

Background

Course description

BIOL 144L course is designed to present and explain basic organization of the brain and its functional anatomy. There is a primary focus on microscopic organization of the human brain, but it also discusses some comparative neuroanatomy in other vertebrates. The objective of this course is to give a broader perspective of how the nervous system is organized, with emphasis on the human brain and its function.

Challenges students were facing

Brain structures identifications, 3D visualisation, neural pathway tracking are main challenges that students experience.

Redesigned activities with XR

I have redesigned last module of the class: research projects. Instead of having students to develop project on one of the nervous systems and do comparative research on different animal models, students had to explore VR app and create project on available data sets and present it at the class.



Neuroanatomy and Neuroscience at a Glance, 5th Edition

XR Activity Planning

Learning objectives

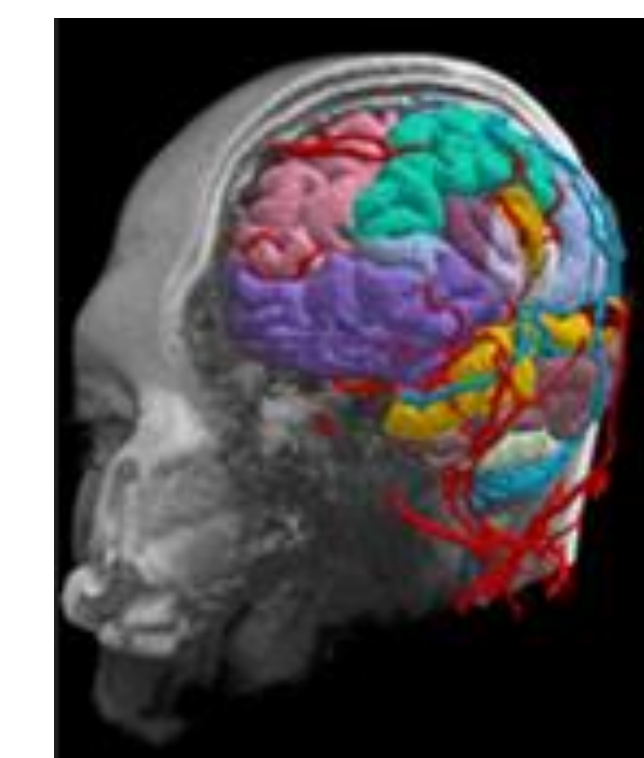
Give an idea on how the VR implementation in the neuroanatomy course would look like, which program would be used and for what it can be used.

Conducted assessment

Students have taken pre and post evaluation surveys and prepared final group project presentation.

XR learning activity

Students used their class lab space to use Custom designed syGlass app with 3 different data sets. They have been assigned to the 3-4 student groups. Each group had to use 1 headset and had an access to one laptop compatible for the external app. Students had take turns to use the headsets, the app, explore tutorials and try to do analyses, measurements, video recordings within the app and write down the narratives. In total 20 licenses for 30 days have been used during 5 classes. students spent 25+ hours on their projects.



syGlass dataset

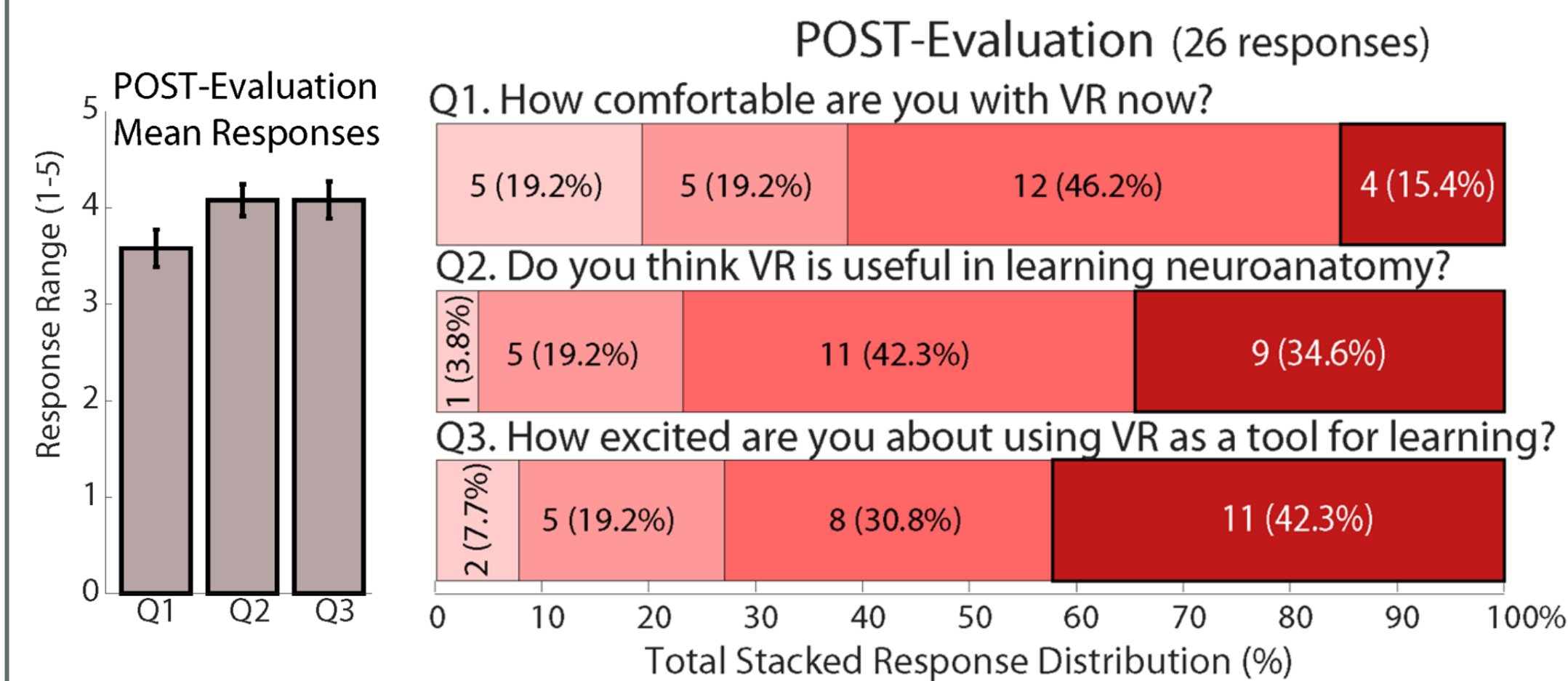
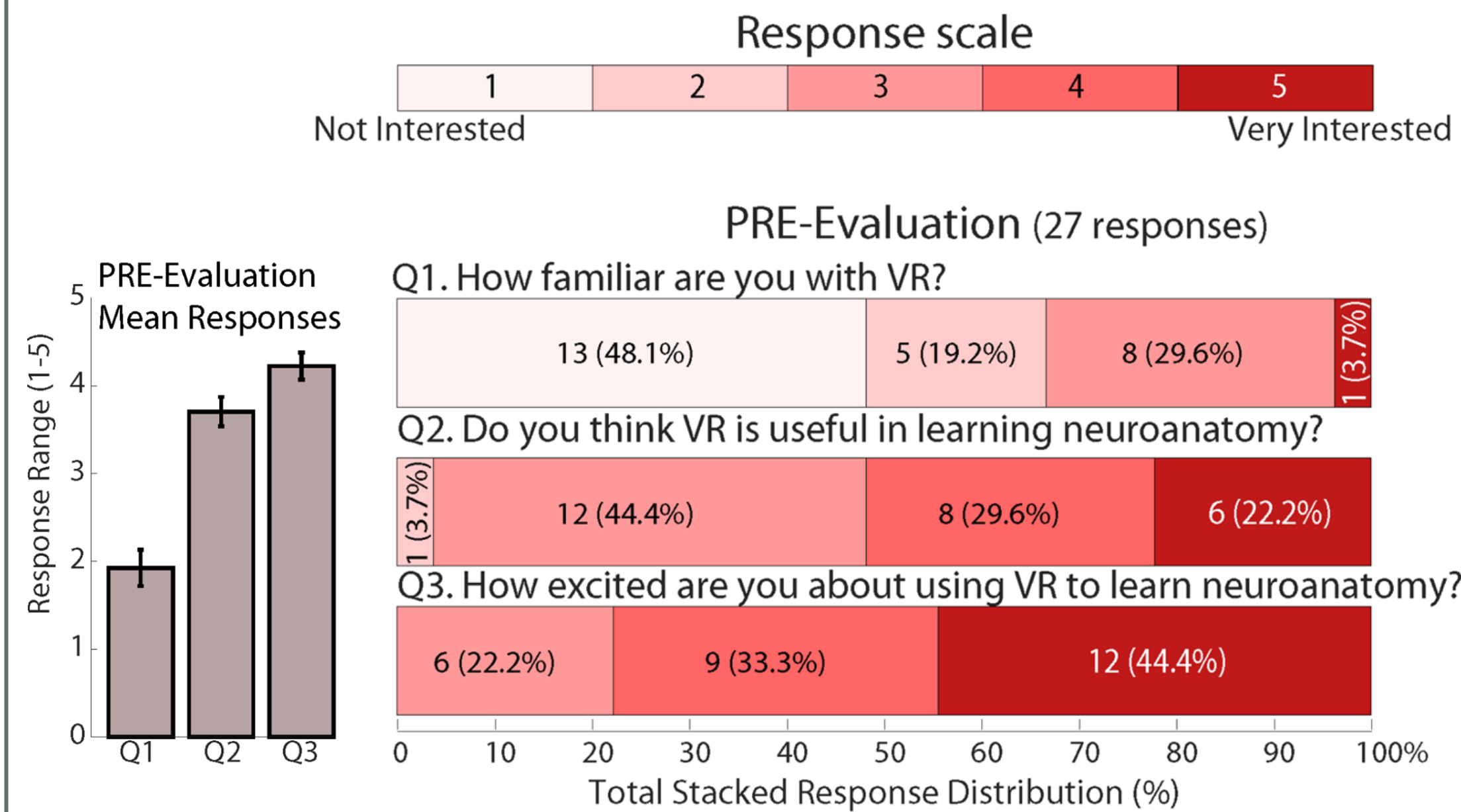


Oculus Quest headsets

Students and the Instructor

BIOL 144L is upper-division undergraduate course, where mostly senior students are enrolled. It has a lecture and 2 lab sections in each in average 18 students. I have been teaching the Lab section of the course for 5 semester. Before this training I had no experience with XR technology.

Student Assessment Quantitative Results



Students responded positively to the VR use in learning Neuroanatomy.

- During PRE and POST evaluations students from 2 Neuroanatomy lab sections have been asked 3 questions.
- In PRE-Evaluation assessment in total 27 and in POST-Evaluation assessment in total 26 students responded.
- More than 70% of students were not familiar with VR system (PRE-evaluation (Q1.)), but after using it 62% of the students felt comfortable using it (POST-evaluation (Q1.)).
- After exploring syGlass and getting more experienced in using Oculus Quest Headsets, significantly more students do think that VR is useful tool in learning Neuroanatomy. (PRE-evaluation (Q2.) 50% POST-evaluation (Q2.) 80%).
- PRE and POST evaluation revealed that after using VR Students are still very excited to use VR as a learning tool. (PRE-evaluation (Q3.) 78% POST-evaluation (Q3.) 73%).
- PRE and POST Evaluation Mean responses indicate overall students satisfaction in using VR for enhancing learning.

Student Assessment Qualitative Results

PRE-Evaluation

Before starting the projects students had mostly commented as being interested, excited but the same time had concerns on motion sickness and difficulty level, as most of them were going to use VR system for the first time.



POST-Evaluation

After completing projects most of the comments were related on motion sickness, needing more time to explore the syGlass. Cople of students comments listed below:

- I enjoyed working with the VR, it is a different way to learn about the human brain.
- Using a 3D learning material allows myself to learn in a way that on paper does not.
- I think having other lab assignments using the VR from the beginning of the course can be helpful.
- The positive side of VR for neuroanatomy is that you can use the features (tools) to move around and see a 3D model of the brain structure.
- I think it is possible to use this VR as a learning diagram, if there was more models. That way the student can used as to see pathway on how the function flow to the 3d model.

Conclusion

Important Findings

- Overall Students did have positive responses on VR in general as well as for Neuroanatomy lab class.
- Those students that were not familiar with the system it took 2 class times (6 hours) to get familiar with using headsets and syGlass.
- Use of VR did increase learning outcomes for students as they were able to get into 3D brain and track pathways and structures.
- Some students did experience headaches so they spent their time or documenting narration and working on presentation.of the brain connect to the other structures of the brain.

Reflections

PROS

- Another learning dimension.
- Helps science to be more accessible.
- Color coded brain makes identification easier.
- Decreases cost of lab materials.

CONS

- Headaches & eye pain.
- Connection issues of syGlass app and headsets
- Not enough devices available for individual use for homeworks.
- Limited number of data sets.
- Engaging for person using the headset, not for viewers
- Large upfront cost for programs and hardver.

Recommendations

- Program license.
- More compatible devices.
- Better headsets.
- Student assistance.

Acknowledgment

Thank you to Alis-XR team for providing opportunity to learn about available VR tools, provided help and expertise.
Thank you Dr. David Lent for agreeing to participate in implementing VVR in his Neuroanatomy lab, Helping with device and program troubleshooting and assessment design.
Thank you to syGlass team for providing as their program and data sets.

