

Master Project Proposals - Informatic Didactics

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1 Code Review of Assignments in INF101 by INF112 Students as a Formative Assessment

Code review is an important practice for quality assurance in most development projects. It is a skill which would prepare most computer science students for the working life. As of now few subjects has this as part of the curriculum at the department of Informatics at the University of Bergen. The course *Introduction to Systems Development* (INF112) does touch on the matter, but only light theory and no practical work.

In code review the two parties involved, the reviewer and the code author, both benefit from the practice. The reviewer hones their feedback abilities, and the code author learns to code better, both leading to further quality assurance of the program. Usually the reviewer is a senior developer, while the code author is a junior developer. These two roles (often) reflect the person's maturity and skill level. Something that is paralleled in an older and younger student.

A case study of code review as a formative assessment at the Norwegian University of Science and Technology (NTNU) [1] had the students of a database course do code review of each others projects, and use the feedback to improve their program before grading. The students report benefits in knowledge and skill development, learning support, product quality improvement and social implications. One of the barriers reported in the study was lack of domain knowledge. When students were to review a project they struggled with themselves it was hard to give constructive feedback.

The review process in [1] did not reflect the traditional relation between senior and junior developer, and therefore the reviewers domain knowledge could be a problem. However, if the reviewer were to be an older student that has finished the project in question, this issue could be mitigated.

1.1 Experiment Idea

Have students of the course *Introduction to Systems Development* (INF112) do code review of the first mandatory assignment in the course *Object-oriented programming* (INF101): Tetris. This project is a recurring programming task for each iteration of INF101. INF112 is a course taken by most one year after

INF101. Hence, the students of INF112 will be familiar with this project and have the necessary domain knowledge to conduct a code review on the programs of INF101 students.

The INF101 students will hand in a "finished" version of their program which the INF112 students will review and give feedback on. Then the INF101 students will be given a second chance to make changes to their program given the feedback received. As a second hand in assignments will be graded by teaching staff. The INF112 students will be assessed on their code review.

Potential benefits

- INF112 students learn code review
- INF101 students better learn the curriculum of the subject
- The revision of the assignments will lead to better grades (and hopefully better learning)
- Train potential group leaders in their ability to give feedback (something that is sorely needed)

1.2 Research Questions

To assess the benefits and drawbacks of this review scheme we ask the following research questions.

RQ1: What are the benefits of formative code review as seen by the INF101 students?

RQ2: What are the benefits of formative code review as seen by the INF112 students?

RQ3: What are the barriers of formative code review as seen by the INF101 students?

RQ4: What are the barriers of formative code review as seen by the INF112 students?

RQ3: Does formative code review impact INF101 student scores?

1.3 Methodology

After the deadline of the first mandatory assignment in INF101, each submission is given to a student in INF112. The number of students in INF101 is usually greater than in INF112. Hence, several submissions can be given to a INF112 student (will evaluate when seeing admission numbers). The INF112 students perform code review on their assignments, which the INF101 students use to improve their code for a final delivery. Finally, the teaching staff grades the submissions. INF112 students are graded on how good their reviews are.

INF112 must have a teaching module early in the course (before the deadline of the first mandatory in INF101) about doing code review. The time spent performing the reviews and mending their code based on the reviews will have to be decided closer to semester start, but one week seems fitting.

1.3.1 Data Collection

- Survey for both INF101 and INF112 students on how they perceive the experience of receiving and conducting code review
- Compare submissions from before and after review mending
- Compare scores before and after review mending
- Compare submission and score difference based on grade given to the review

2 Video Portfolio as an exam option in various introductory subjects

Something similar to [2].

3 Pair Programming in CS1/CS2

Something similar to [3].

4 Transition from Python to Java

How to best transition from Python in CS1 to Java in CS2?

References

- [1] Rune Hjelmsvold and Nipuna Hiranya Weeratunge. Peer code review as formative assessment: A case study from a database course project. In *Norsk IKT-konferanse for forskning og utdanning*, number 4, 2021.
- [2] Per Lauvås jr. Video portfolio as an exam option in a database course. In *Norsk IKT-konferanse for forskning og utdanning*, number 4, 2021.
- [3] Nachiappan Nagappan, Laurie Williams, Miriam Ferzli, Eric Wiebe, Kai Yang, Carol Miller, and Suzanne Balik. Improving the cs1 experience with pair programming. *ACM Sigcse Bulletin*, 35(1):359–362, 2003.