



Augmented Reality in the Field of Nanotechnology Education

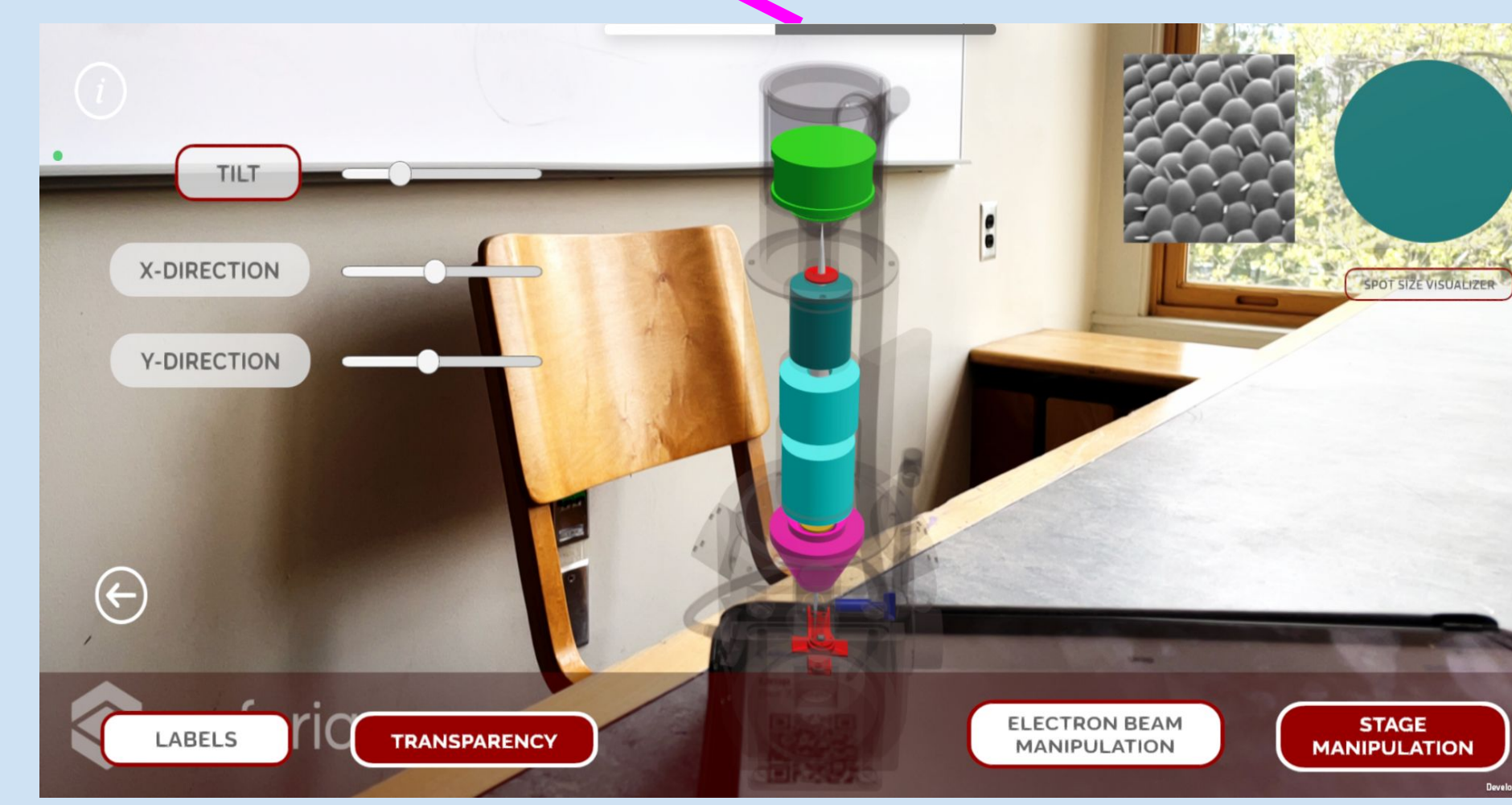
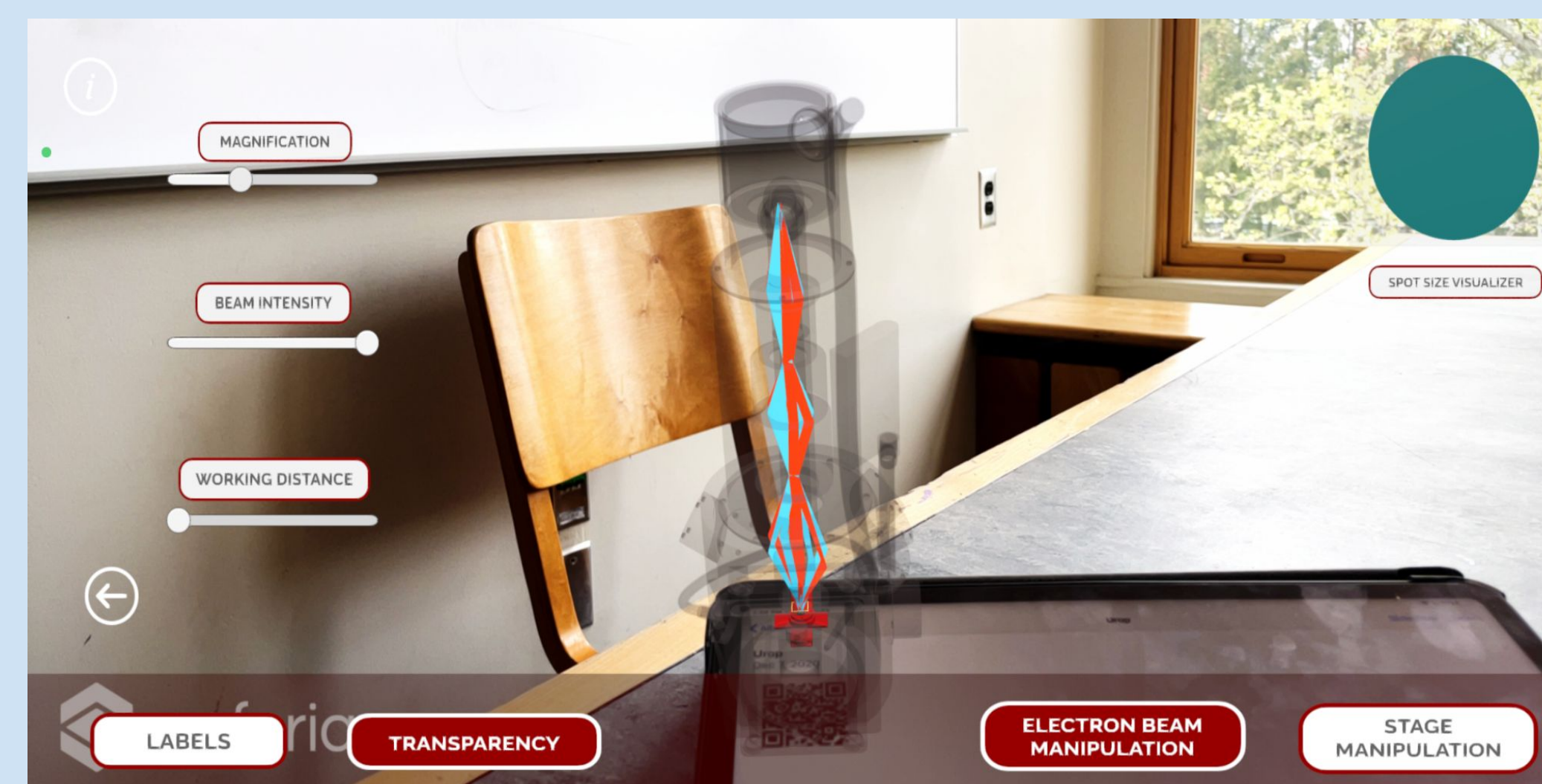
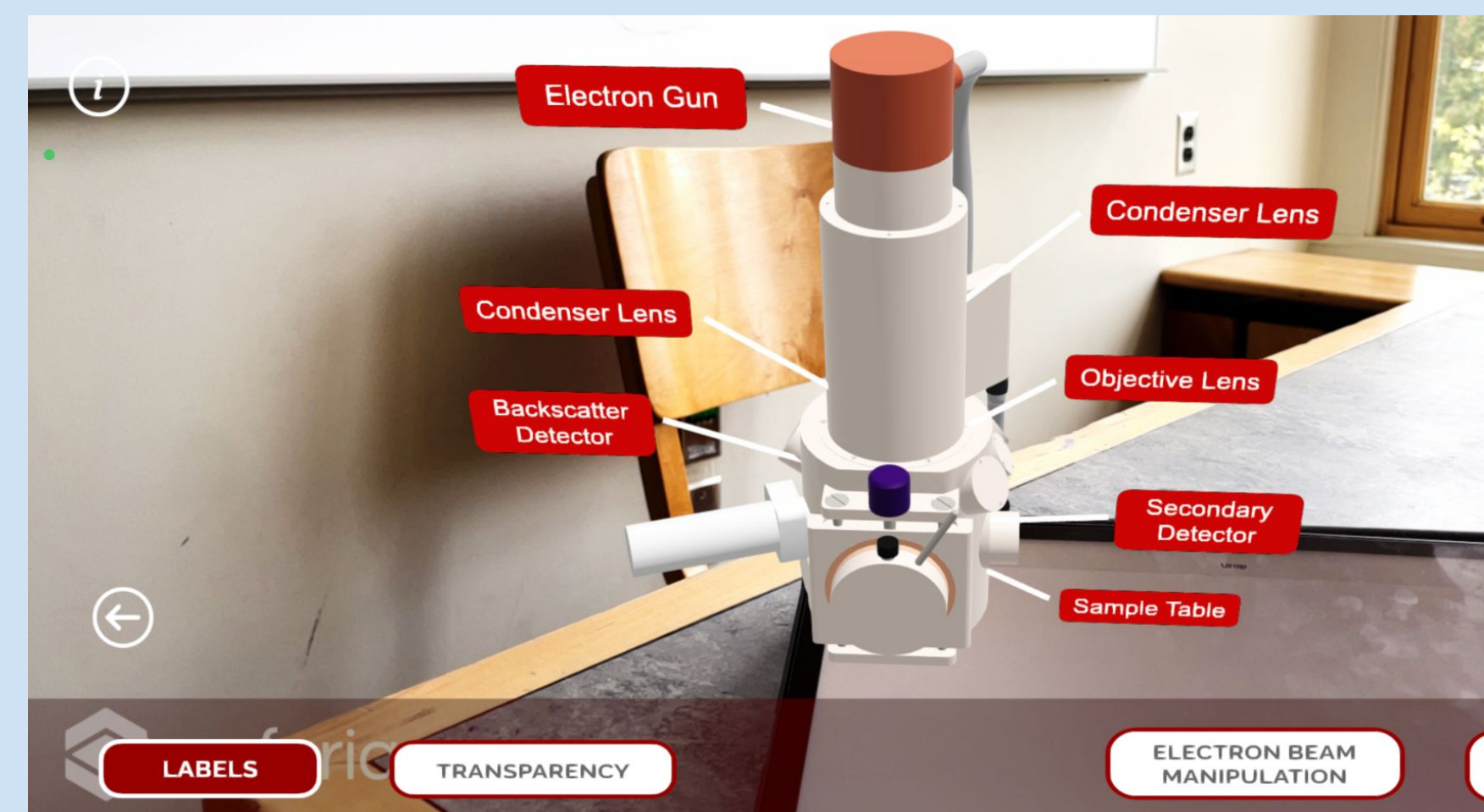


Megan Ngo and Tema Nwana
MIT Mechanical Engineering Department

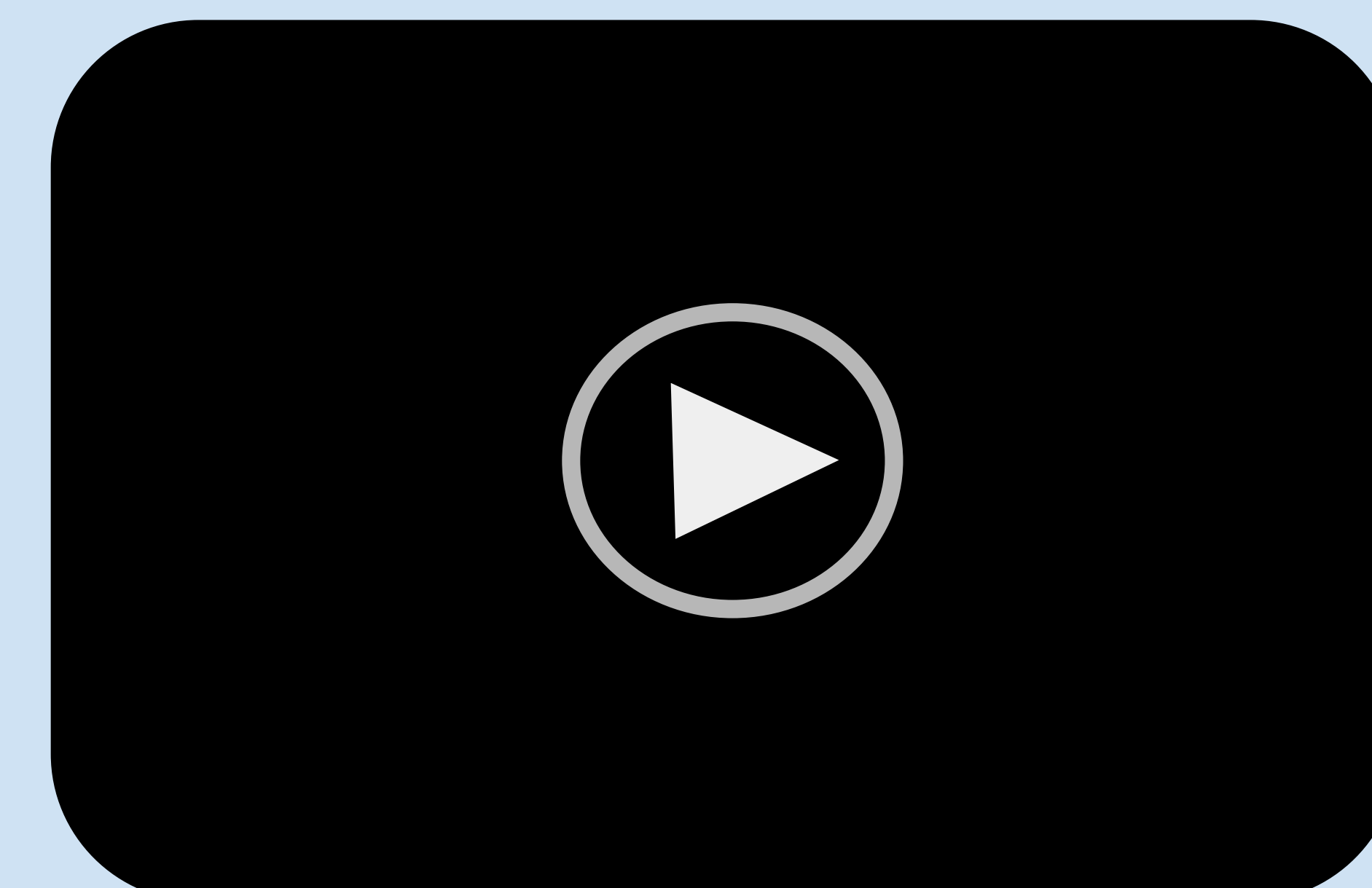
Abstract

In the field of nanotechnology, students are facing a learning deficiency when it comes to physical intuition and real world visualization. The scanning electron microscopy (SEM) is well recognized as an important “gateway” tool for initial understanding of material properties in the field of nanotechnology. Our solution was an Augmented Reality application that students could use to understand the inner workings and mechanics of a scanning electron microscope. Utilizing the Vuforia AR Engine we are able to model a fully labeled, interact-able microscope that can be seen relative to the 3D space around you. We hope to continue testing of the application with students in the field and be able to implement our material in the classroom.

Development



Demo Video (come to our presentation to watch it!)



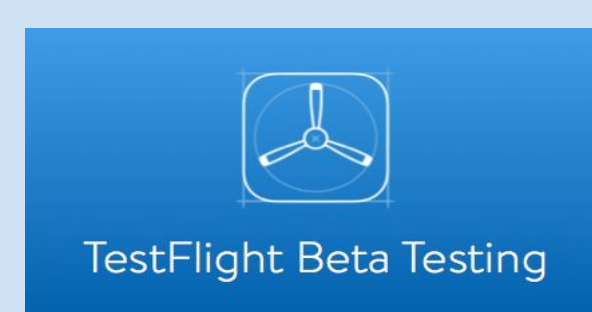
Conclusion

Through utilizing Unity Technology with Vuforia Engine and PTC, we successfully built an Augmented Reality application that provided an interactive and enhanced learning experience for students in their SEM lab during COVID-19. Overall, users stated they learned more by using the app and would prefer to use it for learning over more traditional methods. Though testing was limited to a small 10-person lab class, the student’s positive experience and feedback indicate use of the application would prove helpful and effective for classroom learning, even beyond of COVID-19. Future iterations and additions could include real time simulation of the SEM in a virtual environment, as well as developing simulations to further explore the effects of the electron beam on the image produced.

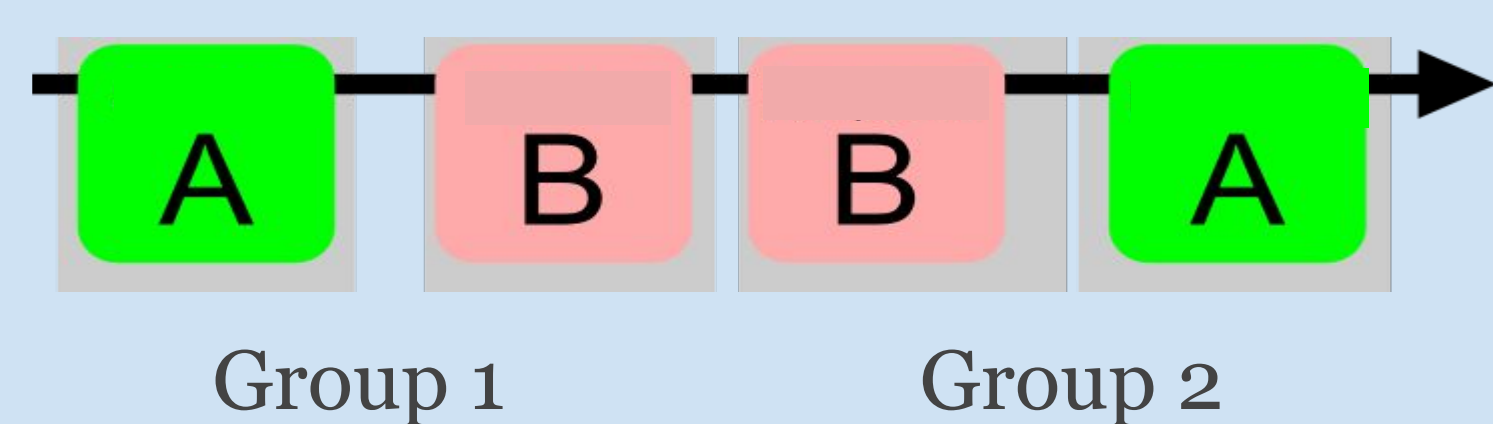
Materials



Methodology



- App distributed to students using Apple’s Testflight Beta Testing platform

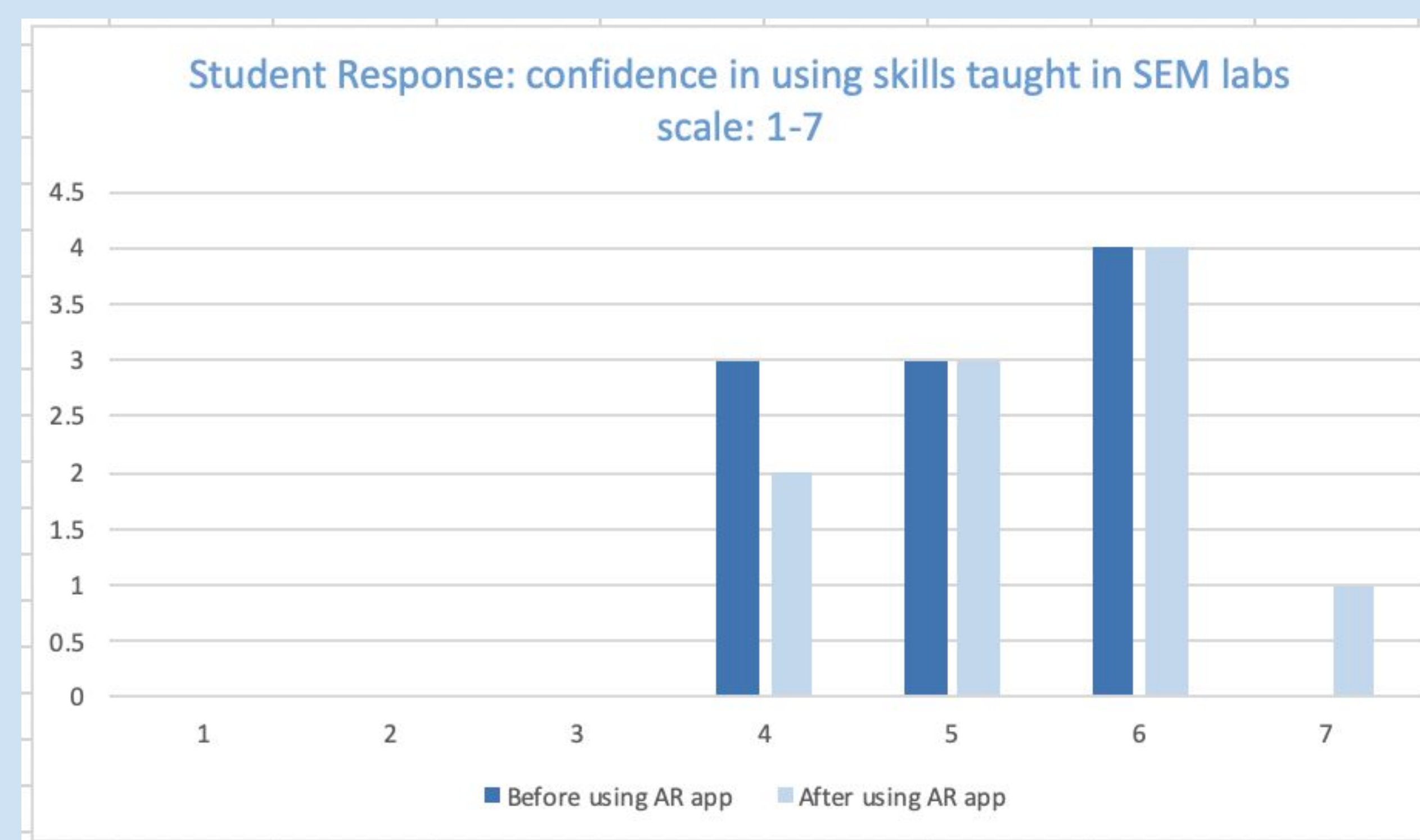


- ABBA testing (two sets of assessment questions)
- Surveying questions on their thoughts about Augmented Reality

Results

Users overall enjoyed using the AR app, particularly over traditional classroom methods and felt more confident in their SEM skills.

Student Responses: scale 1-7		
	Mean	Median
Enjoyed learning w/ AR.	4.8	5.0
Increased knowledge about SEM using AR.	5.1	5.0
Prefers learning about SEM using AR over trad. methods	4.8	5.0



Acknowledgements

We would like to thank our faculty advisor Dr. John Liu, supervisor Emily Welsh, lab instructor Benita Comeau, and Unity consultant Kachina Studer for their dedication, assistance, and expertise provided to make this project possible. Thank you to the Lord Foundation and MIT Alumni Class Funds for supporting our research.