

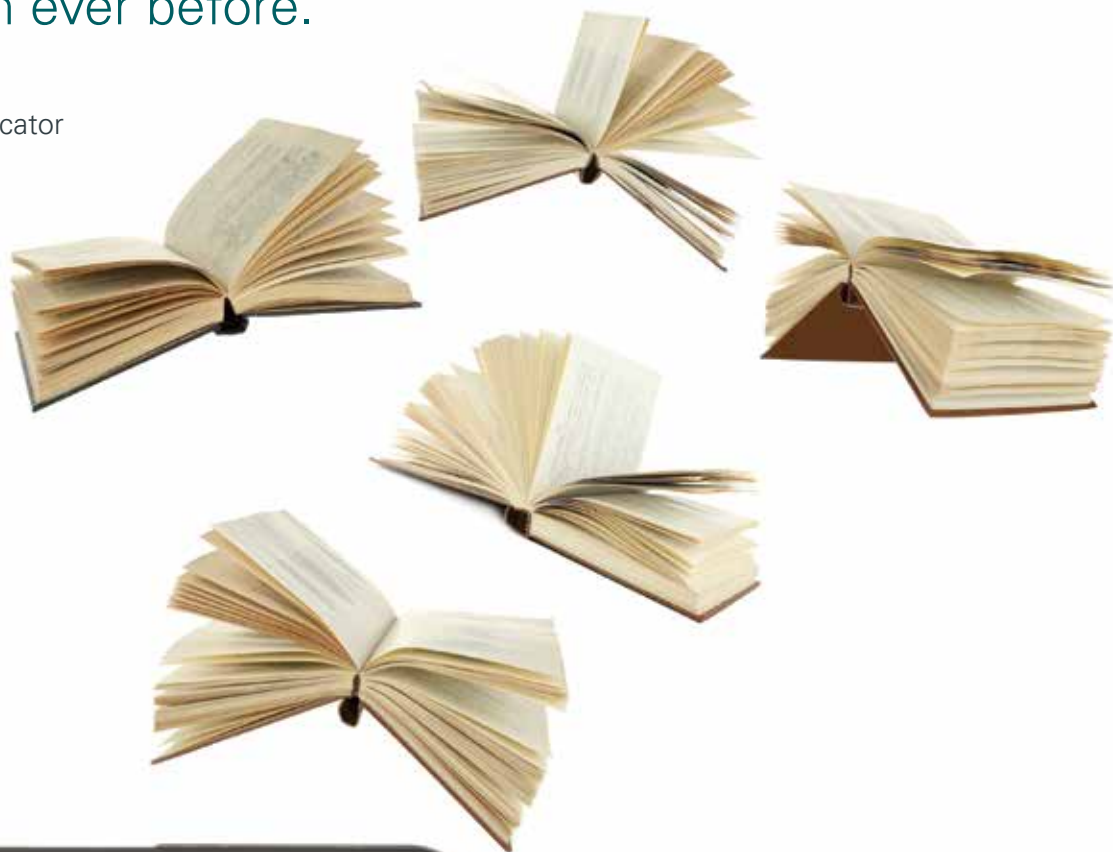


# Innovators in Education

UNMC students who are  
moving e-learning forward

“**Technology** can become the wings that will allow the **educational world** to fly **farther and faster** than ever before.”

Jenny Arledge  
Career and Technology Educator



UNMC's e-learning journey continues to get more exciting. Driven by the devotion and dedication of innovators who have invested many hours of their time, the transformation of UNMC's curricula through the incorporation of technology is well underway.

The creative process in moving education forward has never been more evident than in our most recent E-Learning Program projects. The projects highlighted in this book were developed for students by students.

Because the projects were created by digital learners for digital learners, the e-modules bring a unique perspective to the learning experience.

Working with a faculty advisor, these student developers created innovative ways to enhance existing curricula and make the learning experience easier for their peers.

The students have been highly invested in the success of their projects and have gone to great lengths to ensure the production of top-quality e-modules. As colleges update their curricula, the use of these e-modules is a great opportunity to engage learners and improve outcomes.

Further, the student developers moved beyond basic knowledge to a higher learning level of critical thinking. This highlights the need to actively involve students in their education.

It is also important to note some of the projects involve faculty advisors who themselves are new to the E-Learning Program; this highlights the continued expansion of the program into UNMC's learning environment.

I want to express my gratitude and appreciation for all the hard work that went into the creation of these e-learning projects, and I hope you enjoy learning about how our students are taking an active role in moving education forward.



**H. Dele Davies, MD,  
MS, MHCM**

Vice Chancellor,  
Academic Affairs

Dean,  
Graduate Studies

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Senior Vice President for Global Strategic Alliances at Elsevier

Dr. Brad Fenwick is a Professor of Pathobiology and Microbiology and holds a Doctor of Veterinary Medicine and Masters of Pathology from Kansas State University and PhD in Comparative Pathology from UC Davis where he completed his residency and is distinguished alumnus. He is a Fellow with the American Council on Education, a Fellow with the American Association for the Advancement of Science, a Jefferson Science Fellow, and Senior Science Advisor to the U.S. Department of State and USAID. Dr. Fenwick has held many senior administrative positions, including Graduate Dean, Vice President, Vice Chancellor and Federal Chief Scientist.



### **Nicholas Lorenzo, MD, MHCM, CPE**

Founder, CEO and Chief Medical Officer of PHLT Consultants  
Chief Medical Officer at MeMD Inc.

Dr. Nicholas Lorenzo is a subspecialty and fellowship-trained, board-certified neurologist. He is a serial health care, health care publishing and health care technology entrepreneur. Dr. Lorenzo has served as the Co-Founder and Chief Publishing Officer of eMedicine (acquired by WebMD), the Founder and CEO of Pearlsreview (acquired by Gannett), and he was a Senior Founding Contributor to Boston Medical Publishing (acquired by McGraw-Hill). Currently, Dr. Lorenzo is the Founder and CEO of PHLT Consultants, and he also serves as the Chief Medical Officer of MeMD, a company that provides telemedicine services across the US.



### **Ray Schroeder**

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Ray Schroeder is Associate Vice Chancellor for Online Learning at the University of Illinois Springfield and Director of the Center for Online Leadership and Strategy at the University Continuing and Professional Education Association (UPCEA). He is an inaugural Sloan Consortium Fellow and recipient of the consortium's highest Individual award — the A. Frank Mayadas Leadership Award. He received the 2011 University of Illinois Distinguished Service Award.

## E-Learning Steering Committee Members

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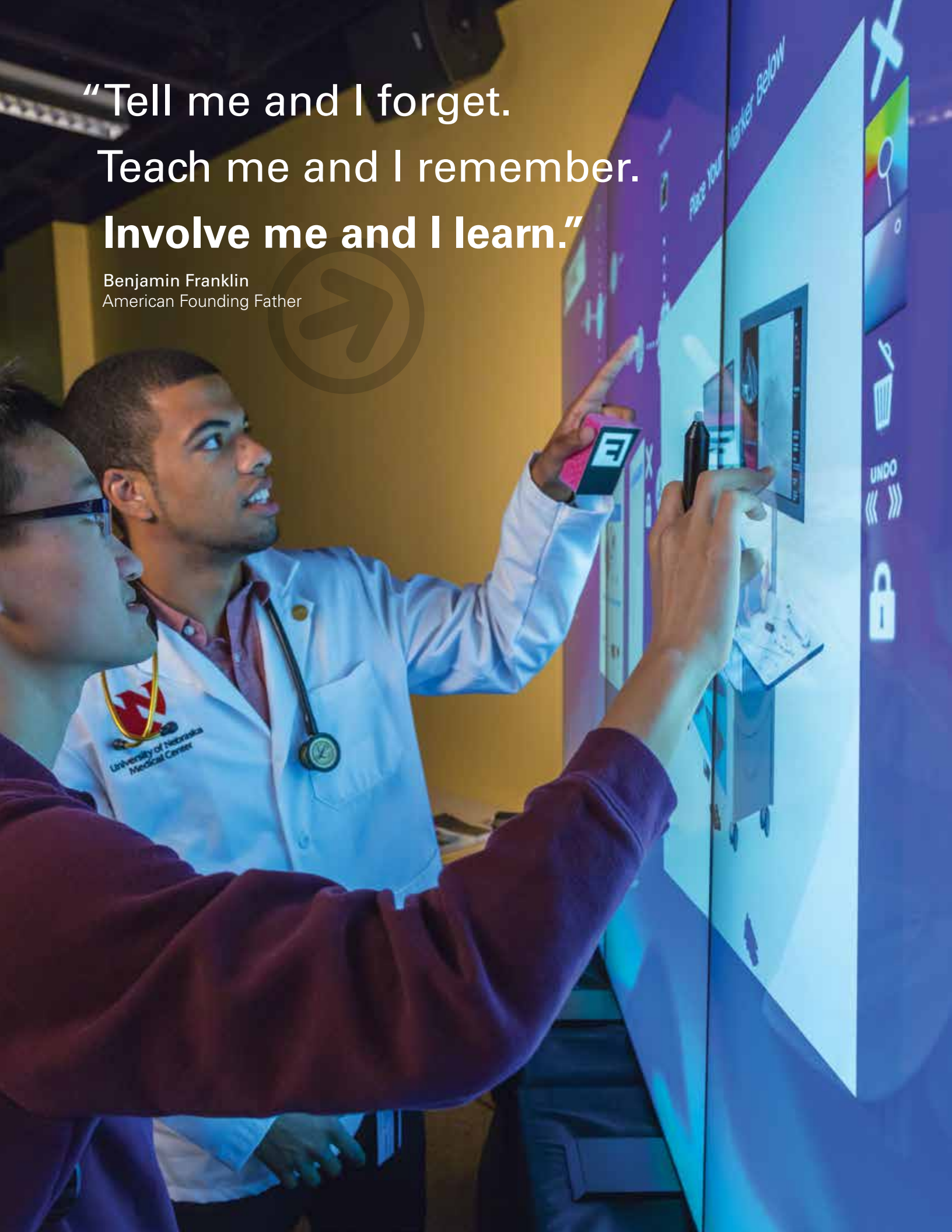
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Associate Dean for Academic Affairs and Professor,  
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“Tell me and I forget.  
Teach me and I remember.  
**Involve me and I learn.”**

Benjamin Franklin  
American Founding Father



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# How to Take a Medication History

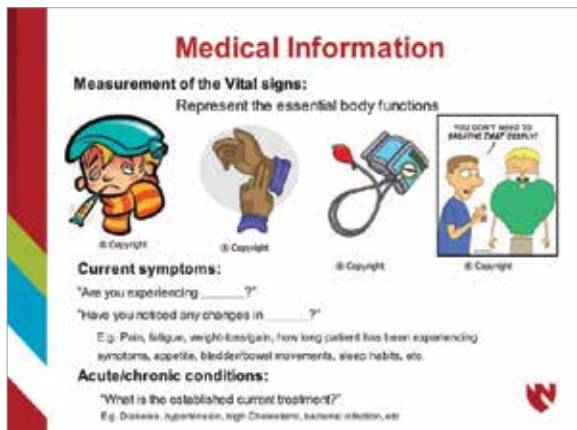
**Student Directors:** Delores Anita Brown, College of Pharmacy, Class of 2019  
Miranda Hopper, College of Pharmacy, Class of 2019

**Faculty Advisor:** Linda Sobeski, PharmD, BCPS, College of Pharmacy

The topic of this project is to explain the components of a complete medication history and demonstrate the proper technique a health care professional should utilize when interacting with a patient to obtain a medication history. This topic was chosen because of the degree of importance a complete and correct medication history holds, as well as the major role it has in patient safety and efficacy of treatment.





The e-module engages the learner by **combining audio with visual stimulation**, as well as **interactive elements** to allow the learner to apply the information. The information within this project is further examined in classroom activities, and students are expected to be able to apply the information in this module to complete a medication history for a patient. The e-module utilizes **assessment tools** to engage the reader and serve as a knowledge check of the information that was presented. This will help the reader take away the major points of the presentation as well as measure the reader's learning.

The project includes an example of a student and patient interaction with an explanation of the proper technique one should use when taking a medication history. This demonstration helps inexperienced students develop into prepared health care professionals by having access to an example of the correct way to obtain a medication history from a patient, which serves as a very important piece of a patient's information.



**Medical Information**

**Measurement of the Vital signs:**  
Represent the essential body functions

**Current symptoms:**  
"Are you experiencing \_\_\_\_\_?"  
"Have you noticed any changes in \_\_\_\_\_?"  
E.g. Pain, fatigue, weight loss/gain, how long patient has been experiencing symptoms, appetite, bladder/bowel movements, sleep habits, etc.

**Acute/chronic conditions:**  
"What is the established current treatment?"  
E.g. Diabetes, hypertension, high cholesterol, asthma, infection, etc.



**Interview Environment**

It is important that the interview be held in a quiet, private and clean area to allow for uninterrupted and comfortable interactions with the patient.

Remove any physical barriers if possible: Use a private room rather than interacting with a patient over the pharmacy counter, through a half-door, etc.

Click on the image below that represents an ideal interview environment





# eUrgent Dental Care Module

**Student Director:** Roy Burkhalter, College of Dentistry, Class of 2017

**Student Members:** Grant Essink, College of Dentistry, Class of 2017  
Levi Brinkerhoff, College of Dentistry, Class of 2017  
Halie Brinker, College of Dentistry, Class of 2016

**Faculty Advisor:** Jennifer K. Kallio, DDS, College of Dentistry



In this module, students will learn to use a systematic approach utilizing the SOAP (subjective, objective, assessment, and plan) technique when evaluating a patient. Prior to development of this module, students commented that they only had exposure to this technique in one class. Students did not feel comfortable utilizing the SOAP format when triaging a patient, which then led to missing information when recording the essential documentation.

The e-module also helps streamline the diagnostic process, making sure all steps are completed before a diagnosis is decided and treatment performed. Many times the emotional status of the patient in pain can disrupt the clinicians train of thought and this tool helps to keep them on track. The project also has a certification that the student will have a competency exam in the emergency clinic.

The project promotes retention and application of the process because it repeats the technique throughout the module, taking the learner from a basic knowledge review of the technique to a higher learning level of critical thinking.

The student is asked to **recognize and classify** the information and place it into the correct category. This assessment also gives **feedback** on the answers. Then, the learner is taken to a higher learning level of critical thinking to construct their own SOAP note after viewing several **videos** and given information about the case. Then, the student can **self-evaluate** their SOAP note against the recommended SOAP note.

The student will be required to complete the module prior to their rotation in the Urgent dental care clinic. The project responds to the contemporary learner by combining **interactive elements, hot spots, and videos**.



# Introduction to Psychiatry

**Student Director:** Shinnyi Chou, College of Medicine, Class of 2017

**Faculty Advisor:** David McMillan, PhD, College of Medicine



The original purpose of the module was to educate all health care professional trainees on basic knowledge regarding antipsychotics. However, after some discussion with the advisor, the project is now focused on educating M3 students entering the psychiatry clerkship on knowledge required to succeed in psychiatry, namely interviewing techniques and some basic knowledge regarding presentations and medications.

The project utilizes **video interviews** from current residents to engage students through personal stories as well as practical advice. **Click-and-reveal interactive components** were also utilized for learning about psychiatric medications.

The module may be used for students preparing to enter the psychiatry clerkship to self-reflect and assess their own strengths and weaknesses.

The **formative assessment** also helps reinforce some of the ideas learned throughout the module.

The module's ease of use and practical knowledge base should help better prepare students before they enter the clerkship.

# A Clean Getaway: Scrub Technique and Operating Room Etiquette

**Student Directors:** Daniel Cloonan, College of Medicine, Class of 2018  
Andrew Hollins, College of Medicine, Class of 2018

**Faculty Advisor:** Lisa L. Schlitzkus, MD, College of Medicine



The operating room can be an intimidating environment for new students. Following the appropriate preparatory steps and maintaining the sterile field are incredibly important to positive patient outcomes. The importance of proper technique and the unique environment of the OR creates an intersection of stress and unfamiliarity for students. Our module helps to prepare students for success in their first OR experiences. This project demonstrates proper scrubbing technique, gowning, and general OR etiquette.

Our module contains demonstrative **narrated videos** of scrubbing, gowning and gloving, and maintaining the sterile field in the OR. The videos were filmed in UNMC OR suites alongside professional staff and nurses to ensure the best technique was demonstrated.

Our module also provides many **interactive knowledge assessment tools** to help solidify the information presented to the student. This includes interactive video quizzing, having the students identify the mistakes made by students, and arranging the proper order of the steps involved in these processes. These tools presented in the module make this a superior teaching device compared to the video or text only resources available now.

## Software Used

This module was created using Articulate Storyline. Videos and narration were edited in Camtasia 2, and all narration was recorded using AVS Editor.

This module will be integrated in the M3 and M4 surgical clerkships and M1 summer rural care block preparations. Students that complete this module will have a strong foundation of skills to build on in the operating room.



Still of scrubbing instructional video



Video quiz where user identifies errors in technique

# Rapid On-Site Evaluation (ROSE) of FNA Specimens in Cytology

**Student Directors:** Haleigh Delavan, College of Allied Health Professions, Class of 2016  
Jordan Hopkins, College of Allied Health Professions, Class of 2016  
Sarah Hove, College of Allied Health Professions, Class of 2016

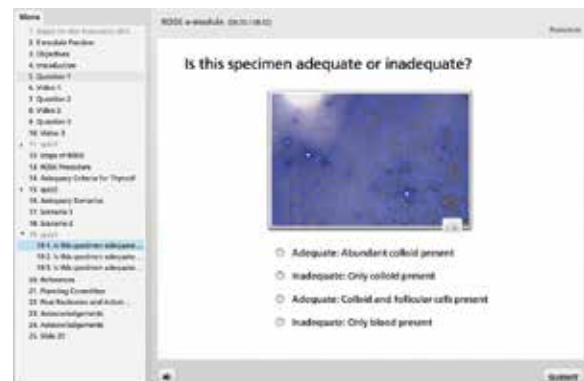
**Faculty Advisors:** Amber Donnelly, PhD, MPH, SCT(ASCP), College of Allied Health Professions  
Maheswari Mukherjee, PhD, MS, CT(ASCP)<sup>CM</sup>, College of Allied Health Professions

Rapid On-Site Evaluation (ROSE) of FNA Specimens in Cytology was chosen to help fill a gap in the Cytotechnology Program curriculum. The fine needle aspiration (FNA) technique is widely used to obtain cellular specimens from various body sites. Furthermore, it is advantageous to the patient for an immediate reading as to if enough cellularity was obtained for an accurate diagnosis, hence, ROSE was developed. With ROSE becoming more popular in the health field, it is pertinent that both Cytotechnology students and residents be familiar with the process.

The e-learning module is focused on teaching future health professionals involved in FNA the process of ROSE. ROSE is a widely used technique in FNA procedures to ensure adequacy, improve accuracy, and heighten efficiency. These factors are showcased while the module goes through a **simulation** of an FNA procedure involving ROSE. The simulation accurately portrays a real-life procedure guaranteeing familiarity when encountering a live procedure.

It is beneficial to show the module to future students and residents before they learn the course material to introduce them to the procedure as a whole, allowing for a more intimate breakdown of the procedure in lecture.

Our module is **interactive** to highlight the main concepts for users and keep them engaged. By testing users with **follow-up questions** over the procedure, the module ensures comprehension. At the end of the module, scenarios will be incorporated to apply the information users previously learned. The module will be tested with current Cytotechnology students, residents, and faculty to assess applicability and user friendliness.



# Interactive Approach to Learning Musculoskeletal Imaging

**Student Director:** Taylor Harms, College of Medicine, Class of 2016

**Faculty Advisor:** Melissa Manzer, MD, College of Medicine

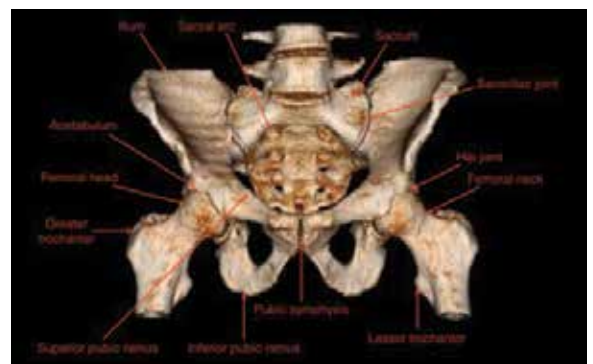
Over the past decade, the need for medical imaging has soared. The use of imaging has become akin to a non-invasive anatomic dissection, increasingly instrumental in aiding a practitioner with a difficult physical exam and guiding long-term patient treatment. As this has become the mainstay of patient care, there is a need to expand our academic approach to imaging in the modern era, beyond the confines of limited textbook pictures which are commonly used in traditional educational curricula.

With the help of Articulate software, our e-module provides an organized, streamlined overview of the major musculoskeletal joints. Normal anatomy is **narrated** and depicted through the use of **detailed color overlay, orchestrated animations, 3-D graphics and conventional radiographs**. Basic patient positioning for common radiographic images is reviewed, and the accompanying radiographic views are showcased.

This module was created to bridge the gap between learned textbook knowledge of anatomy and its radiographic correlate.

The information presented in the module appeals to all health professionals, regardless of level of training and knowledge. Also, the user will have the opportunity to test his or her anatomic learned knowledge through **interactive and matching type questions**.

Because of overlap of many osseous structures, it is initially confusing to identify the boundaries of anatomic landmarks. With the use of color overlay, animations and 3-D graphics, the application of learned anatomic knowledge is simpler.



# Cardiac Function as Described by the Pressure-Volume Loop

**Student Directors:** Adam Kahle, College of Medicine, Class of 2018  
Richard Poppe, College of Medicine, Class of 2018

**Faculty Advisor:** George J. Rozanski, PhD, College of Medicine

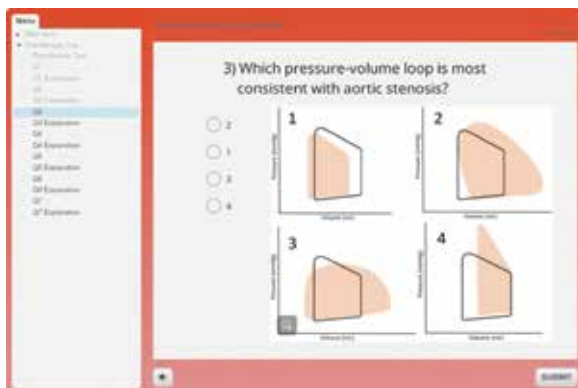
The Pressure-Volume (PV) loop project was chosen because it is a topic that is essential in understanding cardiac functioning. The primary use of the module is to introduce the concept of the PV loop along with some basic pathology and how it is manifested in the loop. By creating a module to explain the basic functioning of the loop, students will come to class with a better baseline of knowledge, ready to discuss higher order learning objectives related to the loop.

## Software Used

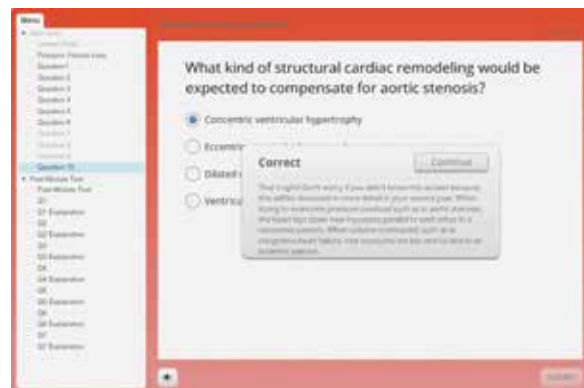
Articulate Storyline was used as the core of module because it allows users control over the presentation, interactive quizzing, and is a familiar format to medical students. Instructional videos embedded in the module were made using Camtasia. This program was chosen because it keeps students' attention through both audio and visualization as images are drawn allowing maneuverability in teaching an interactive concept such as a pressure-volume loop.

The format of the module, including **videos** where the user watches as the loop is being drawn along with **audio** explaining the different aspects, keeps students continually engaged and allows time for comprehension. **Intermittent quizzing** (using a variety of formats such as drag-and-drop, matching, and multiple choice) after each new topic also ensures active learning and reinforcement. Finally, a **post-module quiz** that assesses both mastery of learning objectives covered in the module and extrapolation of concepts not expressly covered, allows for self-evaluation and is a predictor of how well students are prepared to discuss higher order objectives later in class.

Understanding basic cardiac functioning is essential for every specialty in medicine, and while the pressure-volume loop is intended mainly to convey theory, an appreciation for the concepts explained through the loop will allow future health care providers a better grasp of cardiology.



Multiple choice question of a post-module question testing extrapolation of concepts covered.



Feedback after a correctly answered question explaining the reasoning of the correct answer.

# Hepatic Vascular Anatomy with Pathologic and Clinical Correlation

**Student Director:** Joe Marion, College of Medicine, Class of 2016

**Faculty Advisor:** Christopher Vargo, MD, College of Medicine

We chose to create an e-module describing the anatomy, pathology, and treatment options for hepatic vascular anatomy because the anatomy can be difficult to understand, but it plays an important role in pathology and treatment.

The module is designed to establish a base understanding of the relevant anatomy and build knowledge of pathology and treatment from there. It is loaded with interaction and formative feedback to promote retention. The module will best be used for:

- First-year medical students learning anatomy
- Second-year medical students learning pathology and treatment
- Third-year medical students who need a refresher of all of these

For each of these students, the module can be used in conjunction with lecture or small group discussion.

The module includes **images, audio, and interaction** for all types of learners. It is flexible, and allows the learner to determine how much time to spend on each section.

## Software Used

Articulate Storyline was chosen because of the ability to add slider interactions. This has proven to be very useful when adding CT, MRI, and arteriographic images that can be viewed in a manner similar to a radiologist.



This is one of the interactions. The learner can move the text boxes to the model to reveal the anatomy.



The pathology and treatment information is presented using two patient presentations.

# The Glycolysis Module

**Student Director:** Joseph M. Pachunka, College of Medicine, Class of 2018

**Student Member:** Shannon K. Haines, College of Medicine, Class of 2018

**Faculty Advisor:** Justin Mott, MD, PhD, College of Medicine

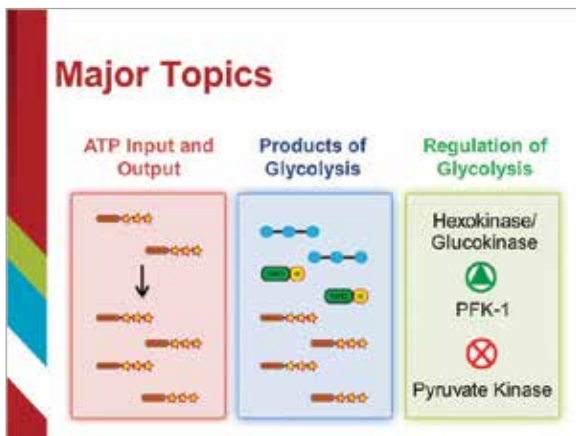
Glycolysis is a foundational concept in metabolism and biochemistry. It is an important topic, and usually review for health professional students. However, it is easy to be overwhelmed while learning (or re-learning) about glycolysis because of its complexity. This module is designed to only hit the main points of glycolysis so that students can devote more time to more complicated aspects of metabolic processes and associated diseases.

This project seeks to emphasize the key points of energy production, fates of products of glycolysis, and the regulation of glycolysis. Utilizing Articulate Storyline, **diagrams** and **images** have been designed to illustrate the production of energy in a very simple way and to clearly illustrate complex regulatory processes. Included throughout the module are **quiz questions** to ensure students are focusing on the most important facts.

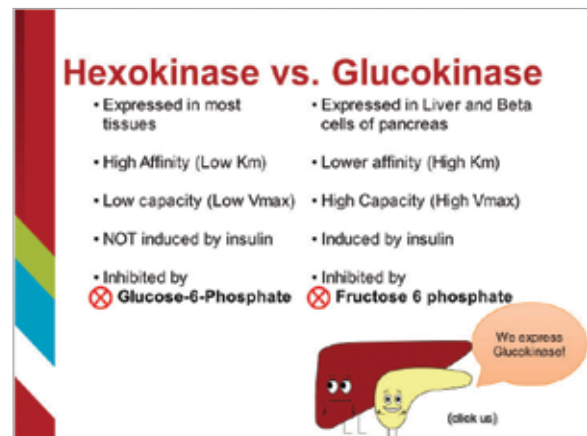
Combining what is covered in normal course material with what is emphasized in board review books means that the focus of our module is on high-yield information.

This module is designed to be versatile; it can stand alone, be previewed before a pertinent lecture, or be used as review for students in various health professions.

Participants will find the module was built to be very interactive and engaging. This will draw students' attention to the concepts we want them to walk away with.



This is the interactive overview slide that illustrates the key points of the module. This also illustrates the symbols used throughout the module.



This module tries to highlight key points with clearly designed slides, interactive elements, and some humor.



# Symptom Management at the End of Life

**Student Directors:** Shana Peper, MD, College of Medicine, House Officer III  
John Anderson, DO, College of Medicine, House Officer II

**Member:** Angela Anderson, DPN-APRN, Internal Medicine, Nebraska Medicine

**Faculty Advisors:** Andrew Moellering, MD, College of Medicine  
Sarah Richards, MD, College of Medicine



Despite an ever-growing population of elderly patients, palliative and end-of-life care are underrepresented in the curricula of medical schools and graduate medical education programs. As a result, health care practitioners are frequently uncomfortable managing and explaining end-of-life symptoms to both patients and families. This module will educate health care practitioners about the recognition, assessment, and management of symptoms associated with end-of-life care through an interactive case-based scenario.

End-of-life care is emotional, and our module appeals to the learner's affect to promote retention. Professional actors portray a patient, physician, and family member as they role-model the care, compassion, and communication necessary for end-of-life care. The e-module includes **interactive videos** and a **clinical scenario** that assesses the learner's ability to recognize and treat end-of-life symptoms and teach basic concepts of palliative care. Learners will be asked to interpret what they witnessed in the preceding videos and formulate an appropriate treatment plan.

Learners in all stages, from students to faculty, will finish the module with the skills necessary, both clinical and behavioral, to confidently care for actively dying patients.

Our module responds to the need for formal training in palliative and end-of-life care.



### Treatment of Dyspnea

	PO	IV
Opioids		
Morphine	7.5 mg q 1 hr prn	0-2 mg q 20 mins prn
Oxycodone	5 mg q 1 hr prn	
Hydromorphone		1 mg q 20 mins prn
Benzodiazepines		
Lorazepam	1 mg q 1 hr prn	1 mg q 1 hr prn

## Am I the Only One?

**Student Directors:** Christina Roberts, College of Medicine, Class of 2017  
Shinnyi Chou, College of Medicine, Class of 2017  
Gabrielle Mock, College of Medicine, Class of 2017  
Kimberly Clawson, College of Medicine, Class of 2017

**Faculty Advisors:** Jennifer Yalof, PsyD, College of Medicine  
Steven P. Wengel, MD, College of Medicine

As students, we constantly struggle to keep up with the amount of study material, clinical responsibilities, extracurricular activities, and everyday life. It can be difficult to handle the stress of it all when you are also worried about taking care of patients. At times, it is easy to forget to make the time to take care of yourself. Recent studies and polls have demonstrated that there is an increasing prevalence of mental health issues, such as burnout, among health care students and providers. This project aims to educate participants on recognizing the signs and symptoms of anxiety, depression, and burnout in students and trainees. It will also provide a list of campus and community resources to help students support themselves and each other while dealing with mental health challenges.

Our goal is to empower students and trainees to take an active role in the maintenance of their mental health while also encouraging them to be more receptive to the subtle signs of the struggles of their colleagues. We hope to spark conversation about mental health issues and promote better well-being on campus.

This e-module was created using Articulate software and utilizes **avatars** and **interactive questions**. In it are scenarios that guide participants through potential situations concerning mental health that they might encounter during their training. The e-module will help to educate participants on signs and symptoms of burnout and other mental health challenges, ways to engage colleagues in conversations about mental health, and strategies for managing stress, anxiety, and depression.



# EKGs: An Introduction to Normal

**Student Director:** Cory Rohlfen, MD, College of Medicine, House Officer I

**Faculty Advisor:** David O'Dell, MD, College of Medicine



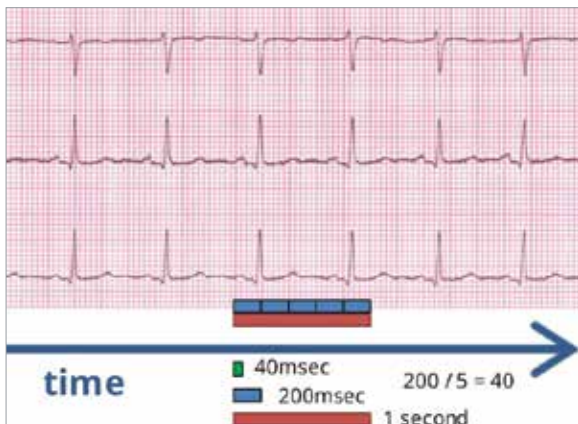
Basic interpretation of EKGs is a skill required of all graduating medical students, physician assistants, and nurse practitioners. Unlike other material in medical curricula, this topic is still taught using traditional lecture format. This is not the ideal way to learn the science of EKGs because class sizes are too large for effective communication and learners quickly become lost. Unlike other material which requires little introduction, EKGs are complex and learners retain more if they have a firm grasp on the basics. The goal of this e-module is to prepare learners with a solid foundation from which they can build their knowledge.

Because the fundamentals of EKG interpretation have not changed in several decades, this material is uniquely fit for transformation into an e-module. Our ultimate goal is to create a series of e-modules that will comprehensively teach EKG interpretation in a systematic manner. With online materials accessible 24/7, learners will be equipped to study content at their own pace. We feel this “flipped classroom” approach will maximize learning potential both inside and outside of the classroom.

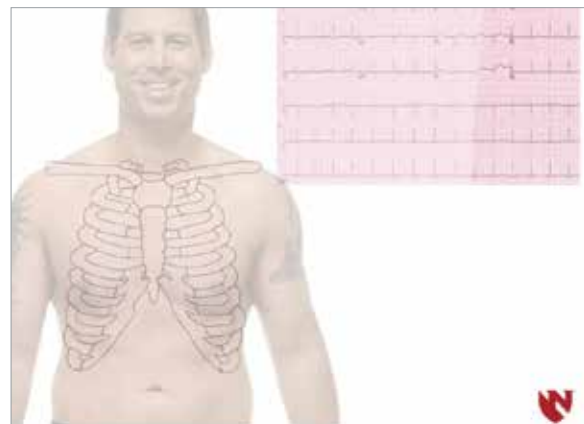
The scope of this module includes orientation to:

- ➔ Lead placement
- ➔ Wave forms
- ➔ Time intervals
- ➔ Heart rate
- ➔ Heart axis
- ➔ Voltage
- ➔ R-wave progression

**Definitions** are provided for reference. Learners are challenged to apply their knowledge at the end of each section and formative feedback is offered. In total, there are seven **mini-lectures** with a **post-test** at the end as a source of summative assessment.



Zoom features in Articulate software allow users to visualize intervals that are important in EKG interpretation.



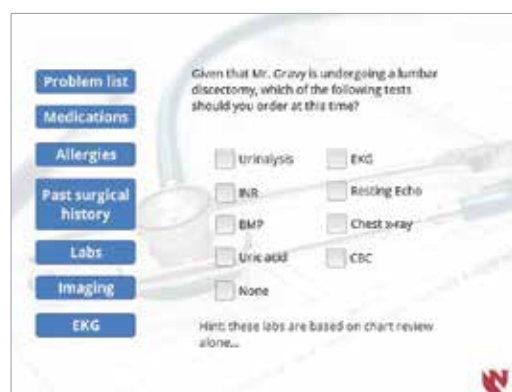
“Drag and drop” features simulate EKG lead placement to engage learners.

# Peri-Operative Evaluation: A Primary Care Clinicians Guide to Evidence-Based Care

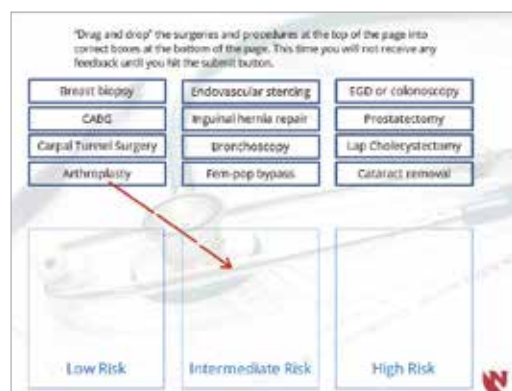
**Student Director:** Cory Rohlfen, MD, College of Medicine, House Officer I

**Faculty Advisors:** Chad Vokoun, MD, College of Medicine  
Jason Shiffermiller, MD, MPH, College of Medicine

Peri-operative evaluation is not a conventional component of US medical school or residency curricula. As a result, students and residents are left to learn practices from each other, mimic the behavior of their attendings, or develop the necessary knowledge and skills after they begin practice. This disjointed method of learning is not only inefficient,



This page simulates the chart review process performed in the clinic prior to seeing a patient. The user is prompted to order labs, imaging, and EKG based on information ascertained in the chart. Immediate feedback is offered based on whether or not a study is indicated.



Using the “drag and drop” feature in Articulate software, users receive feedback based on how they risk stratify various surgeries.

but also rarely reflects the growing body of evidence-based practices which have evolved in the last five to 10 years. To our knowledge, there currently is no e-module that teaches peri-operative evaluation in a systematic manner. Our goal was to fill that void.

To maximize learner engagement, we present **evidence-based practices in a case-based manner**. Cases center around clinical scenarios that challenge the status quo of traditional practice.

We aim to guide learners toward adopting a patient-centered, cost-conscious model of peri-operative care.

Cases pose dilemmas that primary care physicians face in everyday practice, and provide immediate feedback with realistic consequences of inappropriate care. Clinical decisions including laboratory testing, stress testing, and medication management reflect the most recent advances in the primary literature. After completing this module, learners will begin to feel confident in their ability to properly assess and mitigate peri-operative risks.

This e-module will be most useful to residents rotating through the surgical co-management services at UNMC, including residents in the following programs:

- Primary Care
- Family Medicine
- Internal Medicine
- Anesthesiology

It also has the potential to serve as a source of formative assessment in ambulatory curriculums nationwide.

# Telecytology

**Student Directors:** Ibrahim Saad, College of Allied Health Professions, Class of 2016  
Andrew Johng, College of Allied Health Professions, Class of 2016

**Members:** Stanley J. Radio, MD, College of Medicine  
Troy Matthias, CT(ASCP), Nebraska Medicine

**Faculty Advisors:** Maheswari Mukherjee, PhD, MS, CT(ASCP)<sup>CM</sup>, College of Allied Health Professions  
Amber Donnelly, PhD, MPH, SCT(ASCP), College of Allied Health Professions

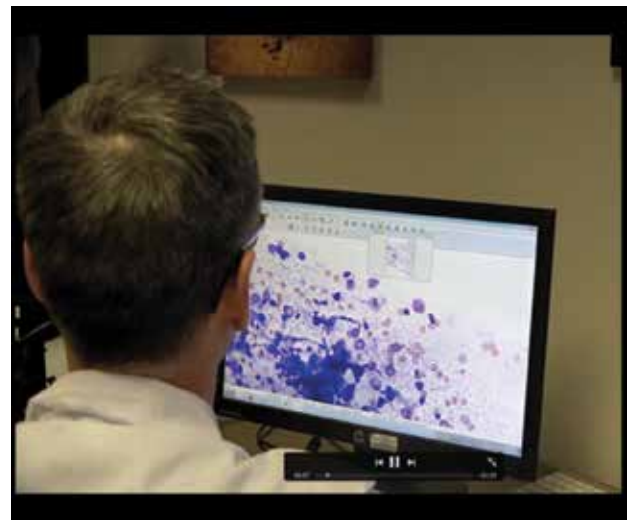
The overall aim of this e-learning module is to improve the health professional students' and practitioners', particularly the cytotechnology students', understanding of the role of telecytology in cytopathology practice. Hence, help the cytology students and professionals to be able to clinically integrate and actively participate in the clinical management of telecytology.

This e-learning module contains short **video clips** for demonstrational purposes on the different practices of telecytology that are available for use. The video clips also compare and contrast these available technologies, and will briefly explain the types of equipment used in performing the different telecytology practices.

This module allows the students to excel and better prepare themselves for the telecytology practices in future.

This e-learning module provides **visual and auditory input**, which will improve retention and comprehension. There are **self-assessments** to test knowledge gained from the information presented in the videos. The self-assessment tools included in this e-module are multiple choice questions and multiple response questions that encourages critical thinking and understanding of the students. Also included are survey questions for assessment of the module itself.

This e-learning module primarily targets cytotechnology students in their Fine Needle Aspiration Cytology coursework. However, it will also benefits practicing cytotechnologists, pathology residents, and any other medical professional for reviewing purposes.

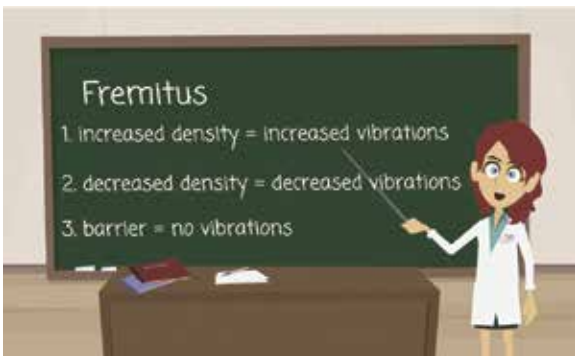


A screenshot of a video clip showing the pathologist reviewing a slide image via telecytology.

# Good Vibrations: Interpretation of Fremitus and Percussion in a Chest Examination

**Student Directors:** Jamie Straube, College of Allied Health Professions, Class of 2017  
Jena Mizner, College of Allied Health Professions, Class of 2017

**Faculty Advisor:** Sara Bills, PT, DPT, GCS, College of Allied Health Professions



E-learning modules allow students to gain fundamental knowledge at a convenient time and pace. Knowledge gained through the module can then be applied during higher-level discussions in a group learning environment. The topic of this module is the interpretation of fremitus and percussion in a chest examination.

Fremitus and percussion are valuable components of a clinician's chest exam and help in developing a patient's differential diagnosis and plan of care. The key to accurate interpretation of these tests relies on a solid understanding of the mechanical behaviors of wave transmission. Recognizing the characteristics of abnormal wave transmission enables the clinician to determine the likely underlying cause of shortness of breath and, in some cases, determine if emergent care is needed.

This module uses **animated video** to illustrate commonly known-examples of physics principles to better understand how waves travel through mediums of different densities. **Clickable interaction** and **embedded questions** encourage viewers to examine a virtual chest and apply their knowledge of wave transmission to the lungs, pleura and chest wall. To keep the 15-minute module engaging and practical for students, knowledge checks with feedback are integrated throughout.

While intended to be viewed before class discussion, the module will be a readily available resource for students to revisit when preparing for exams or treating patients in the clinic.

# Mastering the Brachial Plexus

**Student Director:** Austin Svec, College of Medicine, Class of 2019

**Student Member:** Kevin Selting, Graduate Studies, Class of 2016

**Faculty Advisors:** Gib Willett, PhD, Graduate Studies  
Sarah Keim-Janssen, Ph.D., MT (ASCP), College of Medicine



This project was chosen to help students in College of Medicine, College of Allied Health Professions, and Graduate Studies prepare for their first professional school exam. It will help students transition to the more rigorous demands of the school work and help to focus them on the most important subject matter. This project is designed as a study aid, with the ability to use it with no background knowledge, and then as a quizzing aid to use after the student feels comfortable with the material.

The module uses questions that can be looked up in the Interactive Dissecting Guide, which will be utilized by the students throughout their anatomy course. This promotes the learning of lab and lecture material at the same time. This project is designed to help teach students not only the material they are learning, but how to approach nerve lesion questions they will encounter throughout school and their careers.

Another benefit of the module is that it is very well broken down into chunks of information. This allows students to work at their own pace, to work for 5-10 minutes through the course of a specific nerve, save their work and start a new area later. This method best utilizes the e-learning philosophy of small increments, but also provides a complete summary of the brachial plexus.

## Peer Feedback

“I think this project would have helped my test score, confidence, and decreased the stress of the first weeks of school.”

– Claire Svec, M1

“This project has the potential to streamline the first unit of anatomy, it combines the best resources all into one e-module.”

– Charlie Treinen, M1



# Linked Recognition: Linking the Theory with Reality

**Student Director:** James Trenhaile, College of Medicine, Class of 2017

**Student Members:** Ben Wiese, College of Medicine, Class of 2017  
Dustin Herring, College of Medicine, Class of 2019

**Member:** Amy Cannella, MD, College of Medicine

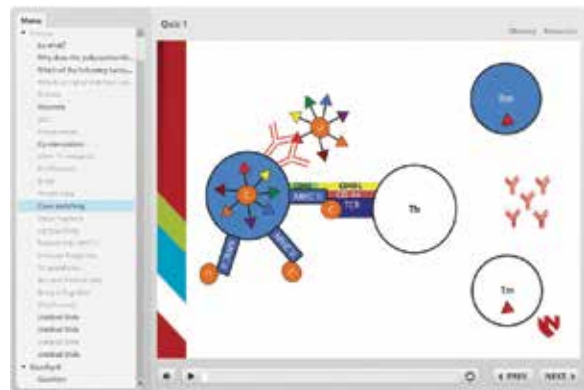
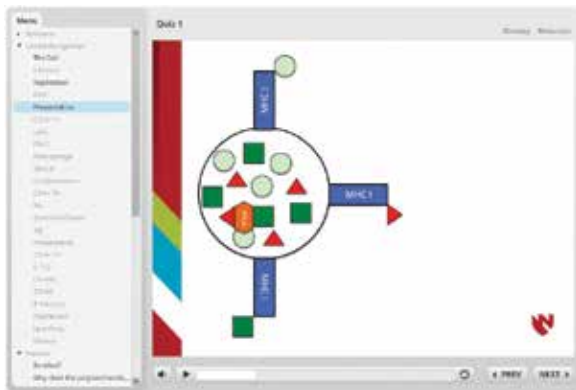
**Faculty Advisor:** Geoffrey Thiele, PhD, College of Medicine

Immunology is a subject that often brings headaches to students. Linked recognition is a theory that encompasses many of the tenets of immunology: the immunological response to a foreign invader, how different parts of the system work together, and secondary response. Learning the theory can be difficult because of its many pieces. This project aims to put these pieces into a more concise and logical format that students can revisit and review.

The topic was also chosen because of its real-life application. Some vaccines, such as Prevnar, use linked recognition principles to create an immunologic response.

Our hope is to motivate students to learn the principles of immunology by linking theory with real-life examples.

We also hope to make this project easily accessible to modern learners by publishing it in both e-module format accessible through Blackboard and also on YouTube. This will make it available at any time on almost every piece of technology owned by modern learners.





# Clinical Management of Common Medical Problems: Treating Diabetes, Dyslipidemia, and Hypertension



**Student Directors:** Lance Villeneuve, PhD, College of Medicine, Class of 2018  
Michael Visenio, College of Medicine, Class of 2018

**Faculty Advisor:** Audrey Paulman, MD, College of Medicine

Although most students have the opportunity to become volunteer providers at the SHARING Clinics as early as the second semester of their respective programs, they may not yet have been widely exposed to the clinical diagnosis and management of diseases in general, and diabetes, dyslipidemia, and hypertension in particular. Because these are the three diseases most commonly encountered in the SHARING Clinic, specifically, it is important to have some background knowledge of the pathogenesis and treatment to more effectively help patients and efficiently utilize clinic time.

This project promotes retention and application of material for a couple reasons. First, the e-module format allows for interactive learning and assessment that can be done at an individual pace. Second, the short module distills the management of three otherwise complex diseases into high-yield principles that bear clinical significance and provide usable information.

The e-module promotes critical thinking by exposing students to complex drug treatment regimens at an early point. In doing so, students will be better prepared to critically evaluate the drug mechanism, interactions, and common comorbidities associated with hypertension, diabetes, and dyslipidemia.

Our project will gauge student learning by utilizing a **pretest, three-question quiz** after each clinical section, and **post-test** for self-assessment. By combining an **interactive narrative** with some common medical problems, this e-module looks to provide broad appeal to students from all health professions. For contemporary learners in particular, this module will provide the etiology and treatment of three normally encountered medical conditions in 15 minutes.

## Software Utilized

We used Articulate Storyline 2 as the primary application to generate our module. After outlining and scripting our content, the program fits seamlessly into our workflow, allowing us to make slides interactive, add narration to enrich on-screen information, and provide quizzing features that promote retention of information.



# Connecting the Dots: Online Case-Based Modules Integrating Basic Disease Processes

**Student Director:** Anthony White, College of Medicine, Class of 2018

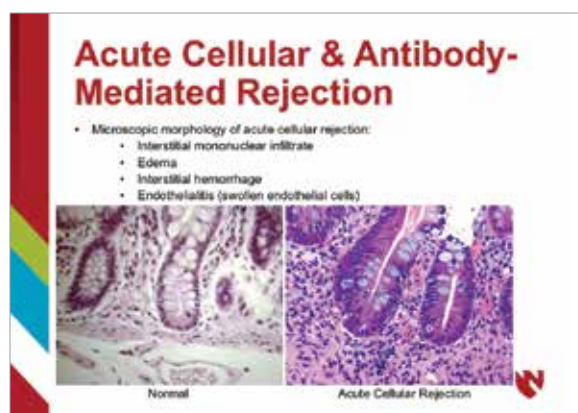
**Student Members:** Carl Post, College of Medicine, Class of 2018  
Ethan Schneider, College of Medicine, Class of 2018

**Faculty Advisor:** Geoffrey A. Talmon, MD, College of Medicine

In the current iteration of the second year of the College of Medicine curriculum, the first core is Introduction to Disease Processes. The diverse material in the core is meant to introduce basic concepts to prepare students for their work in the following organ-based cores throughout the remainder of the year, including basic pathology, immunology, fundamental microbiology, nutrition, acid-base abnormalities, and anemia. A recurrent complaint from students is the disjointed nature of this disparate content.

This series of five self-paced e-modules will present an unfolding case based on a real pediatric small bowel transplant patient that will serve to exemplify the utility of the topics covered in lecture to the care of this individual. The five modules include discussions of:

- Pediatric pathology
- Nutrition (total parenteral nutrition, content developed with the assistance with medical nutritional faculty)
- Transplant immunology
- Opportunistic infections (viral)
- Neoplasia (posttransplant lymphoproliferative disorder)

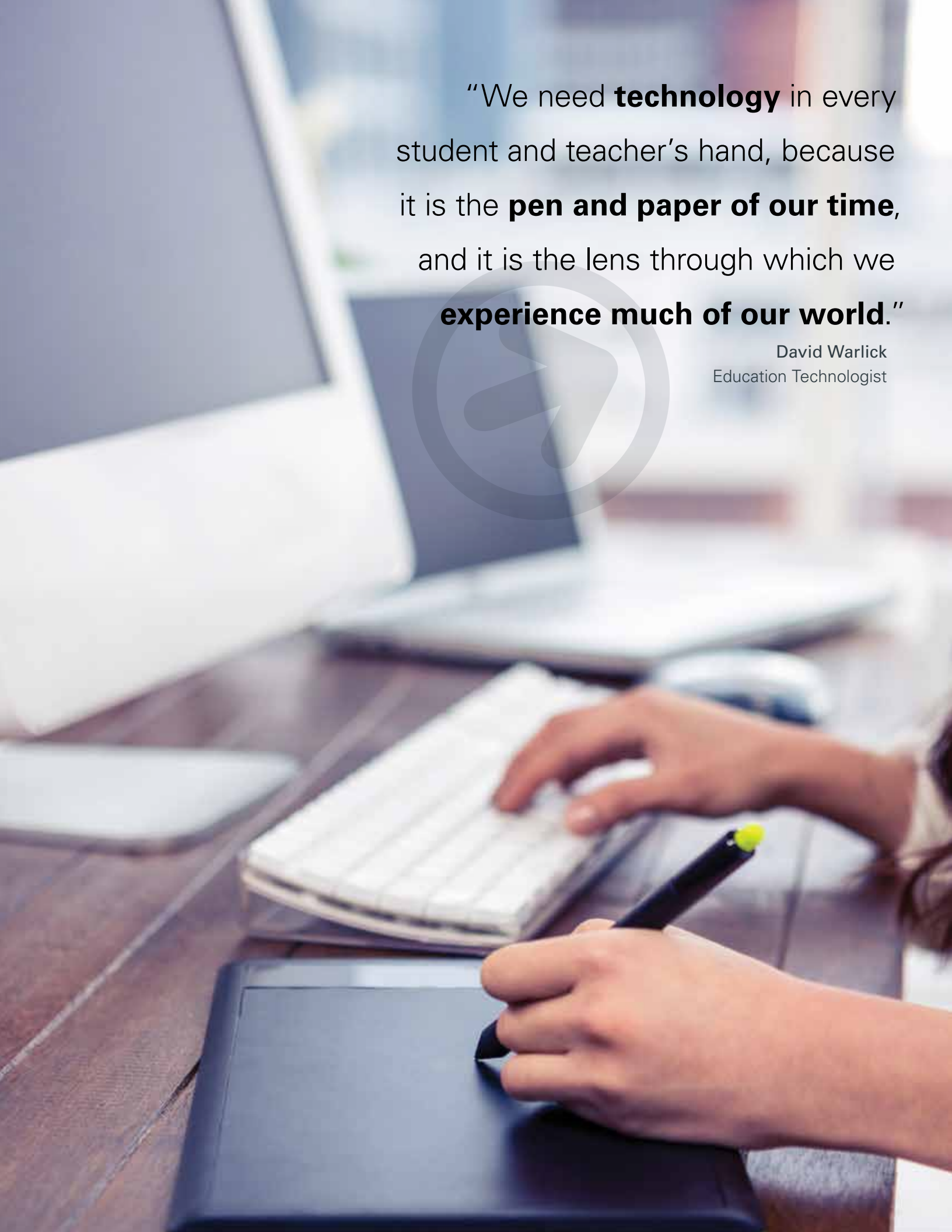


This slide represents some of the major histologic changes seen in acute cellular rejection of a transplant. The slide will be interactive, so students can identify each of the major changes seen on histology.

All five modules show the “practical” application of the related concepts presented in the morning didactic lectures. The e-modules will be case-based and are built on an Articulate-type platform to incorporate **interactive content delivery** and **formative assessments**.

In addition, it utilizes **annotated and/or guided examination** of virtual microscopic slides, and is centered around a **filmed simulated patient interaction**.

The experience ends with the students completing a **concept map** of the items discussed in the modules.

A person is sitting at a wooden desk, using a tablet with a stylus. A white keyboard is visible in front of them. In the background, there is a large computer monitor and a laptop. The scene is brightly lit, suggesting an office or classroom environment.

“We need **technology** in every student and teacher’s hand, because it is the **pen and paper of our time**, and it is the lens through which we **experience much of our world.**”

David Warlick  
Education Technologist

## Interactive E-Learning Program

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