

Learning strategies students adopt during programming-heavy and theory-heavy assessments: *Critical Thinking Drives Both*

Sebastian Iacovino Spitaleri
Supervisor(s): Xiaoqi Feng,
Martin Skrodzki, Rafael Bidarra

1. Motivation

For researchers and educators is to understand how students learn effectively
For students is how to best study.

3. Research Question

What learning strategies do final-year CS students adopt during programming-heavy assessments compared to theory-heavy assessments?

2. Definitions:

"To **assess** is to make judgements about students' work, inferring from this what they have the capacity to do in the assessed domain, and thus what they know, value, or are capable of doing." (Joughin, 2009, p. 16)

Theory-heavy assessments are CS assessments are those whose primary learning outcomes involve mathematical reasoning, formal proofs, and abstract concepts.

Programming-heavy assessments are CS assessments whose primary learning outcomes involve writing, designing, and evaluating code.

Rehearsal Strategies are those that involve simple repetition. For example, copying notes or rereading text.

Elaboration Strategies are those that involve building internal connections between items to be learned. For example, Paraphrasing, summarizing, and generative note-taking.

Organization Strategies are those that involve building an internal overview. For example, clustering and outlining.

Critical Thinking involves applying previous knowledge to new situations.

Metacognitive Self-Regulation involves planning, monitoring and regulation activities. For example, tracking of one's attention and questioning.

4. Methodology

Sampling was done using two methods, first Purposive sampling using final-year CSE students as an exclusion criteria and second using Convenience sampling by recruiting through local networks.

One-to-one interviews
Semi-structured interviews
Interview guide
Length: 30 mins

3 interviews
Analysis was done
1. Familiarize with the data.
2. Initial Open coding
3. Re-coded using the 5 strategies as theoretical framework.

Theory Rehearsal

Looking at the lecture slides for activation of information in working memory

P1: "I would first go over the slides"

→ Slides are important learning material for students.

Elaboration

Note-taking as effective strategy for Conceptual Understanding

P2: "I think if you go to every lecture and make lecture **notes**, then for theory that would be way better."

→ Students should try to take notes.

Cheat Sheets as effective strategy for Summarising

P1: "I would say making cheat sheets always helps because you see the content one more time."

→ Lecturers can incentivise making of a cheat sheet.

Critical Thinking

Practice Exams to for new relevant situations

P2: "I made a lot of old exams. I just tried to do it my own, try to find answer behind it."

→ Lecturers make sure the questions in the practice exams are relevant and diverse.

Programming

Metacognitive Self-Regulation

Practice Exams for new relevant situations

P3: "I did all of the previous exams, the past exams that they had available."

→ Lecturers make sure the questions in the practice exams are relevant and diverse.

References:

Joughin, G. (2009, January). Assessment, learning and judgement in higher education. <https://doi.org/10.1007/978-1-4020-8905-3>
Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). A manual for the use of the motivated strategies for learning questionnaire (mslq) (tech. rep.). National Center for Research to Improve Postsecondary Teaching and Learning, University of Michigan. Ann Arbor, MI.