EDTECH 2023

Investigating the use of Augmented Reality (AR) technology to enhance Anatomy Teaching – a case study

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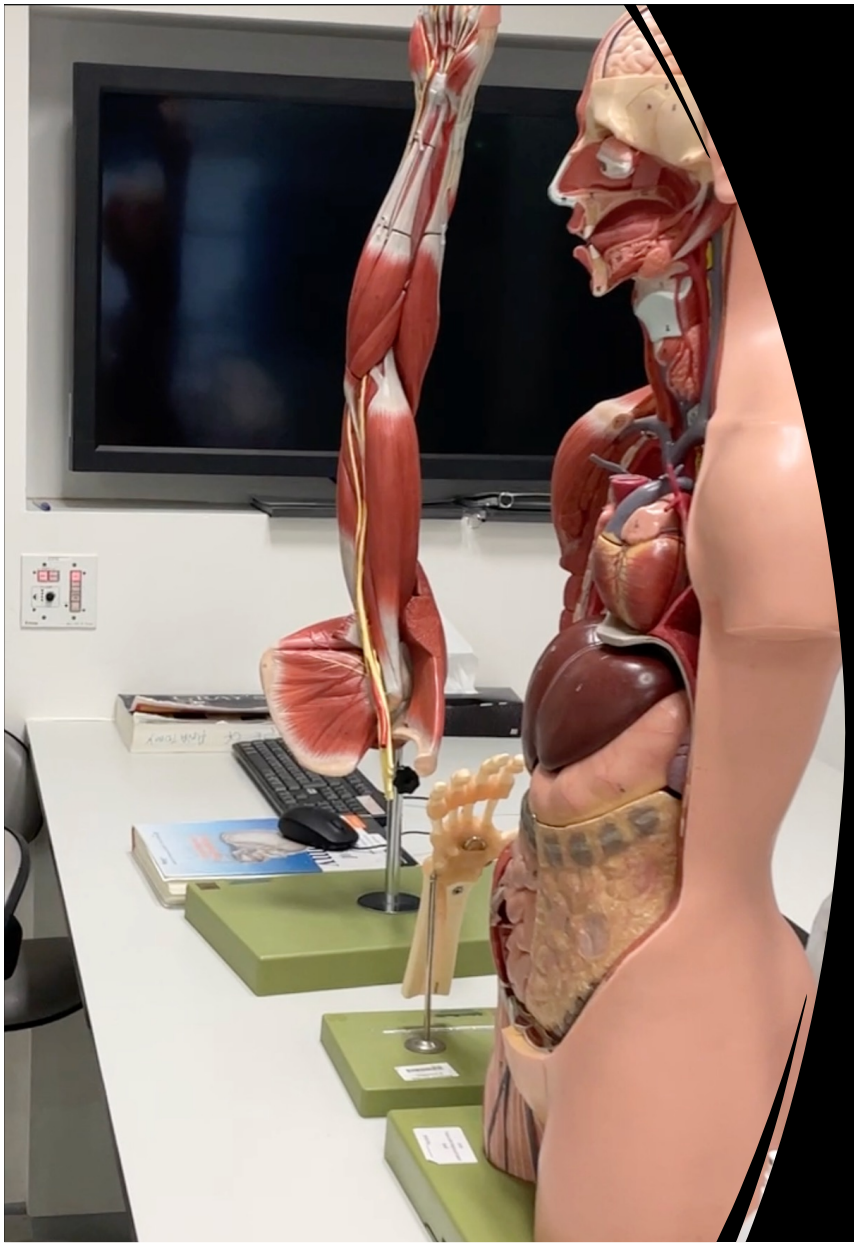
What is Anatomy?

- Study of structure of (human) body
- Important in medical education
- Conventional methods
  - Dissection/ “prosections”
  - Books, plastic models
- Newer methods
  - 3D visualisation apps
  - Augmented/Virtual Reality
- Visual learning activity
  - Shape, size, relations in 3D space, etc.



What did we do?

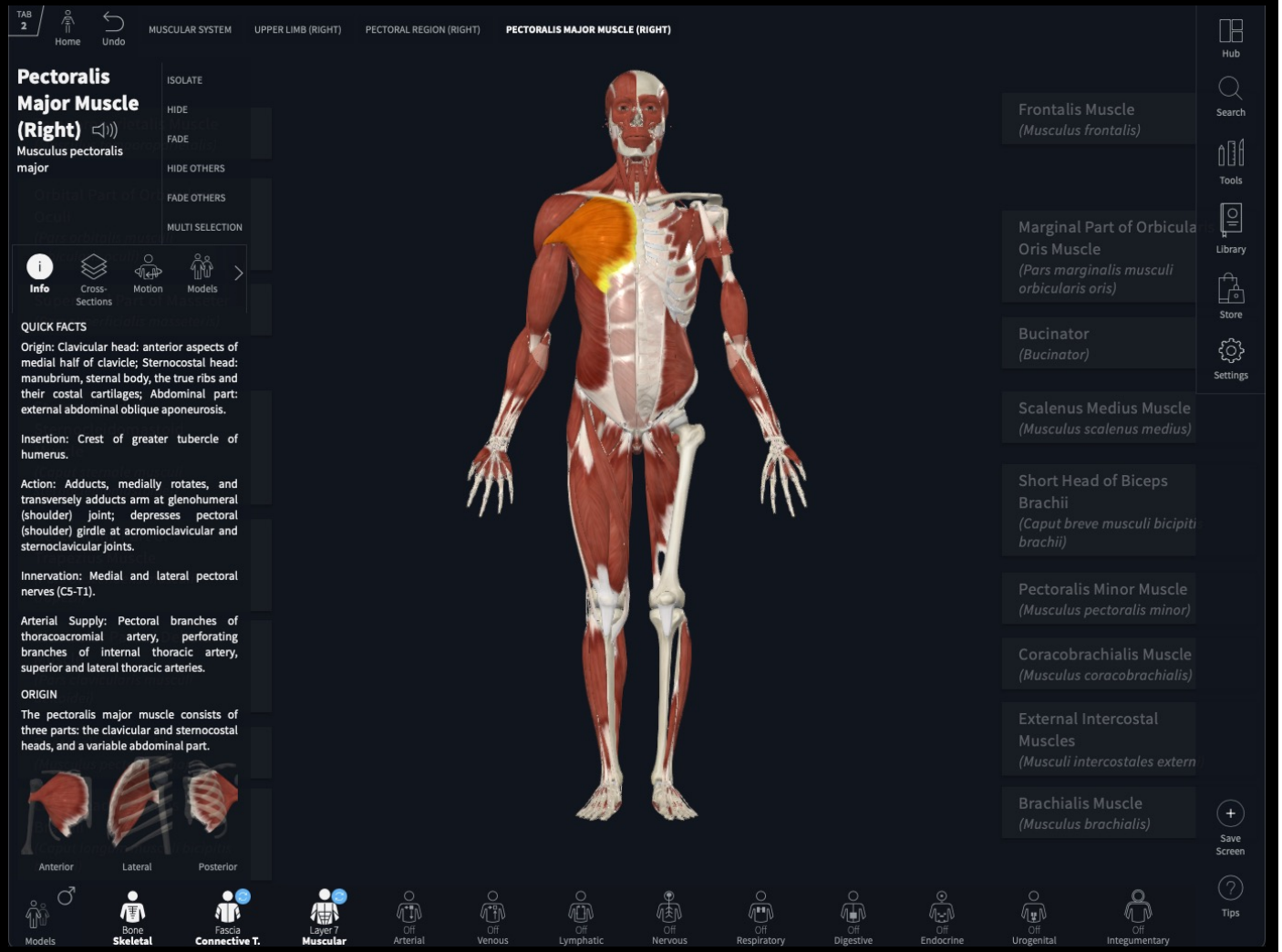
- FLAME Laboratory
  - Practical lab for Department of Anatomy and Neuroscience in UCC
- In 2022, Sinead and Sarah researching Anatomy Pedagogy
- Ran 2 studies with 2 student cohorts
  - MSc Anatomy students (n=11)
  - Undergrad Dental students (n=54)

What were the studies?

- Picked a topic/practical – Larynx
  - (small, hard to understand, not much research?)
- Compared AR with conventional methods
  - Evaluate student learning
  - Evaluate student experience/engagement/enjoyment

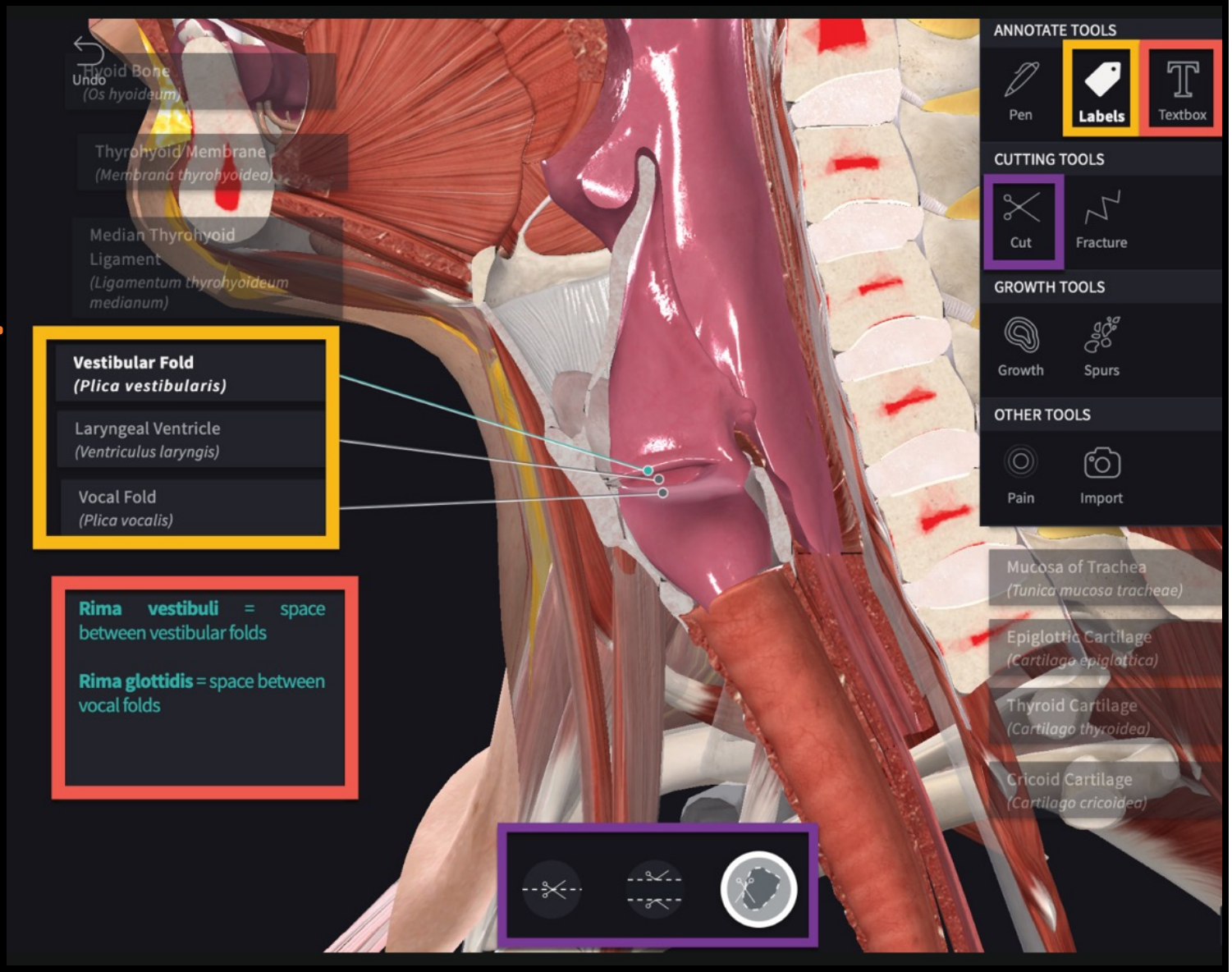
What app did we use?

- "Complete Anatomy" by 3D4Medical/Elsevier
  - 2 modes - 3D and AR
- Installed on computers + tablets in FLAME Lab
- Configured to align with
  - Learning Outcomes
  - FLAME Lab material



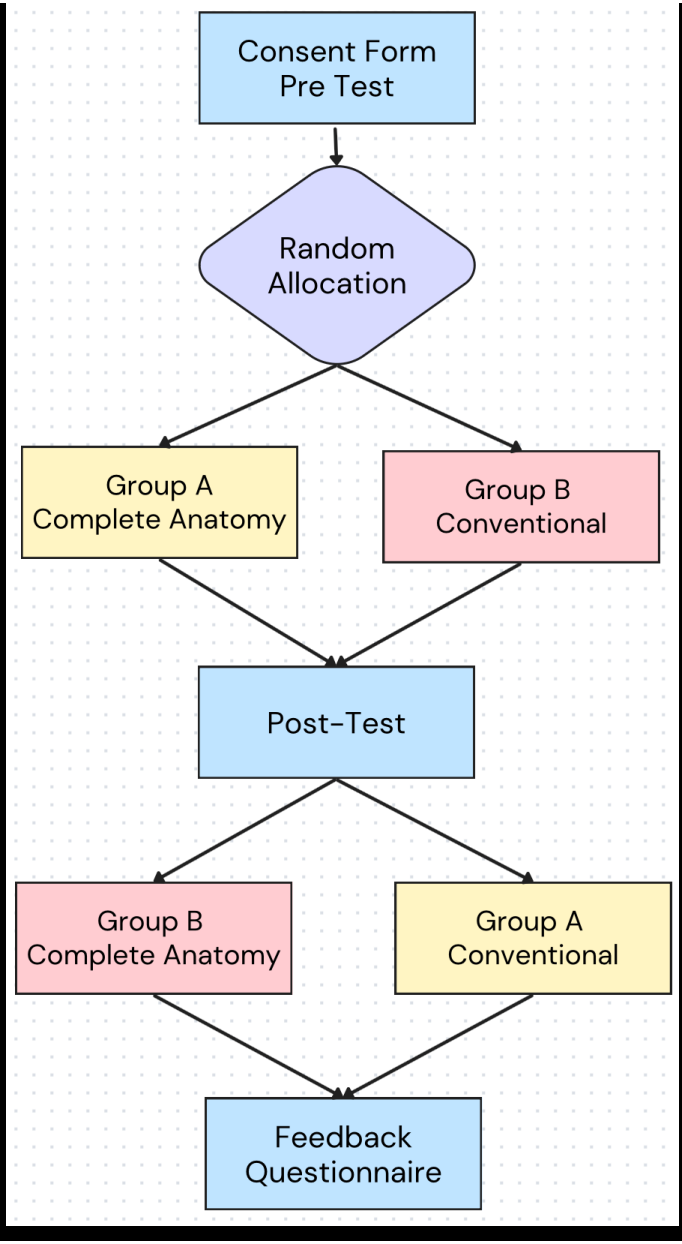
How did we configure it?

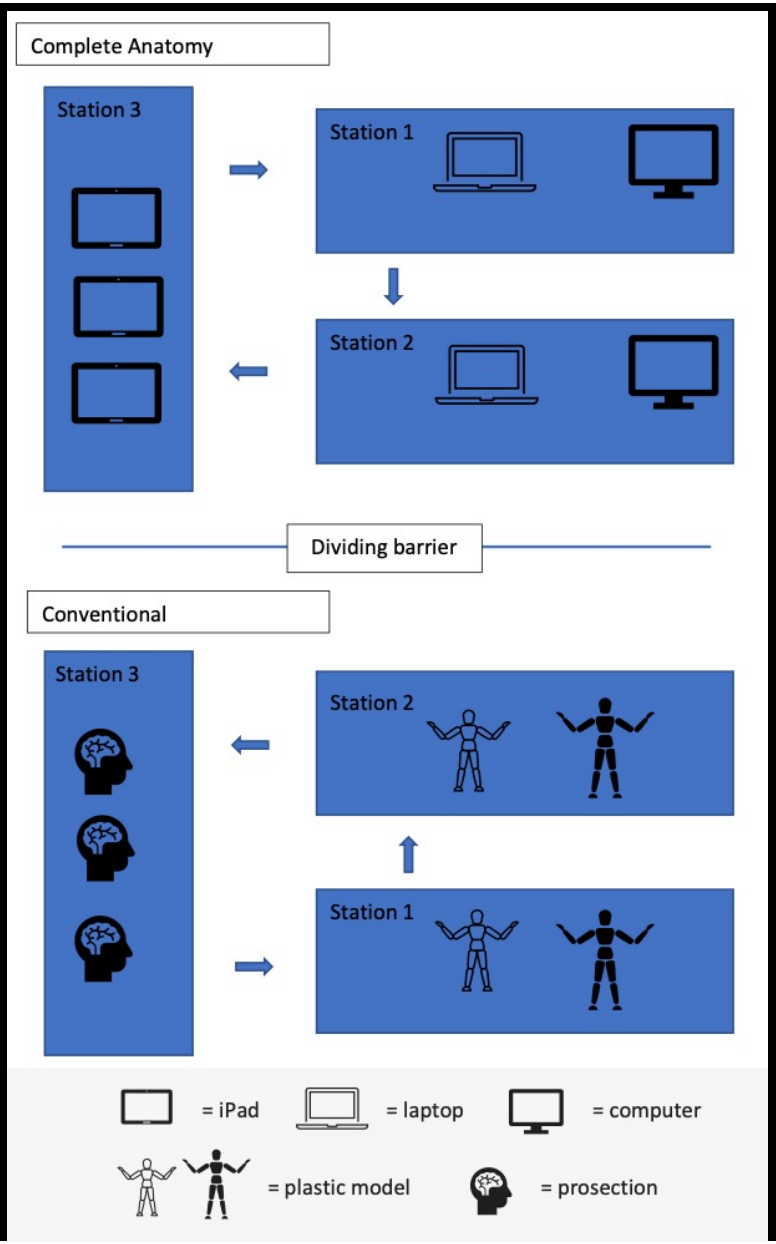
- Annotate Tools
  - **Label**
  - **Text**
- Cutting Tools
  - **Cut**
- Reveal relevant structures, add labels and text



What was the study design?

- Pre-test (Quantitative)
  - Written and image/identification questions
- Randomly assigned into two groups
  - One group for Complete Anatomy (CA)
  - One group for Conventional (CON)
- Quick Tutorial + Practical Session
- Post-test
  - Combined with pre-test to measure knowledge gain
- Cross-over (no student disadvantaged)
- Feedback Questionnaire (Qualitative)
  - Likert-style + open ended



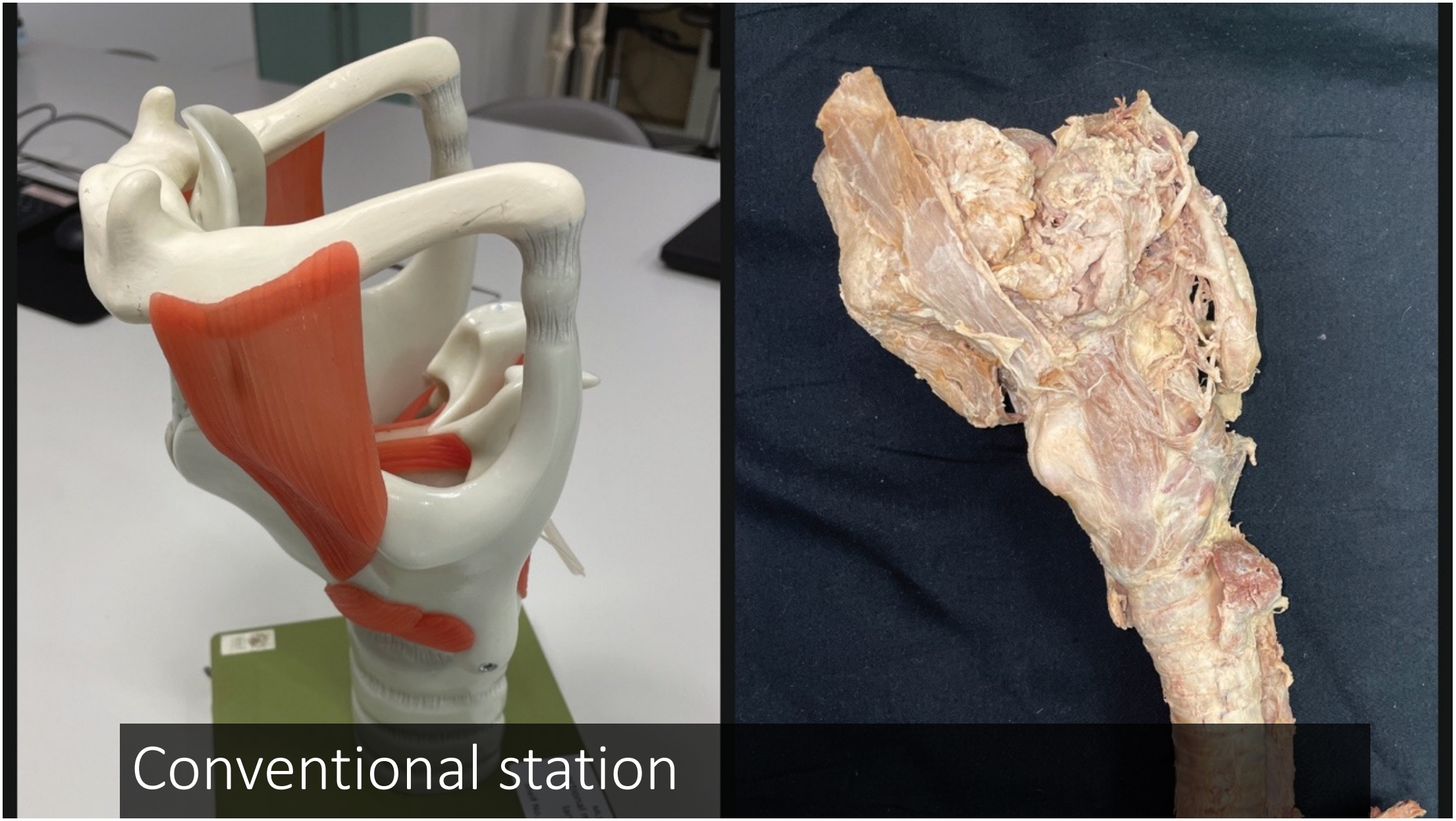


What was the practical setup?

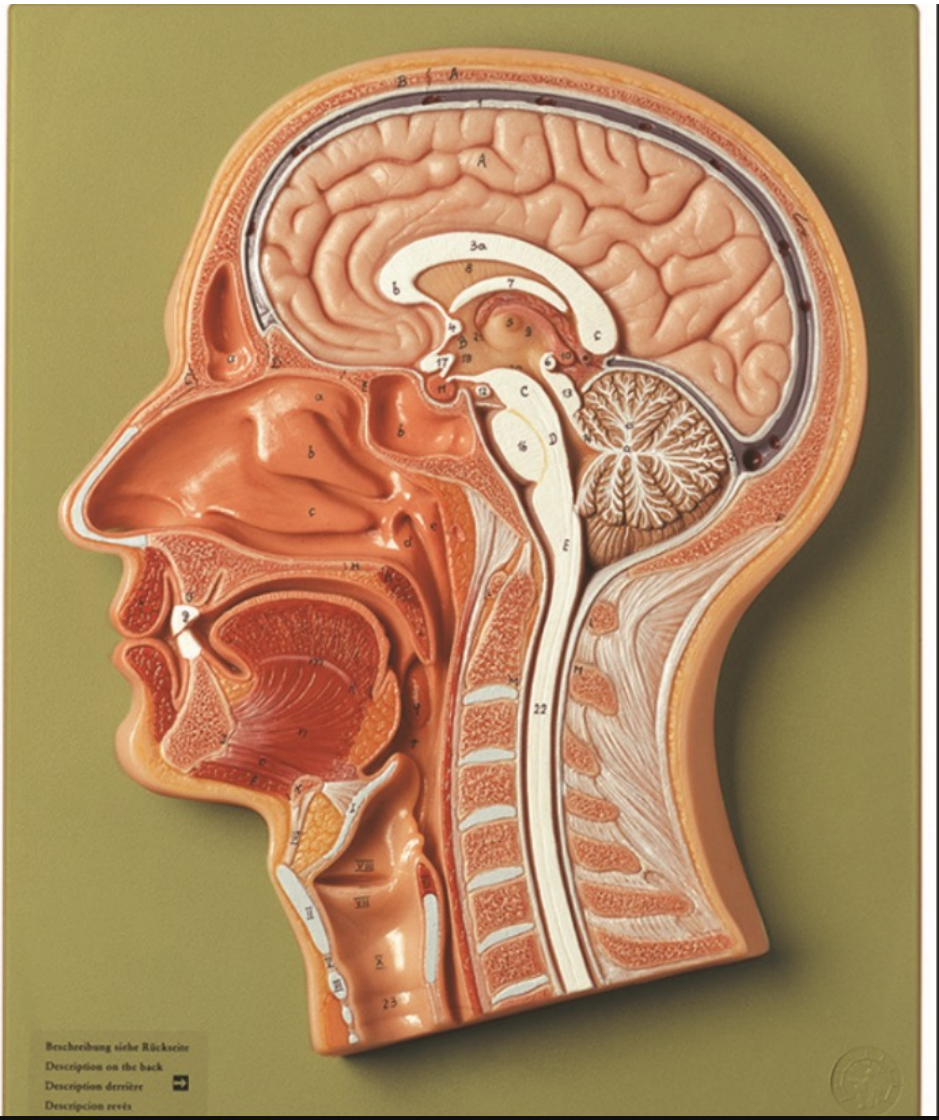
- Both groups had 3 stations
- Complete Anatomy
  - Station 1 + 2
    - 3D visualisation (on computers)
  - Station 3
    - AR (on tablets)
- Conventional group
  - Station 1 + 2
    - Plastic models + keys
  - Station 3
    - Prosections + atlas

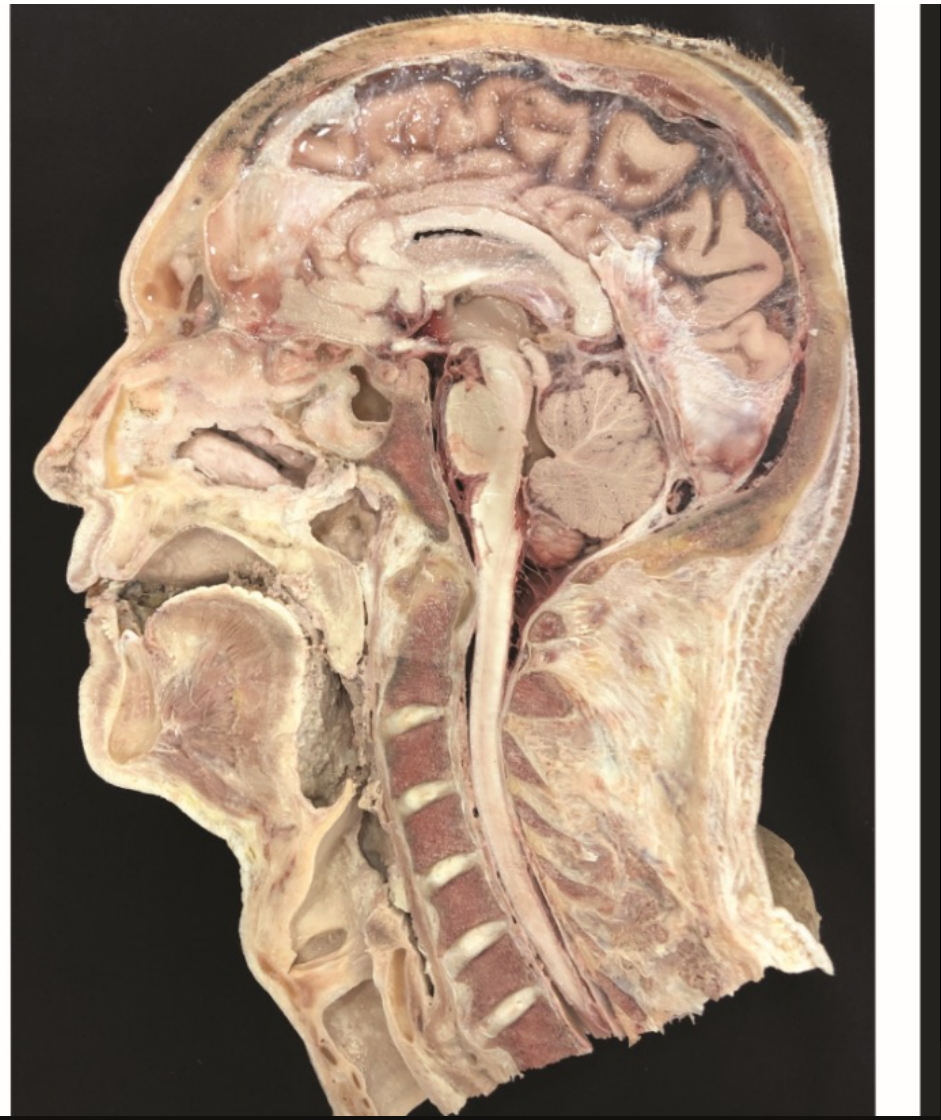
(Warning)

There are some cadaveric images in the following slides

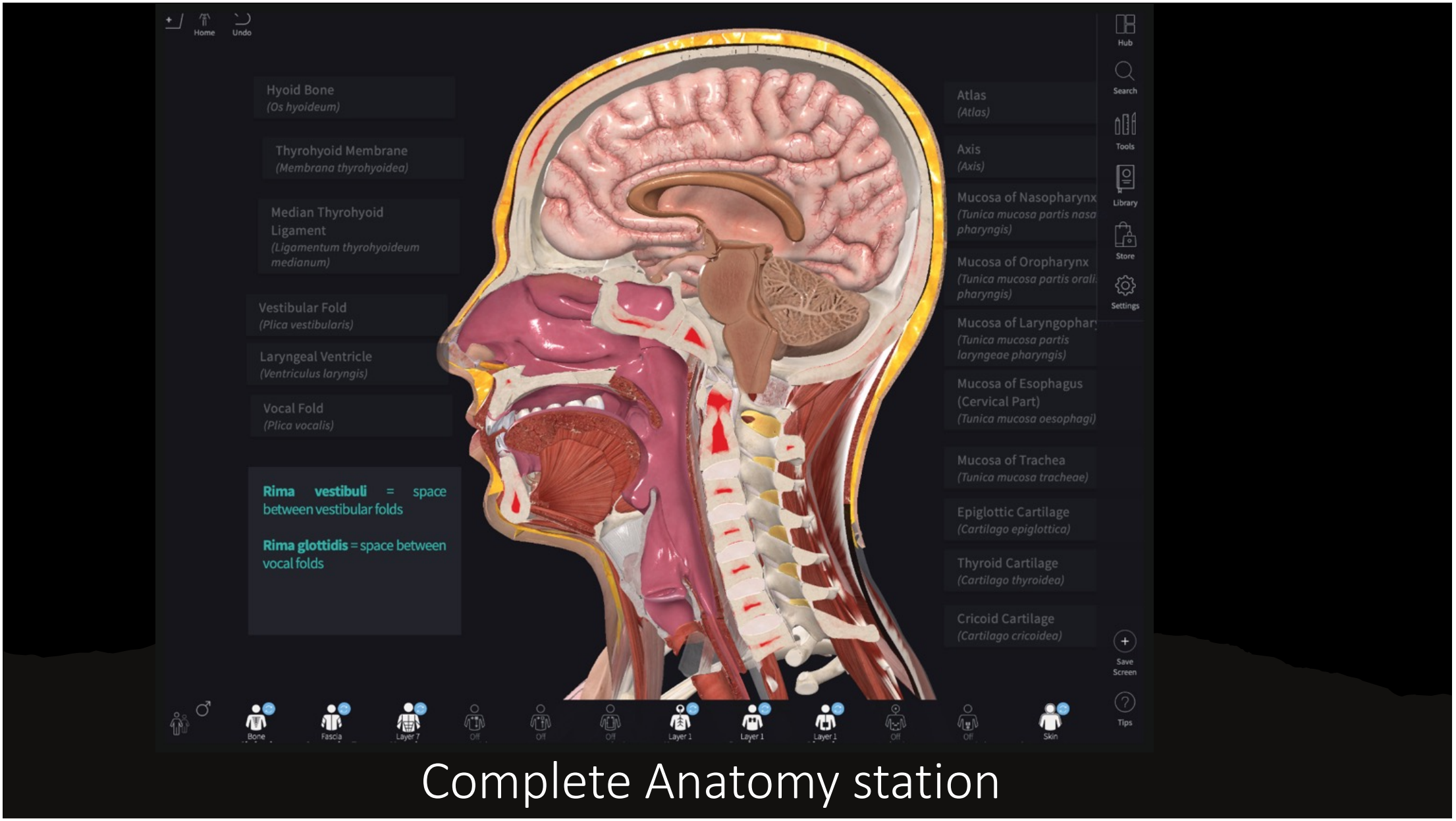

Conventional station

Complete Anatomy station





Conventional station



Complete Anatomy station

What did we find out? (Quantitative)

For both projects

- Both CA and CON groups significantly improved between pre and post test

For project 1 [n=11]

- CA group scored slightly higher than CON in post-test (but not significant)

For project 2 [n=54]

- CON group scored higher than CA in post-test (for written questions)
- => CA helped with identification/image questions, but might have been a distraction for learning theory?

What did we find out? (Qualitative)

- No significant difference between CA and CON [Likert]
  - Usefulness
  - Enjoyment
  - Ease of understanding 3D nature
- Students reported [Open questions]
  - Labels and annotations good, structures are easier to see and manipulate
  - Difficulty using application, unrealistic, no sense of physical touch
- Results support that CA could be used as substitute if needed, but…
  - 75% would not like to use solely CA without conventional methods
  - => use CA to augment conventional methods

What else did we learn?

- AR mode distracting some students
  - Choice of topic not suitable for AR?
  - Cognitive overload
  - => Provide training sessions
    - (AY2023 VR project incorporated training sessions)

Thanks and References

- Thanks to the FLAME Lab in UCC for facilitating the research
- Complete Anatomy Images courtesy of 3D4Medical/Elsevier