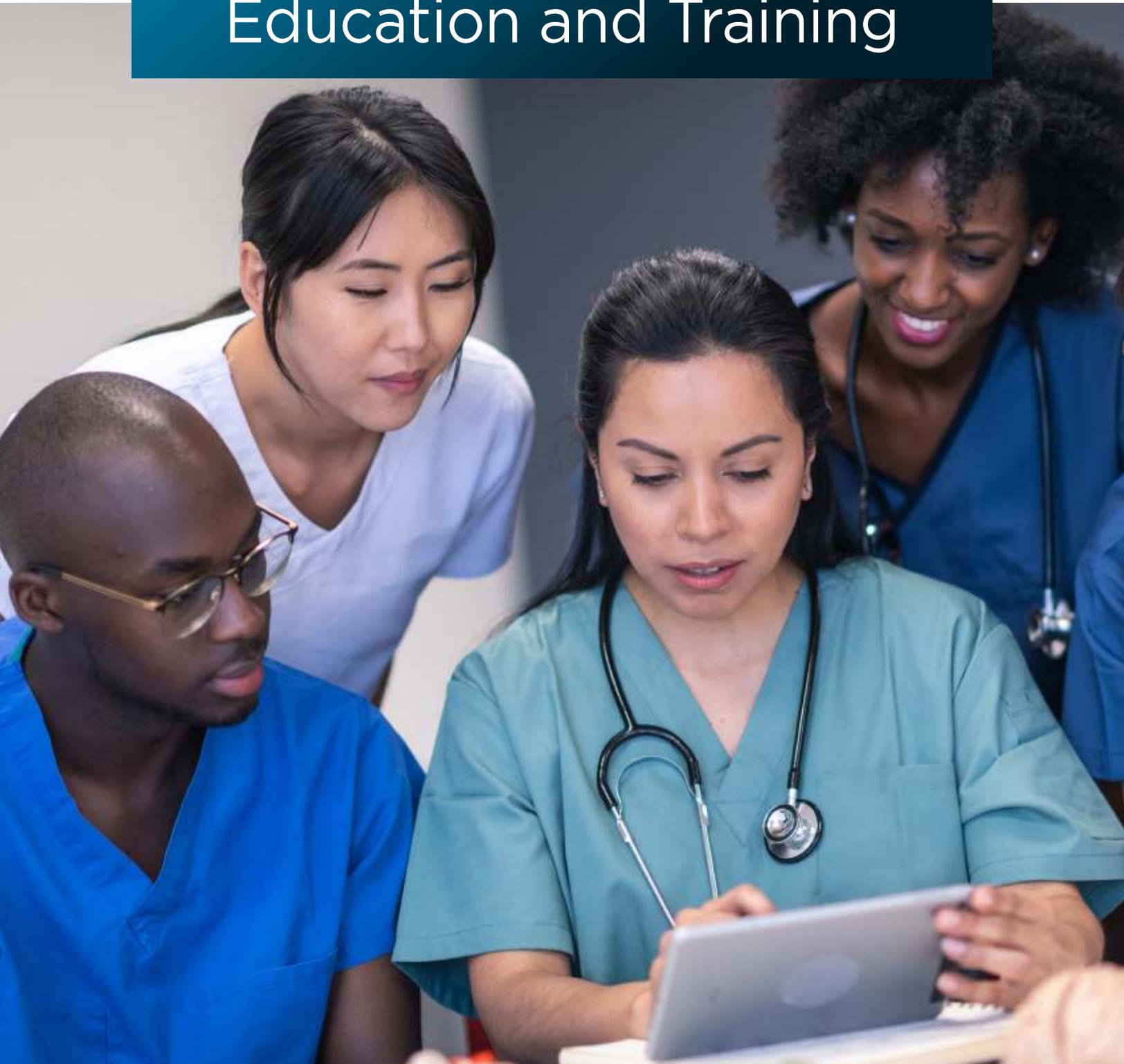


Visualizing Clinical Decision-Making in Medical Education and Training



As the quantity of medical knowledge exponentially grows, many educators continue to design coursework around evaluating concept retention through multiple-choice examinations. At VisualDx we recognize the need for students to internalize core medical knowledge, but we also believe that testing to “facts” is not an educational paradigm in fostering better care. We are on a mission to create the framework and information tools that inspire continual learning and navigating of information.

At VisualDx we are thinking about — and innovating upon — these fundamental challenges:

- How do we improve clinical reasoning and differential diagnosis skills?
- How do we improve the learner’s logical competence?
- How do we get our students to be life-long information acquirers of knowledge and evidence?

We offer a solution to these questions through hybridizing clinical decision support and educational cases. By using problem-based exercises in conjunction with clinical decision support technology, students develop better clinical reasoning skills and learn the importance of evidence.

We understand that clinicians need excellent, lifelong information-seeking habits to best serve patients. To achieve this, members of faculty model and teach the importance of reliable clinical decision support tools and technology. Our VisualDx platform, used in conjunction with case studies by future clinicians, is engaging and provides a “real-world” experience for the learner. Through case-based education and differential building, students can see how unique patient factors can influence the construction of a differential diagnosis, assist the evaluation process, and guide appropriate therapeutics.

Educators deserve technology that seamlessly integrates into curricula to best train students, and resources must actively engage students—especially as virtual classrooms become the new normal. Just as pilots are highly reliable because they are trained in checklists and cockpit instruments, students need “cockpit training” in instruments that improve care delivery throughout their careers.

At VisualDx, we believe that teaching with information technology should be used to bridge gaps of knowledge and enhance clinical reasoning skills.



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To bring positive change to the medical care provided to Black, Latinx, and other patients with non-white skin, we need to change the way medical education is being taught and our students must have access to technologies and leadership training that ensures that they become health professionals who provide care that is reflective, inclusive and equitable.

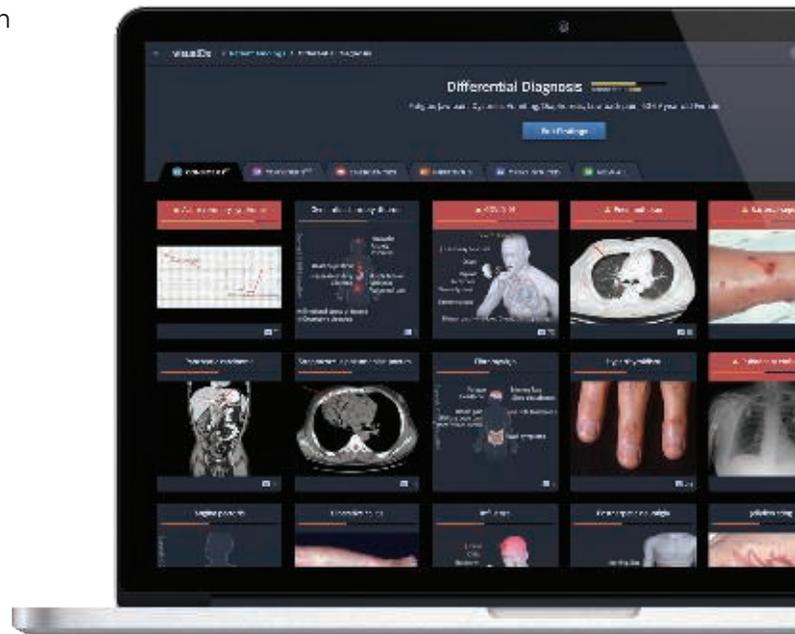
— JOHN T. LANGELL, MD, PHD, MPH, MBA, PRESIDENT OF NEOMED



Challenges Currently Faced in Medical Education

In 2020, VisualDx surveyed its faculty users in medical education programs across the country to learn about their common challenges. We received feedback from 85 faculty educators representing specialties such as dermatology, family medicine, emergency medicine, ophthalmology, clinical medicine, information management, hospital medicine, urology, and more. These are some of their responses.

- Accessing resources
- Viewing eye, hair, nail, and oral images that can give insight to other infectious diseases
- Not enough time and money
- Creating interactive content for users
- Using appropriate technology
- Visual recognition and diagnosis
- Making space in curriculum for evidence-based medicine



Case-Based Learning Examples Used in Teaching

More than 100 medical programs, including MD, DO, NP, and PA schools, embrace VisualDx as an essential resource for medical education.

Read on to see specific examples of how medical educators are integrating VisualDx into their curriculum.

Case Example #1: Clinical Reasoning

Instructors at this school of medicine have created three activities focusing on different skills to reinforce the importance of developing a wide differential for patient presentations to protect against premature closure. Recognizing that several diseases may present very similarly allows us to develop clinical questions and key exam maneuvers to differentiate between the diseases. This allows the provider to become more efficient at developing and prioritizing a differential.

Learning Objectives

- Apply different methods of improving differential diagnosis.
- Review how having an accurate illness script for a disease improves diagnosis.
- Review the illness scripts for various diseases that are relevant to your practice.
- Review mimickers of specific diseases to understand how to differentiate between the two.

Sample Activities

#1: What else could it have been?

At some point in our medical careers, we have all fallen victim to diagnostic error. Therefore, it is important to work on widening our differentials to prevent this in the future. This activity will entail reminiscing on a patient for whom you struggled to come up with the correct diagnosis, and attempting to widen your differential based on their presentation

As practicing clinicians, we should continuously strive to improve our differentials, know how diseases in our differentials present, and learn new (or forgotten) diagnoses. Practicing physicians do exercises like this frequently to stay current.



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I typically use VisualDx as a resource for rotating medical students during clinic primarily for the high-quality images, including the range of presentations of any given disease. A number of our residents have shared with me that they love it and use it on consults especially, not only for the images, but for classic descriptions of diseases.

— MD AT HARVARD MEDICAL SCHOOL

Steps

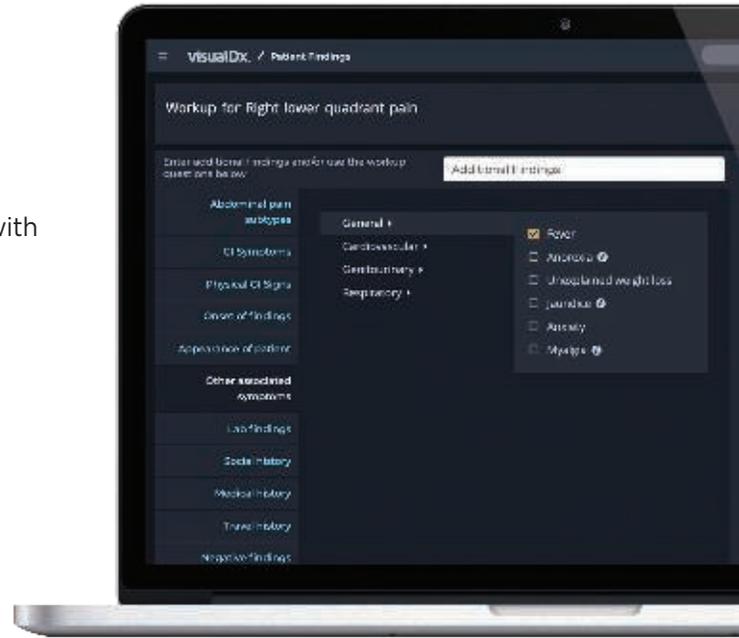
1. Type chief complaint of **RLQ pain** in VisualDx search bar.
 - Note how patient information has defaulted to 50–59-year-old and female
 - Note that clicking on green dot next to the finding will toggle it from green (required) to gray (not required)
2. Add **Fever** (make it required in VisualDx)
3. Add **Diarrhea** (make it required in VisualDx)
4. Add **Developed Acutely** (make it required in VisualDx)
5. Write down as many diseases that you can think of that present with these symptoms.
 - Utilize the VINDICATEM-P mnemonic to help
6. Now click on the **View this Differential** button.
 - How did your list compare?
 - Are there diseases on the differential that you did not think of? (please review)
 - Are there diseases on the VisualDx list that you need to review? (Please do so)
 - Are there diseases that you would have put on the list, but VisualDx did not?
7. You can start over by clicking on the VisualDx logo in the upper left-hand corner.

Activity

- Repeat this with presentations with which you struggle. Start with a chief complaint and add up to three modifiers (based on a patient you have seen).
- Write down as many diseases that you can think of that present with these symptoms.
 - See how close you come to the complete differential.
- Read up on those diseases upon which you need a refresher.
- Change the age from “adult” to “pediatric” to see the difference in the differential.

#2: Can I think of disease mimickers to widen my differential?

As clinicians, we often think we have the diagnosis shortly into our evaluation. We often fall prey to premature closure because we don't think of other diseases that present similarly. Knowing what diseases may present in the same manner will allow you to widen your differential. Knowing what aspects help differentiate similar diseases allows you to be more efficient at gathering relevant data.



As practicing clinicians, we should continuously strive to improve our differentials, know how diseases in our differentials present, and learn new (or forgotten) diagnoses.



Steps

1. Type in **Migraine Headache**.
2. Read the synopsis and the diagnostic pearls, but do not expose the section on differential diagnosis.
3. After reading the information on migraine, write down as many diseases you can think of that might mimic a migraine.
4. Compare your list with the list on VisualDx.
 - Review the common diseases you did not put on your list
 - Review the common diseases for which you need a tune up

#3: Can I describe a disease accurately?

The better we can describe a disease, the better we know what features to search for in the history and physical. Realizing that your description of one disease may also be that of other diseases allows you to search for differentiating aspects of diseases.

Steps

1. Type in **Vesicle**.
2. Describe the disease “Herpes Zoster” by putting in as much information into the additional findings as you can think of to describe herpes zoster.
3. View the differential.
 - Did you make it to “Herpes Zoster?”
 - Review images of the various diseases.

Case Example #2: Virtual Learning

Instructors incorporate VisualDx pediatric cases into their educational material. The cases are used in a joint teaching session co-taught by a pediatric clerkship director and a medical informatics leader and is done virtually.

Learning Objectives

- Use VisualDx resources effectively when building a differential.
- Improve students' clinical reasoning skills, particularly knowing what items from a history and physical examination are most important in building a differential.

After a brief introduction, the first case is introduced in a slide presentation and VisualDx is opened on the web. The students are asked to identify findings. The students respond verbally and via chat. Instructors enter findings into the differential builder. As a group, students review the differential, making sure to consider all tabs before making a diagnosis.

After a diagnosis is made, the instructors discuss why the diagnosis fits the vignette well and walk through all the resources and features of VisualDx, such as:

- Monograph – child vs adult, synopsis, diagnostic pearls, links to PubMed, etc.
- Image types
- Image filters
- Patient education applications

After the case reviews, instructors also discuss health literacy and how to utilize resources to explain the diagnosis to families and patients. This process is repeated with another case study. Each student is required to do an assignment based on a third case.

Case Example

Case History

A 14-year-old boy with a past medical history of autism spectrum disorder is admitted with the following concerns, per his mother:

- Poor oral intake for years; refusal to eat over the last month
- Weight loss
- Frequent bleeding from mouth, particularly after teeth brushing
- Refusal to walk
- Complaints of pain in legs
- Swelling of legs
- Slow healing of minor wounds
- Rash on legs



“

VisualDx provides accessibility to a wealth of visuals representing the variation in disease presentation you simply cannot find in any other point-of-care resource. Seeing the look of relief in a mother's eyes after showing her pictures of her child's recurrent rash that had eluded diagnosis was all I needed to realize that this was a clinical tool I could not be without.

— TAD JACOBS, DO, CHIEF MEDICAL OFFICER, AVERA MEDICAL GROUP



Physical Examination

Upon admission, the team notes the following findings on physical examination:

- Gingival bleeding
- Gingival edema
- Purpura, prominent on the lower extremities
- Bilateral edema of lower extremities
- Splinter hemorrhages of nail beds
- Several poorly healed abrasions of extremities
- Limping with attempts to ambulate
- Significant pain with palpation of muscles diffusely

Diagnosis

Scurvy

Case Example #3: Pairing VisualDx with Basic Foundational Science Courses

Instructors are using VisualDx as a reference for clinical relevance in the institution's foundational science courses for first- and second-year medical students. Students and faculty have licensed VisualDx and are using customized resources including case vignettes and diagnostic image challenges to assist both in the classroom and in online education.

Learning Objectives

- Use knowledge from foundational courses in biochemistry, anatomy, and musculoskeletal and physiology, etc. and apply it to real-world clinical cases.
- Use the guided workup to consider additional relevant findings other than the chief complaint that may affect diagnosis.

Case Example

Case History

A 20-year-old male baseball player went to his primary care physician because he was experiencing pain in his right arm. There was no specific baseball injury reported, but he did use his right hand for catching and throwing the ball. He also had numbness in his hand, arm muscle weakness, and a prickling sensation.

Steps

1. Add the relevant findings based on description of physical exam into the differential builder:
 - **Arm pain**
 - **Hand numbness**
 - **Muscle weakness**
 - **Paresthesia**
 - **20-29-year-old male**
2. View the differential and consider the possibilities.
3. Review the differential in relation to previous lessons on anatomy in the upper body.
4. Did you make it to “cubital tunnel syndrome?”
5. Review images and descriptions of the various diseases.



“

VisualDx provides essential introductory elements to diagnosis and gives students the building blocks on which to begin their clinical training. It has proved invaluable as a teaching tool and will remain an important part of our medical school and residency training curriculum.

— PATRICIA MERCADO, MD, UNIVERSITY OF ALABAMA SCHOOL OF MEDICINE

Medical Education Resources for Educators and Students

In addition to the VisualDx system, we have created educational resources to be used in conjunction with VisualDx. These resources engage the learner in clinical decision-making and improve their knowledge of the proper use of information technology.

Problem-Based Learning

Students learn by inputting case findings in VisualDx, reviewing the differential diagnosis, and then discussing their logic.

Case Vignettes for Teaching

Use case stories to teach problem-solving with VisualDx.

LearnDerm

This self-study dermatology education resource consists of 5 interactive lessons to help build a solid foundation in essential terminology and improve pattern-recognition skills.

LearnDerm Companion Presentation

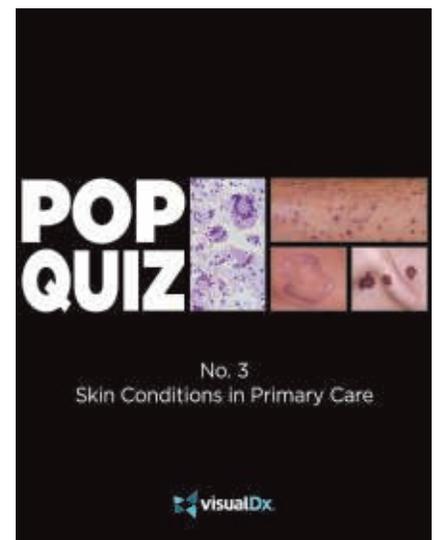
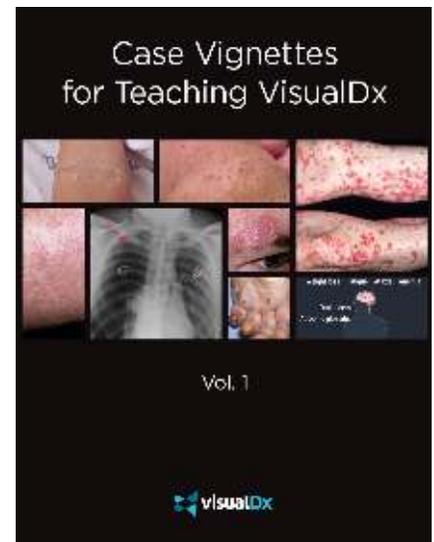
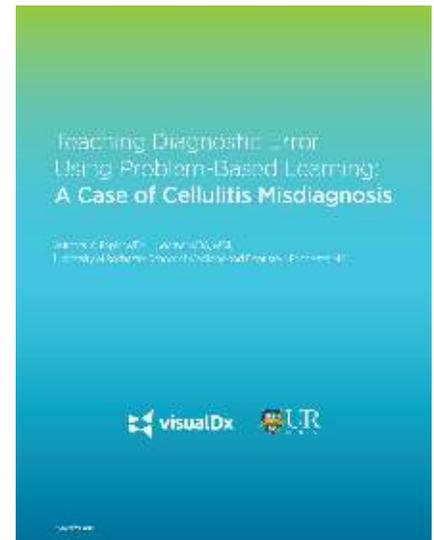
Covers several topics including “Identifying skin lesions,” “Introduction to Morphologic Variation,” and “In-class exam.”

Pop Quizzes

Six presentations consisting of high-quality medical images and multiple-choice responses. Answers provided.

Mobile Quiz

Available on all mobile platforms and featuring images from the vast VisualDx image collection, the quiz improves pattern recognition and assists in exam preparation.



Adding VisualDx to Your Curriculum

VisualDx can help you and your program teach clinical reasoning skills, point-of-care information access, and how cognitive bias impacts accuracy and diagnosis. We have created readily available resources to assist both in the classroom and online education, with virtual education our new normal in this post-COVID world.

You can seamlessly incorporate VisualDx into your curriculum without missing a beat because **VisualDx is fully integrated with Canvas LMS**. Students can begin learning with VisualDx during their first year and continue using the tool throughout their medical careers, acting as a bridge from an academic setting to a clinical one.

Using a reference tool at the point of care can arm students with the knowledge to better identify diseases accurately no matter their location, specialty, or level of experience. It's as if the future physician, nurse practitioner, or physician assistant has an instant second opinion right at her fingertips.

Review of Key Features

- Complements case-based learning and collaborative problem-solving
- Improves pattern-recognition skills
- Provides expert peer-reviewed resources
- Enhances medical school learning virtually, in the classroom, in the clinic, and on the wards
- Easily integrates into problem-based learning and GME-level programs
- Includes quiz feature



Contact

sales@visualdx.com
for ways to implement
VisualDx into your
curriculum.