Web-based tools for teaching & learning

Poll Everywhere

socrative

doceri

PANOPTO

Information about & Resources for...

Education Technology

Faculty Instructional Development|Director, Karen Spear Ellinwood, PhD, JD, EdS*

Introduction to iPads in Medicine

Key Concepts

* Technology for Teaching & Learning
* Technology for Classroom Assessment
* Technology for Promoting Reflective Learning & Practice

Inside this issue:

Tools for medical problem -solving 2

How Students Use ThinkShare™ 4

iPads in Medicine 2 6

Audience Response Systems 8

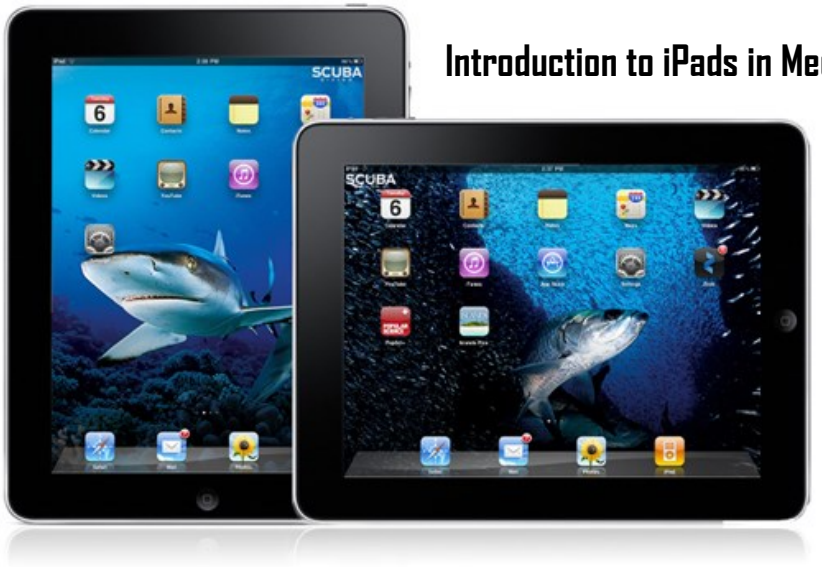
Clinical Key 9

If you have an iPhone or some sort of "smart" phone, you know there are more apps than you can swipe your screen at. These days developers are inventing an app for everything. You can turn on or off the lights at your house from your seat on an airplane while waiting to take off. You can probably find out how many angels dance on the head of a pin, or get someone's closest statistical prediction. Of course, there are apps for teaching and practicing medicine. **Deputy Dean Kevin Moynahan, MD,** and education technology expert **Mike Griffith**, MS, teamed up to present the seventh in our AMES\OMSE FID Series on November 29, 2012—Smart Apps for Medicine & Teaching in Clinical Settings. Mr. Griffith and Dr. Moynahan introduced several apps (applications) and organized them by function, that is, distinguishing those that could be used for teaching, assessing student knowledge, for student or faculty learning, and medical practice. The presentation included demonstrations of at least one app per category.

Apps for Learning. For student learning, the presenters highlighted Notability and iAnnotate. Notability allows students to take notes and to record voice at the same time, create markers to connect the voice recording with particular points in the notes. iAnnotate can be used with many textbooks or other documents and allows the learner to take notes in line with the text, among other things.

Apps for teaching. You might have heard the term "flipping the classroom". If not, you most likely have heard of the Khan Academy on YouTube. The Academy brings the classroom to students online using an application called *Doceri* (see image at right). With Doceri, instructors can create diagrams freehand or mark up existing materials, write text and record voice to explain the process or concepts depicted. The output is a video recorded lesson, which could be viewed at any time, uploaded online or forwarded to the learner. Skitch enables instructors to snatch images and text from the screen

* Author of content unless otherwise indicated.



Introduction to iPads in Medicine

Tools for teaching students medical problem-solving

How do students learn how to think like doctors?

There's an old saying, practice makes perfect. But where would students get to practice thinking like doctors?

CBI. Case-based instruction provides an opportunity for medical students in preclinical years to practice the kind of strategic and reflective thinking required of physicians in professional practice. UA COM has established a pedagogy and online tools to help forge that bridge between preclinical and clinical years.

Students are using online tools to cultivate a habit of reflection before, during and after each case. Students work through cases online in an asynchronous format, able to share their thinking as they prepare for facilitated sessions. These eTools, as we call them, utilize a structured approach to medical problem-solving in CBI as part of a developmental curriculum. A developmental curriculum fosters a movement away from instructor-dependent learning toward self-regulated learning, progressively removing scaffolding initially in place as students learn new practices and skills. (Read more about UA COM's developmental curriculum.) Thus, in CBI, the content of cases as well as facilitation methods present increasing challenges over the course of two years.

Physicians are life-long self-directed or self-regulated learners. Metacognitive engagement is a key component of self-regulated learning, which involves an awareness of not only what one thinks but how one thinks. "Reflective habits assist practitioners in addressing and managing unexpected situations and challenges for which there is no one right answer and enable them to learn and grow" (Butani, et al. 2013, 206). Thus, curriculum must offer strategic opportunities for students to reflect on not only *what* they are learning but *why* it is significant and *how* to apply acquired knowledge in practice. The purpose of building a reflective habit is to support students in their transition to the reflective practice of medicine. In short, we hope that reflective learning will become reflective professional practice.

Evidence-based decision making is a form of reflective practice and is key to developing "competencies and dispositions for acting adaptively in problem domains" (Pea 2006, emphasis in original). To make decisions based on evidence, students must learn to engage in critical reflection, a form of metacognitive engagement. "Critical reflection occurs when one not only explores one's own beliefs, biases, and approaches but also those of others who may have contributed to the way events unfolded" (Butani, et al. 2013, 204).

Schön (1983) found

and create jpg's for use in presentations or other supportive materials.

Bedside Teaching & Practice. To foster effective communication with patients as well as colleagues, Draw MD is a program pre-populated with anatomical diagrams to which the student or physician can add notes, highlight features, etc.. If you were not able to attend but would like to see the presentation, you can watch it online—click here!

that professionals in a variety of fields (e.g., law, medicine, engineering) demonstrated a habit of reflecting *in* action and *on* action, that is, while performing responsibilities and after completing their work. Butani, et al. (2013) state that one strategy to promote "reflection in action" is "to ask [a student] to think of an additional diagnosis for this patient besides pneumonia and reprioritize the differential based on the defining and discriminating features of the case". To promote "reflection on action ", Butani et al. proposed that asking the student to use a tool that structured their thinking process (such as SNAPPS* or IDEA**) would foster development of "a structured and systematic clinical reasoning process that encourages the student to defend diagnoses based on key features in the patient's history and physical examination," and avoid assumptions or supposition.

The UA College of Medicine emphasizes the importance of engaging in such reflection as an instructional practice and a learning strategy. Using a Before-During-After model, an extension of Schön's (1983) reflection-in and reflection-on action suggested by Plack & Santasier (2004, 2005), UA COM's 5-step problem-solving structure for medical cases expects students to engage in reflection before facilitated sessions, during and after.

The 5-step structured problem-solving approach integrates reflection with scientific method, problem-solving and clinical practice. For example, it emphasizes processes involved in developing a differential diagnosis by assist practitioners in addressing and managing unexpected situations and challenges for which there is no one right answer and enable them to learn and grow" (Butani, et al. 2013, 206). Thus, curriculum must offer strategic opportunities for students to reflect on not only *what* they are learning but *why* it is significant and *how* to apply acquired knowledge in practice. The purpose of building a reflective habit is to support students in their transition to the reflective practice of medicine. In short, we hope that reflective learning will become reflective professional practice.

Evidence-based decision making is a form of reflective practice and is key to developing "competencies and dispositions for acting adaptively in problem domains" (Pea 2006, emphasis in original). To make decisions based on evidence, students must learn to engage in critical reflection, a form of metacognitive engagement. "Critical reflection occurs when one not only explores one's own beliefs, biases, and approaches but also those of others who may have contributed to the way events unfolded" (Butani, et al. 2013, 204).

Schön (1983) found that professionals in a variety of fields (e.g., law, medicine, engineering) demonstrated a habit of reflecting *in* action and *on* action, that is, while performing responsibilities and after completing their work. Butani, et al. (2013) state that one strategy to promote "reflection in action" is "to ask [a student] to think of an additional diagnosis for this patient besides pneumonia and reprioritize the differential based on the defining and discriminating features of the case". To promote "reflection on action ", Butani et al. proposed that asking the student to use a tool that structured their thinking process (such as SNAPPS* or IDEA**) would foster development of "a structured and systematic clinical reasoning process that encourages the student to defend diagnoses based on key features in the patient's history and physical examination," and avoid assumptions or supposition.

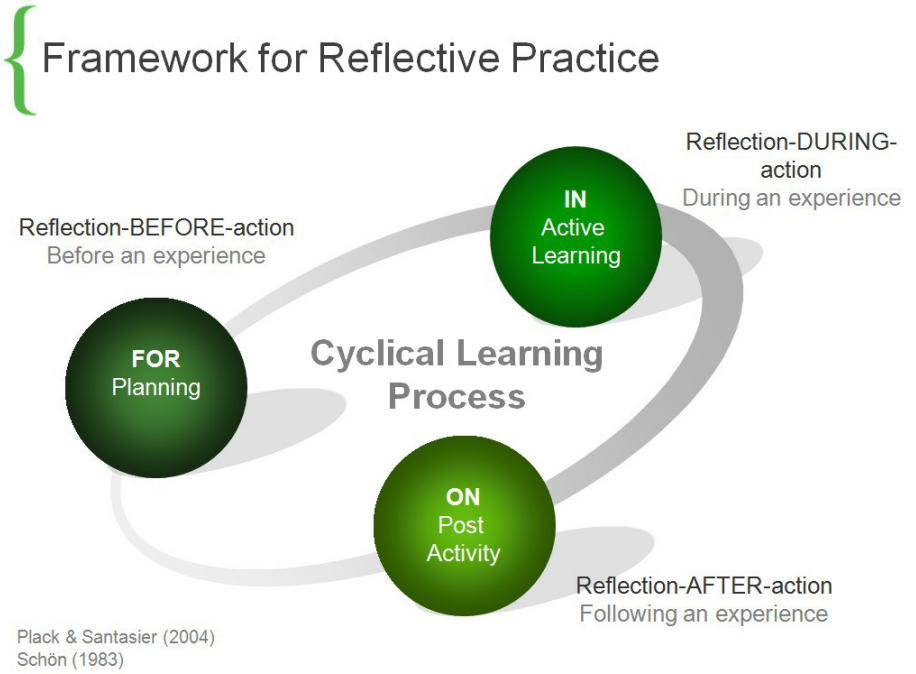
The UA College of Medicine emphasizes the importance of engaging in such reflection as an instructional practice and a learning strategy. Using a Before-During-After model, an extension of Schön's (1983) reflection-in and reflection-on action suggested by Plack & Santasier (2004, 2005), UA COM's 5-step problem-solving structure for medical cases expects students to engage in reflection before facilitated sessions, during and after. *The 5-step structured problem-solving* approach integrates reflection with scientific method, problem-solving and clinical practice. For example, it emphasizes processes involved in developing a differential diagnosis by asking students to define the nature of the problem, formulate at least two hypotheses and articulate rationales. Students are expected to craft and pose questions to resolve each case and consult the ideas of peers to advance their own thinking. During sessions, facilitators are expected to engage students in an inquiry-learning process, rather than rote learning. At the close of each session, students debrief the case in group and then write a personal reflection on case, self and process before moving on to the next case.

"Reflective habits assist practitioners in addressing and managing unexpected situations and challenges for which there is no one right answer and enable them to learn and grow" (Butani, et al. 2013, 206). The CBI 5-step process is designed to foster students' development of clinical reasoning by asking them, at every juncture, to explain their reasoning, synthesize information, and strategize to resolve the case, and to reflect back on how they might have committed cognitive error or why and how particular strategies might suggest more effective approaches for future medical problem-solving.

Toward the close of each session, the small groups discuss the challenges presented by the case or process and what they might have learned from that struggle. After the group's debriefing, each student writes a personal reflection, entering their thoughts in Step 5 of *ThinkShare Pro*. Students often

describe their strengths or challenges as well as offer themselves *advice*, if you will, for problem-solving. Students' post-case reflections often demonstrate an awareness of the process (e.g., I narrowed my differential too early in the case; it was helpful to share articles during the session), an understanding of the implications for clinical practice (e.g., "in reality we won't get all the information so neatly packaged" so it's good that we have to request it), and how they might improve their approaches to problem-solving (e.g., I need to be more open minded, research the bases for my hypotheses).

Preceptors, residents and attendings should expect, then, that UA COM medical students will be able to translate these CBI problem-solving talents into reflective practice in clerkships or sub-internships. To foster such development, you should ask students to continue to articulate their reasoning. And provide opportunities for them to write or verbalize post-case reflections and offer constructive feedback on their clinical reasoning process. //



References

Butani, L., Blandkenburg, R. & Long, M. (2013). Stimulating Reflective Practice Among Your Learners. Pediatrics 2013, 204-06.

Plack, M.M. & Santasier, L.G. (2005). The Reflective Practitioner: Reaching for Excellence in Practice. Commentary, In Pediatrics. pp. 1545-1553. accessed at http://pediatrics.aappublications.org/content/116/6/1546.full.html

Plack M. & Santasier A. (2004) Reflective practice: a model for facilitating critical thinking skills within an integrative case studies classroom experience. J Phys Ther Educ. 2004;18:4–12.

Schön, D. (1983). The reflective practitioner: How professionals think in action. NY:Basic Books.

How students use ThinkShare™

In the first half of the first semester, students use *ThinkShareapp.com* to share their thinking with peers and their group's facilitator.

Students address cases using this online tool before they participate in small group sessions. They begin by submitting the first 2 steps of the problem-solving structure in one submission: Frame the problem; Formulate hypotheses with rationales (*see*, Figure 1).

Submissions are due about 24 hours before the first of two sessions. Students can view what other students post only after they have posted. Facilitators can view all student posts in their small group, and can comment on student posts—privately or publicly.

Being able to see what students are thinking before they arrive at the small group session enables facilitators to prepare for facilitating a discussion. They know whether students are off track or on track, if they understand the basic science or clinical concepts involved, and whether they are articulating reasoning or simply jotting down a few ideas without explanation.

Students also gain a sense of their thinking in comparison to other students. How do their questions or ideas differ? Have their peers raised issues they should consider? As with faculty, reviewing peer entries enables students to see not only WHAT peers think but HOW they arrived at their hypotheses or how they propose to investigate the case.

In the second half of the first semester, students will continue to use ***ThinkShare-app.com***. Students will use ThinkShare to work through 4 of the 5 steps in the medical problem-solving structure online BEFORE coming to a single session.

In all cases in the first semester, students will take a few minutes at the close of the final session (or single session for Nervous System cases) to write a **post-case reflection**.

We ask students to reflect on the:

⇒ The case

⇒ Their thinking process, possible errors made (self); and

⇒ Their progress in problem-solving medical cases (progress);

⇒ Group process;

⇒ Suggestions for improving their problem-solving approach (self-guidance).

See, Figure 2, next page.

Students should be encouraged to continue this critical thinking, problem-solving approach in clerkship

There are several ways to foster students' continuing development toward reflective practice, including asking students to:

⇒ Keep a journal reflecting on their development over the course of each week or the clerkship;

⇒ Draft SOAP notes and engage them in feedback;

⇒ Write post-case reflections on key experiences with patients or other relevant clinical encounters.

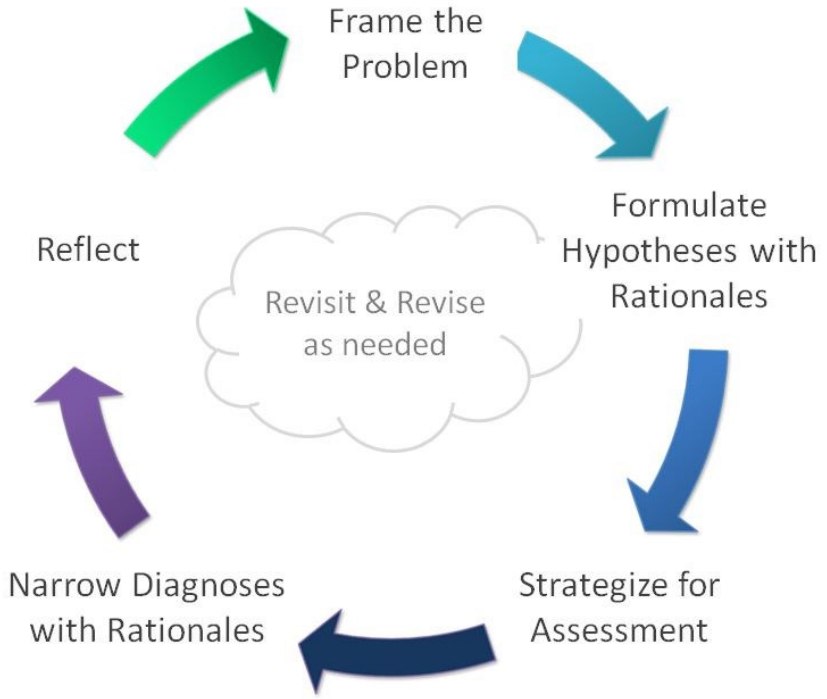
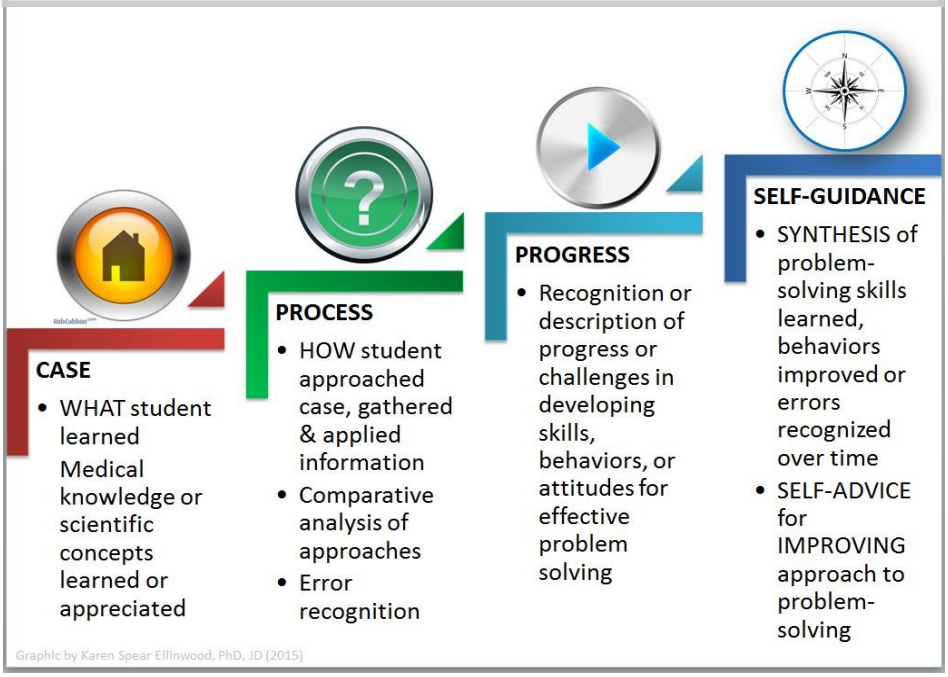
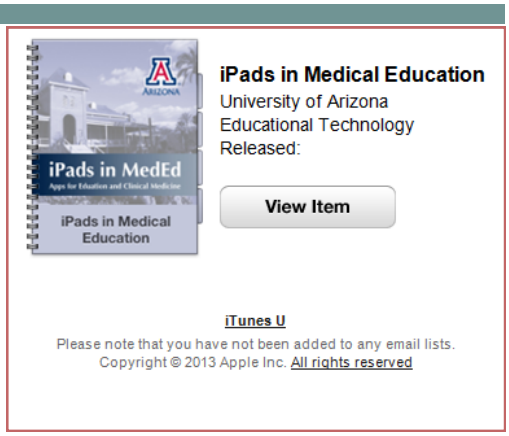


Figure 2. Post-case Reflections



iPads in Medicine2: Smart Apps for Teaching & Learning



The University of Arizona College of Medicine is in its third year of the iPad program. The Arizona Health Sciences Center (AHSC) BioCommunications office provides technical support and instruction to faculty and students upon request. Each year, Mike Griffith, Associate Director AHSC BioCommunications, volunteers to present the AMES/OMSE FID Series seminars on smart apps in medicine. Dr. Moynahan co-presented in 2012 and 2013, lending the clinician's perspective on the use of smart apps for teaching and professional learning.

Dr. Moynahan and Mr. Griffith organized their presentation this year into three parts:

1) Apps for learning;

2) Apps for teaching; and

3) Apps for the bedside.

This article summarizes the use of the iPad and examples of recommended apps in each of these areas.

For those who want to delve deeper, Mr. Griffith also created an iTunes U course for UA COM faculty, adding other smart apps for *productivity* and *keeping current*. Click on the image at left to go to the course. Some of the apps recommended are helpful in collecting data in education research projects as well (e.g., Notability).

Apps for Learning

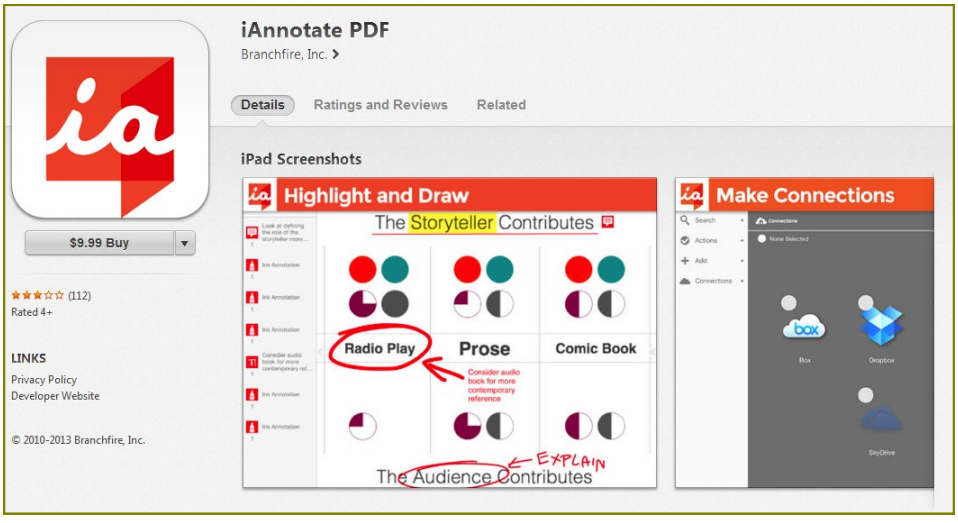
Based on professional and personal use and feedback from UA COM students, Mr. Giffith recommends three apps for professional learning as well as student learning. These are: 1) iAnnotate; 2) Notability; and 3) Anki Flash Card app.

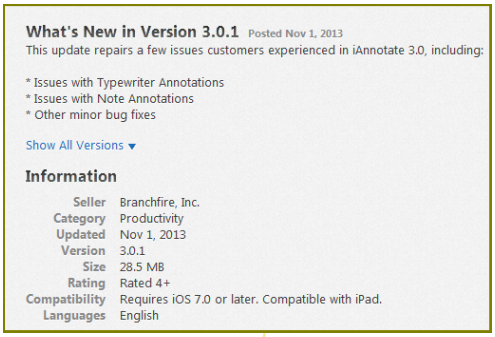
Mike Griffith pointed out that learning to read the app information is critical to choosing a reliable app. Using iAnnotate as an example (Figure 1, below), note that every app provides the identity of the developer (e.g., Branchfire, Inc.), and information as to the version, features or updates made, ratings, and its compatibility with mobile devices (Figure 2). Note that the ratings are only for the most recent version. Thus, iAnnotate's version 3.0.1 received 112 ratings since its publication November 1, 2013. Prior versions received a cumulative rating of 4+ on a 5-point scale, which is noted below the 3 start rating for version 3.0.1 (Figure, left).

Below is a summary of features for apps in each of the 3 categories: Learning, Teaching, Bedside.

iAnnotate [$10—cumulative rating 4+]

This app costs roughly $10 but, according to Mike Griffith, is widely used by undergraduate medical students, who use iAnnotate (Figure 1, above) to add their own notes to the official notes they download from ArizonaMed. They also annotate articles or required texts and use the app to upload their annotated materials to their preferred cloud storage provider (e.g., Microsoft's Skydrive, Box, Dropbox or Google drive). Basic and clinical science faculty are professional lifelong learners and may find iAnnotate helpful in making sense of scholarly articles. For clinicians,





having a choice of multiple cloud storage providers is important, especially for those with HIPAA restrictions on wireless or internet service at hospitals or private clinics. Box, for example, is the only cloud storage that has received HIPAA approval (read more). This app allows the reader to highlight in yellow or other colors, to add handwritten marginalia or to type comments or underline text—all the same annotation you would make on a printed copy.

Notability [$3, cumulative rating 4+]

Notability is a productivity app, that is, you can use it to create documents. Unlike Pages or other note-taking apps, Notability allows the user to create audio recordings that are connected with markers to the place in their notes related to the recording. This app is great for note taking or brainstorming sessions. Users can also draw with a finger or a stylus. The app has versions for iPhone and iPad and can become any researcher's friend, making it possible to take notes and record interviews or focus groups.

AnkiMobile Flashcards [$25, cumulative rating 4+]

This app is FREE on the web. But the mobile app costs money. Despite the cost, medical students use this app for studying for block exams or Step 1. AnkiMobil allows for timed repetition. If the user indicates they know the content of a particular card well, AnkiMobil Flashcards will open the card less frequently to quiz the user. If you indicate you do not know the content well, that flash card will appear more often. This notion of "spaced repetition" is critical for all learners. According to Mike Griffith, UA COM's medical students are using it as a "core tool", adding, "one student made 5000 cards in the first year". If you are teaching medical students in lecture, case-based instruction, team learning or clerkship, let them know this app can help them to build medical knowledge and, because it allows them to create their own cards, they can specify the knowledge they most need to learn or that you need them to know.

Doceri [FREE & $ versions, cumulative rating 4+]

Doceri is an app primarily used for teaching in classroom situations but it can be used for teaching in clinical contexts as well. Doceri also has two lives: one as a remote control of presentations and the other as an app to create multi-media presentations. The big difference between the free and paid versions, says Mike Griffith, is the free version carries the logo in the lower right hand corner of the screen. For $30, the user can eliminate the logo. UA COM faculty have already started using Doceri to create presentations for students to review before coming to lecture and have reported it successful and the learning curve not too difficult to manage. Faculty can create presentations and record their voice to accompany them and start flipping their classrooms. The Doceri audio accompanied presentations ttream to YouTube or iTunes. UA COM anatomy instructors use it extensively for students to view before going into the lab. They find it an effective way to prepare for lecture and find they do not spend as much time explaining the basics.

There are additional apps for creating presentations, such as Panopto, and for engaging the audience during lecture, such as Socrative or Poll Everywhere. The icons at right have live hyperlinks to the websites for each application so you can learn more about these and how you might use them in your teaching. In addition, prior issues of this publication have more detailed information on audience response systems.

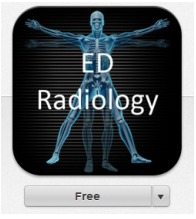
Apps for Bedside Practice & Teaching

Kevin Moynahan, MD, Deputy Dean of Education, highlighted apps he finds useful for teaching in clinical contexts, such as on hospital rounds or in clinic. Some of his favorites include: 1) Sound Builder; 2) Radiology 2.0; and 3D Brain.

Sound Builder [FREE & $ versions, cumulative rating 4+]

"There are other apps out there [that enable you to build heart sounds] but this is currently the best one we have," reports Dr. Monyanhan. This app allows the user to add third heart sounds, for example, and generates a differential diagnosis based upon the sounds created. Instructors can use the Sound Builder to enable students to hear sounds they find difficult to detect in patients or to guide them in knowing what sounds to listen for when examining patients. Mr. Griffith advises that the Litman stethoscope sound builder records sounds that you can import to this app for analysis. This is a handy tool for hospitalists or other physicians who teach in clerkships but also for patient education.

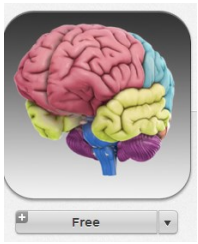
Radiology 2.0: One Night in the ED [Daniel Cornfeld, MD] [FREE, cumulative rating 4+]



This app contains images based on real medical cases. There is no iPad version yet; but it is usable on the iPhone. Dr. Moynahan runs the app on his iPad and enlarges the images using the "2x" button to double the size. Dr. Moynahan indicates that this app can be helpful in generating a differential diagnosis. Instructors could ask

students to use Radiology 2.0 to refresh their recall of brain structures and functions and to articulate reasoning for inclusion or exclusion of conditions in the differential.

3D Brain [FREE, cumulative rating 4+]



Cold Spring Harbor Laboratory develops this app for teaching neuroanatomy. The app includes scientific references and allow for an option to upgrade to a higher resolution images and extra features. Both Dr. Moynahan and Mr. Griffith indicate there is no noticeable difference in function between the free and paid versions. This app helps identify potential cognitive disorders associated with the brain; students or instructors can post "pins" on a specific area of the brain to identify specific regions. Students can use this app to study medical knowledge, while instructors can use this as a mobile app during rounds or in clinic to teach neuro content or to explain brain function and conditions to patients and

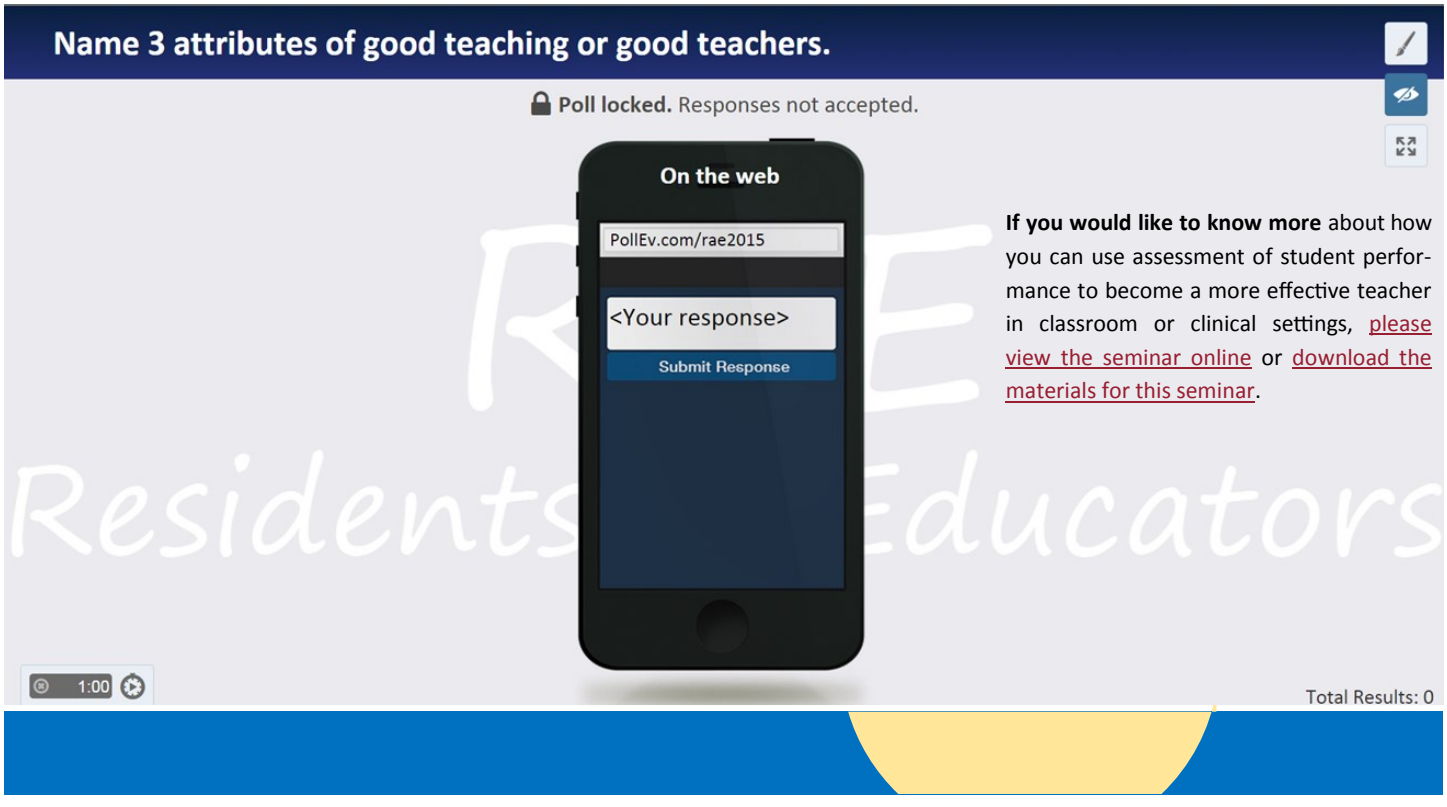
Engaging your learners with Audience Response Systems

Asking learners to actively engage with the material or topic presented promotes learning. Learning new ways to facilitate active engagement by your students should be at the top of your to-do list as a classroom or clinical educator. The *Teaching with Technology (*TWT) *Series* features a deep dive on a different technology (devices or software applications) to assist faculty in integrating 21st century practices into their everyday teaching and promote reflective and active engagement on the part of their learners.

Poll Everywhere is an audience response system available online for free. The pro version is available to all UA College of Medicine faculty. Poll Everywhere can be used in didactic conferences to promote discussion, use assessment for gauging your instructional pace and material or offering formative feedback to learners. What's more is that Poll Everywhere enables instructors to retain the data collected during a session to compare to other groups of learners or to the same group of learners in a pre– and post-test format.

Mike Griffith, MS, Associate Director of Biomedical Communications at the Arizona Health Sciences Center, is the primary facilitator of the TWT Series. Mike is UA COM's resident expert on new media technologies and has been a proven asset in medical and faculty development of 21st century learning and teaching practices.

At the March 21st TWT Series workshop, Mike recommended that faculty explore for themselves how they can use Poll Everywhere—or other audience response systems—in their day to day teaching.



Librarian Support

Clinical Key YouTube tour

EBM

Search Tools at AHSL

PubMed

Search Tools at AHSL

ClinicalKey is Arizona Health Science Library's newest resource, a powerful clinical search engine from Elsevier. It is available at the AHSL website (click on Top Resources, then ClinicalKey | First Consult).

What makes the new ClinicalKey experience different?

This clinical search engine has...

- A **cleaner, mobile-friendly** design.
- More than **1,400** new disease Topic Pages.
- **An enhanced browse feature** with a searchable, filterable list of books, journals, video series + more.
- A new **search history feature** saves time, letting you view and retry recent queries.

In addition, ClinicalKey's **Smart Search** thinks and works like you do by recognizing relevant clinical concepts as you type. Clinical Key **ranks search results by clinical relevance**, and swiftly filters by content type – more than 1,100 books, 500 journals, First Consult point-of-care content, videos, patient education handouts, procedural videos, and more.

Clinical Key enables you to:

- **Narrow** your search by relevant medical specialties, dates of publication, or study type;
- **Preview** content in real time from the results screen;
- **Review** the top full-text resources, complete with the same high-quality images you'd find in print;
- **Bookmark** important content by adding it to your personal Reading List *(create your free ClinicalKey account for exclusive benefits);*
- **Download** a PDF, print or email content, all from within ClinicalKey;
- **Earn** Category 1 CME credits (point-five for every search); and
- **Generate** a PowerPoint presentation automatically from selected images, complete with citations.

Take this brief YouTube tour to get started finding smarter, faster answers with ClinicalKey.

Darla Delgadillo, MSLIS
Librarian, Clinical Education
AHSL Partnering Librarian

CONTACT

Darla Delgadillo, MSLIS, will be a regular contributor to the Med/Ed eNews.

Em. darla@medadmin.arizona.edu

Ph. 520.626.1002