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The Utilization of the Anatomage Virtual Dissection Table in the Education of Imaging Science Students

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Abstract

Objectives: The purpose of this research was to investigate the use of the Anatomage Virtual Dissection Table in the education of imaging science students and to assess the beliefs and perceptions of the students in regard to using the Table for teaching imaging-based anatomy & pathology.

Subjects & Methods: Study participants included 17 medical imaging students to include 9 Diagnostic Medical Sonography students, 2 Magnetic Resonance Imaging students, 2 Nuclear Medicine Technology students, 2 Radiation Therapy students and 2 Cardiovascular Interventional Technology students. Data was collected through focus groups and course/instructor evaluations. The researchers followed Creswell's procedure for data analysis and representation.

Results: Assessment of students' perceptions showed that 96% of students felt that the Table was a positive/beneficial tool in terms of their learning. Students also noted several advantages to using the Table in the education of imaging science students.

Conclusion: The use of virtual dissection technology seems to have a promising role in future educational training although more research is needed to better understand the efficacy of using this technology in the classroom. The results of this study show that students appreciate learning with this technology and believe that it is a beneficial and effective tool in preparing them to enter a health care profession.

Literature Review

A solid understanding of normal anatomy and function enhances students' abilities to recognize how normal function may be affected when the anatomy has been altered as the result of a developmental defect, disease, or trauma (Miller et al, 2002). This understanding may be enhanced using technology such as anatomy visualization systems. Fredieu et al (2015) note that the use of digital 3D anatomic models, such as anatomical visualization systems, have been reported as an effective tool in enhancing learning and retention in medical and dental students. No research currently exists in regard to the use of anatomy visualization in the education of imaging science students.

Over the past year, UNMC faculty have implemented the Anatomage Virtual Dissection Table and Invivo5 software into their curriculum to improve educational practices and outcomes for imaging science students. The Anatomage Table (Figure 1) is a life-size virtual dissection table that displays gross anatomy models reconstructed from cadavers. The accompanying Invivo5 software allows for the creation of case studies from computed tomography (CT) and magnetic resonance (MR) images imported via DICOM files. Anatomy can be presented in 3D format and in coronal, axial, sagittal or user-defined planes. As this technology was incorporated, data were collected to evaluate students' perceptions and beliefs related to the implementation of these tools into the courses. This poster will highlight best practices and student perceptions related to the use of interactive technology in the education of imaging science students.



Figure 1. The Anatomage Virtual Dissection Table.

Methodology

This study was approved by the Institutional Review Board (IRB) at the University of Nebraska Medical Center (IRB #450-14-EX). Participants were recruited based on their enrollment in various post-primary imaging science programs. The only essential attribute used in the sampling was that the students were in good standing with the program.

The study was completed using a qualitative, single-site case study method. Data was collected by conducting three focus groups held over the course of two semesters along with utilizing feedback on course evaluations from both fall and spring semesters. The investigators developed the focus group and interview questions based on previous experience and knowledge. Prior to data collection, all subjects were informed of the purpose of the research and signed informed consent forms approved by the IRB. All focus group sessions were audiotaped, transcribed and reviewed by the researchers for data analysis. The researchers followed Creswell's (2013) procedure for data analysis and representation. This involved the organization of the data, a preliminary read through, coding and organizing of themes, data representation and finally interpretation (Creswell, 2013).

Results

The identified themes were labeled and further separated into subthemes. The themes were broken down into the following categories: (a) advantages of utilizing the Anatomage Table, (b) disadvantages of utilizing the Anatomage Table and (c) student beliefs in regard to utilizing the Anatomage Table which can be further broken down into perceptions based on the time frame (i.e. perceptions at the beginning of the course, perceptions mid-semester, perceptions at the end of the course & perceptions five months after the course had been completed). A summary of the main findings can be found in Table 1.

Table 1: Student Perceptions

Aspect	Perception
Anatomage Table/Invivo 5 Software activities used within the courses	<ul style="list-style-type: none"> Viewing anatomy & pathology in 3D and different anatomical planes Dissecting the anatomy based on various body systems Viewing & presenting pathology case studies Using the Table quiz function for in & out of class activities Viewing an entire patient scan by laying an egg
Advantages of using the Table in the course	<ul style="list-style-type: none"> Ability to view the anatomy in reconstructed & cross-sectional planes vs. viewing still images in a text book Ability to rotate & dissect the anatomy to better visualize the different body systems Ability to visualize the anatomy/pathology in relation to the surrounding tissues/organs Ability to view pathology exams both on the table & within the on-line course (egg)
Disadvantages of the Table	<ul style="list-style-type: none"> Jumping Table image when scrolling through a patient scan Inability to view Positron Emission Tomography images Inability to view Ultrasound images Inability to view an egg on a MAC computer

The main advantage noted by students was the ability to better visualize both anatomy and pathology using a 3D format and in various anatomical planes. This included being able to scroll through the entire body vs. simply seeing subsequent images in a text book. The students also noted the ability to view and present specific pathological case studies on the Table as main advantage.

The students who participated in this study were enrolled in a variety of different post-primary imaging programs and the Table was used for a variety of different courses. The main disadvantage that was noted by students was the inability to view Sonography and Positron Emission Tomography exams on the Table. One other disadvantage noted was the amount of time the Table was utilized in the courses. Several courses began with slowly incorporating the Table by only using it 4-5 times per semester in one hour increments. Overall, the students felt that exposure to the Table anywhere from 1 – 3 hours/week would be optimal.

Discussion



Figure 2. Student centered learning with the Anatomage Table.

Assessment of students' perceptions showed that, fifteen out of the seventeen students felt that the Table was a positive/beneficial tool in terms of their learning. As faculty move forward, the results of this study in terms of understanding the attitudes of students in regard to the Table will be important. The results note that the students who spent 2 – 3 hours per week working on the Table had a more positive perception. There was also a significant change in the perceptions over time. Focus groups were held half way through the fall semester, at the end of the fall semester and at the end of the spring semester. The final focus group showed the largest change in positive perception which notes that the more the students worked with the Table, the more they saw the benefit to their learning. It is essential that faculty incorporate the Table into the curriculum in a way that shows benefit and helps to create more of a student-centered learning experience (See Figure 2).

Conclusion and Future Directions

This study documented and described the perceptions and beliefs of imaging science student in regard to the Anatomage Virtual Dissection Table. The use of virtual dissection technology seems to have a promising role in future educational training although more research is needed to better understand the efficacy of using this technology in the classroom. The results of this study show that students appreciate learning with the Anatomage Table and believe that the Table is a beneficial and effective tool in preparing them to enter a health care profession.

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