



# Making 'Ceutics Stick: Effects of Instruction on Evidence-Based Learning Strategies on Pharmaceutics Exam Grades

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## Purpose

- Pharmacy students are often high achievers. Yet, pharmacy faculty should not assume that students automatically practice effective techniques for learning the vast amounts of knowledge required of individuals entering the pharmacy profession today.<sup>1</sup>
- Based on their research, several pharmacy academicians have called for providing education on effective study strategies.<sup>1,2</sup>
- Evidence-based learning strategies (EBLS) have demonstrated efficacy in retaining information to long-term memory.<sup>3</sup> They include deliberate practice, spaced learning, interleaving, elaboration, and retrieval/recall.
- The main objective of this project was to determine if incorporating instruction and activities on EBLS in a personal development course for first professional year students impacts pharmaceutics exam grades.

## Methods

- Participants:** first professional year students in an accelerated Doctor of Pharmacy program. Students learn synchronously on 2 campuses using distance education technology.
- Intervention:**
  - Eight weekly EBLS sessions were incorporated into the mandatory course Student Personal and Professional Development I in the PharmD curriculum
- Outcomes:** Exam and course grades in concurrently running Pharmaceutics were compared between the cohort that received instruction on EBLS (intervention group) versus the previous year's cohort who did not receive such instruction (control group).
  - Methods of instruction and assessment in Pharmaceutics were consistent between the two cohorts
- Statistical analysis:** Mean exam scores and final course grades were compared using a student's t-test.

## Acknowledgement

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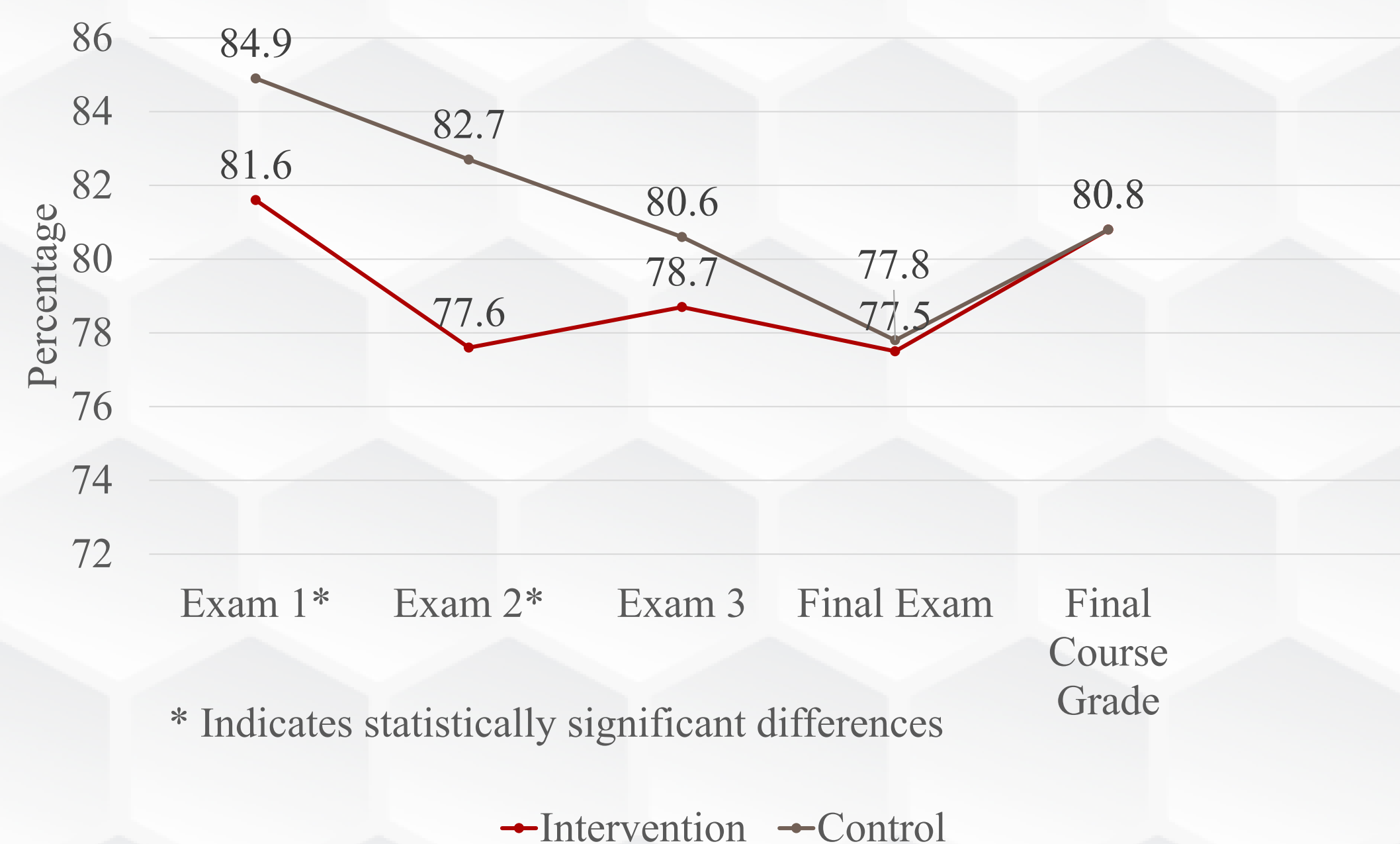
## EBLS Intervention

Table 1. EBLS topics in the Student Personal and Professional Development I course.

Week	Topic	Activity
1	Workflow management	Weekly and Semester Calendar
2	Environment, Focus, and Motivation	Minute Paper
3	Pre-class preparation	Preview Guide
4	In-class Engagement	Exam Wrapper and Minute Paper
5	Evidence-based learning strategies	Boxed lecture materials
6	Monitoring and titration	Learning Dashboard and Study Plan
7	Active recall practice	Learning Dashboard and Study Plan
8	EBLS Wrap Up	Small Group Discussion with Advisors

## Results

Figure 1. Mean Pharmaceutics exam scores for the intervention (n=121) and control (n=120).



## Discussion

- Pharmacy students should ideally develop metacognitive skills early in the PharmD curriculum.<sup>1</sup> This intervention to learn and apply EBLS was employed during the first semester of an accelerated PharmD program on 2 campuses.
- A previous study examined pharmacy students' preferred learning methods and reported that reviewing class material, watching lecture recordings, and engaging in material by attending class sessions and participating in "clicker" questions are the methods most often utilized.<sup>4</sup> To our knowledge, application of specific EBLS by pharmacy students has not yet been examined in the literature.
- Our results showed that the intervention group had lower mean Pharmaceutics Exam 1 and Exam 2 grades compared to the control group, but this difference did not remain statistically significant for Exam 3 and the comprehensive final exam. Mean final course grades were similar between the 2 cohorts. The improvement in exam and course grades in the intervention group correlated with the timeline of the EBLS intervention, that occurred over 8-weeks during the same semester as the course.
- Further research is needed to determine if there were other differences between the cohorts and if other courses were impacted by this intervention.

## Conclusion

This intervention to incorporate EBLS into the curriculum appeared to improve performance on Pharmaceutics grades for first professional year students. Other institutions may benefit from adding instruction on EBLS in their programs.

## References

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