

Value of Podcast-Based Laboratory Learning Modules for First Year Medical Microbiology Course

S. Tara Dhawan BA¹, Lee Ann Schein, PhD, ACUE²

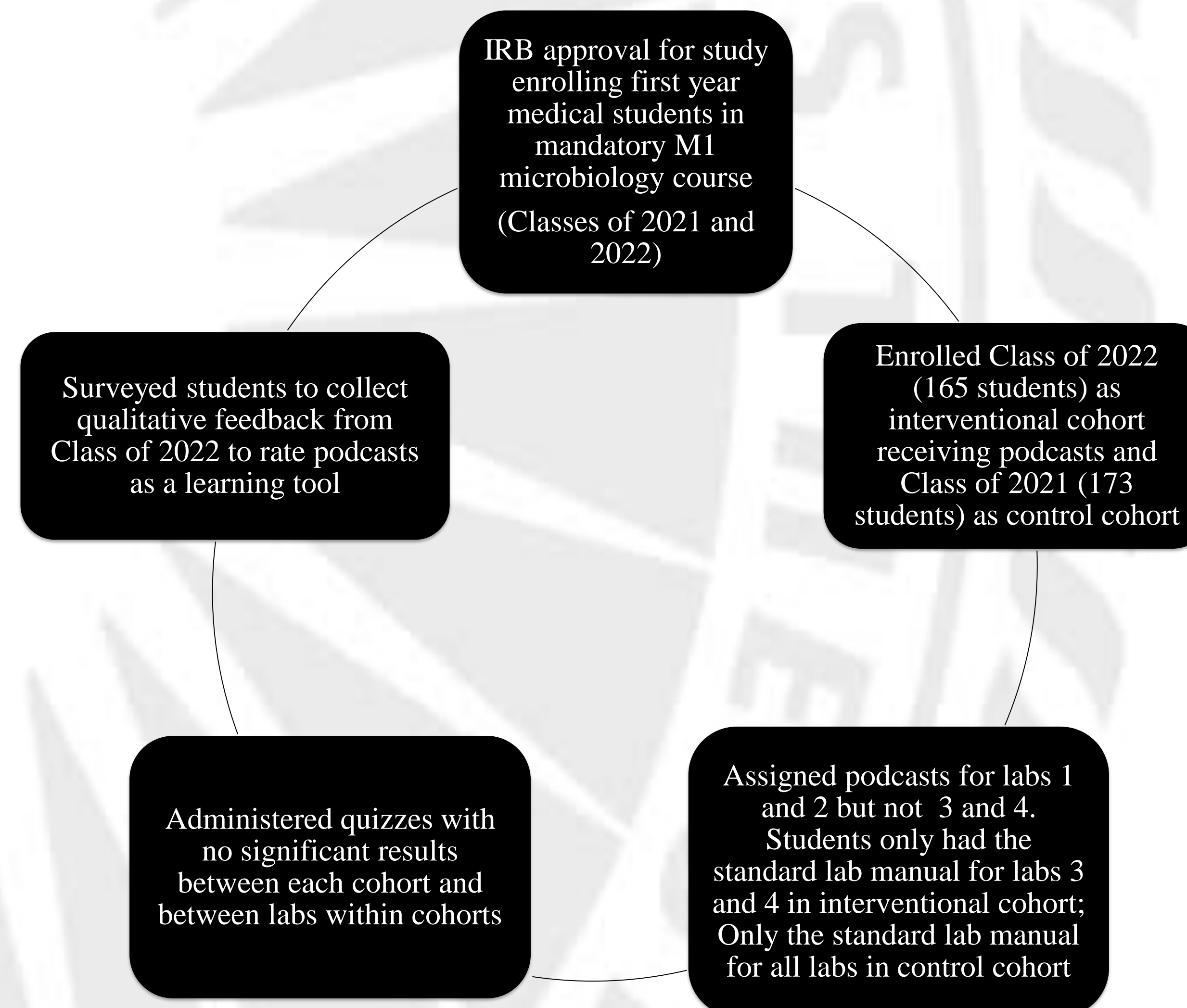
1. Rutgers Robert Wood Johnson Medical School

2. Department of Pharmacology, Rutgers Robert Wood Johnson Medical School (Contact: scheinla@rwjms.rutgers.edu)

Background:

- Students in the digital age report that podcast-based learning increases their confidence with materials, and students have rated them favorably as a learning tool¹⁻⁵.
- Other studies determined that trainees preferred learning procedural skills from podcast as opposed to textbooks⁶⁻⁷.
- The demands of quickly absorbing a large volume of information can be associated with increased stress and anxiety levels⁸⁻¹⁰.
- Literature elucidating the effects of digital-based learning, such as podcasts, on lessening student stress and anxiety levels is scarce.
- One study reported that using podcasts may help reduce student anxiety and stress¹⁰.
- We created podcasts for our first year microbiology course to augment their comprehension of the lab techniques as well as the general scientific concepts behind the wet laboratory exercises.

Methods:



Results:

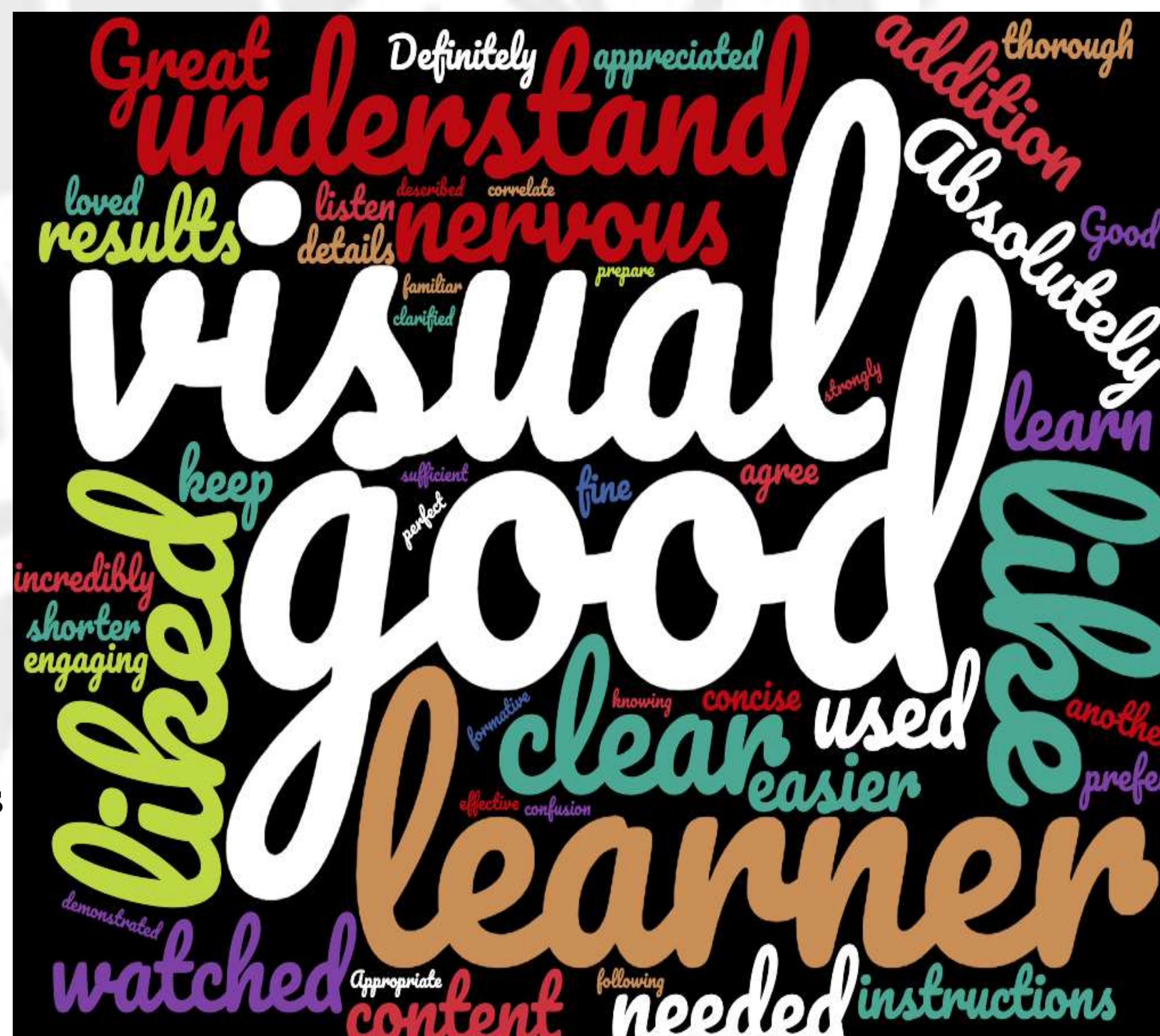


Image 1: Word cloud depicting student feedback regarding using podcasts. Each word was used at least 4 times in students' comments. The size of the individual word corresponds to the frequency of use by students.

Question	% of students	# of total respondents	Mean Likert score
1. How many videos did you watch?	97.7 (watched either 1 or 2 videos, 2 being the highest score)	170	1.88
2. Rate the clarity, including audio and video, of the podcasts.	91.1 (very good/excellent, excellent being the highest score of 5)	170	4.51
3. Rate the quality of the content covered in the podcasts	91.6 (very good/excellent, excellent being the highest score of 5)	168	4.59
4. How well did the podcasts enhance your learning?	88.7 (very good/excellent, excellent being the highest score of 5)	168	4.52
5. Rate the length of the podcast	90.5 (appropriate, too brief=1, appropriate=2, too long=3)	168	1.9
6. Did using podcasts with the lab manual enhance your learning?	95.8 (yes, yes=2, no=1)	168	1.96
7. How well did the video hold your attention?	88.1 (very well/well, very well being the highest score of 5)	168	4.29
8. To what extent do you agree or disagree with this statement "I feel less nervous about doing lab procedures after watching the videos"	87.5 (strongly agree/agree, strongly agree being the highest score of 5)	168	4.30
9. To what extent do you agree or disagree with this statement "I feel more confident in my understanding of the theory of microbiology laboratory techniques after watching the podcasts"	92.2 (strongly agree/agree, strongly agree being the highest score of 5)	168	4.30
10. Do you agree with the statement "Overall, the videos improved the quality of the lab education component of microbiology"	95.2 (strongly agree/agree, strongly agree being the highest score of 5)	168	4.4
11. To what extent do you agree or disagree with this statement "I feel less nervous working in the lab, including handling equipment, after watching the videos"	87.5 (strongly agree/agree, strongly agree being the highest score of 5)	168	4.55

Table 1: Survey questions. Percentage of students that responded positively to each item in column 1. Total number of respondents are listed in column 2. Column 3 describes the average rating on the likert scale for each question.

References

1. Back, David Alexander, et al. "Superior Gain in Knowledge by Podcasts Versus Text-Based Learning in Teaching Orthopedics: A Randomized Controlled Trial." *Journal of Surgical Education*, vol. 74, no. 1, 2017, pp. 154-160., doi:10.1016/j.jsurg.2016.07.008.
2. Gough, Kevin C. "Enhanced Podcasts for Teaching Biochemistry to Veterinary Students." *Biochemistry and Molecular Biology Education*, vol. 39, no. 6, 2011, pp. 421-425., doi:10.1002/bmb.20543.
3. Jang, Hye Won, and Kyong-Jee Kim. "Use of Online Clinical Videos for Clinical Skills Training for Medical Students: Benefits and Challenges." *BMC Medical Education*, vol. 14, no. 1, 2014, doi:10.1186/1472-6920-14-56.
4. Neeraj, N. Liban, Ahmed, et al. "An evaluation of the '5 minute medicine' video podcast series compared to conventional medical resources for the internal medicine clerkship." *Medical Teacher*, vol. 34, no. 11, 2012, doi: 10.3109/0142159X.2012.689442.
5. Shantikumar, Sharan. "From Lecture Theatre to Portable Media: Students' Perceptions of an Enhanced Podcast for Revision." *Medical Teacher*, vol. 31, no. 7, 2009, doi: 10.1080/01421590802365584.
6. Varghese, J., M. Faith, and M. Jacob. Impact of e-resources on learning in biochemistry: first-year medical students' perceptions. *BMC Medical Education*, 2012. 12(1): p. 21.
7. Chin, A., A. Helman, and T.M. Chan. Podcast Use in Undergraduate Medical Education. *Cureus*, 2017. 9(12): p. e1930.
8. Moffat, K.J., et al. First year medical student stress and coping in a problem-based learning medical curriculum. *Med Educ*, 2004. 38(5): p. 482-91.
9. Dahlin, M., N. Joneborg, and B. Runeson. Stress and depression among medical students: a cross-sectional study. *Med Educ*, 2005. 39(6): p. 594-604.
10. Pilarski, P.P., et al. From music to macromolecules: using rich media/podcast lecture recordings to enhance the preclinical educational experience. *Med Teach*, 2008. 30(6): p. 630-2.

Outcomes and limitations:

- Our results indicate that students preferred podcasts over the traditional lab manual in preparing for the wet labs.
- Our research demonstrates that podcasts were qualitatively more effective than a traditional laboratory manual for first-year medical microbiology.
- We also found that students report less anxiety and stress around laboratory procedures with the addition of podcasts in the curriculum.
- One limitation to our study includes the fact that we were not able to truly randomize our cohorts, as it was not feasible to completely replace the lab manual with podcasts.
- Based on our results, we plan to permanently include podcasts into our curriculum.
- Of note, our innovation was particularly helpful during the COVID-19 pandemic, as all medical education for first year medical students was moved online.