

Interleaved Practice for Engineering Concepts

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The instructional strategies used by engineering professors have the potential to encourage positive student outcomes on tests and improve a student's ability to make accurate practical applications. Prior research has indicated that students who use interleaving rather than blocked practice tend to struggle more with short-term assessments but perform better on summative assessments, experience greater long-term retention, and ultimately demonstrate increased ability to make real world engineering applications.^{1, 3, 4} While blocked practice involves learning individual skills sequentially (e.g., aaabbbccc), interleaved practice involves learning skills in a randomized or intermixed format (e.g., abcba). Interleaving has been shown to improve a student's ability to discriminate between different categories of problems.⁵ Block practice may contextualize learning, making the application of material outside of the learning context more difficult.¹ However, this approach poses a particular problem in engineering courses, as most textbooks present practice problems in a blocked manner, which does not allow students to utilize interleaved practice.

Very little work on interleaving practice has been applied to engineering concepts, yet this approach has great potential to improve student learning and practical application and performance in engineering courses. The current understanding of interleaved practice suggests that students are more likely to improve their ability to *discriminate* between different types of problems.^{2, 4, 5, 6} Additional research is necessary to further understand the way in which interleaved practice can help students better *associate* various problems with the most effective solutions.⁴

As a result of existing gaps in the research on interleaving practice, this proposed study will further examine the likelihood that such practice not only improves student discrimination of engineering concepts but also enhances their ability to strengthen associations between the problems and their most effective solutions. More specifically, this study will investigate whether interleaved practice, rather than blocked practice, strengthens the association between engineering problems and their most effective solutions in a Statics and Dynamics course.

In order to accomplish this goal, a quantitative quasi-experimental pretest-posttest study will be used to gain a better understanding of the effects of blocked and interleaved practice. Prior to learning, students will take a pretest to gauge current student understanding of three concepts (i.e. trusses, frames, and friction). After learning these topics in class two groups will be formed; the control group will receive traditional blocked practices, while the experimental

group will receive interleaved practice. All students will take a two-part posttest to evaluate their ability to both discriminate between types of problems (i.e. trusses, frames, and friction) and their ability associate the appropriate strategy used to solve the problem (i.e., analysis of trusses, analysis of frames, and analysis of friction).

Given the importance of efficiently and effectively applying classroom knowledge within the engineering field, interleaved practice serves to help produce better prepared engineers. This study seeks to gain a better understanding of best practices in engineering education while further exploring the ability of interleaved practice to improve student association strategies.

References

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