1. Think about your own experience and whether reflecting on success and failure helped you, e.g. in labs

* Practical use of lecture material in labs was very helpful for me in 1st year, e.g. cs1p labs.
* Looking back and analysing my work has helped me to understand where I went wrong.
* Working out solutions myself with prompts helps understand and reinforce concepts compared with seeing the answer and working backwards
* Reattempting exercises I found challenging was helpful for revision
* Spending too long on one specific lab problem would often lead to frustration and I would not put as much time into the other tasks – could implement a max time for each task and move on whether the student has finished it or not
* At what stage does spending too much time on a task have a negative impact?
* Peer-reflection (informal code review) has been particularly helpful through my academic journey. Discussing solutions and ideas with other students helped me to understand different ways of thinking and how I could apply them into my own work. They have also helped me to see mistake and bad practices that I should avoid.

1. Look for relevant literature about reflective learning

* chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.brettbecker.com/wp-content/uploads/2017/05/glanville2016reflective.pdf – study on level 1 comsci students – “The conclusions from this study indicate that the use of a reflective learning journal can lead to frustration for some students. While some students did indicate benefits in using the journal, the negative comments outweighed the positive overall, and therefore reflective learning journals should no be recommended to all students, at least for environments such as that studied in this paper.”- Conclusions indicate that reflective learning journals are not helpful for all students but helpful for some. They can become tedious and can lead to frustration.
* <https://link.springer.com/article/10.1007/s10758-018-9391-y> - a study looking at beginner tools Scratch and Alice. The conclusion indicates that teaching with Scratch increased engagement and “reflective thinking more positively”
* Chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://files.eric.ed.gov/fulltext/EJ1099318.pdf – study looking at correlation between students taking notes and self-reflection. The study concludes that notetaking increases the level of self-evaluation and reflection of the material.

1. See whether there are any existing programming tools or practices that support this activity.

* Code academy – tool that I have used to help understand and learn concepts but no real reflective tools
* Most other tools that I have used for programming help (stack-overflow, GeeksforGeeks) give examples and answers to my questions but do not involve any sort of reflective process to help reinforce my learning

Below are two reflective cycles widely used across academia.

* Kolb’s four stage reflective cycle developed in 1984, takes learning and applies it to new experiences, 4 stages:
  + Concrete experience
  + Reviewing and reflecting on the experience
  + Making conclusions and learning based on the experiences
  + Applying what the student has learned onto new problems
* Gibbs’ Reflective Cycle, developed in 1988 to define a structed way to learn from experience devised into 6 stages:
  + Description of the experience
  + Feelings and thoughts about the experience
  + Evaluation of the experience, both good and bad
  + Analysis to make sense of the situation
  + Conclusion about what you learned and what you could have done differently
  + Action plan for how you would deal with similar situations in the future, or general changes you might find appropriate.
* <https://www.cambridge-community.org.uk/professional-development/gswrp/index.html>
* <https://www.ed.ac.uk/reflection/reflectors-toolkit/reflecting-on-experience#:~:text=The%205R%20framework%20for%20reflection%20will%20guide%20you%20through%20Reporting,sense%20of%20a%20learning%20experience>.
* Both Edinburgh and Cambridge universities had pages on reflective learning (not programming specific)