

# A Pre-Matriculation Pharmacy Calculations Module Enhances Student Performance in First Year Pharmacy Calculations Course

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## Introduction

A review of data from the Pharmacy Calculations course suggested that an increasing number of students struggle with course content. In response, a P-zero (P0) program was created and implemented in the summer of 2022 prior to P1 matriculation in the fall to enhance the preparedness and academic readiness of incoming P1 students. The program was completed by 64 out of 71 incoming students.

## Objective

The aim of this study was to assess the impact of the pharmacy calculations module of the P0 preparation program on the academic performance of first-year (P1) pharmacy students in the core calculations course offered in the fall.

## Methods

- Calculations module in the P0 program was online and self-paced
- Fundamental mathematical concepts relevant to pharmacy were included in the module
- Included a mandatory summative assessment
- Class averages and failures in the calculations course were compared between the 2021 P1 and the 2022 P1 cohort which completed P0
- The effectiveness was assessed through P0 pre-and post-implementation surveys and a post-semester survey

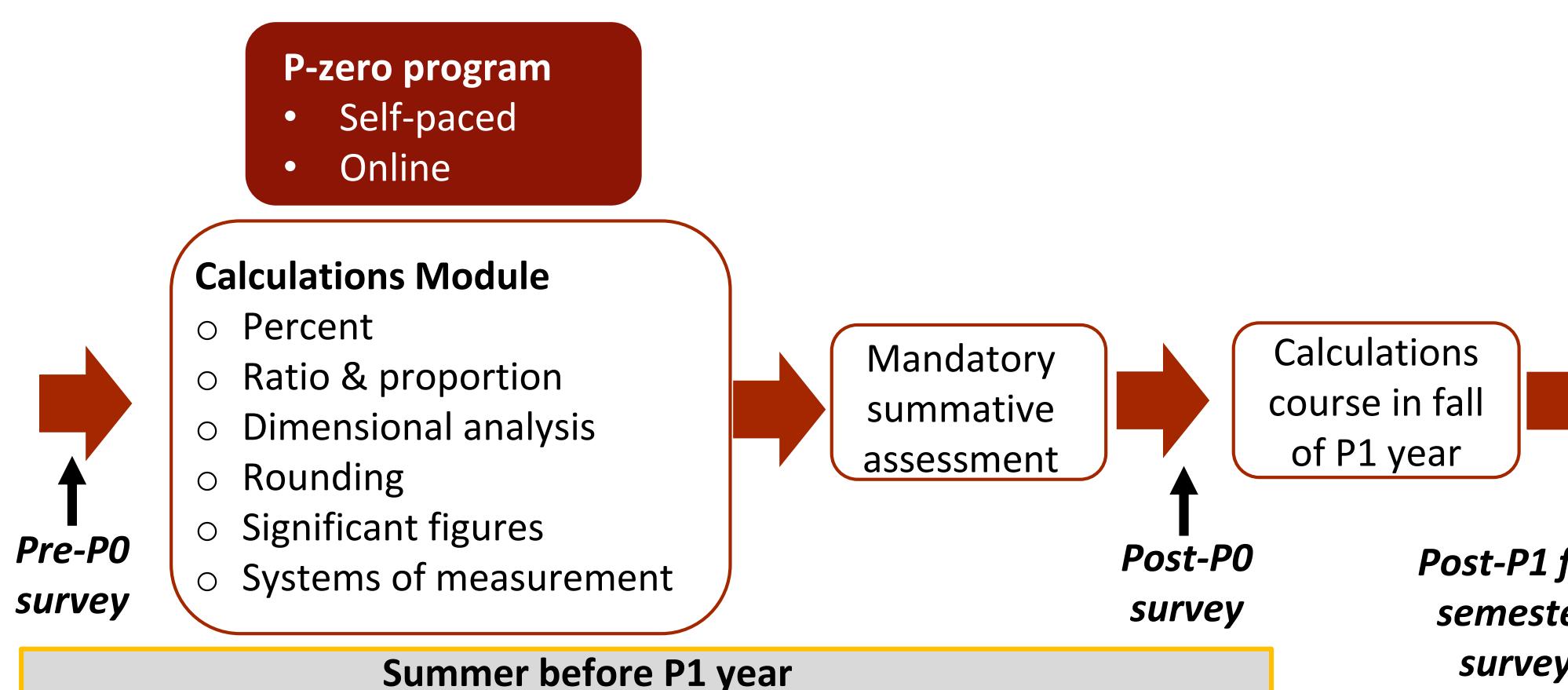


Figure 1: Graphical representation of implementation of pre-matriculation pharmacy calculations module for first year pharmacy students. Educational methods: video lectures, practice problems, quizzes.

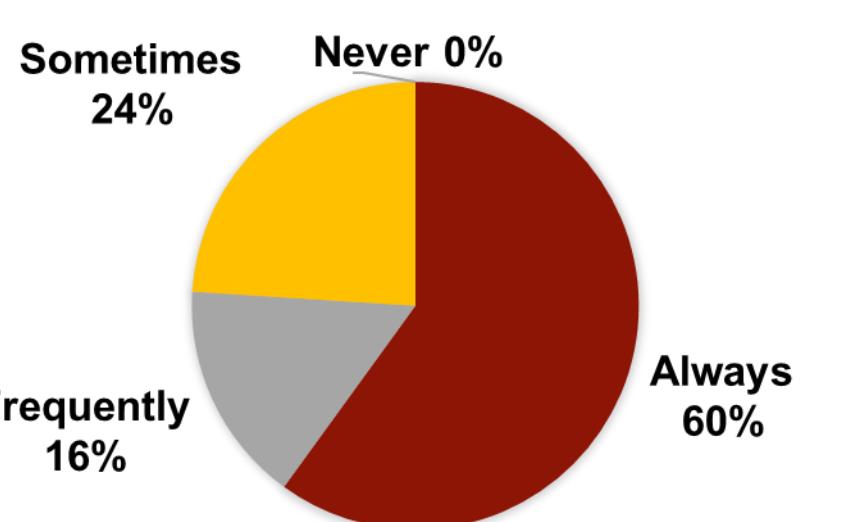


Figure 2: Post-semester survey reflecting use of knowledge introduced in calculations module of P0 during P1 calculations course

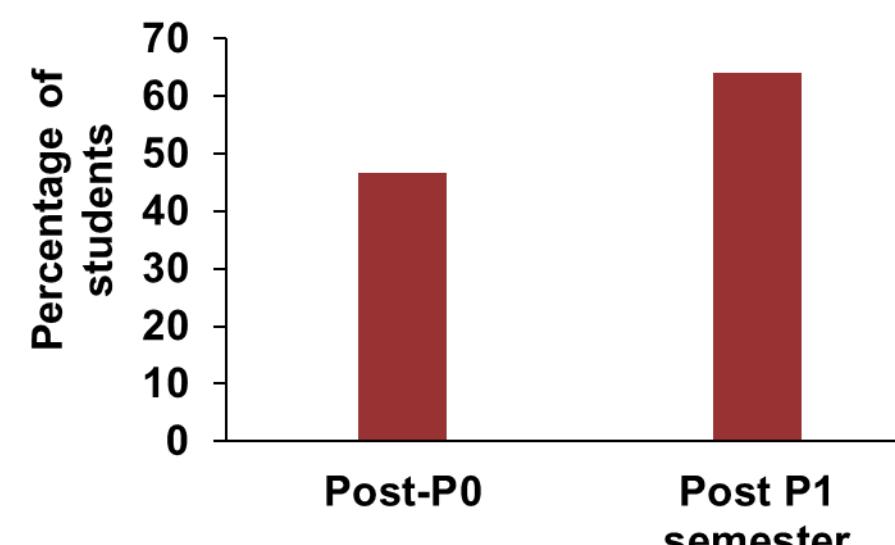


Figure 3: Survey results showing percentage of students who found calculations module the most helpful in the P0 program

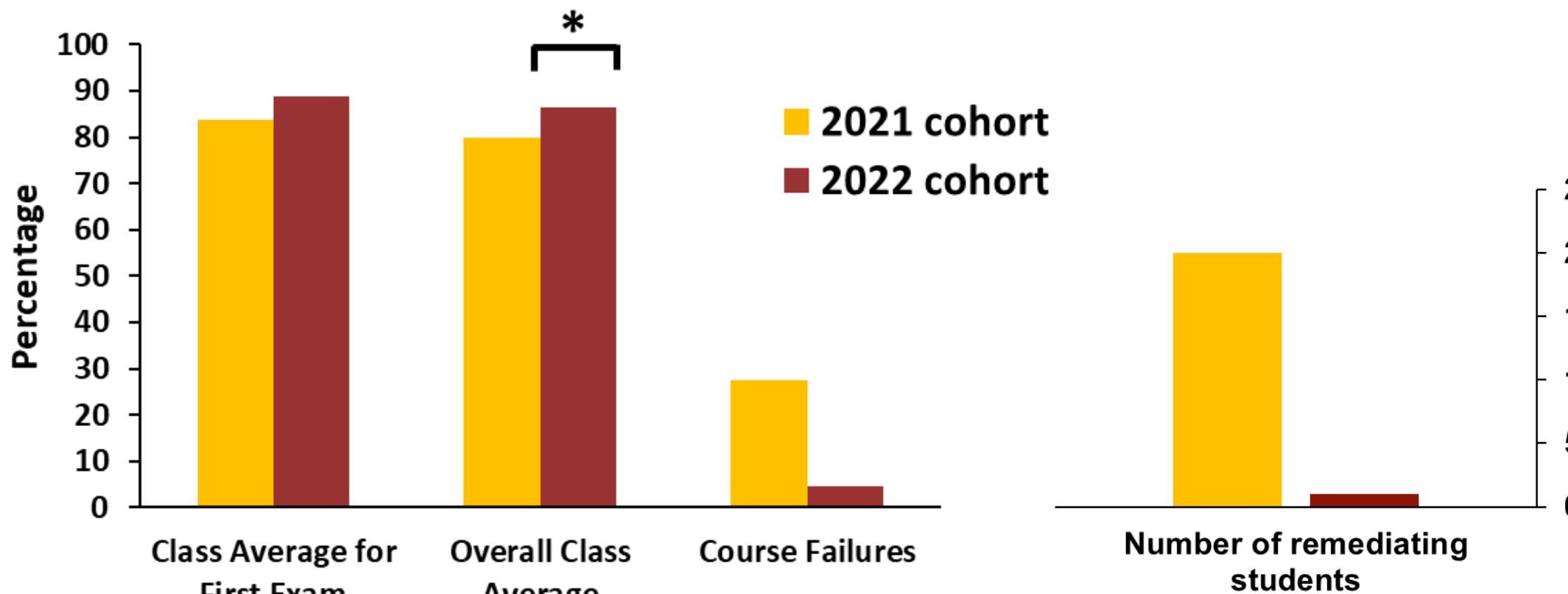


Figure 4: Comparison of two cohorts of Pharmacy Calculations for 2021 (no P0) and 2022 (with P0) cohorts (\*t-test, p<.001)

## Results

- 69% and 53% of the students showed concern about their math ability in Pre-P0 and Post-P0 surveys, respectively
- P1 2021 cohort class average for calculations exam one was 83.6% ( $\pm 4.22\%$ ) with 18 students failing
- P1 2022 cohort class average was 88.8% ( $\pm 2.56\%$ ) with only 5 students failing
- Total course failures were substantially reduced from 27.4% (2021) to 4.5% (2022)
- Overall course averages in the fall calculations course were significantly enhanced by 6.6% for the P1 2022 cohort (t-test,  $p<.001$ )

## Conclusions

- The P0 calculations module was identified as an effective means of enhancing the mathematical skills of incoming Pharm.D. students
- The P0 module significantly contributed to improved student performance and success in the fall P1 Calculations course

**Limitations:** Other changes were made that may have influenced the performance of students in Pharmacy Calculations.

- Addition of mandatory graded quizzes
- Increase in exam time
- Increase in the number of exams
- Extended office hours and study hall hours

## Reference:

Hegener MA, Buring SM, Papas E. Impact of a Required Pharmaceutical Calculations Course on Mathematics Ability and Knowledge Retention. American Journal of Pharmaceutical Education. Aug 2013, 77 (6) 124; Article 776124.