An interactive platform to enhance knowledge and understanding of ovarian neoplasm: *A pilot media program to standardize clerkship education*

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Abstract

Clinical clerkships at Augusta University vary in level of student's exposure to patients due to geographical locations of clerkships. Standardizing clerkship material will lead to more accurate patient diagnoses and treatment. This project describes the development of a pilot e-learning module to enhance clerkship experience through standardization of the media.

Introduction and Purpose

Third-year medical students have the opportunity to be placed throughout Georgia to carry out the nine clerkships. Due to geographical location students are exposed to different patient populations, creating varied exposure to diseases and clerkship preceptor experiences. A lack of clinical exposure to patient diseases makes it difficult for students to observe and therefore retain patient presentation.[1]

The main purpose of this project is to standardize clerkship clinical instruction despite differences in location, preceptor, and media, thus allowing for blended learning. "The use of blended resources reduces barriers associated with lack of patient availability for specific, infrequent and/or rare diagnoses encounters."[2]
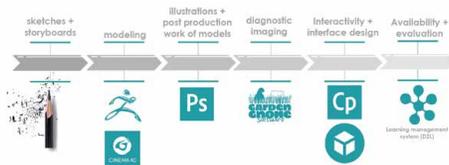
Materials & Methods

Fig 1. *Project workflow*

1. 3D model manipulability ⟶ Increases retention
2. Cross section anatomy ⟶ Emphasizes didactic material
3. Diagnostic, histological, and didactic imaging ⟶ Creates blended learning experience
4. An online self-paced e-learning module ⟶ Availability and supports adaptive learning
5. Differential diagnosis questions ⟶ Increases clinical reasoning and supports problem-based learning

❶ Interactive pelvis
A pelvis MRI was obtained and brought into Pixologic ZBrush for editing and addition of the aorta, branches, and uterus. The pelvis was uploaded to Sketchfab and HTML then embedded into Adobe Captivate. This allows for the model to be interactive, decreased file size compared to other options, and most importantly supported the complex anatomy associated with the shape and arterial supply of the uterus. Giving students the ability to interact has been shown to increase engagement in internet-based learning for health professionals.[3]

Fig 2. Manipulatable 3D pelvis in the module
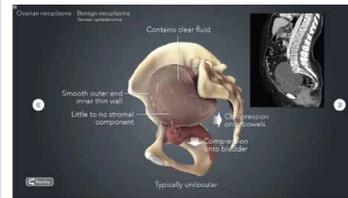
Materials & Methods (cont.)

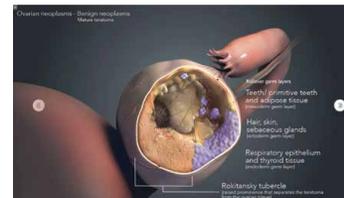**Fig 3.** *Examples of the 12 neoplasm cross sections*

Fig 3.1

❷ 3D models
The following 3D models were made in Zbrush, these models were created using surgical photos and ultrasound imaging. Selective emphasis on structures present in ultrasounds or that contribute to the physiology of the neoplasm was utilized to increase the didactic learning effectiveness.
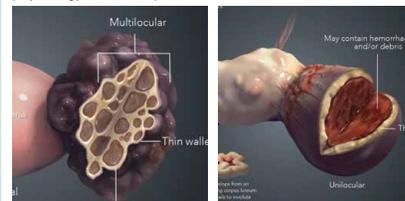

- Female pelvis with uterus, ovaries, and blood supply
- Ovary cross section with follicles
- 12 neoplasms and corresponding cross sections

Fig 3.2   **Fig 3.3**

❸ Diagnostic imaging, histology, and illustrations
Ultrasounds were collected and exported from Pixmeo Horos into Garden Gnome Object2VR, where the HTML was then embedded into Captivate allowing for user scrolling. Histological images were obtained from the department of pathology and added into Captivate with highlighted rollovers on the necessary structures. Molecular illustrations were added to define the tumor markers for malignant neoplasms by use of didactic coloring. Other illustrations include anatomy, ovarian torsion, patient signs and symptoms and didactic women to illustrate age groups, in total; 12 Illustrations and 7 molecular tumor marker illustrations are included in the module. The media combined created a blended learning experience between the clinic and online learning bridging the gap of pathologies not seen during the clinic hours.

Scrollable ultrasounds

Rollover histology

Illustrations
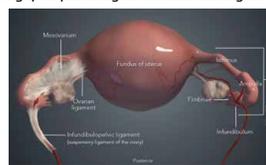
❹ Interface
Captivate was used to create this multi-platform project, due to the HTML programing ability and responsive design capability. HTML was the final file type due to availability on all devices without the need to download a Flash player or the newest version of Adobe Acrobat Pro.

Fig 4. *(on the left) A screen shot of the Captivate interface.*

Materials & Methods (cont.)

❺ Assessment
Captivate allows for assessments to be tracked on the university's learning management system (LMS) with highly customizable question types that utilize blended learning.

Fig 5. *A screen shot of the module interface on the LMS. The tab at the top left allows for the student to access the table of contents for self-paced learning.*

Results

A study proposal was developed to track third-year clerkship students' scores on the ungraded quiz and the interactivity throughout the module through D2L. This quiz tracking on D2L is set up with sharable content object reference model (SCORM) in Captivate. These scores will be compared to those students that did not utilize the module and their scores on the weekly assessment. A focus group will be convened to discuss the level of effectiveness with the interactivity, types of images and questions. This information will be utilized for iterative improvement of the current module and as a template for standardizing whole clerkship media.

The module will be considered successful if:
1. Students perform higher on their weekly clerkship quiz on the assigned topic

2. Students can recall information from this pilot better than topics without the pilot on their SHELF exam

3. Students can recognize patient presentation of early signs of ovarian cancer resulting in a higher diagnosis rate at stage 1

Conclusions & Discussion

The approach to this solution was efficient with the use of Captivate in an academic setting. Captivate allows for versatility with the many types of output formats and ease of integration of different media types. HTML loads quicker than the HTML/SWF output on the LMS for the final output. Captivate proved to be a great solution for creating e-learning modules.

Acknowledgments

Bibliography

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