivation to provide the feedback:
- Extrinic motivation is not enough (i.e. marks)
- Instrinic motivation is needed – (i.e. that their opinions and thoughts are important and will need to be responded to/addressed)

- That is, **the feedback needs to be ACTIVATED!**

Tip 2: Peer Feedback provides students with lots of comments
- But the quality of the feedback varies significantly
- So often more is better, where students should have to review several reports, so that they see the diversity among reports and can compare them
- If possible, diverse groups of students provide a better mixture of feedback and comments
- Also, training helps to improve the quality

Tip 3: Don't introduce Peer feedback as a way to get out of providing feedback, use it to complement your feedback.
- Invariably you end up with a lot more marking
- Or a lot more complains
- And a lot more hassle if not implemented very well or inappropriately.

Tip 4: Carefully consider how the peer feedback fits with your Intended Learning Outcomes
- E.g. In my course two of the ILOs are:
  - Critique and evaluate the information architecture of web applications
  - Identify and critically analyze the requirements of a web application
- Thus the course explicitly focuses on developing the professional skills of the software engineers.

Tip 5: Carefully consider the instruments that the students are going to use to provide feedback –i.e. unstructured to highly structured
- The more open-ended the more vague the comments
- Imposing structuring within the feedback form tends to:
  - Can reduce the amount of waffle
  - Gets the students to focus on the main points

o Provides the students with an explicit guide
- Too much structure though and the students will begin to sacrifice their own abilities to think critically in lieu of a box ticking exercise
  o For example a **Feed Forward** approach with a checklist

Tip 6: How critical the feedback can be depends upon the **Completeness** and **Clarity** of the work, so provide training and guides to steer students in the right direction.
- For example, if the work is incomplete, the feedback focuses on the incompleteness. If it is unclear, then likewise.
- Student feedback is often way too positive and often glosses over important details regarding the correctness of the work.
- *Constructing the peer feedback exercise so that students provide critical feedback is really difficult*!

Tip 7: Consider using a system like Aropa, which handles submissions and the peer feedback
- But also realize that such systems often don't do everything you need and often require a lot of effort to setup properly.

Pro's and Con's of Active/Peer Feedback

Con 1: There is a high overhead in setting up the assignments for Peer Feedback and significantly more marking is required i.e. the reports and the feedback needs to be marked and if active feedback is incorporated, then reports need to be double marked.

Pro 2: Provides the students with a lot of comments and feedback from different points of view and having to take these points on board generally improved the quality of the work.

Con 3: Sometimes the feedback falls on deaf ears and the students are resistant to take the feedback onboard.

Pro 4: It is often perceived as a positive learning experience (for deep/engaged learners)*

Con 5: It is generally perceived as a hassle (by shallow learners*) and as just another hoop to jump through (by strategic learners*) i.e. they only address what was specifically raised.

Pro 6: The peer feedback provided a third party perspective, which at times may have been uninformed, much like an actual client, on their designs. This provided realism to the exercise, and the issues raised needed to be addressed.

Con 7: The validity of the peer feedback was questioned – and in some case outright rejected. Often students felt unfairly treated by the feedback they had received commenting, "it was read properly" or "they don't understand it". This rejection signals that the students are realizing that it is their report that is not clear enough!

Students need to be convinced of the validity of the peer feedback and that it needs to be responded to professionally, i.e. in a reasoned and sensible fashion. And they need to be reminded that the criticisms are not launched at them but at their work and the goal is improve the quality of the work.

Pro 8: By asking the students to provide peer feedback, it introduced a reflective element to the course work and encouraged them to question their own work which often led them to see the flaws in their own work more clearly.

Con and Pro 9: By the time they receive their peer feedback from others, they also can see more clearly the flaws in their own work, to which some students then perceive the value of their peer's feedback as less valuable. I see this as a really positive learning experience as the student's can more readily identify problems with their own work. And while they view their peer's comments as less valuable, I ask them the question, *if you knew what was wrong with it, why didn't you fix it in the first place?*

Con 10: Through the process of feedback, addressing the feedback, and re-marking the reports, the overall marks improve. This is good for the student, but it is bad if you want to have a normal distribution.

Pro 11: Often students never get to see other student's work, so by providing them with the duty of reviewing assignments, then they obtain experience in the peer review process. But better than that they develop a better appreciation of your job as a lecturer and in particularly what it is like to mark poor work (and perhaps worse mediocre work).