



Department of Biomedical Engineering

UNIVERSITY OF WISCONSIN-MADISON

Reusable 3D Pelvic Floor Teaching Model For Layered Construction Activities

SuperModels:

Katherine Ahlquist, Sara Mlodik, Abigayle Chapman,
Karen Pisano, Hiba Shah, Mina Hawkins

Client: Kelsey Henriquez and Sarah Traynor

Advisor: Prof. David Dean

October 2nd, 2026

Overview

- Problem Statement
- Background Information
- Previous and Competing Designs
- Summary of Product Design Specifications
- Design 1
- Design 2
- Design 3
- Design Matrix
- Final Design
- Future Work
- References



Problem Statement

- Pelvic floor anatomy workshop
 - Currently limited by two-dimensional activity
- Three-dimensional model would improve student understanding
- Must be:
 - Anatomically accurate
 - Easily cleanable
 - Easily transportable
 - Allow Play-Doh to attach

Background Information

- PA curriculum includes a Pelvic Floor Anatomy Workshop
- Current activity is restricted by 2-D paper handouts
- A 3-D Pelvic Outlet Model would greatly improve student understanding



Fig. 1. Intimate Rose Pelvic Floor Model [1]
[25 cm x 18 cm]

Previous and Competing Designs

- Currently in classroom use: 2D paper template
 - Pros: Inexpensive, easy play-doh layering
 - Cons: Lacks 3D depth and realistic anatomical landmarks

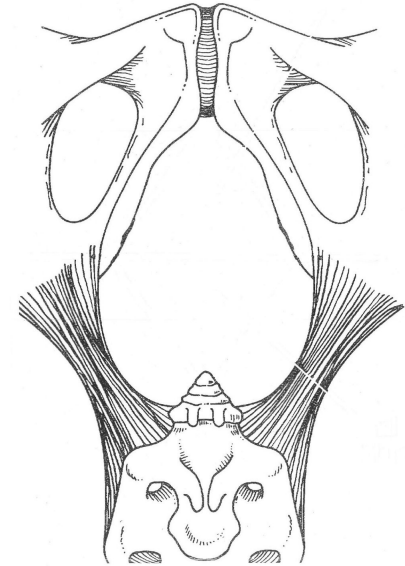


Fig. 2. Paper template currently used in classroom (21 cm x 28 cm) [2]

Previous and Competing Designs Cont.

- 3D Bone Structure models (e.g. Walmart PVC Model - \$286.99)
 - Limitations: Smooth PVC won't adhere to Play-Doh, single-sex geometry, costly
- Pre-Built Musculature Models (e.g. Rüdiger Model - \$641.50)
 - Limitations: Passive, costly (\$19,000+ for 1 classroom)



Fig. 3. Walmart Pelvic Model (Height: 12.7 cm) [3]

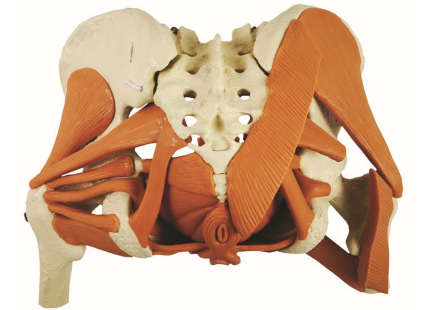


Fig. 4. Rüdiger Pelvic Model (9.4 in x 9.4 in x 6.3 in) [4]

Summary of Product Design Specifications

Quantity: 30 total models

Budget: \$100-200 total (\$3-7 per model)

Anatomical accuracy:

- Essential landmarks: ischial spines, tuberosities, sacrum, subpubic arch of 85° [5] to represent both male/female anatomy

Longevity/Durability:

- 3-5 year lifespan, withstand 623.9 N grip force [6] and table drops (0.75 m) [7]
- Lightweight for transport

Design 1: Surface Texture and Diaphragm Shelf

Pros

- Anatomically accurate
- Good Play-Doh adhesion
- Removable diaphragm shelf
- Durable 3D-printed structure

Cons

- Play-Doh may get stuck in surface texture
- More complex fabrication and assembly

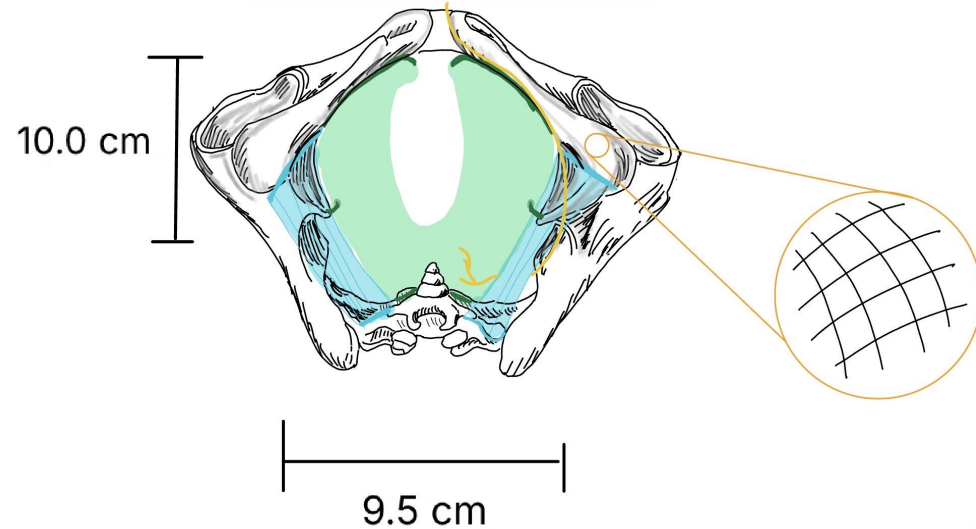


Fig. 5. Surface Texture and Diaphragm Shelf Design

Design 2: Foldable with Snap Buttons

Pros

- Foldable and stackable
- Easy to clean
- Low material cost
- Easy to transport and store

Cons

- Lower anatomical accuracy
- Repeated snapping may cause wear

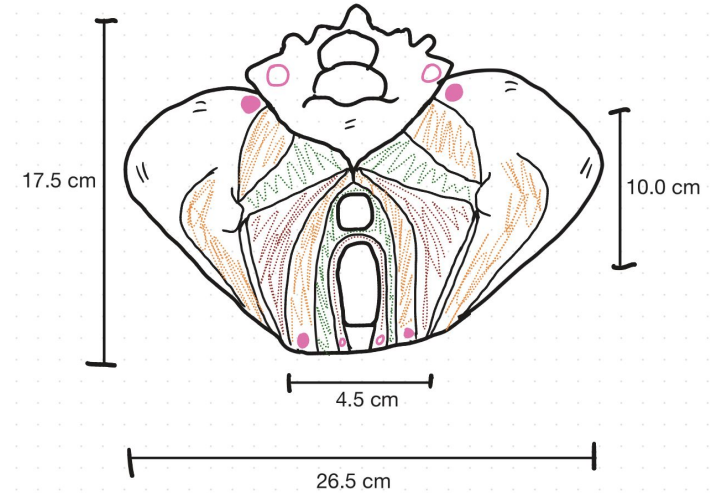


Fig. 6. Foldable with Snap Buttons Design

Design 3: Pegs with Attachments

Pros

- Anatomically accurate
- Good Play-Doh adhesion
- Interactive attachments
- Easy to clean

Cons

- Lacks compact storage
- Peg attachment/removal wear down

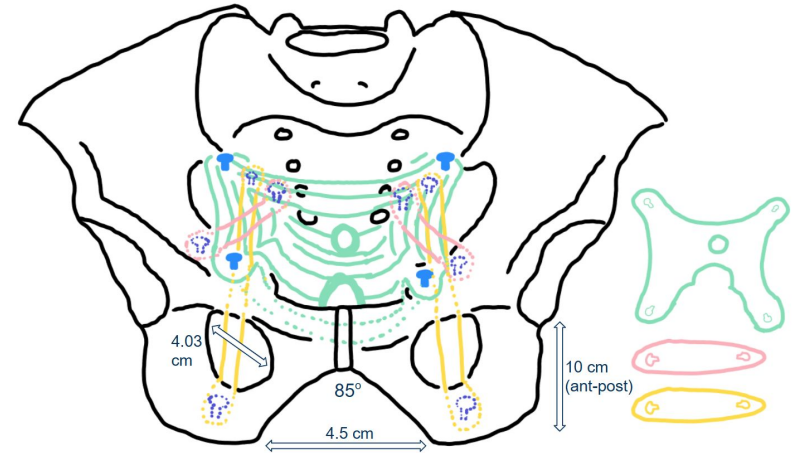
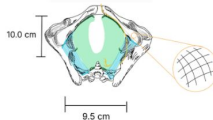
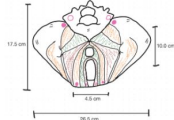
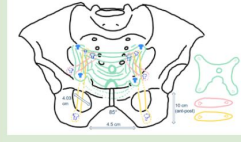


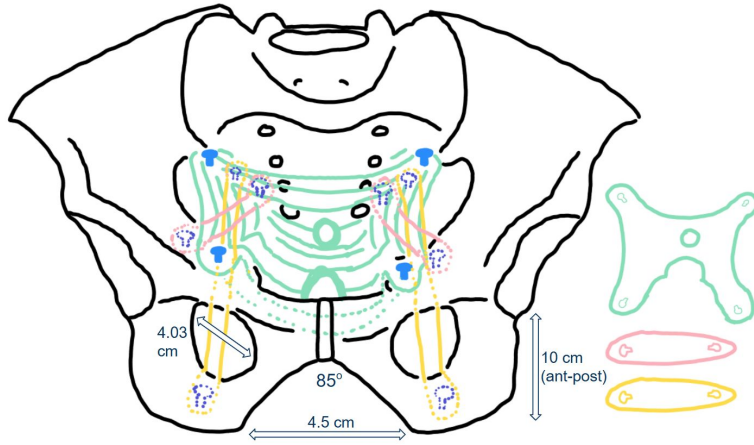
Fig. 7(a) . Pegs with Attachments Design

Design Matrix

Table 1: Design Matrix of 3D Pelvic Floor Model

		Design 1: Surface Texture and Diaphragm Shelf 		Design 2: Foldable with Snap Buttons 		Design 3: Pegs with Attachments 	
Criteria	Weight	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Play-doh Adhesion	30	4/5	24	3/5	18	5/5	30
Longevity	20	4/5	16	2/5	8	3/5	12
Ease of Fabrication	15	3/5	9	2/5	6	3/5	9
Anatomical Accuracy	15	5/5	15	3/5	9	4/5	12
Cost-effectiveness	10	3/5	6	5/5	10	3/5	6
Safety & ease of cleaning	10	3/5	6	4/5	8	5/5	10
Total	100		76/100		59/100		79/100

Final Design



- Highest score: 79/100
- Main concerns:
 - peg durability
 - fabrication complexity

Fig. 7(b) . Pegs with Attachments Design

Future Work

- Testing Play-Doh adhesion
- Testing connection methods
- Consistent fabrication of 30 models with 3D printing
- Final appearance





Department of Biomedical Engineering

UNIVERSITY OF WISCONSIN-MADISON

Acknowledgements:

Dr. Puccinelli

Prof. David Dean

Kelsey Henriquez and Sarah Traynor

References

- [1] "Pelvic Floor Model," Intimate Rose, 2026. <https://www.intimaterose.com/products/pelvic-floor-model> (accessed Sept. 24, 2026).
- [2] PA Anatomy Labs, "Pelvis and Perineum Workshop" [Online]. Available: <https://wisc.pb.unizin.org/paanatomylabs/chapter/pelvis-and-perineum-workshop/>
- [3] Walmart, "Adult Female Pelvis Model - Excellent Quality Anatomical Replica Durable PVC Accurate Medical Teaching Tool" [Online]. Available: <https://www.walmart.com/ip/Adult-Female-Pelvis-Model-Excellent-Quality-Anatomical-Replica-Durable-PVC-Accurate-Medical-Teaching-Tool/16852305636>
- [4] Anatomy Warehouse, "Rüdiger Anatomie Premium Female Pelvic Floor with Gluteus Muscles Anatomy Model" [Online]. Available: <https://anatomywarehouse.com/rudiger-anatomie-premium-female-pelvic-floor-with-gluteus-muscles-anatomy-model-a-108859>
- [5] "7.7E: Comparison of Female and Male Pelves - Medicine LibreTexts." Accessed: Sep. 15, 2026. [Online]. Available: [https://med.libretexts.org/Bookshelves/Anatomy_and_Physiology/Anatomy_and_Physiology_\(Boundless\)/7%3A_Skeletal_System_-_Parts_of_the_Skeleton/7.7%3A_The_Hip/7.7E%3A_Comparison_of_Female_and_Male_Pelves](https://med.libretexts.org/Bookshelves/Anatomy_and_Physiology/Anatomy_and_Physiology_(Boundless)/7%3A_Skeletal_System_-_Parts_of_the_Skeleton/7.7%3A_The_Hip/7.7E%3A_Comparison_of_Female_and_Male_Pelves)
- [6] "International norms for adult handgrip strength: A systematic review of data on 2.4 million adults aged 20 to 100+ years from 69 countries and regions - PubMed." Accessed: Sep. 15, 2026. [Online]. Available: <https://pubmed.ncbi.nlm.nih.gov/39647778/>
- [7] "BIFMA G1-2013 Ergonomics Guidelines | PDF | Chair | Anthropometry." Accessed: Sep. 14, 2026. [Online]. Available: <https://www.scribd.com/document/929848178/Bifma-g1-Ergonomics-Guideline-for-Furniture>



Questions?

