

Functional Assessment of Full-body 3D Anatomy Apps in the App Stores

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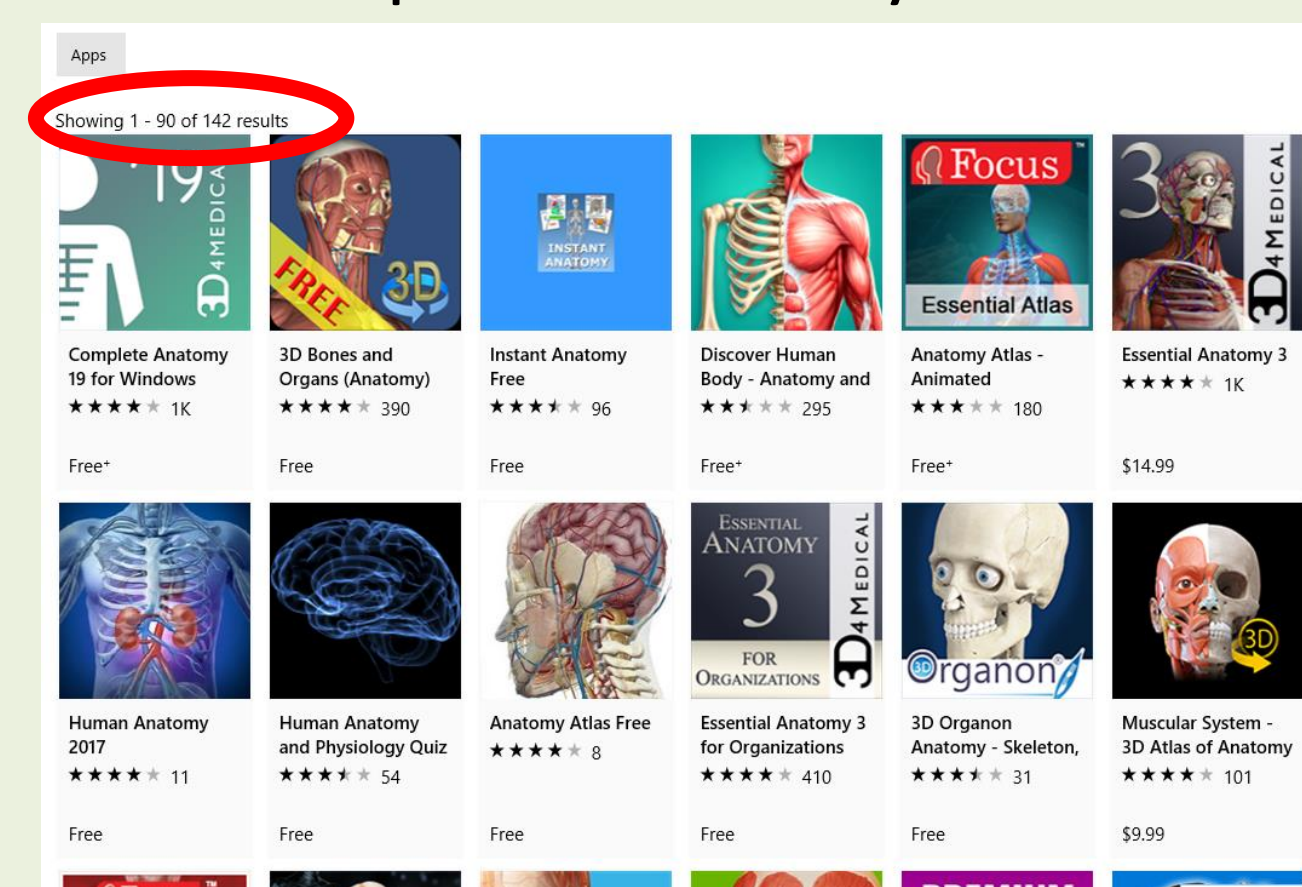
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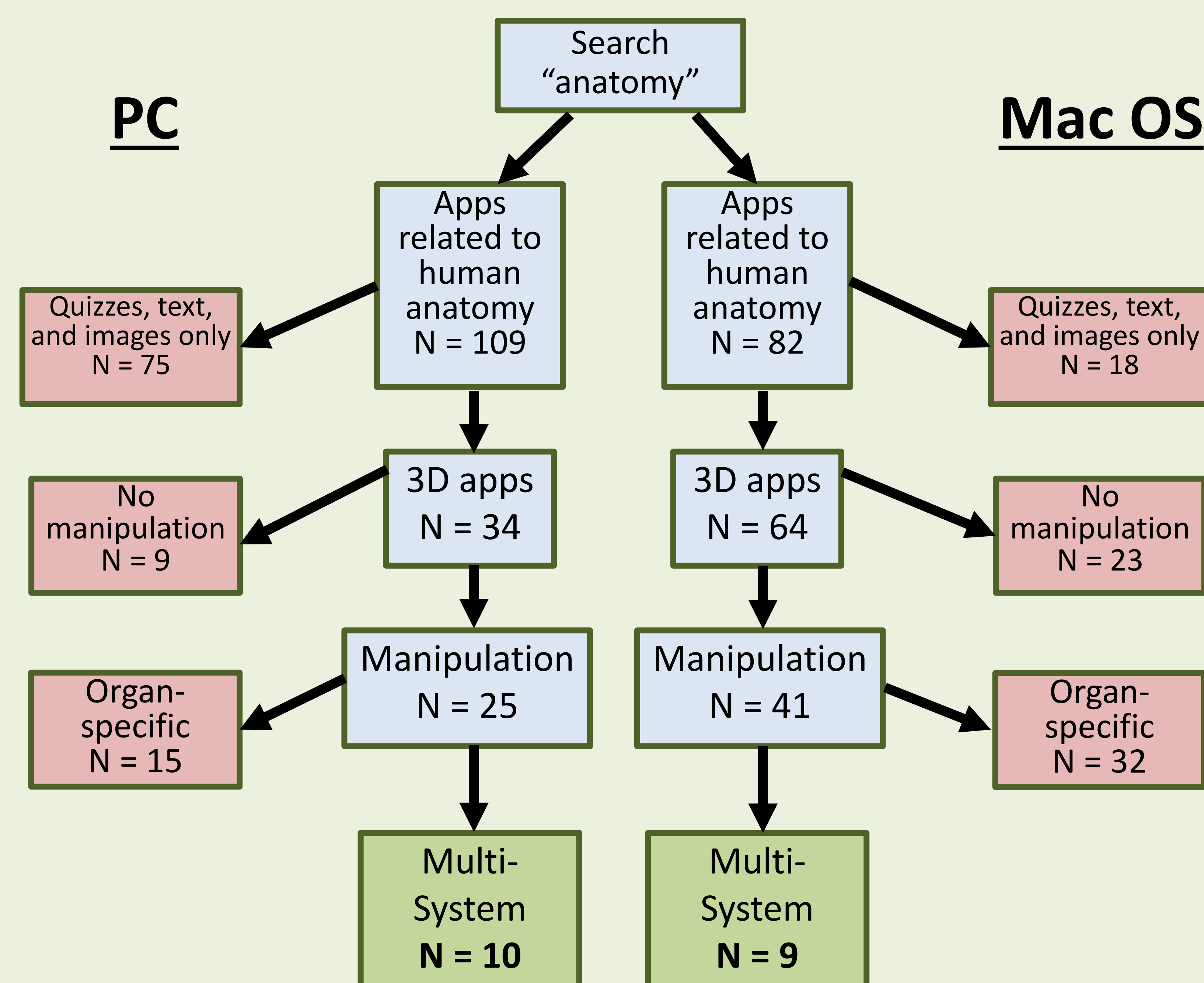
Problem

Rapid advances in 3D animation have resulted in proliferation of 3D anatomy applications (apps). In recent years, sales models for these software products have expanded to include the App Stores, where students can directly purchase and download educational anatomy products for a relatively low price, much cheaper than a typical anatomy atlas. Student knowledge of the quality of these apps is likely limited by lack of expertise, and faculty awareness of the potential utility of these apps is limited by lack of experience in a rapidly changing technology marketplace. These gaps point to a need for authoritative review of these technologies to answer the questions of our students (which apps should I get?) and the questions of our faculty (how might I use these apps as more than a supplementary resource?).



Methods

We reviewed the 3D anatomy Apps that are currently available for individual purchase in the App Stores with a scope of evaluating cost, content, quality of visuals, manipulation tools, presentation tools and overall usability. Searching "Anatomy" in the Microsoft store yielded 108 apps, and 82 apps in the Apple store. Selection criteria were used to focus on apps that (1) contained 3D visualizations, (2) allowed users to manipulate models and (3) contained multiple organ systems. These criteria filtered the list of apps to 10 PC apps and 9 Mac apps. Two reviewers evaluated all apps for the focus areas and compared findings to ensure validity.



Of the 11 apps selected, 5 apps from 3 developers were clearly superior to the rest, these were chosen for full evaluation

App	Maker	Platform
Complete Anatomy 2018	3D4 Medical	PC/Mac
Essential Anatomy 3 (v5 for Mac)	3D4 Medical	PC/Mac
3D Human Anatomy	Education Mobile	PC
Anatomy 3D Organs	Real Bodywork	PC/Mac
3D Organon Anatomy	Medis Media	PC/Mac
Visual Anatomy – Human Body	GraphicVizion	PC/Mac
Human Encyclopedia	inKlusion	PC
Human Anatomy Atlas 2018	Visible Body	PC/Mac
Anatomy and Physiology (curriculum)	Visible Body	PC/Mac
3D Human Body Organs Reference	USaMau03	Mac
Anatomy Lesson 3D	Academ Media Labs	Mac

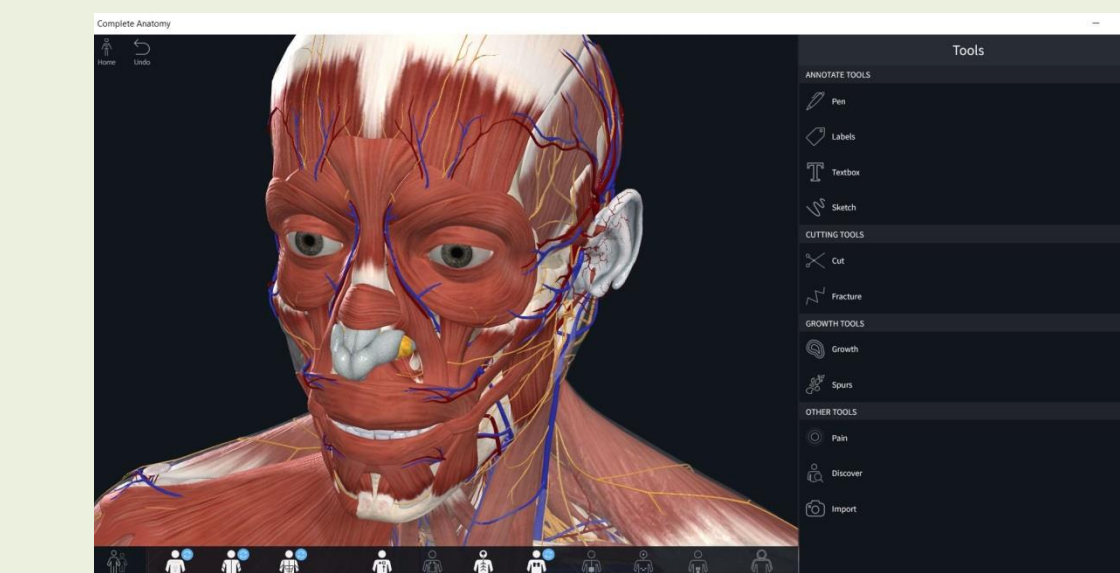
Rubric and Results

Content: What's in the apps?

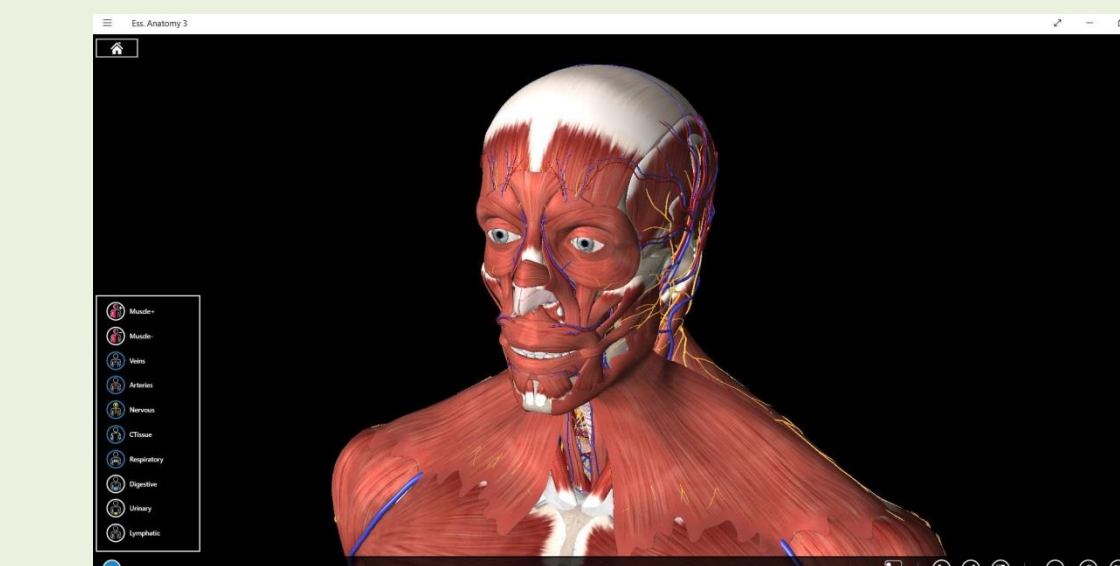
App (maker)	Inclusions	Motion	Structure details	Clinical Correlations	Pronunciation	Quizzes
Complete Anatomy 2018 (3D4)	Fasciae, Membranes, Bursae	Yes (not all muscles)	O/I/B/N *Isolate B/N	Detailed text	Yes	Yes (premade and authorable)
Essential Anatomy 3/5 (3D4)	Bursae	Yes (video only)	O/I/B/N *Isolate B/N	No	Yes	Yes
3D Organon Anatomy	Membranes, Bursae	Skeletal only	O/I/B/N	System-level correlations	Yes (not working)	No
Human Anatomy Atlas 2018 (VB)	Membranes, Bursae	Yes (not all muscles)	O/I/B/N	Systems-level pathology	Yes	Yes
Anatomy & Physiology (VB, curriculum)	Detailed physiology	Yes (video only)	O/I/B/N	Systems-level pathology	Yes	Yes

Visuals: how do the graphics look?

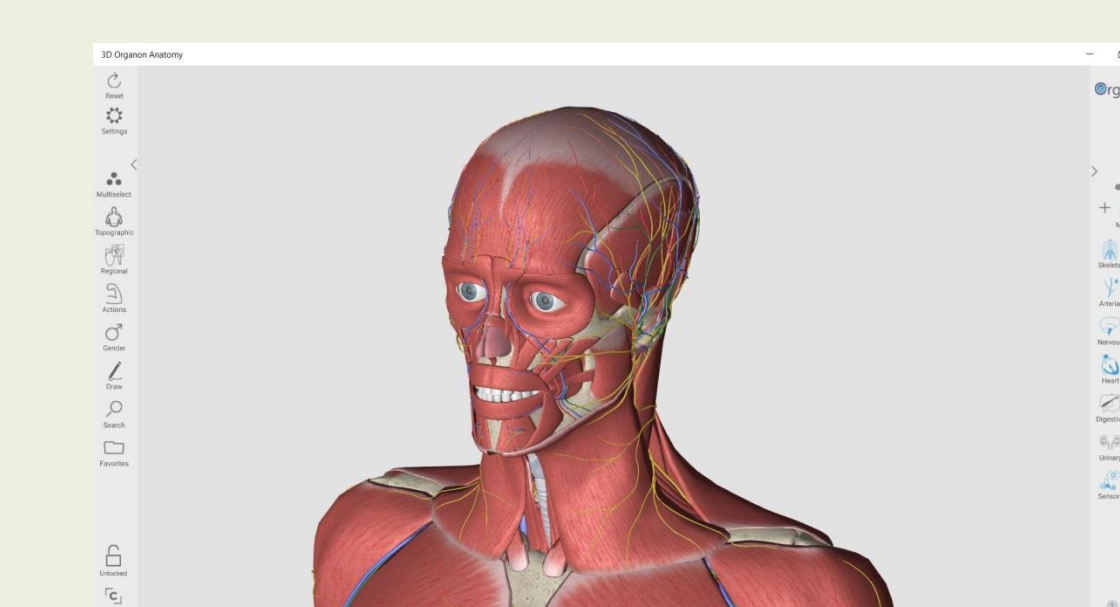
Complete Anatomy 2018 (3D4)
Glossy, high quality textures
Rank: 1(DH)/1(VM)



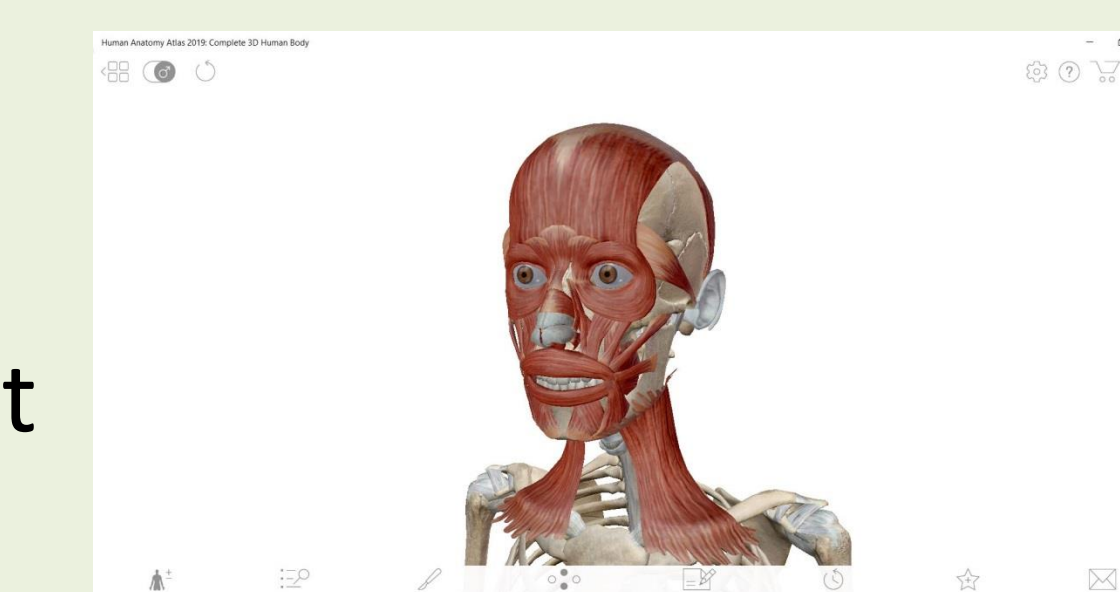
Essential Anatomy 3/5 (3D4)
Similar to Complete, less glossy
Rank: 2(DH)/2(VM)



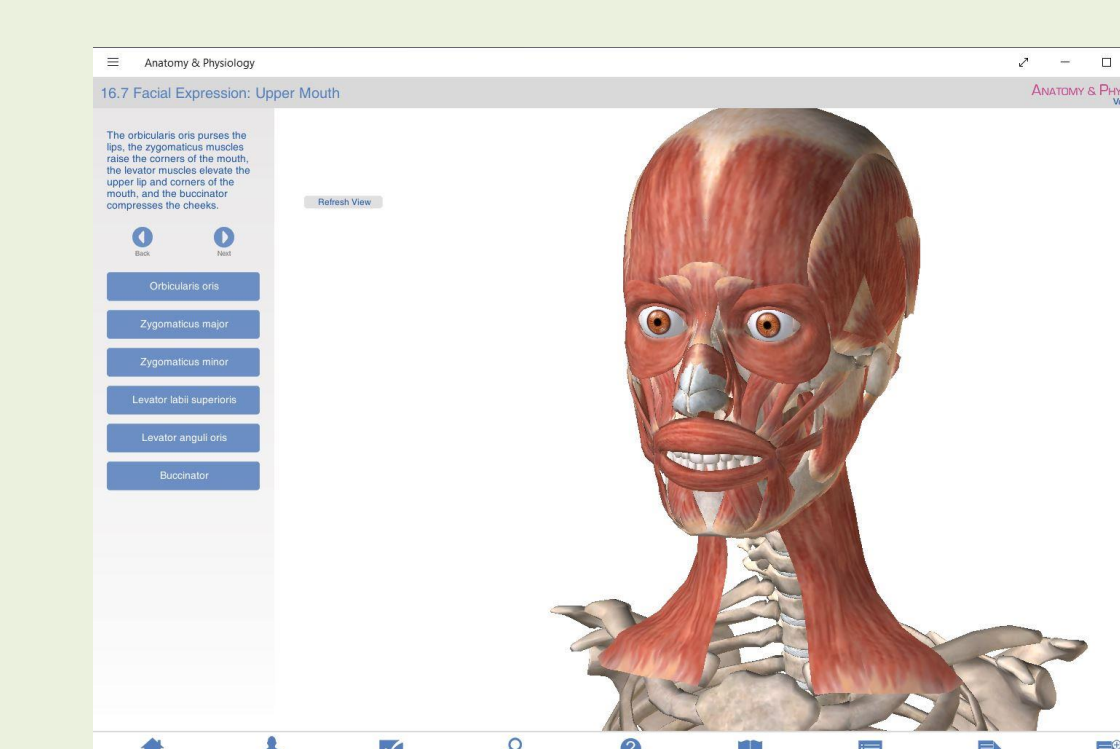
3D Organon Anatomy
Softer molded aesthetic
Rank: 5(DH)/4(VM)



Human Anatomy Atlas 2018
Very good, not as glossy as 3D4, white background is very different
Rank: 3(DH)/3(VM)



Anatomy and Physiology
Same as Human Anatomy Atlas 2018
Rank: 4(DH)/5(VM)



Manipulation: How do you interact with the model?

App (maker)	Pan/Rotate/Zoom	Dissecting Tools	Multiple Select	Notable Features
Complete Anatomy 2018 (3D4)	P/R/Z	Hide/Isolate/Fade	Yes	Multiple undo option, Discover mode
Essential Anatomy 3/5 (3D4)	P/R/Z	Hide/Isolate/Fade	No	No Undo, only startover
3D Organon Anatomy	P/R/Z	Hide/Fade	Yes	Combining systems in a region is tricky
Human Anatomy Atlas 2018 (VB)	P/R/Z	Hide/Isolate/Fade	Yes	Radius blast function builds structures around Undo 1x only
Anatomy & Physiology (VB, curriculum)	P/R/Z	Hide/Fade	Yes	Undo 1x only

Tools: What options are there for teachers?

App (maker)	Load/Save	Search	Sharing	Recording	Annotation	Import media
Complete Anatomy 2018 (3D4)	Yes	Yes	Yes (in-app)	Yes (audio, pointer)	Pen, Labels	Yes (images)
Essential Anatomy 3/5 (3D4)	Yes	Yes	Yes (via email)	No	Pen	No
3D Organon Anatomy	Yes	Yes	No	No	Pen	No
Human Anatomy Atlas 2018 (VB)	Yes	Yes	Yes (via email)	No	Labels	No
Anatomy & Physiology (VB, curriculum)	Yes/No	Yes	No	No	No	No

Usability: Who can use it?

App (maker)	Confusion	Education Level	Study Guide
Complete Anatomy 2018 (3D4)	Lots on screen, gets overwhelming	Undergrad-Medical	No
Essential Anatomy 3/5 (3D4)	None	Undergrad-Medical	No
3D Organon Anatomy	None	Undergrad-Medical	No
Human Anatomy Atlas 2018 (VB)	Lots on screen, gets overwhelming	Undergrad-Medical	No
Anatomy & Physiology (VB, curriculum)	None (lots of structure)	Undergrad	Yes

Cost: What does the app cost, add-ons?

App (maker)	Up-Front Cost (PC)	Up-Front Cost (Mac)	In-App Purchases?
Complete Anatomy 2018 (3D4)	Free + \$44.99	Free + \$44.99	Courses, lectures (\$ variable)
Essential Anatomy 3/5 (3D4)	\$14.99	\$29.99	\$12.00 to upgrade muscles (movements, attachments)
3D Organon Anatomy	\$24.99	\$28.99	None
Human Anatomy Atlas 2018 (VB)	\$24.99	\$24.99	Patient education animations
Anatomy & Physiology (VB, curriculum)	\$32.99	\$34.99	None

Summary

The three top apps in this study contain many features that would be useful to students looking for independent study tools to support their anatomy learning. In addition, some of the apps provide features that faculty could use to create content to enhance in-class lessons and distribute as exercises for at-home study. The results of this study illustrate the versatile capability of these apps to support our courses and students' learning.

Future Directions

- Assess apps on iOS and Android devices
- Evaluate Accuracy of models in each app
- Explore specific curriculum applications for these technologies

