



Crafting Cheat Sheets : Increasing Student Success Through Facilitated Study Guides

Bella Lares, Maarten Rios, Jessy Cadena, Avi Anguiano, Abby Polapink, Ashley Smith



Abstract

Chem 4 is an introductory lower-division class for STEM students, and Chem 24 is one of the first upper-division introductory courses students take. Many of these students have yet to develop effective study methods- a critical factor for academic success. In this research, we aim to improve exam performance by having them prepare “cheat sheets”. These cheat sheets were intended to help students compile important information for exam topics. We compared scores with the control group that did not make cheat sheets the same week of the exam. Our findings showed an improvement in scores when students wrote out cheat sheets versus when they did not, this furthers this studies' implications that students have an increased chance of success when they have structured study strategies.

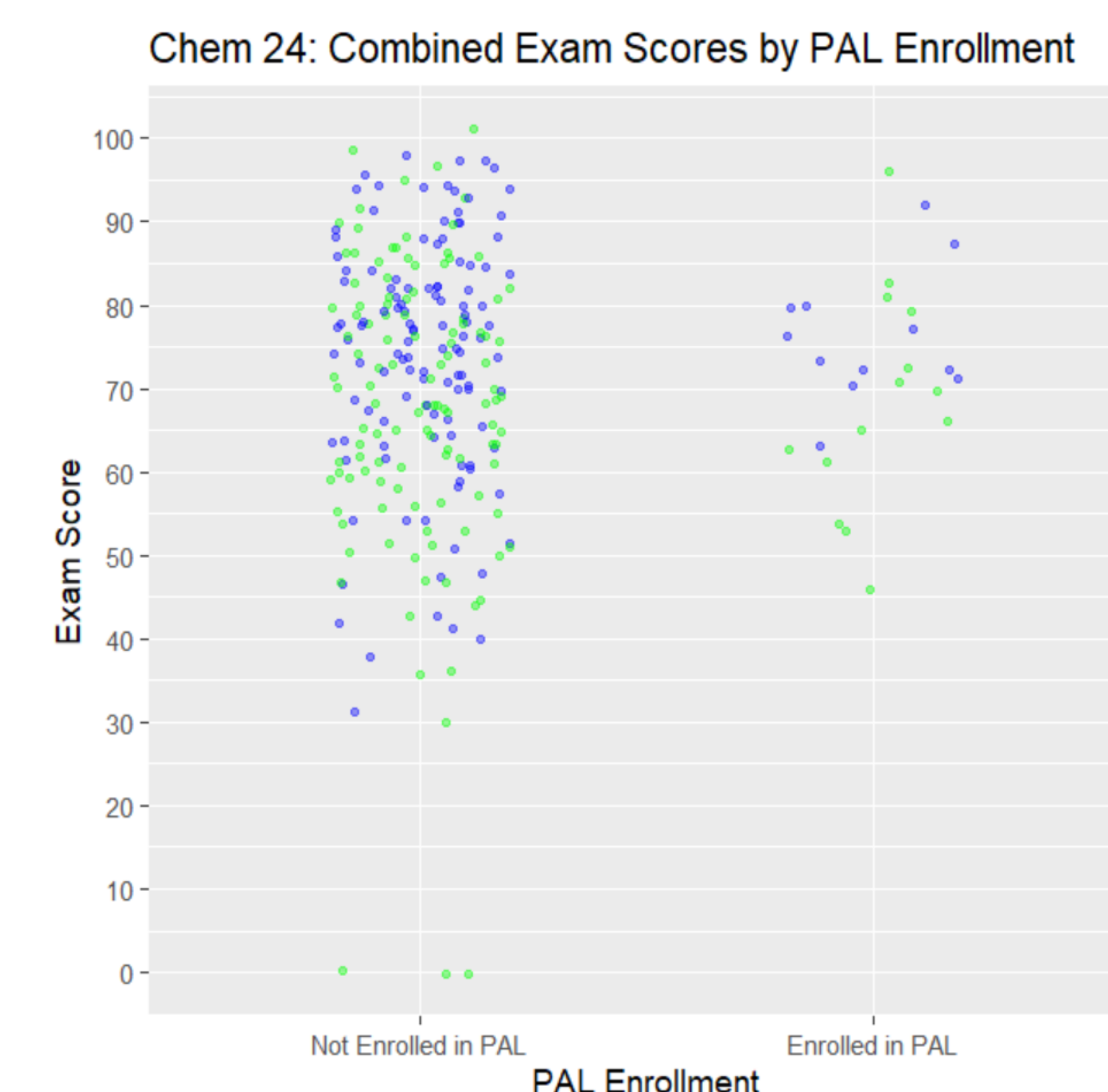
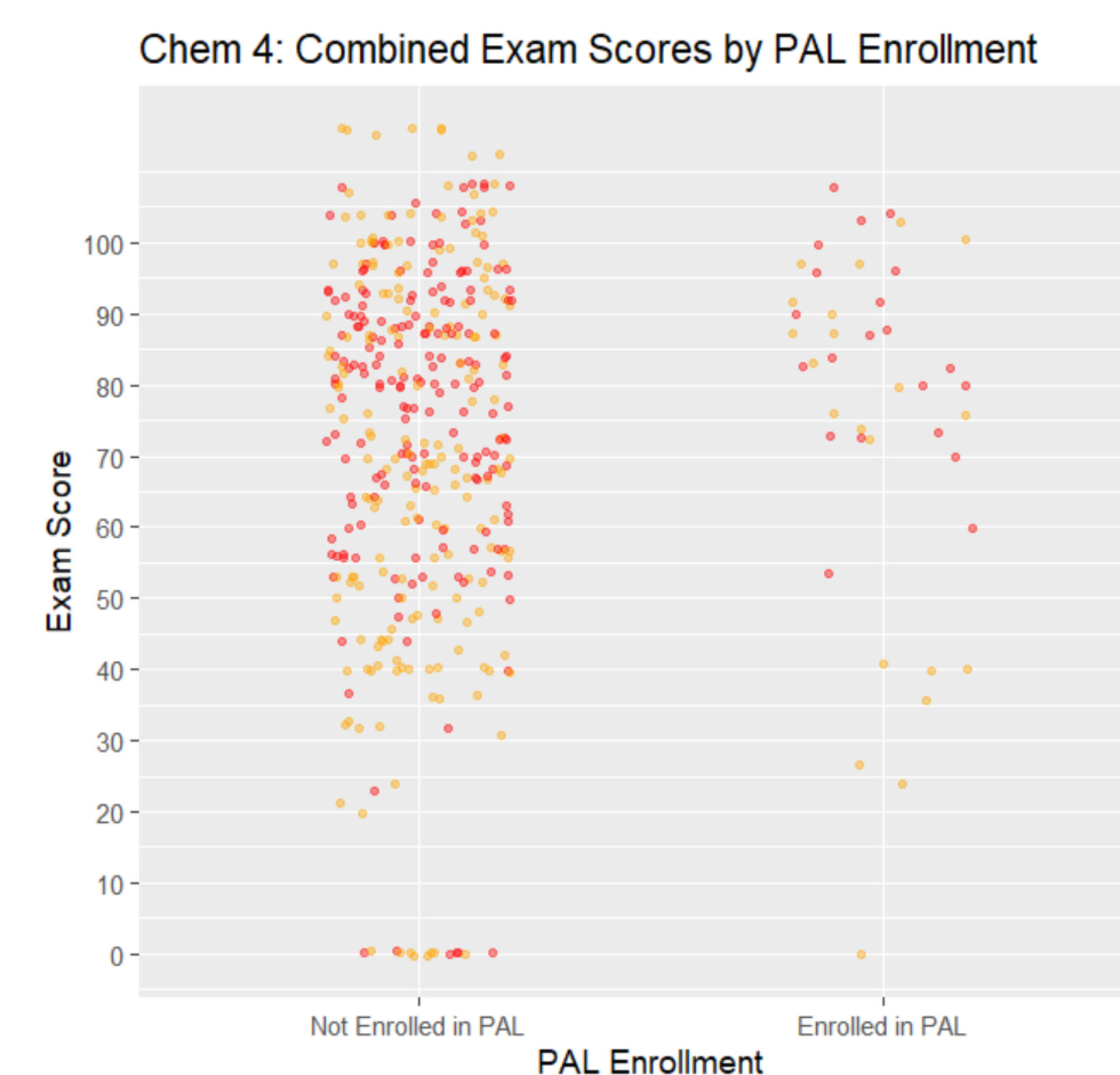
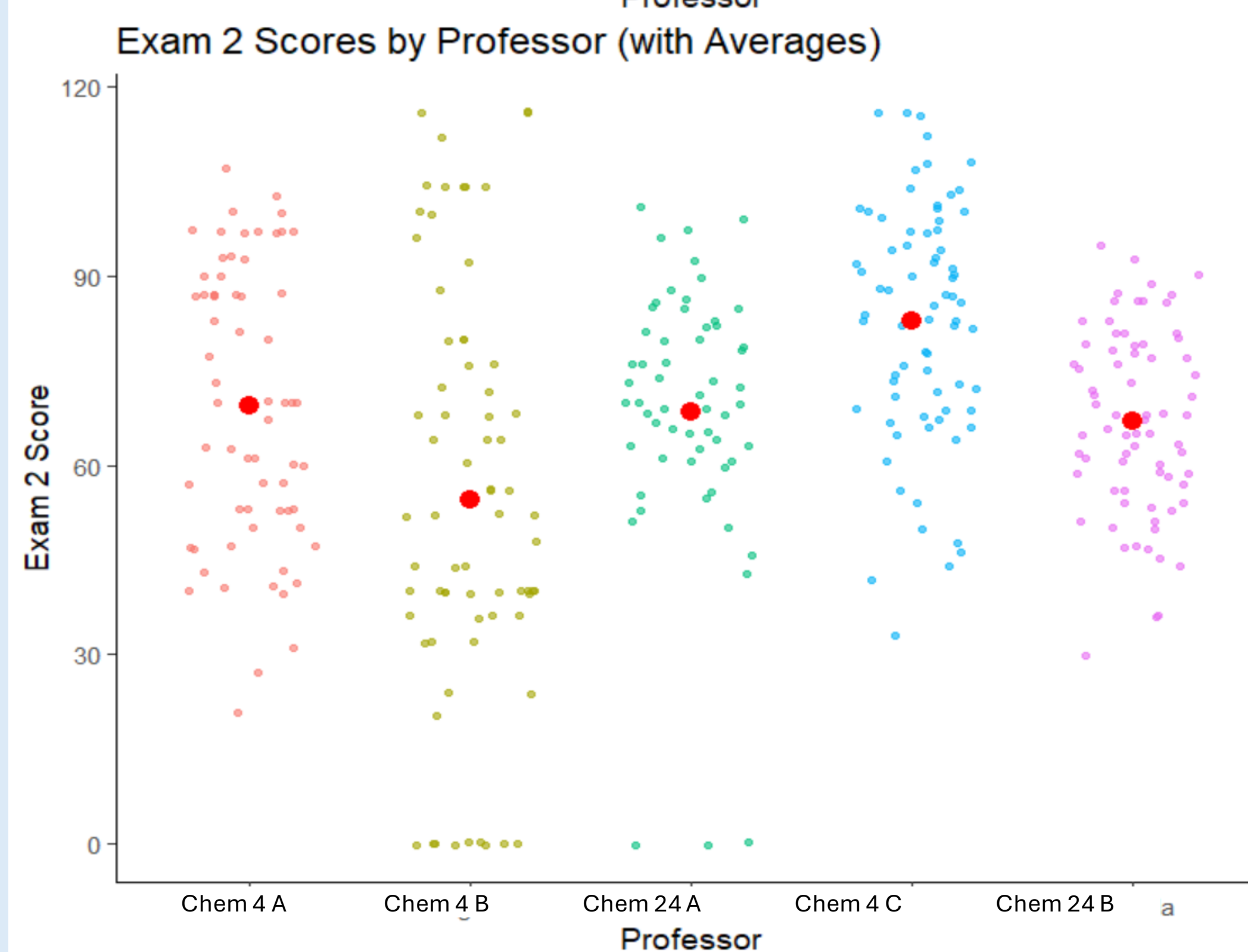
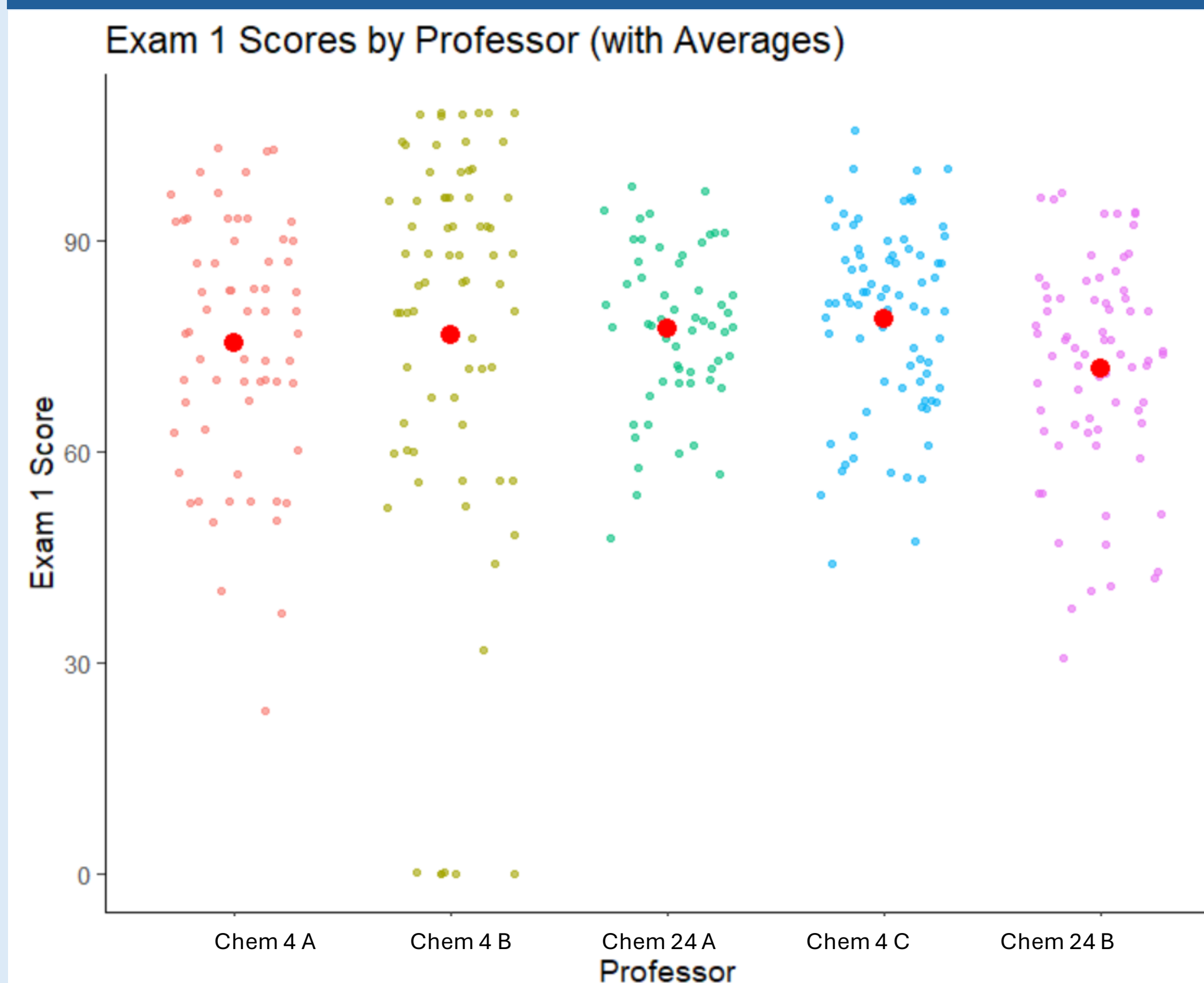
Background

In chemistry, there is an abundance of information for students to memorize. Along with memorization, there must be an understanding of how these topics are related to one another and students must be able to apply important topics as their knowledge builds. In a study on the use of cheat sheets during exams it was found that making cheat sheets helped students learn the material more effectively¹. The simple act of creating cheat sheets works as a study method, even when students are not allowed to use them on an exam. This demonstrates the positive effects of making cheat sheets beyond being able to reference the cheat sheet during the exam. However, in other studies it was found that without guidance, student's note cards (cheat sheets) can often have extraneous information that is not helpful when taking their exams^{2,4}. In order to mitigate this, students will craft their cheat sheets under the guidance of facilitators. By having students organize their information into a cheat sheet they will use in their PAL classes, we hope to see an increase in exam scores.

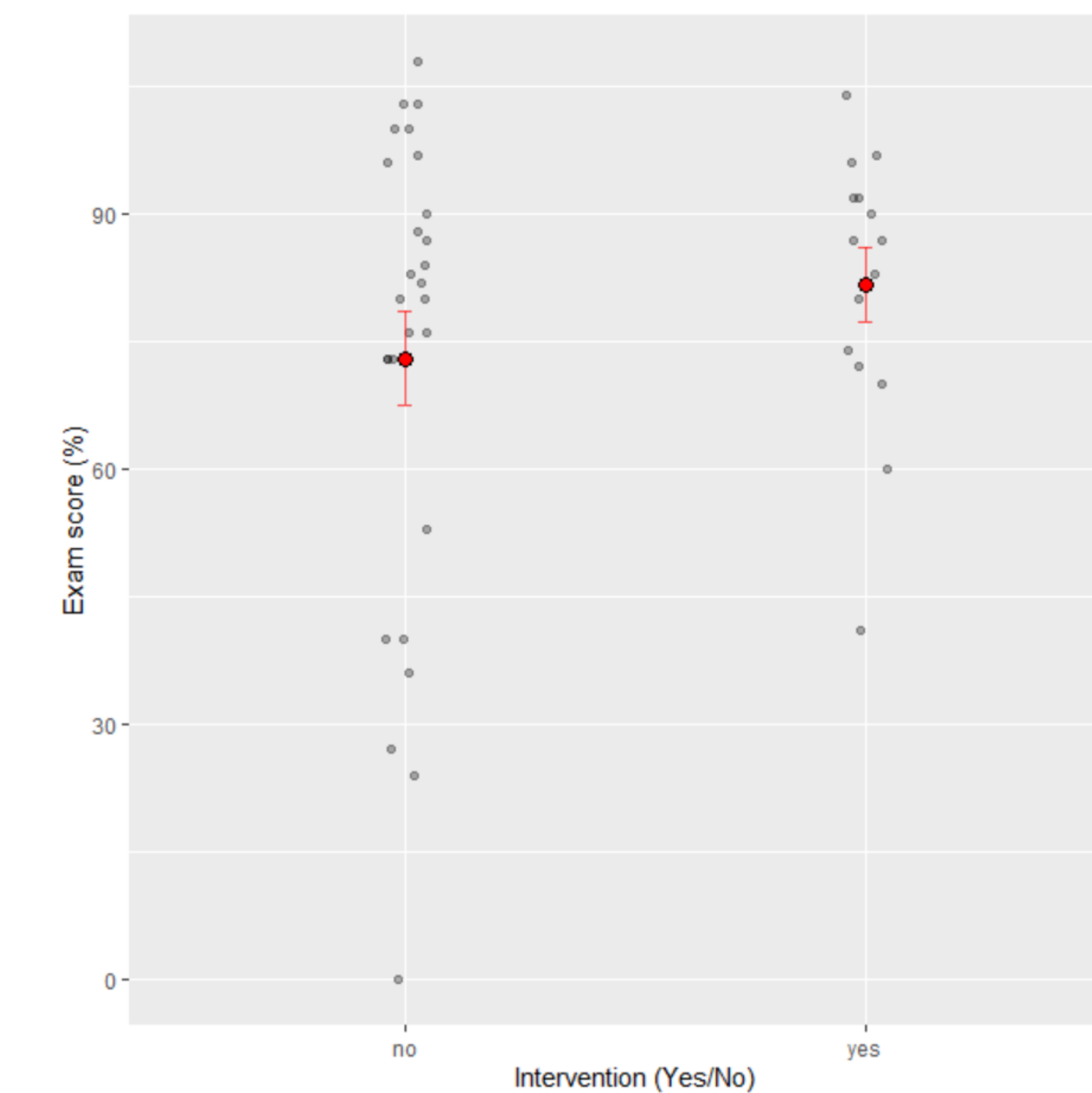
Methods

PAL sections for the same class will alternate in who makes the cheat sheets. Chem 4 has four sections and Chem 24 has two sections. For Exam 1 we took two chem 4 sections and had them make cheat sheets with relevant information. One section of Chem 24 did the same. For Exam 2, the sections that did not create cheat sheets made theirs and the groups that did for the previous exams did not. This allowed us to see the comparison between PAL students with cheat sheets vs without, as well as allowed us to have a baseline of non-PAL students. Average and median exam grades were compared to see if the extra intervention did help students improve grades beyond the standard 23% PAL already boosts on average.

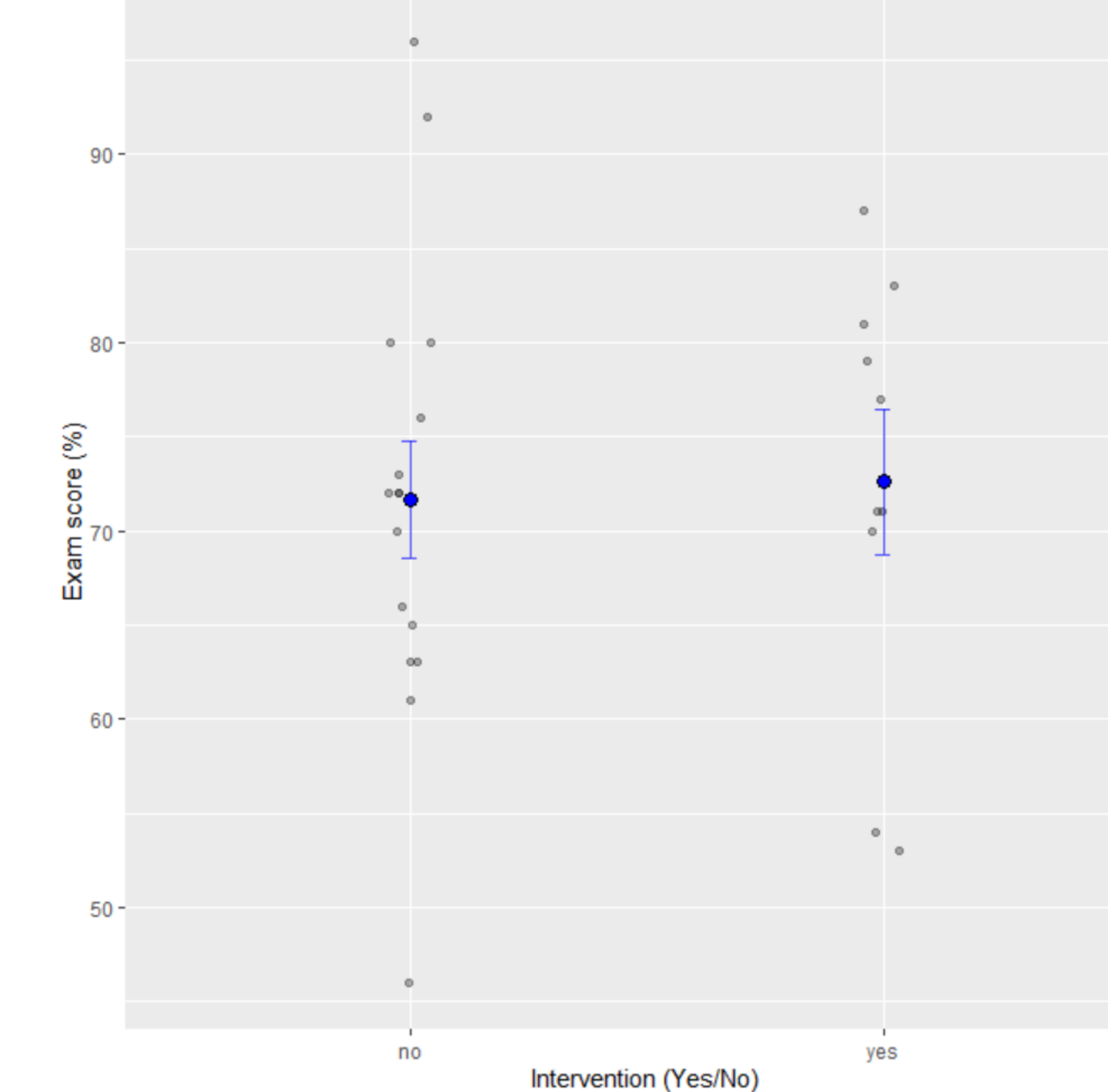
Data & Results



Chem 4 students enrolled in PAL



Chem 24 students enrolled in PAL



Discussion

In order to better understand the effects of students creating cheat sheets as part of our PAL classes. Our statistical analysis looked at professor outcomes, PAL enrollment outcomes as well as intervention status. We first analyzed average exam scores in 3 sections of Chem 4 and 2 sections of Chem 24. Instructors did not play a statistically significant role in grade averages ($p = 0.228$). There was a statistically significant ($p = 9.8 \times 10^{-6}$) drop in scores from Exam 1 (76.0%) to Exam 2 (68.5%), this is likely due to Exam 1 testing on the fundamentals of their class, while Exam 2 focused on application. Further analysis was done in order to better understand the role PAL plays in student success, student scores in Chem 4 and Chem 24 were pooled and the average exam score for PAL students was 81.5% to non-PAL students 75.0% ($p = 0.02$, $n = 760$). Having established a correlation between PAL enrollment and student success we then analyzed the effects of our intervention. Both Chem 24 ($p = 0.8$, $n = 26$) and Chem 4 ($p = 0.2$, $n = 41$) intervention groups did not do significantly better when compared to their PAL counterparts. Cheat sheets were created under the guidance of PAL facilitators; students were welcome to use them as a study aid in and outside of class however their usage was not measured or monitored. While our intervention did not improve student scores, we hope this provided a new study habit for our students.

References

- Özer, Selda. *State Test Anxiety, Exam Scores and Opinions of Prospective ...*, 2021, files.eric.ed.gov/fulltext/EJ1313187.pdf.
- Santosa, Ignatius Edi. “Representation and Content in Student’s Exam Note Sheets.” *Momentum: Physics Education Journal*, ejournal.unikama.ac.id/index.php/momentum/article/view/6320. Accessed 25 Nov. 2024.
- The Use of Exam Notes in an Online ..., files.eric.ed.gov/fulltext/EJ1223940.pdf. Accessed 26 Nov. 2024.
- Wang, Zezhong, et al. “Cheat Sheets for Data Visualization Techniques: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems.” *ACM Conferences*, 23 Apr. 2020, dl.acm.org/doi/abs/10.1145/3313831.3376271.

Acknowledgements

We would like to thank all of the Sacramento State faculty that supported us in our research endeavors:

- Dr. Pigno
- Dr. Evangeline Ballerini
- Dr. Wright
- Kimberly Duran
- STEM4Equity: US Dept. of Education STEMHSI P031C210012

