

Lessons Learned from Implementing Supplemental Instruction in Strength of Materials

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We intend to prepare a presentation only for observed lessons learned from implementing supplemental instructions (SI) in Strength of Materials (SoM). SoM is one of the fundamental core courses of the Mechanical Engineering (ME) major and has been identified as one of the top predictor courses for student success in the ME program at Cal State LA. Historically, this course has been a bottleneck due to its relatively high DFW rate and influence on succeeding courses. Many self-studies and reflections among faculty who have taught this course indicate that there is a lack of proficiency in formalizing the mathematical analysis and problem solving. Traditionally, mathematical tools and problem solving procedures have been taught in class with a combination of generic derivations, proofs, and real life examples, yet the outcomes have not been as good as expected. SI has been introduced into SoM as a means of intervention to improve students' success by providing students additional opportunities to identify and resolve muddy concepts and to enhance their problem-solving skills.

To date, we have offered SI sections for SoM in Spring 2018 and Fall 2018 and have improved the delivery based on the lessons learned. Three one-hour sessions are offered per week to accommodate student scheduling conflicts and students are encouraged to attend one of these sessions. Attendance in SI sections is voluntary and does not affect the course grade. The SI facilitator attends course lectures to aid in the selection of topics and problems for the SI session. The SI facilitator and the course instructor collaboratively decide on SI problems that reflect the lectures learning outcomes closely and comprehensively. During the first offering of SI in Spring 2018, the SI facilitator would go over a problem as a group discussion and then additional problems would be given to the students to work on individually or in small groups. During the second offering of SI, a more traditional version of SI was implemented by removing the group discussion portion of the session in order to allow more time for students to work collaboratively or individually on identified problems.

The structure of SI for SoM will be presented including SI session topics, sample problems, and facilitation strategies. Preliminary data will be shared on attendance and impact on student performance, as well as, observations from the SI facilitator and course instructors. Overall, it has been observed that the removal of the group discussion in the beginning of an SI session has led to the students being able to

better retain information – they had a better understanding of what they completed during the session. The main challenge facing the SI practice has been students' attendance; we conjecture that this is partially due to Cal State LA being a nonresidential campus which makes it more challenging to adopt a very inclusive SI schedule. We are exploring ways to improve attendance and identifying how to better scaffold problem solving skills across the sessions.