

## Background

- The School of Pharmacy – Worcester/Manchester (SOP-W/M) prepares students for successful careers in pharmacy through a 34-month accelerated PharmD curriculum.
- Faculty at the School of Pharmacy – Worcester/Manchester are engaged in continuous quality improvement of their teaching and assessment methods to prepare students for successful careers in pharmacy.

## Objective

- Students enrolled in Pharmaceutical Calculations course were either not given (2019) or giving a mock/practice exam prior to the first unit exam (i.e., actual exam / Exam 1) in an in-person (2020) or virtual (2021) learning and exam settings.
- This study evaluated the impact of the mock exams on student performance in an actual exam (2020 and 2021).
- The study also compared the impact of the mock exam on student learning and performance in an actual exam in both in-person (2020) and virtual (2021) exam settings.

## Methods

- The Pharmaceutical Calculations course (PSW 312) taught at SOP-W/M between 2019 and 2021 consisted of the first of three unit exams (i.e., actual exam / Exam 1) that was not preceded (2019) or preceded (2020 and 2021) by a mock exam.
- For the 2020 and 2021 student cohort, a mock exam that simulated an actual exam in duration, level of difficulty, and content was offered as an optional exam preparation tool the day prior to the actual exam.
- Assessment scores were collected for the mock exam and actual exam.
- An average test score was calculated for both exams and compared using a t-test.
- The P-value was calculated and considered to be significant if  $P < 0.05$ .
- The average mock and/or actual exam scores and central tendency values were compared between across the three cohort years.
- A survey was deployed to the 2020 & 2021 student cohort to assess their perspectives on the course and exam preparation tools.
- This research project was approved under an exempt status by the Massachusetts College of Pharmacy and Health Sciences University Institutional Review Board (IRB).

## Results

**Table 1: Comparison of Mock Exam Statistics Between 2020 and 2021**

	2020 Mock Exam	2021 Mock Exam
Mean %	67.4	62.6
p-value	0.061	
N (%)	221 (93%)	115 (63%)

Mean mock assessment score (67.42%) in-person 2020 cohort (n = 237) who participated in the mock assessment (n = 221) was comparable to the (62.61%) 2021 virtual cohort (n = 183) who took the mock assessment (n = 115) (Table 1 & Fig 1).

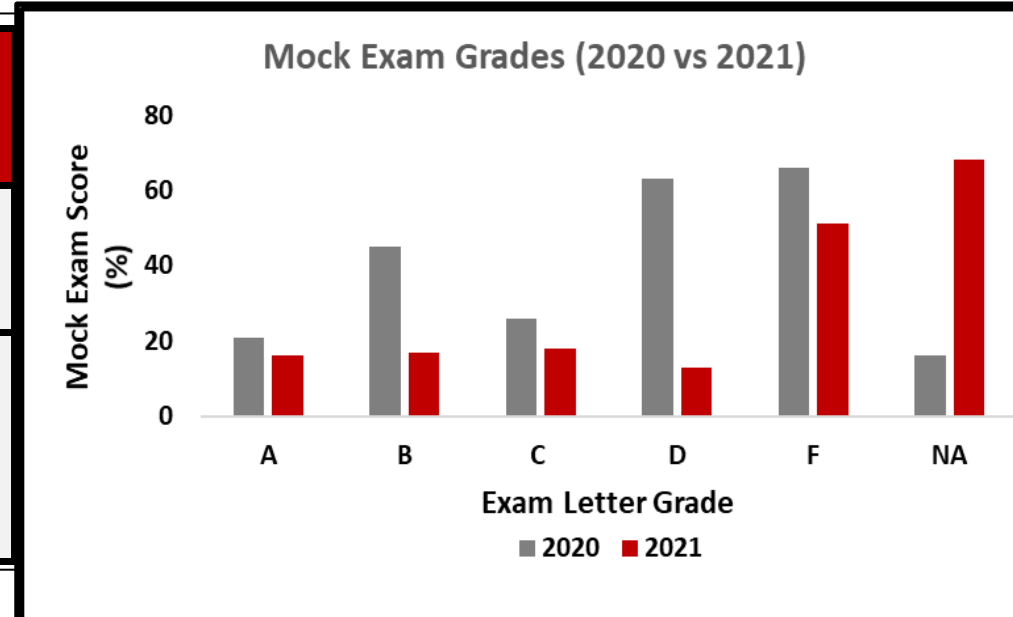


Figure 1. Comparative Letter grades earned by students on mock exams in 2020 vs 2021.

**Table 2: Comparison of 2020 Actual Exam Statistics Among Student Participants vs Non-Participants in Mock Exam<sup>a</sup>, and Students who Failed vs Passed Mock Exam<sup>b</sup>**

	Actual Exam (No Mock) <sup>a</sup>	Actual Exam (Mock) <sup>a</sup>	Actual Exam (Mock - Fail) <sup>b</sup>	Actual Exam (Mock - Pass) <sup>b</sup>	Actual Exam (All Students)
Mean %	91.0	94.3	91.7	97.9	94.1
p-value	0.303		<0.05		
N	*16	221	#129	92	237

Actual exam averages difference for the 2020 cohort between students who took the mock assessment (94.3%) vs those who did not (91.0%) was not significant (Table 2).  
\*15 (93.8%) out of the 16 students who did not participate in the mock exam still passed the actual exam.  
#118 (91.5%) out of the 129 students who did not pass the mock improved their actual exam score.

**Table 3: Comparison of 2021 Actual Exam Statistics Among Student Participants vs Non-Participants in Mock Exam<sup>a</sup>, and Students who Failed vs Passed Mock Exam<sup>b</sup>**

	Actual Exam (No Mock)	Actual Exam (Mock)	Actual Exam (Mock - Fail)	Actual Exam (Mock - Pass)	Actual Exam (All Students)
Mean %	84.9	92.7	90.0	96.1	89.8
p-value	<0.05		<0.05		
N	*68	115	#64	##51	183

Actual exam averages for the 2021 virtual cohort between those who took the mock assessment (84.9%) vs those who did not (92.7%) differed significantly (p = 0.0002) (Table 3).  
\*57 (83.8%) out of the 68 students who did not participate in the mock exam still passed the actual exam.  
#All 64 students who did not pass the mock improved their actual exam score.  
##All 51 students who passed the mock improved their in the actual exam score.

- Students who had a C grade or better in the mock assessment performed better in the actual exam compared to those who earned less than a C grade in both 2020 and 2021 cohorts (Supplementary Tables 1 & 2, respectively).
- There was a statistically significant difference in student performance on the actual exam scores between the 2020 in-person cohort (94.1%) and the 2021 virtual cohort (89.8%) (p = 0.0001)

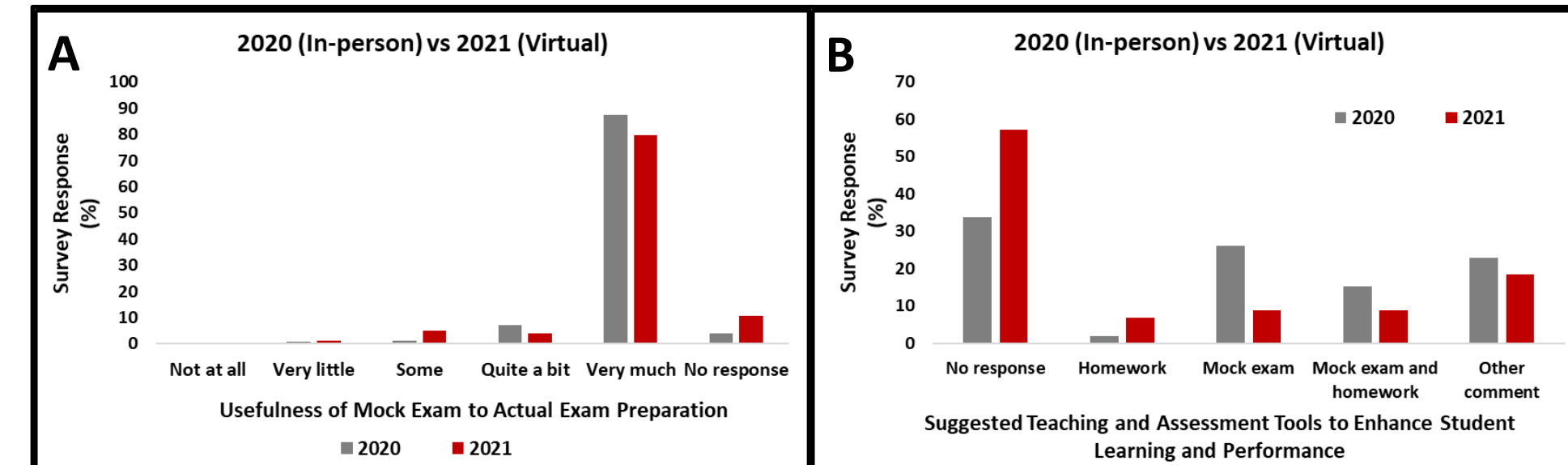


Figure 2. The extent to which the mock exam helped prepare students for the actual exam in 2020 vs 2021. Figure 3. Suggested Teaching and Assessment Methods to Enhance Student Learning and Performance in 2020 vs 2021.

Survey responses among 2020 vs 2021 cohorts showing students' perceptions about (A) the usefulness of mock exam to actual exam preparation (Fig 2), and (B) suggestions on teaching and assessment methods to enhance learning.

Response rate:

- Figure 2: 96%, n = 157 (2020) vs 89%, n = 103 (2021)
- Figure 3: 66%, n = 157 (2020) vs 43%, n = 103 (2021)

## Conclusion

- The administration of a mock exam prior to the actual exam improved individual student and overall class performance in both in-person (2020) and virtual settings (2021).
- In-person learning and assessment setting was associated with a relatively higher student performance in an actual exam compared to a virtual setting.
- In both in-person and virtual settings, mock exams produced enhanced student performance among low-performing students.
- Students in both cohorts expressed positive attitudes about the use of mock exams as a formative tool to improve learning and performance in the calculations course.

## Disclosure

The authors have no disclosures to make.