



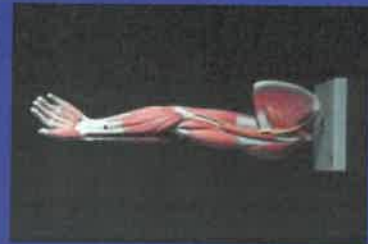
Gross Anatomy:

Are Anatomical Models Worth the Investment?

G.J. Corey Harmon and Mary Roby

Yes, they are for us!

- 91% of students surveyed agreed that using the anatomical models had a positive impact on their learning.
- Feedback from Student User Surveys:
 - "They are awesome! They make it easier to learn."
 - "The lab manual doesn't give as good of a reference for the models we use in class, so these models help me study every week."
- Collection Stats:
 - Size: 236
 - Total Circulation 2011-August 2019: 18,082
 - Apr 2018-Mar 2019 Circulation: 3476 (41.26% of total circulation).
 - Overall Cost Per Use: \$9.94



Laupus Library began its anatomical model collection in the late 1980s with one model of the fetus. In intervening years, the collection has grown to 236 models ranging from single organs to entire bodies. As of September 1, 2019, the circulation count for the models was 18,082. During the 2018-2019 academic year, we observed that several of the models had become too damaged to continue circulating and we evaluated whether to replace them or slowly discontinue the service. Based on circulation numbers, as well as anecdotal evidence such as the results of an informal survey of model requests from students, we chose to replace the damaged models and expand the collection further.

A survey was sent to all 20 academic health science libraries in the Mid-Atlantic Chapter region to determine anatomical model ownership and use. Of the 16 respondents 11, owned or housed anatomical models. The average number of models provided by libraries was 31 with a minimum of 1 and a maximum of 133. If Laupus Library is included, the average jumps to 48 and the maximum becomes 236. Based on this response, we are confident in stating that Laupus Library has the largest anatomical model collection among all academic health science libraries in the MAC region.

Top 5 Most Circulated Models	Date Added	Uses	Cost Per Use
Disarticulated Hand/Wrist/Hand	11/6/2006	488	\$1.50
Muscular Peg	4/27/1984	478	\$1.25
3D model of muscular anatomy of the arm and shoulder	6/12/2007	407	\$1.18
Premier skull	5/9/2005	400	\$6.02
Ear model, 3 lines the size, 6 part.	6/4/2004	378	\$6.26

Model Focus	# of Models	Circulation	Cost Per Use
Ear	5	470	\$2.69
Heart	13	726	\$9.21
Arm	10	1601	\$4.00
Leg	6	1113	\$7.42
Eye	7	795	\$3.28
Staff	16	2035	\$2.21
Skeleton	16	1955	\$6.23
Lung	6	396	\$9.81
Foot	4	298	\$4.08
Hand	4	126	\$9.46
Torso	8	264	\$66.40
Life-Size Full Body	17	1688	\$38.78
Blind	10	797	\$5.07
Spine/vertebrae	9	529	\$4.26
Dentist/teeth	11	141	\$31.00

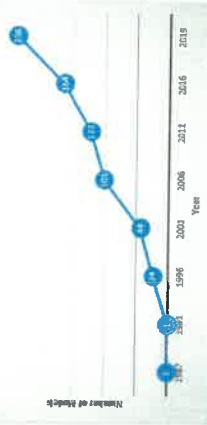
These focus areas account for only 1.44 models, or 61% of the library's model collection with a Cost Per Use of \$11.40

- The library has access to several e-anatomy resources:
- Acland's Video Atlas of Human Anatomy
 - Anatomy Atlases
 - Anatomy.tv (aka Primal Pictures)
 - e-Anatomy: Interactive Anatomy Atlas
 - Human Anatomy Online
 - Visible Body
 - 3D Organon VR Anatomy – In our new VR lab
 - Sharecare VR – in our new VR lab

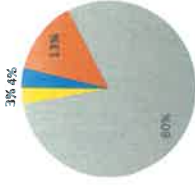
Patrons can also use our 65" Ideum Touch Table to access Visible Body and Anatomy.tv in the library.

Anatomy.tv and e-Anatomy had 5046 sessions/logins since 2015 but these numbers do not accurately reflect the actual usage.

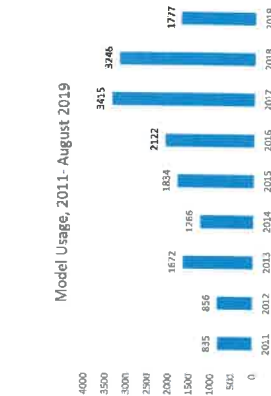
Model Collection Growth, 1987-2019



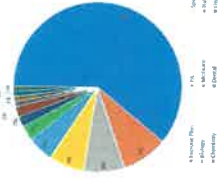
Model Usage by Patron Type



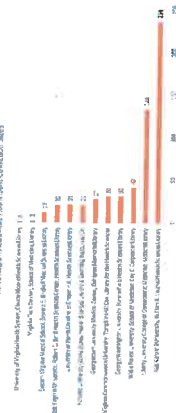
Model Usage, 2011-August 2019



Model Usage By Degree Program



MAC Region Academic Health Science Collection Sites



Laupus Library began its anatomical model collection in the late 1980s with one model of the fetus. In intervening years, the collection has grown to 236 models ranging from single organs to entire bodies. As of September 1, 2019, the circulation count for the models was 18,082. During the 2018-2019 academic year, we observed that several of the models had become too damaged to continue circulating and we evaluated whether to replace them or slowly discontinue the service. Based on circulation numbers, as well as anecdotal evidence such as the results of an informal survey of model requests from students, we chose to replace the damaged models and expand the collection further.

A survey was sent to all 20 academic health science libraries in the Mid-Atlantic Chapter region to determine anatomical model ownership and use. Of the 16 respondents, 11 owned or housed anatomical models. The average number of models provided by libraries was 31 with a minimum of 1 and a maximum of 133. If Laupus Library is included, the average jumps to 48 and the maximum becomes 236. Based on this response, we are confident in stating that Laupus Library has the largest anatomical model collection among all academic health science libraries in the MAC region.

The library has access to several e-anatomy resources:

- Acland's Video Atlas of Human Anatomy
- Anatomy Atlases
- Anatomy.tv (aka Primal Pictures)
- e-Anatomy: Interactive Anatomy Atlas
- Human Anatomy Online
- Visible Body
- 3D Organon VR Anatomy – in our new VR lab
- Sharecare VR – in our new VR lab

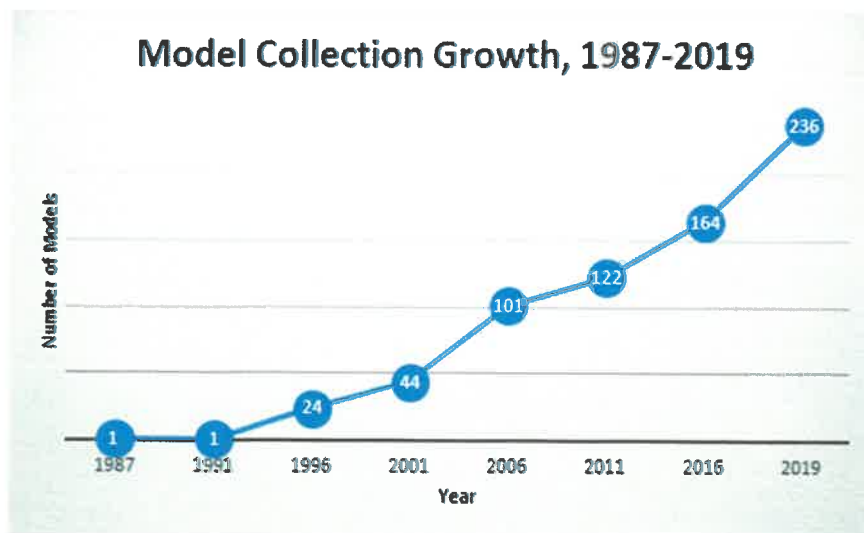
Patrons can also use our 65" Ideum Touch Table to access Visible Body and Anatomy.tv in the library.

Anatomy.tv and e-Anatomy had 5046 sessions/logins since 2015 but these numbers do not accurately reflect the actual usage.

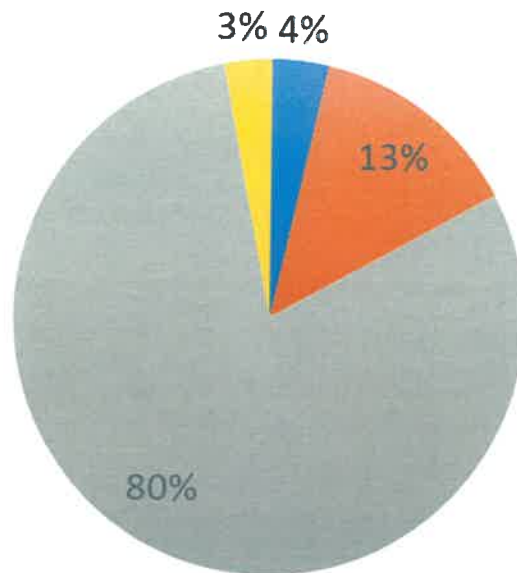
Top 5 Most Circulated Models	Date Added	Uses	Cost Per Use
Disarticulated half-skeleton.	11/8/2006	498	\$1.50
Muscular leg.	4/27/1994	476	\$1.25
Six-part muscular anatomy of the arm and shoulder	6/12/2007	407	\$1.16
Premier skull.	5/9/2005	400	\$0.62
Ear model, 3 times life size, 6 part.	6/4/2004	378	\$0.36

Model Focus	# of Models	Circulation	Cost Per Use
Ear	5	470	\$2.89
Heart	13	736	\$6.21
Arm	10	1581	\$4.00
Leg	8	1113	\$7.42
Eye	7	785	\$3.26
Skull	16	2035	\$2.21
Skeleton	16	1855	\$6.23
Lung	6	356	\$9.81
Foot	4	238	\$4.08
Hand	4	126	\$8.48
Torso	8	284	\$66.40
Life-Size Full Body	17	1888	\$38.78
Brain	10	787	\$5.07
Spine/Vertebrae	9	529	\$4.26
Dental/Teeth	11	141	\$31.00

These focus areas account for only 144 models, or 61% of the library's model collection with a Overall Cost Per Use of \$11.40

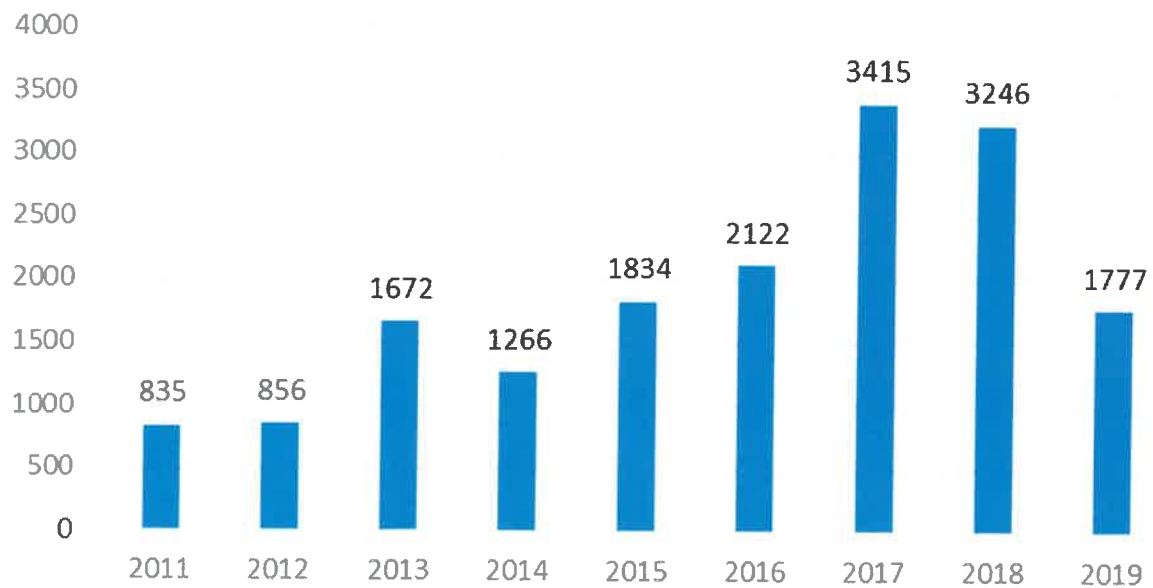


Model Usage by Patron Type

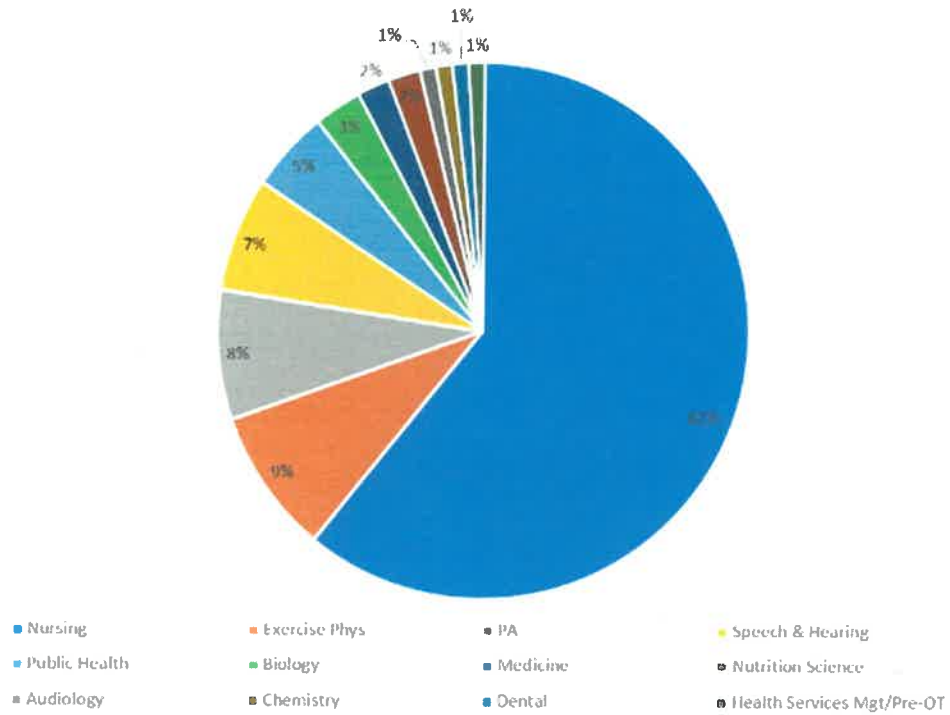


■ ECU Faculty and Staff ■ ECU Graduate Student ■ ECU Undergraduate Student ■ Non-ECU Users

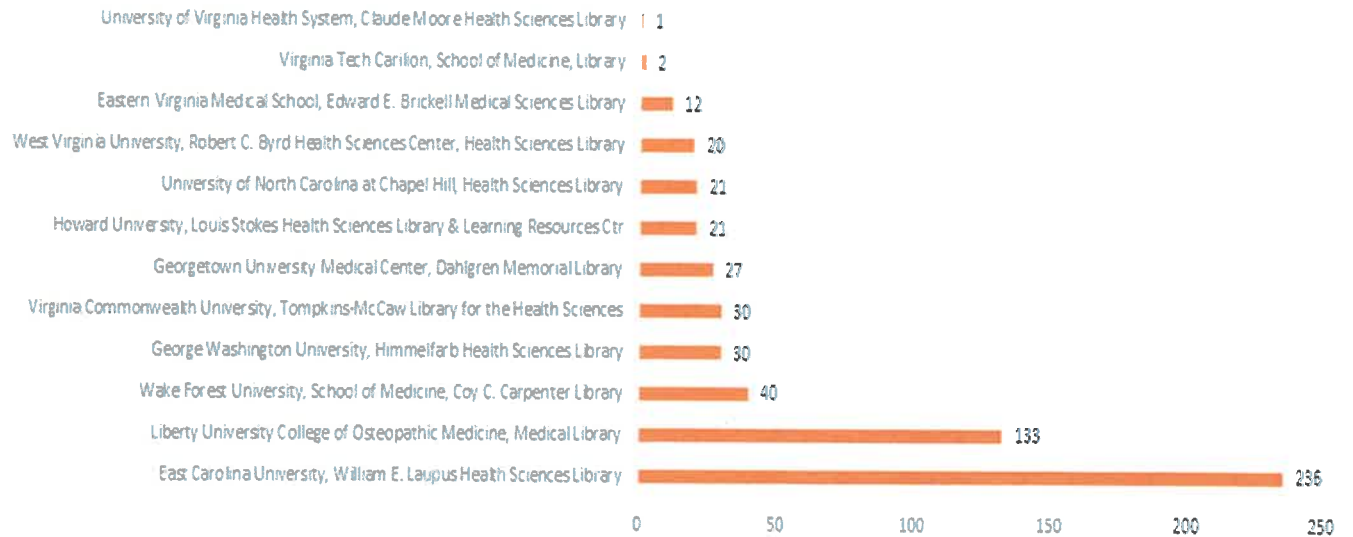
Model Usage, 2011- August 2019



Model Usage By Degree Program



MAC Region Academic HSL Model Collection Sizes



References

- Davis, C. R., Bates, A. S., Ellis, H., & Roberts, A. M. (2014). Human anatomy: Let the students tell us how to teach. *Anatomical Sciences Education*, 7(4), 262-272. doi:10.1002/ase.1424 [doi]
- de Seigneux, R. (1946). Anatomical models in teaching. *Lancet*, 2(6418), 30-x. doi:S0140-6736(46)90801-X [pii]
- Estai, M., & Bunt, S. (2016). Best teaching practices in anatomy education: A critical review. *Annals of Anatomy = Anatomischer Anzeiger: Official Organ of the Anatomische Gesellschaft*, 208, 151-157. doi:S0940-9602(16)30032-2 [pii]
- Khot, Z., Quinlan, K., Norman, G. R., & Wainman, B. (2013). The relative effectiveness of computer-based and traditional resources for education in anatomy. *Anatomical Sciences Education*, 6(4), 211-215. doi:10.1002/ase.1355 [doi]
- Latorre, R., Bainbridge, D., Tavernor, A., & Lopez Albors, O. (2016). Plastination in anatomy learning: An experience at Cambridge University. *Journal of Veterinary Medical Education*, 43(3), 226-234. doi:10.3138/jvme.0715-113R1 [doi]
- Lombardi, S. A., Hicks, R. E., Thompson, K. V., & Marbach-Ad, G. (2014). Are all hands-on activities equally effective? Effect of using plastic models, organ dissections, and virtual dissections on student learning and perceptions. *Advances in Physiology Education*, 38(1), 80-86. doi:10.1152/advan.00154.2012 [doi]
- Pawlina, W., & Drake, R. L. (2013). Anatomical models: Don't banish them from the anatomy laboratory yet. *Anatomical Sciences Education*, 6(4), 209-210. doi:10.1002/ase.1380 [doi]
- Preece, D., Williams, S. B., Lam, R., & Weller, R. (2013). "Let's get physical": Advantages of a physical model over 3D computer models and textbooks in learning imaging anatomy. *Anatomical Sciences Education*, 6(4), 216-224. doi:10.1002/ase.1345 [doi]

- Seitel, M., Maier-Hein, L., Seitel, A., Franz, A. M., Kenngott, H., De Simone, R., . . . Meinzer, H. P. (2009). RepliExplore: Coupling physical and virtual anatomy models. *International Journal of Computer Assisted Radiology and Surgery*, 4(5), 417-424. doi:10.1007/s11548-009-0363-5 [doi]
- Shin, D. S., Jang, H. G., Hwang, S. B., Har, D. H., Moon, Y. L., & Chung, M. S. (2013). Two-dimensional sectioned images and three-dimensional surface models for learning the anatomy of the female pelvis. *Anatomical Sciences Education*, 6(5), 316-323. doi:10.1002/ase.1342 [doi]
- Wainman, B., Wolak, L., Pukas, G., Zheng, E., & Norman, G. R. (2018). The superiority of three-dimensional physical models to two-dimensional computer presentations in anatomy learning. *Medical Education*, 52(11), 1138-1146. doi:10.1111/medu.13683 [doi]
- Wilson, A. B., Miller, C. H., Klein, B. A., Taylor, M. A., Goodwin, M., Boyle, E. K., . . . Lazarus, M. (2018). A meta-analysis of anatomy laboratory pedagogies. *Clinical Anatomy*, 31(1), 122-133. doi:10.1002/ca.22934 [doi]
- Yamine, K., & Violato, C. (2016). The effectiveness of physical models in teaching anatomy: A meta-analysis of comparative studies. *Advances in Health Sciences Education: Theory and Practice*, 21(4), 883-895. doi:10.1007/s10459-015-9644-7 [doi]