

Class Project Reflections and Reflection Essays

Educator: Sohum Sohoni, Assistant Professor, School of Computing, Informatics, and Decision Systems Engineering (CIDSE)'s Software Engineering Program

Context: Out of class; Microcomputer Architecture and Programming (Introduction to Microprocessors Computer Organization)

Keywords: growth mindset, project reflections

Student Activity Time: 5 hours outside of class over the semester

At the end of each class project, students reflected on different aspects of the lab.

Introducing the Reflection Activity

In a required microprocessors course, sophomore and junior students engaged in class projects throughout a 16-week semester. This course was designed to implement a progressive learning platform to scaffold students learning of how software interacts with hardware, how the hardware is designed, and why it is designed that way. The course was organized with four class projects that each had a reflection portion in addition to a concluding reflective essay at the end of the semester. The purposeful design of the integration of reflections into each class projects was to support students' growth mindset.¹

At the beginning of the course, the educator talked to students about the value of reflection in life generally, and more specifically as it related to their learning in college and the course. He also talked to them about mindset theory—growth mindset as characterized by a desire to learn something new and fixed mindset as characterized by a comfort in getting things done, or being successful at the things they know they can be successful at.¹

In the class, students engaged in group projects, which were broken into different phases or class projects that had technical deliverables and a reflection component. The reflection prompts were purposefully designed by the educator and colleagues to balance capturing the technical aspect of the course, and being reasonable for students to understand. The reflection questions ranged in nature, from topics like team work to group dynamics to communication. These questions encouraged students to take a critical look at the progression of their project. For example, in one class project students were asked to respond to the prompt:

“Did your groups have any false starts, or begin down a path only to have to turn back when conducting research for your program. Describe in detail what happened, for example, what specific decision led you to the false starts, if not, why do you think the team had progress so smoothly, give a specific example.”

The purpose of these reflection questions was to give students a platform to start the reflection and to continue to guide the students in reflecting. After students

¹ Dweck, C. S. (2007). *Mindset: The New Psychology of Success*. New York: Ballantine Books.

submitted their reflections, the educator read and graded the reflection. If students put thought and effort into the reflection, then the students received full credit. In some cases, students focused the reflection on the technical aspects of what they did in the lab. Because so many students approached the reflection in this way, the educator talked to the class about the purpose of reflection and provided students with example reflections.

In terms of outcomes, there is potential that students would pause and actually understand aspects of their learning that they would not have been aware of before engaging in the reflection. As well, it is possible that after reflecting students would have a better understanding of their experience in the course and how it connects to their overall knowledge repertoire. Additionally, because the activity gets students writing and the educator emphasized the importance of writing, students may become better writers and may value the role of writing in engineering.

Recreating the Reflection Activity

	Description
1	Assign the reflection assignments to each class project.
2	Talk to students about the purpose and value of reflection.
3	Give students examples of different approaches to a reflection activities
4	Grade the reflections.
5	Debrief the assignment after it has been graded. If there are common misconceptions, reteach those topics.

In the words of the Educator: Tips and Inspiration

Base a significant portion of the grade on the reflection. When deciding on grading reflections, it is important to assign the reflection a significant percentage of the overall class grade. This approach shows students that you value the reflection assignment.

Provide students with reflection examples. Because so many students wrote about the technical aspects of the lab, I started providing them with reflection examples. I gave them examples of purely technical reflections as a way to show students what not to do. I also provided them with a few reflections that were short but insightful and some reflections that were really long and insightful, so I think I gave examples of both of those too. This technique was a way to support them moving beyond simply writing about the technical content, and to help them recognize that there is no “right way” to approach a reflection activity—anything is fine as long as you’re reflecting and can convey that.

Be willing to engage in reflection. As an educator, I think it is important that we continually reflect on our classroom activities. For example, reflecting on whether this was a good reflection prompt or not.

Balance being specific and open in the prompt. Students, especially engineering students, often want specific guidelines on how to do an assignment. While supporting students' engagement in the reflection is important, it is important to balance the specific and open-nature of the reflection prompt. Don't make it too vague, but also don't make it very specific. For example, if it's a yes or no question it is likely not something useful for a reflection, but you could always follow it up with whatever else you subjectively want from the students.

Be aware that fully supporting students' engagement in reflection takes time. I think it is important to read and respond to every student's reflection, but this approach takes significant time. So, when implementing a reflection activity gauge how much time it'll take you to read and respond to the reflection. You have to be reasonable about how many reflections you can do during the semester or course. It can easily explode and you might just end up collecting the reflections and not really reading them, which still has value as the students spend the time reflecting, but not as much value if you were going to use them and close the loop.

Close the loop with the reflection. As mentioned in the previous tip, I think it is important to read and respond to every student's reflection. Additionally, I find it important to debrief the class on what I saw in the reflections. For example, if there are a number of misconceptions, it is important to re-teach those topics. This activity is an important "closing the loop" activity that brings the reflection full circle. I think it helps the quality of the reflections if the students know that you are actually spending the time reading their writing, they tend to make more of an effort and do a better job.

Balance the number of reflection activities. In engaging students in reflection activities, it is important to think about the amount—too few, too many, and just the right amount. Looking back on the first time I used reflection activities in this course, reflecting on what I've done, I think that I used too many.

What was the inspiration for the reflection activity? Using reflection in my teaching originated as part of a research study. A co-PI on a research project, a faculty member from the English Department, was the one who helped me formalized the reflections in my first class as part of the progressive learning platform, so really it was the research that drove reflections into my courses. As I have continued teaching this course and other courses, I have embraced the practice of implementing reflection activities into my teaching.