Problem-Based Learning in Healthcare Education

with Lecturio

lecturio

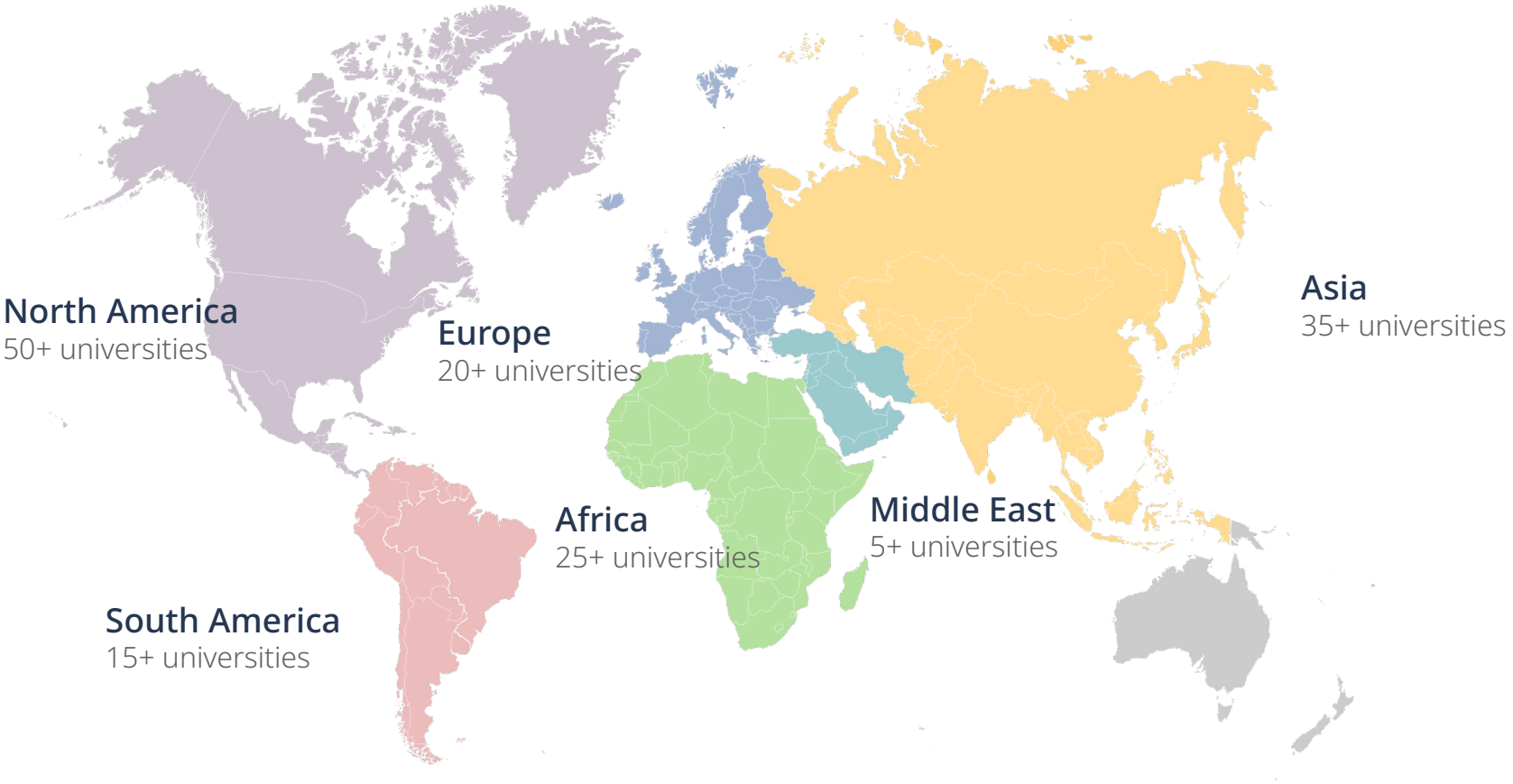
Today's Speaker

Adonis Wazir

Medical Doctor, East Surrey Hospital, United Kingdom

MSc Medical Education candidate, Swansea University Medical School

Medical Education Consultant, Lecturio


North America
50+ universities
Europe
20+ universities
Asia
35+ universities
Africa
25+ universities
Middle East
5+ universities
South America
15+ universities

Today’s Agenda

1. Introduction to Lecturio
2. What is Problem-Based Learning (PBL)?
3. Why use PBL?
4. How to use PBL
5. How Lecturio can support

Who are we?

Lecturio

comprehensive digital medical education platform

Content from top professors including from

Yale University School of Medicine

HARVARD UNIVERSITY

Stanford University

BROWN Alpert Medical School

JOHNS HOPKINS SCHOOL of MEDICINE

Lecturio Covers the Entire

Medical & Nursing

Curricula in all key learning formats

12,000+ High-End Videos
in TV quality, short, and engaging

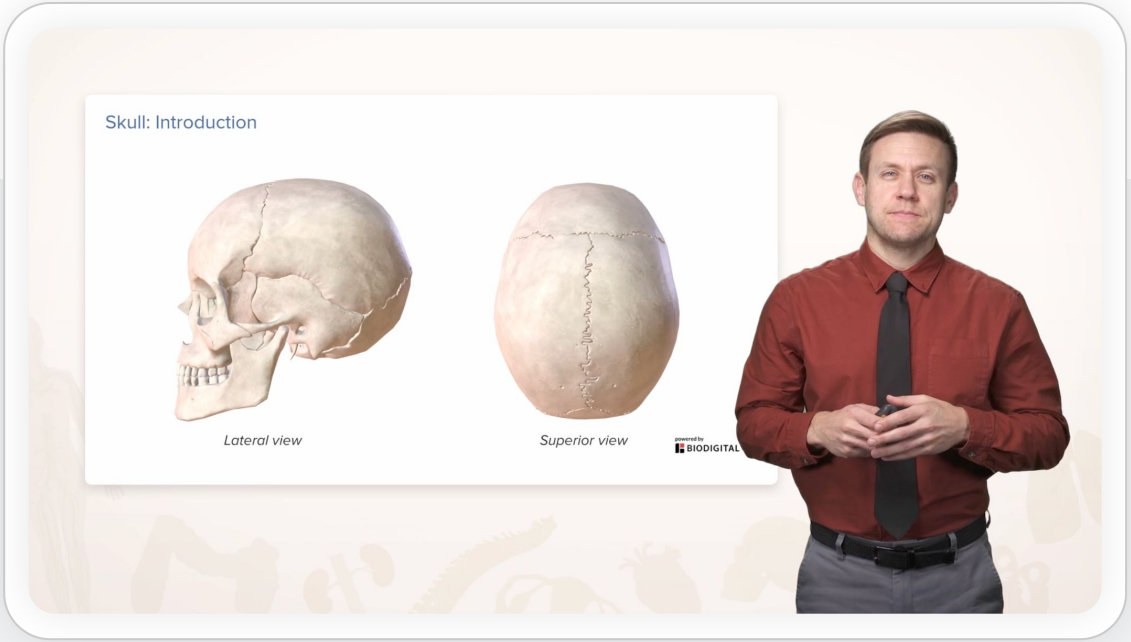
9,800+ Clinical Cases
with text and video explanations

35,000+ Recall Questions
using a spaced repetition algorithm and adaptive review

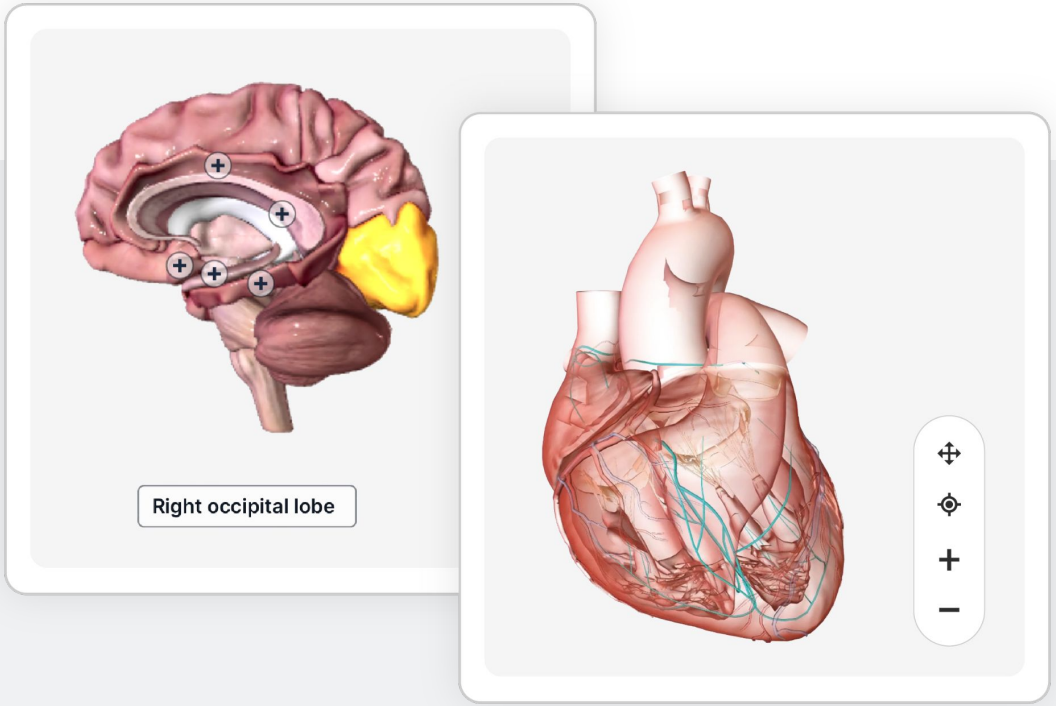
1,500+ Concept Pages
organized in a comprehensive library

Concise Videos on All Key Concepts

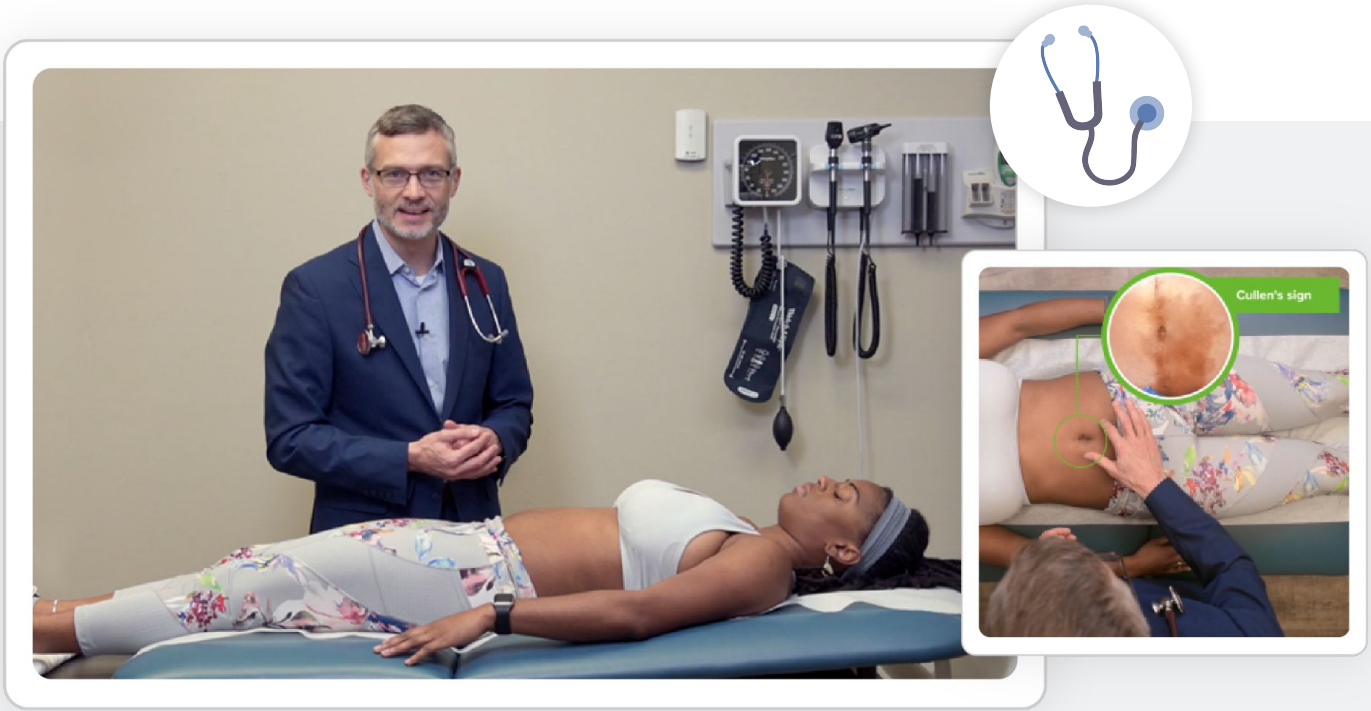
- All key medical concepts are covered in-depth
- 3-9 minutes
- Linked recall questions for formative assessment



3D Anatomy With 400 Pre-Mapped Views



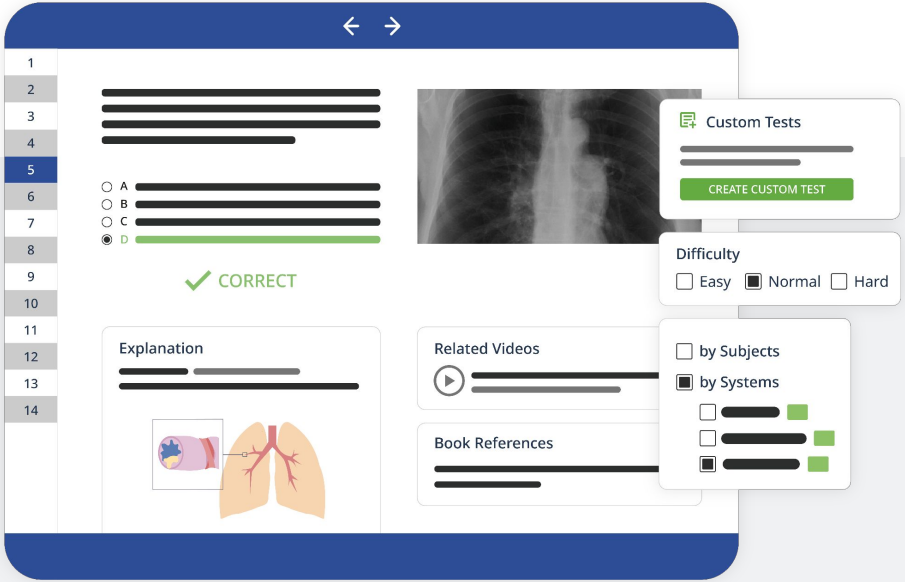
Comprehensive Coverage of Clinical Skills



Comprehensive Coverage of Clinical Skills

Clinical Cases to Practice Application of Learned Concepts

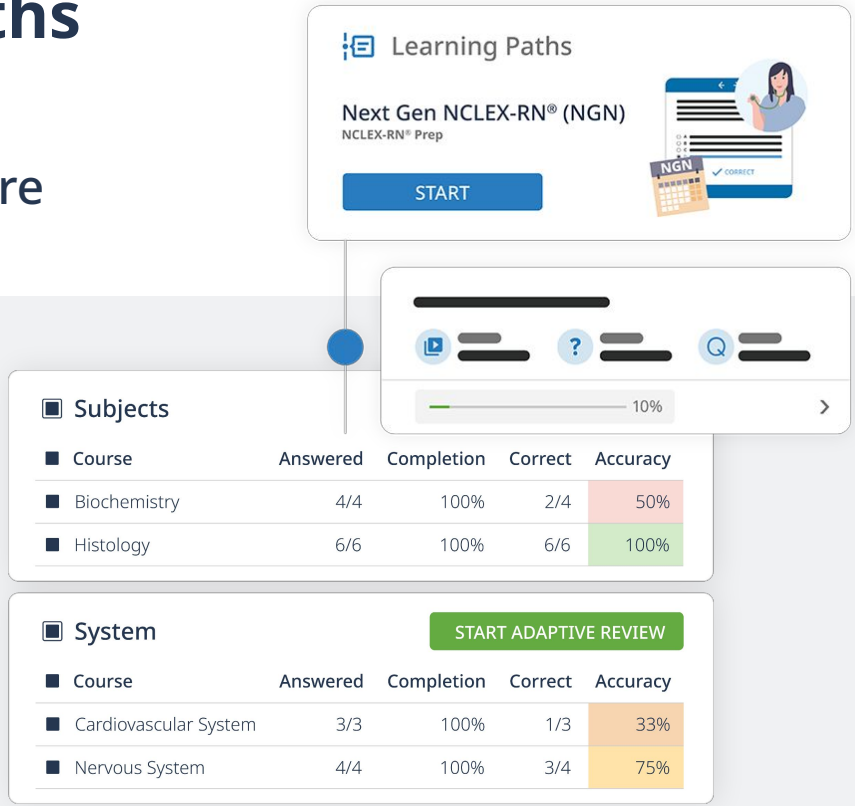
- Real-life clinical scenarios
- Automated feedback
- Linked videos
- Use for self-directed learning or exams



Detailed Learning Paths

for USMLE® Step 1, 2, NBME Subject Exams, NP, NGN & More

- Learning Paths combine video and Qbank blocks
- **Adaptive review** within each path



Lecturio Concept Pages

The fastest and easiest way to find and fill knowledge gaps

Heart: Anatomy

The heart is a 4-chambered muscular pump made primarily of cardiac muscle tissue. The heart is divided into 4 chambers: 2 upper cham
receiving blood from the great vessels, known as the right and left atria, and 2 stronger lower chambers, known as the right and left ventricle
pump blood throughout the body. Blood flows through the heart in 1 direction, moving from the right side of the heart, through the lungs, a
returning to the left side of the heart, where it is pumped out to the rest of the body. As blood moves through the heart, 4 important valves
backflow. The heart muscle itself is supplied by the coronary arteries. The heart also has its own conduction system, triggering its own
contractions.

Last updated: March 10, 2023

0/10 questions correct START TEST

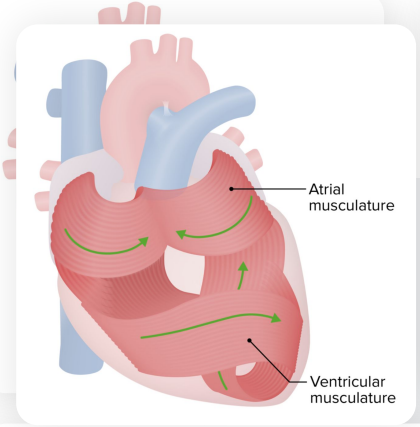
CONTENTS

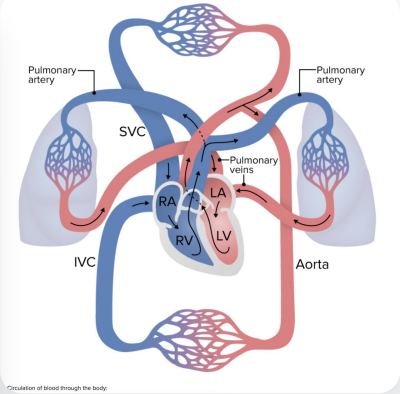
General Structure and Location of the Heart

Overview of the heart structure

The heart is a 4-chambered muscular pump made of cardiac muscle tissue.

- 4 primary muscular chambers:
  - Right atrium (RA)
  - Right ventricle (RV)
  - Left atrium (LA)
  - Left ventricle (LV)
- Connections to the great vessels:
  - Veins (bring blood back to the heart):
    - Superior and inferior vena cava (deoxygenated) → RA
    - Pulmonary veins (oxygenated) → LA
  - Arteries (carry blood away):
    - Pulmonary trunk and pulmonary arteries (deoxygenated) → from the RV
    - Aorta (oxygenated) → from the LV





Related videos

Cardiovascular System – Anatomy of the Heart

Components of the Heart – Anatomy of the Heart

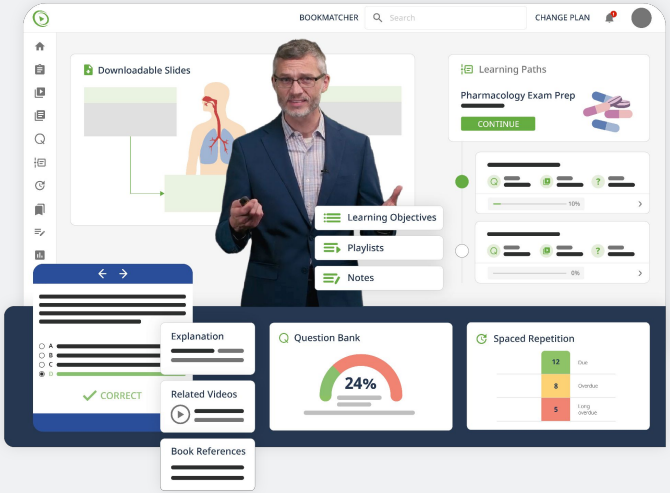
Surface Anatomy of the Heart – Heart (Cor)

The Two Sides of

Precision Health Science Teaching

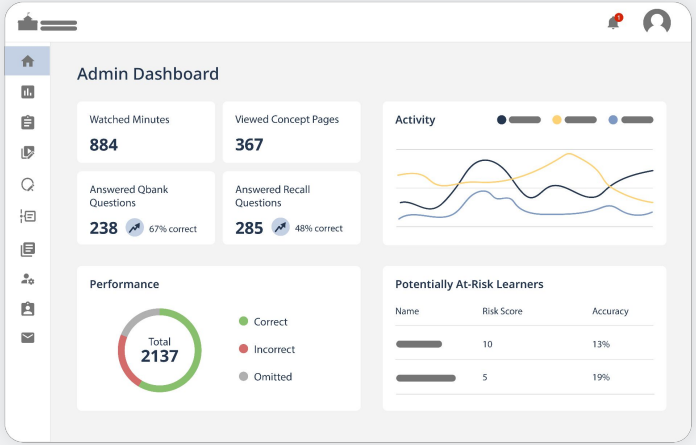
For Students

Personalized smart tutor



For Faculty

Digital teaching assistant

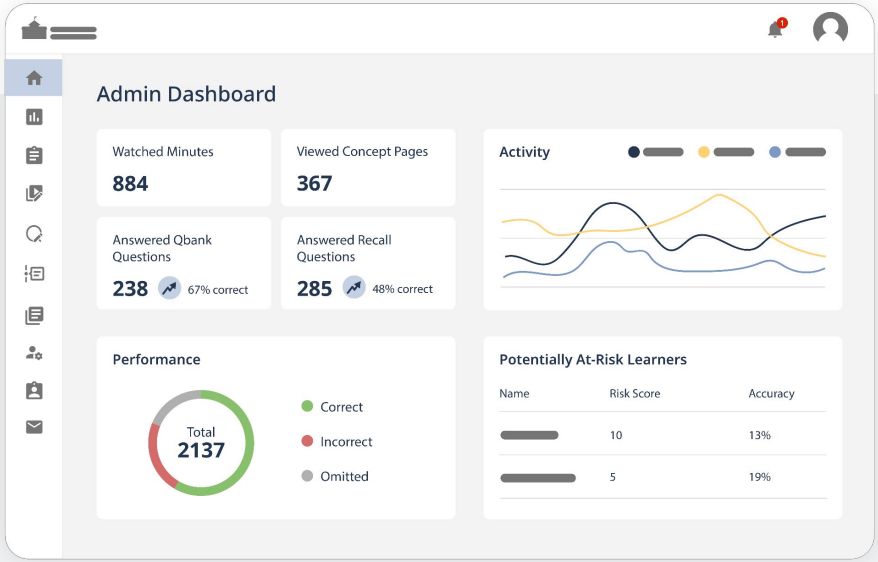


Comprehensive Tracking Enables a Comprehensive

Live Faculty Dashboard

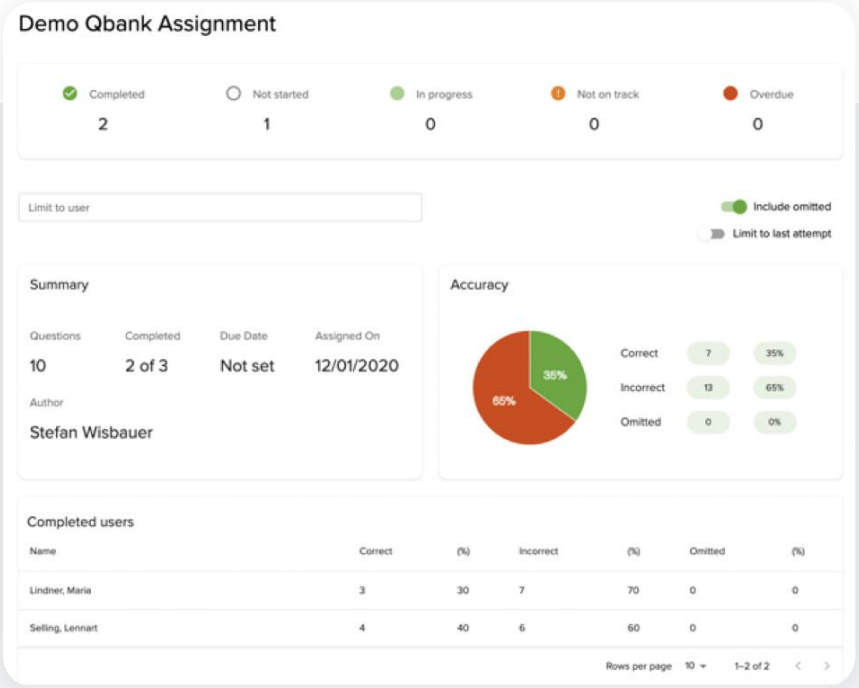
The system tracks:

- competence
- confidence
- overconfidence
- spaced repetition adherence
- mastery level
- typical mistakes
- readiness assessments



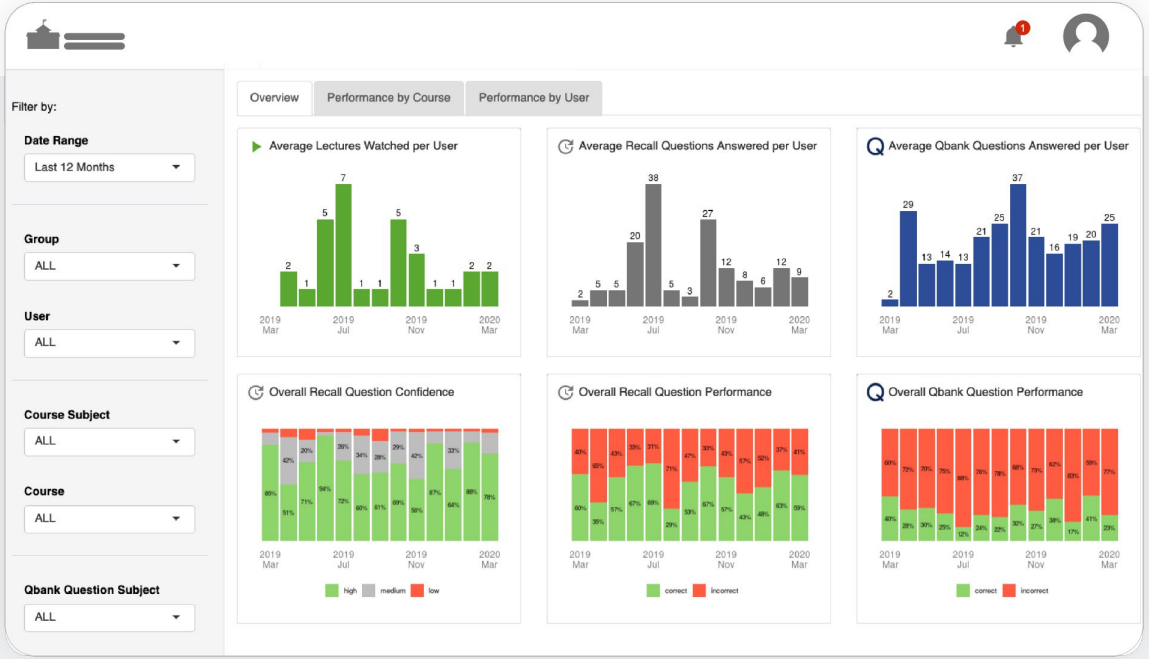
Assignment Stats

Help Focus Teaching Time on Where Students Struggle Including Typical Mistakes



Your Teaching Dashboard

Aggregate Data With Location Drill-Down on Activity, Competence, Confidence, Over-Confidence



Easy Integration With Your Existing Setup

LMS / Testing

- CANVAS
- Bb
- moodle
- SEB
- proctorio

Deep Linking
LTI SSO

Proctoring
Integrations

Session Prep:
Strengths &
Weaknesses,
Typical Mistakes

Content &
Recording
Upload

Live Teaching & Training

- Microsoft Teams
- zoom

Data Lake / Analytics

- Power BI
- R

What is Problem-Based Learning (PBL)?

Definition and key principles

What is Problem-Based Learning?

A pedagogical approach that enables students to learn while engaging actively with meaningful problems

Elaine H.J. Yew, Karen Goh. Problem-Based Learning: An Overview of its Process and Impact on Learning. *Health Professions Education.* Volume 2, Issue 2, 2016, Pages 75-79, ISSN 2452-3011, https://doi.org/10.1016/j.hpe.2016.01.004.

What is Problem-Based Learning?

Well-established and used in:

1. Undergraduate
2. Postgraduate
3. Continuing medical education

Engel CE. Problem- based learning. Br J Hosp Med. 1992 Sep 16-Oct 6;8(6):325–9.

What is Problem-Based Learning?

Facilitates learning that is:

1. Constructive
2. In context
3. Collective
4. Self-directed

Maastricht University. School of Health Professions Education. https://www.maastrichtuniversity.nl/education/why-um/problem-based-learning

Problem-Based Learning Continuum

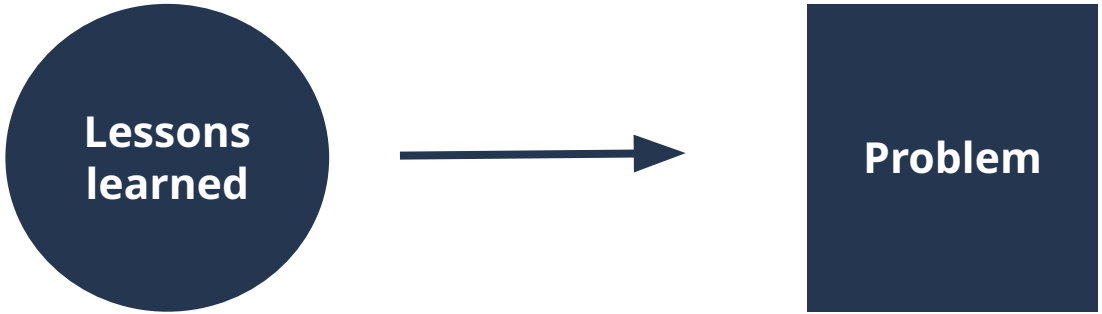
Davis, My Harden, and R. M. Harden. "AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide." Medical teacher 21.2 (1999): 130-140.

Problem-Based Learning Continuum

Traditional teaching

Davis, My Harden, and R. M. Harden. "AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide." Medical teacher 21.2 (1999): 130-140.

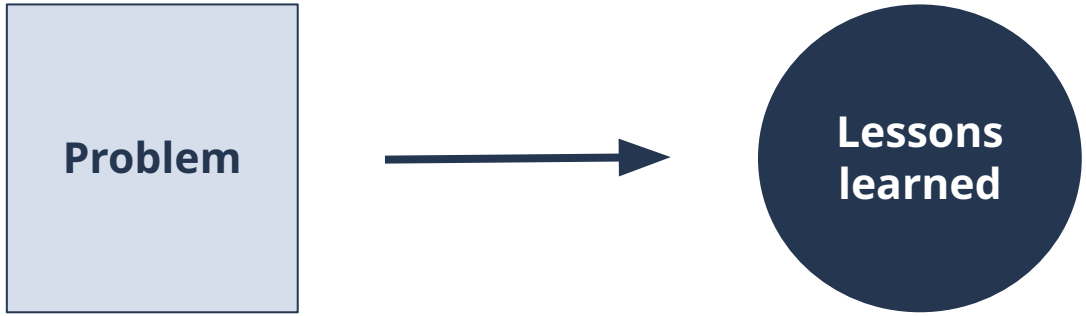
Problem-Based Learning Continuum



Problem-assisted learning

Davis, My Harden, and R. M. Harden. "AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide." Medical teacher 21.2 (1999): 130-140.

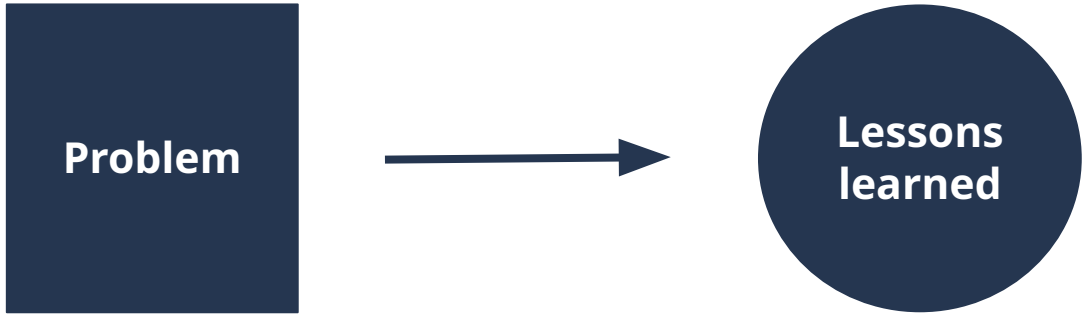
Problem-Based Learning Continuum



Problem-initiated learning

Davis, My Harden, and R. M. Harden. "AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide." Medical teacher 21.2 (1999): 130-140.

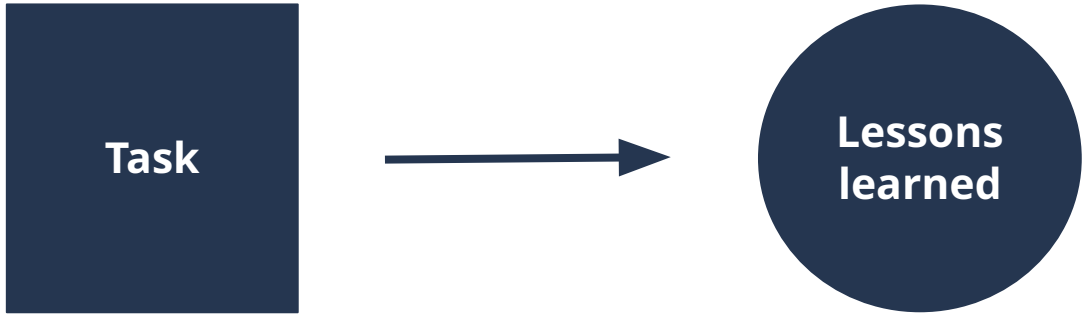
Problem-Based Learning Continuum



Problem-based learning

Davis, My Harden, and R. M. Harden. "AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide." Medical teacher 21.2 (1999): 130-140.

Problem-Based Learning Continuum



Task-based learning

Davis, My Harden, and R. M. Harden. "AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide." Medical teacher 21.2 (1999): 130-140.

PBL vs Traditional teaching methods

PBL	Traditional teaching methods
Student-centered	Teacher-centered
Educator is a facilitator and guide	Educator is primary source of knowledge
Collaborative, small-group	Larger class sizes
Dynamic content	Predetermined curriculum
Engaging	Varying levels of engagement

PBL: Small Group Teaching

- PBL vs TBL vs CBL - small group teaching
- Short-case PBL vs Progressive-release PBL
- ‘Small’ group teaching?
- Active, self-directed, learning
- Role of the educator: instructor, devil’s advocate, neutral chair, consultant, facilitator
- Dealing with group members

Swanwick, Tim. "Understanding medical education." Understanding Medical Education: Evidence, Theory, and Practice (2018): 123-137

Why use Problem-Based Learning (PBL)?

Benefits and evidence

PBL vs Traditional Approaches

1. Results in better long-term knowledge retention
2. Improved clinical reasoning and performance on skill-based assessments
3. Better student satisfaction with training, clinical education, and skills development

1. J. Strobel, A. van Barneveld. When is PBL more effective? A meta-synthesis of meta-analyses comparing PBL to conventional classrooms Interdiscip J Problem-based Learn, 3 (1) (2009), p. 4
2. I.-S. Shin, J.-H. Kim. The effect of problem-based learning in nursing education: a meta-analysis. Adv Health Sci Educ, 18 (5) (2013), pp. 1103-1120
3. K.J. Oja. Using problem-based learning in the clinical setting to improve nursing students' critical thinking: an evidence review. J Nurs Educ, 50 (3) (2011), pp. 145-151

Scoping Review (2022)

Outcome	In favor of PBL	In favor of traditional methods	No difference
Learning and knowledge acquisition (71)	49	3	19
Social and communication skills (5)	5	0	0
Student satisfaction (60)	51	2	7
Tutor satisfaction (15)	8	2	5
Problem-solving (9)	9	0	0

Trullàs, J.C., Blay, C., Sarri, E. et al. Effectiveness of problem-based learning methodology in undergraduate medical education: a scoping review. BMC Med Educ 22, 104 (2022). https://doi.org/10.1186/s12909-022-03154-8

Acquiring useful skills

1

Communication skills: active listening, presenting, questioning, responding, clarifying, empathising

2

Team work: contributing to/collaborating with/learning from others

3

Testing and applying knowledge, constructing/defending an argument

4

Giving and receiving constructive feedback

Swanwick, Tim. "Understanding medical education." Understanding Medical Education: Evidence, Theory, and Practice (2018): 129

How to use Problem-Based Learning (PBL)

Application and implementation

PBL Process: Harvard Medical School

1. Group receives the written problem scenario without the opportunity to study it beforehand
2. The student group defines the problem
3. The study group identifies the learning goals
4. Students work independently to achieve the learning outcomes
5. The group is reconvened. The students build new learning on top of prior knowledge. They review if objectives were met.
6. The group synthesizes and summarizes their work. They generalize from the specific problem to other situations

Davis, My Harden, and R. M. Harden. "AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide." Medical teacher 21.2 (1999): 130-140.

PBL Process: Maastricht Medical School

1. Students clarify the text of the problem in a group
2. Students define the problem
3. Brainstorming is used to identify explanations for phenomena observed in the scenario
4. The group reaches interim conclusions about the problem
5. The group formulates the learning objectives
6. Students work independently to achieve the learning outcomes
7. The group reconvenes to discuss the knowledge acquired

Davis, My Harden, and R. M. Harden. "AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide." Medical teacher 21.2 (1999): 130-140.

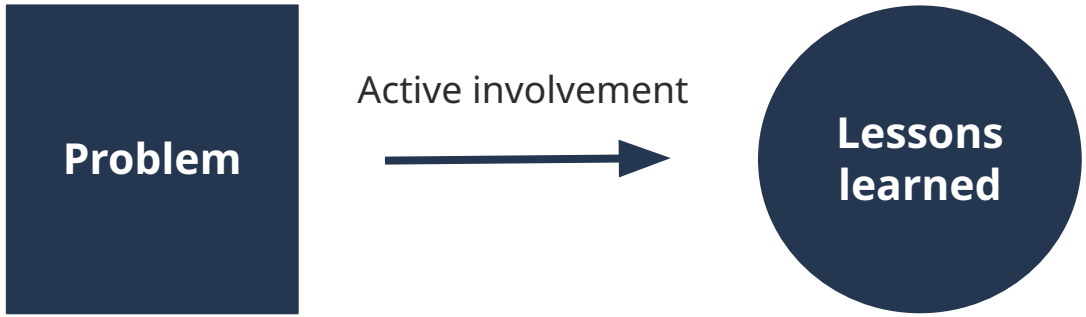
Deciding on a PBL approach

Consider:

- Outcomes of the course - information retention vs application
- Students and staff - training and motivation
- Resources - spaces, facilitators
- Learning context - pre-clinical vs clinical?
- Importance of communication skills
- Student preferences

Davis, My Harden, and R. M. Harden. "AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide." Medical teacher 21.2 (1999): 130-140.

PBL: The basic concept is the same



Davis, My Harden, and R. M. Harden. "AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide." Medical teacher 21.2 (1999): 130-140.

InterPLAY Instructional Events

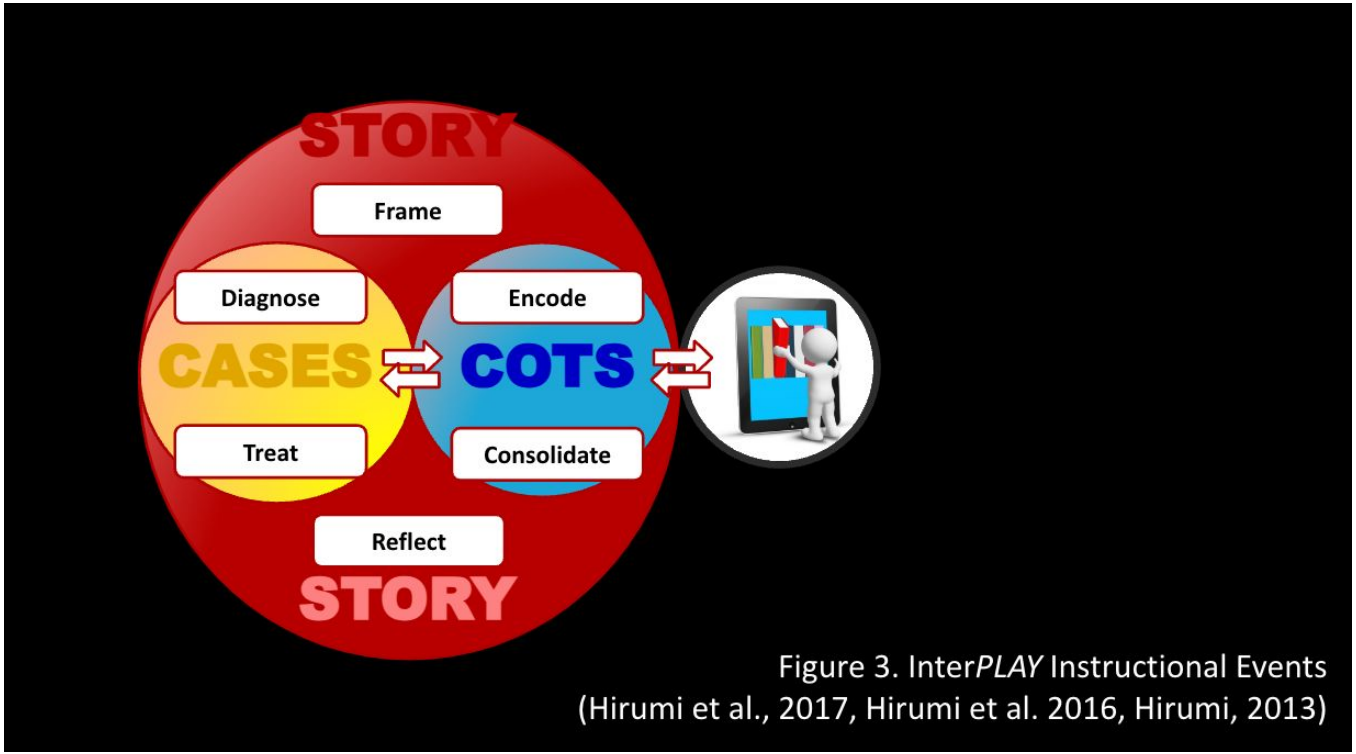


Figure 3. Inter*PLAY* Instructional Events
(Hirumi et al., 2017, Hirumi et al. 2016, Hirumi, 2013)

How to optimize your PBLs

Create Good Problems

- Consider your learning outcomes
- Consider the context and which stage of the curriculum it is in
- Ensure adequate relevance, and authenticity
- Integrate basic and clinical sciences or different disciplines
- Make sure the problem is open to allow for discussion
- Consider how the case will stimulate students' self-directed learning
- Create detailed notes for the facilitators!
- Role of AI? - with caution!

1. Dolmans, D.H.J.M, Snellen-Balendong, H., Wolfhagen, I.H.A.P, & Van Der Vleuten, C.P.M. (1997). Seven principles of effective case design for a problem-based curriculum. *Medical Teacher*, 19:pp 185-189.
2. Samy A. Azer, Ray Peterson, Anthony P. S. Guerrero & Gudrun Edgren (2012) Twelve tips for constructing problem-based learning cases, Medical Teacher, 34:5, 361-367, DOI: 10.3109/0142159X.2011.613500

Involve your students!

- Ground rules
- Role allocation
- Group dynamics
- Feedback
- Monitor progress
- Critical thinking
- Collaborative learning

Becoming a student in a PBL course: twelve tips for successful group discussion, Medical Teacher, 26:1, 12-15, DOI: 10.1080/0142159032000156533

Don’t forget to

- Establish clear learning objectives
- Select relevant and engaging problems
- Foster effective group dynamics
- Provide adequate support and resources
- Assess both process and product

How can Lecturio help?

InterPLAY Instructional Events

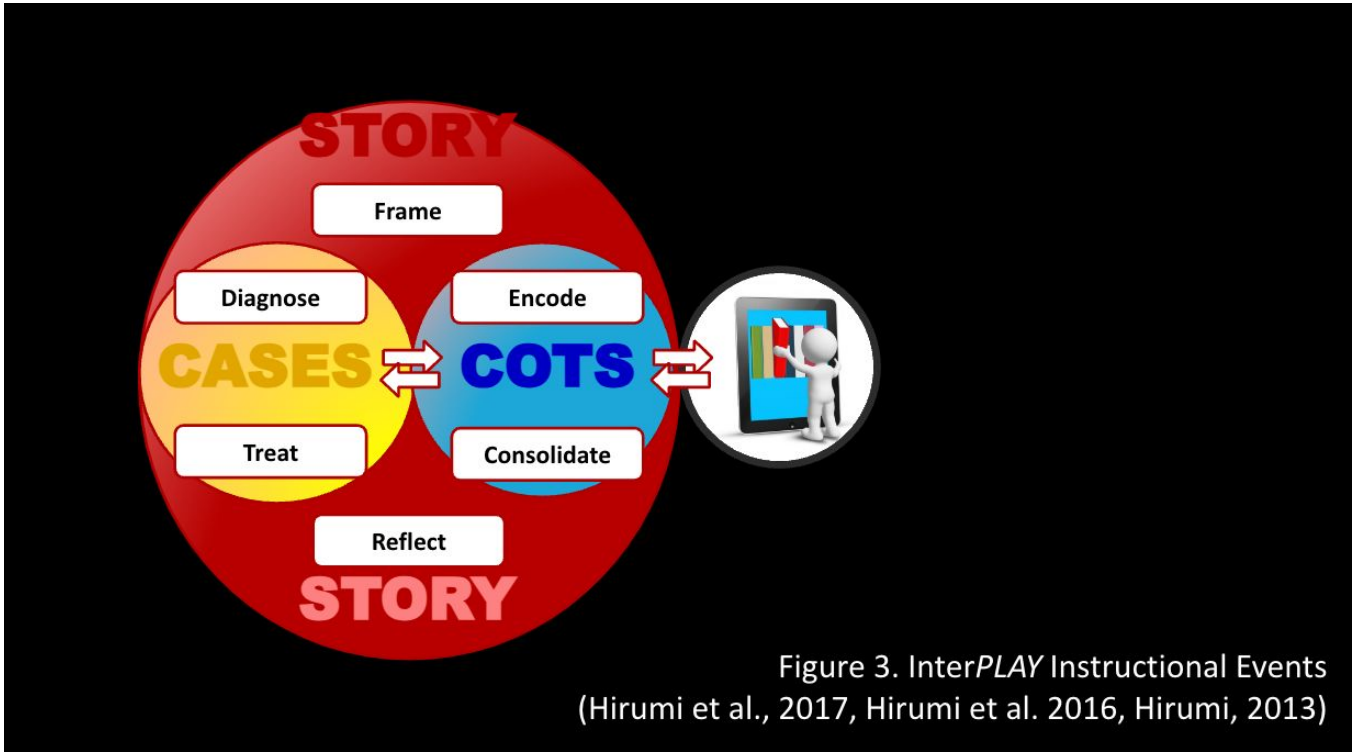
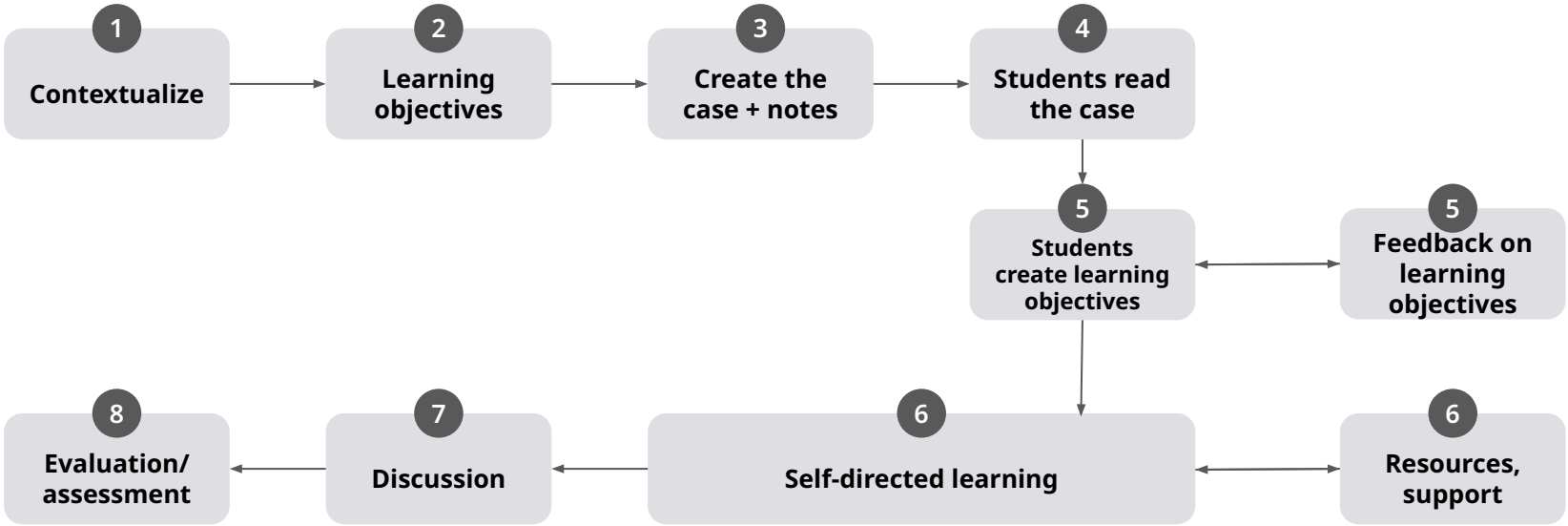


Figure 3. Inter*PLAY* Instructional Events
(Hirumi et al., 2017, Hirumi et al. 2016, Hirumi, 2013)

Designing a PBL exercise

with Lecturio



1

Contextualize

At what stage of the curriculum?

- Pre-clinical or clinical?
- What lectures/other educational activities are the students currently attending?
- What is the focus?

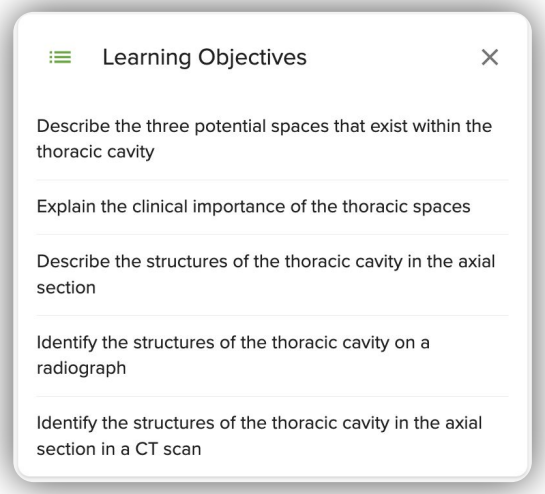
Example:

“The pediatrician conducts a thorough physical examination, noting enlarged tonsils with visible exudate and tender cervical lymph nodes. Lily's vital signs are within the normal range, except for a low-grade fever. Based on the symptoms and examination findings, the doctor suspect **tonsillitis** but consider various possible causes, including **viral or bacterial infections**.”

2

Learning Objectives

What are the intended outcomes?



Lecturio’s content is driven by learning objectives to help you map what resources are needed

3

Create the case + notes

Sample Case Vignette

Student copy

Lily is a 6-year-old girl who has been brought in by her parents, Mr. and Mrs. Johnson. Lily has been experiencing recurrent bouts of throat pain, fever, and difficulty swallowing for the past few months.

Lily's parents report that she has had multiple episodes of sore throat, each lasting a few days, over the past six months. They mention that Lily has missed school and social activities due to these recurrent infections. Mrs. Johnson notes that Lily's tonsils appear swollen and have white patches on them during these episodes. Lily's medical history includes seasonal allergies, but no other significant illnesses or surgeries.

The pediatrician conducts a thorough physical examination, noting enlarged tonsils with visible exudate and tender cervical lymph nodes. Lily's vital signs are within the normal range, except for a low-grade fever. Based on the symptoms and examination findings, the doctor suspect tonsillitis but consider various possible causes, including viral or bacterial infections.

3

Create the case + notes

What prompts can you ask to stimulate a discussion?

Sample Case Vignette

Student copy

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3

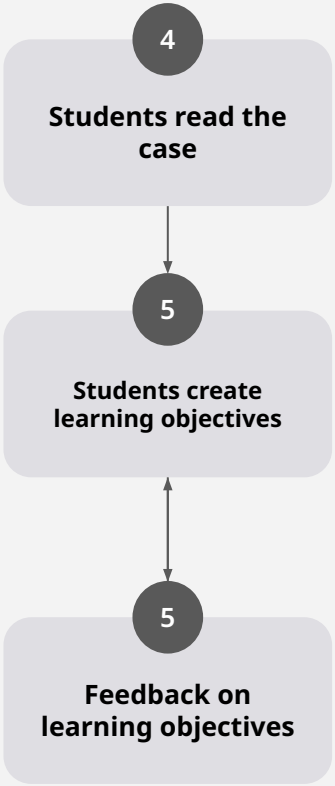
Create the case + notes

Sample Case Vignette

Educator copy

Lily is a 6-year-old girl who has been brought in by her parents, Mr. and Mrs. Johnson. Lily has been experiencing recurrent bouts of throat pain, fever, and difficulty swallowing for the past few months. [Discuss differential diagnosis]
Lily's parents report that she has had multiple episodes of sore throat, each lasting a few days, over the past six months. They mention that Lily has missed school and social activities due to these recurrent infections. Mrs. Johnson notes that Lily's tonsils appear swollen and have white patches on them during these episodes. Lily's medical history includes seasonal allergies, but no other significant illnesses or surgeries. [Discuss significance of findings]

The pediatrician conducts a thorough physical examination, noting enlarged tonsils with visible exudate and tender cervical lymph nodes. Lily's vital signs are within the normal range, except for a low-grade fever. Based on the symptoms and examination findings, the doctor suspect tonsillitis but consider various possible causes, including viral or bacterial infections. [What are other causes?]

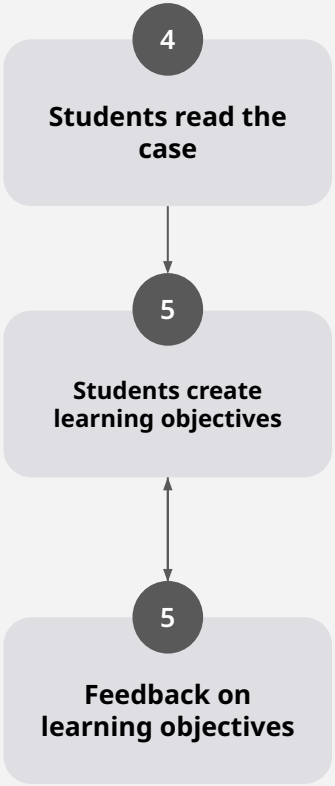


Audience:
Who are the learners?

Behavior:
What will they do?

Condition:
What are the resources, tools, or environment?

Degree:
What determines success?



Audience:
Who are the learners?

Students

Behavior:
What will they do?

will describe

Condition:
What are the resources, tools, or environment?

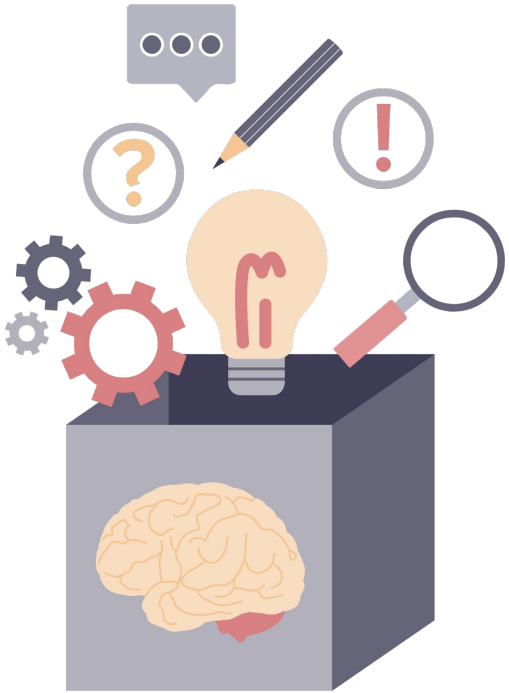
how DNA probes can be used to detect specific nucleic acid sequences in clinical specimens

Degree:
What determines success?

at a level of detail sufficient for another student to complete the procedure.

SMART Model

- **S-** Specific
- **M-** Measurable
- **A-** Attainable
- **R-** Relevant
- **T-** Time-bound



1. Chatterjee D, Corral J. How to Write Well-Defined Learning Objectives. J Educ Perioper Med JEPM [Internet]. 2017 Oct 1 [cited 2022 Jul 27];19(4):E610. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5944406/

6

Self-directed Learning

COTS - Lecturio Resources

12,000+ High-End Videos
in TV quality, short, and engaging

9,800+ Clinical Cases
with text and video explanations

35,000+ Recall Questions
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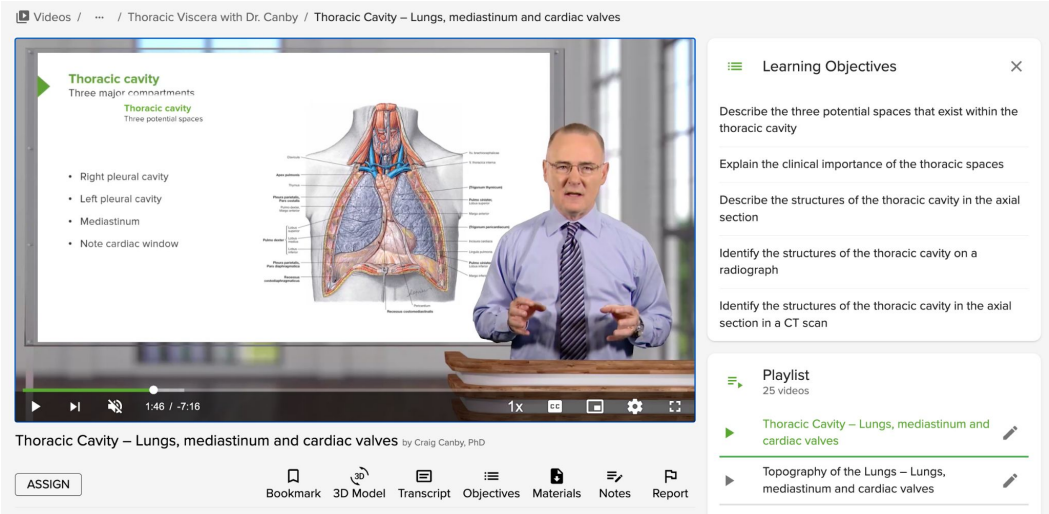
6

Self-directed Learning

Lecturio Resources

Video library



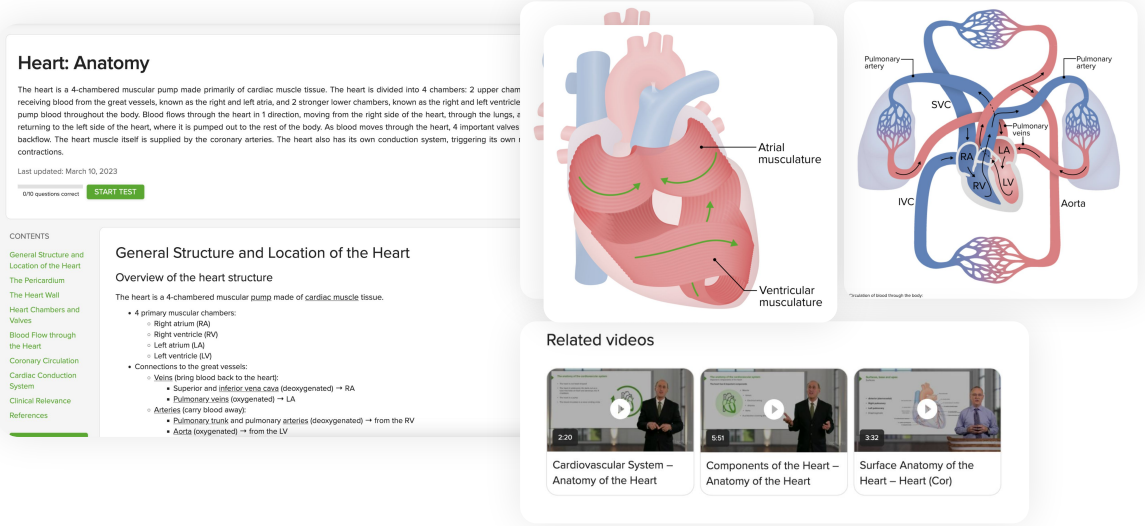
Our video library and concept notes provide a ready-to-use repository of content

6

Self-directed Learning

Lecturio Resources

Concept pages

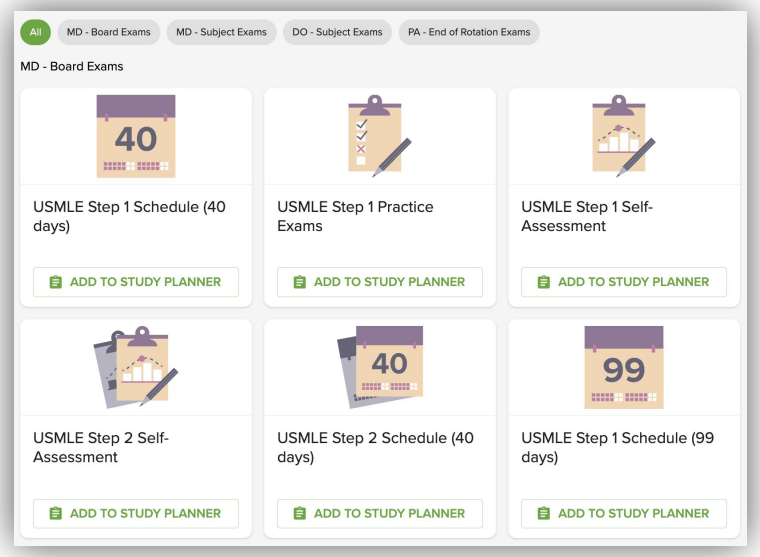


6

Self-directed Learning

Lecturio Resources

Learning Paths

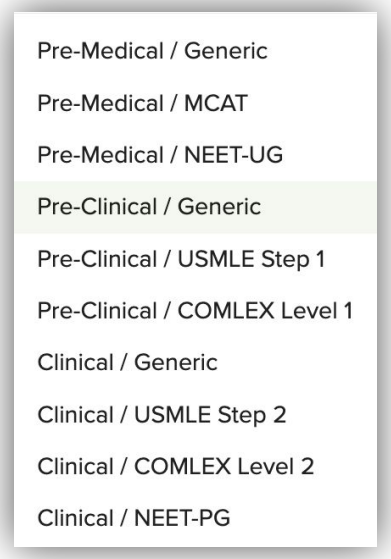


6

Self-directed Learning

Lecturio Resources

Course Mapping



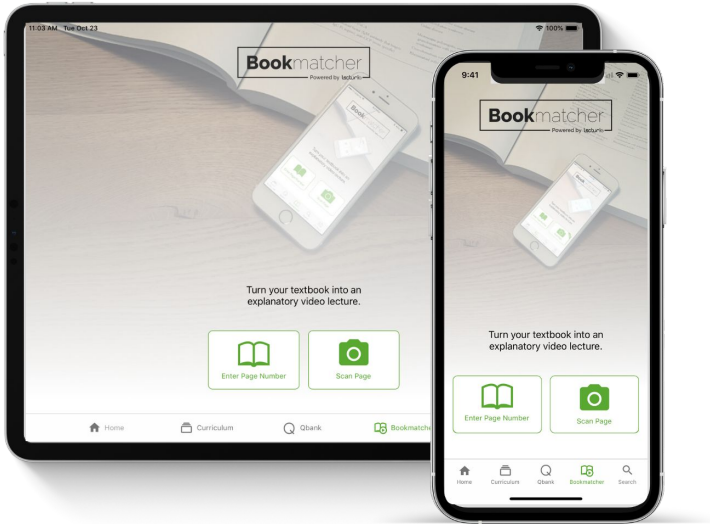
Lecturio course mapping can take the burden off of educators by curating content into courses that fit your curriculum and plans.

6

Self-directed Learning

Lecturio Resources

Desktop and App access



The Lecturio web app and mobile app can be some of the technological tools that teachers include as part of their instructional approach.

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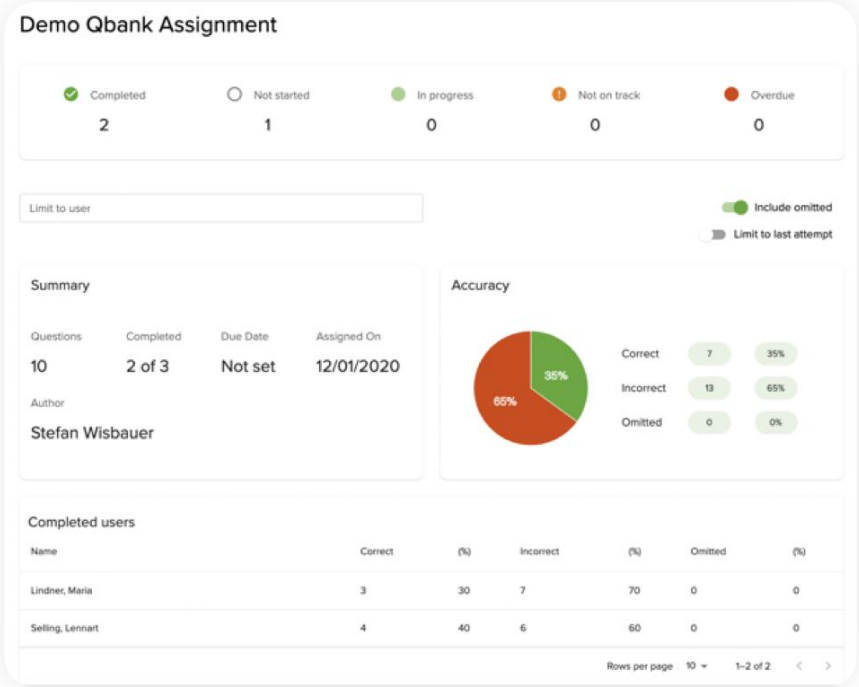
(Directed?) Self-directed Learning

Lecturio Resources

Assignments

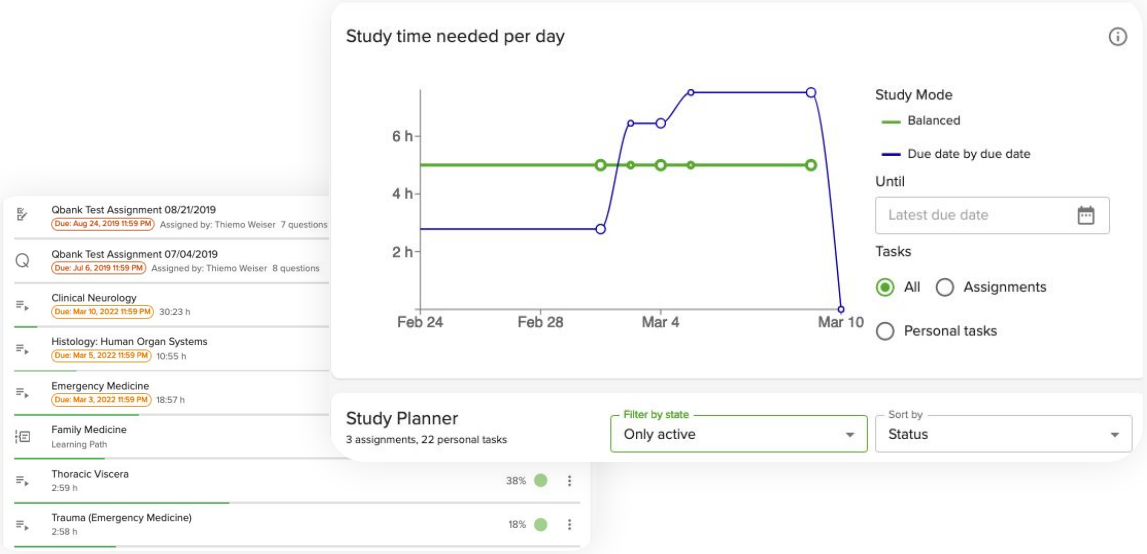


6

Self-directed Learning

Lecturio Resources

Study Planner



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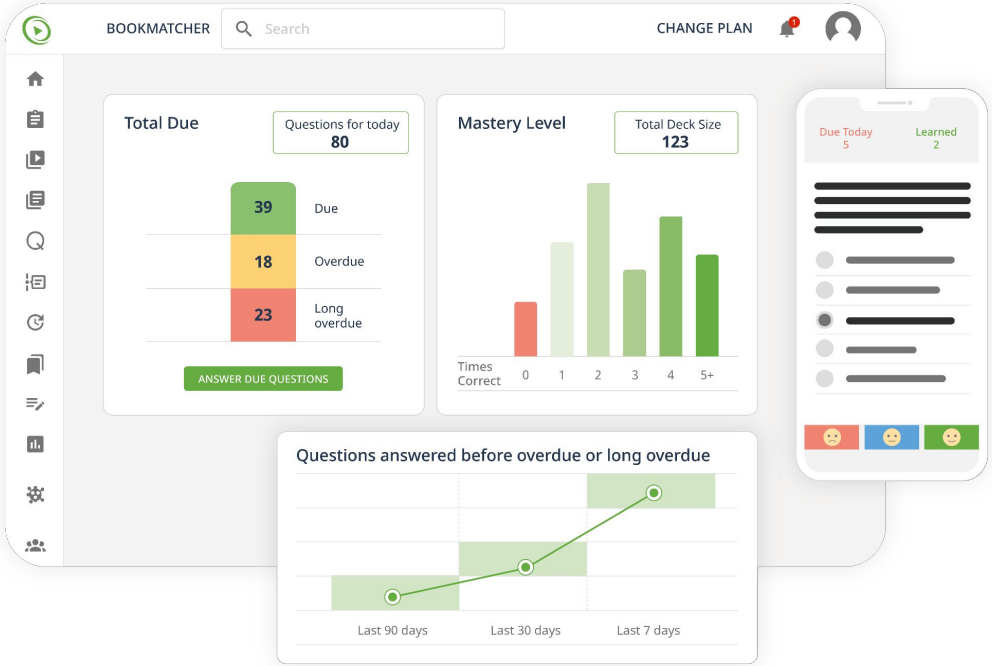
Self-directed Learning

Lecturio Resources

Spaced Retrieval

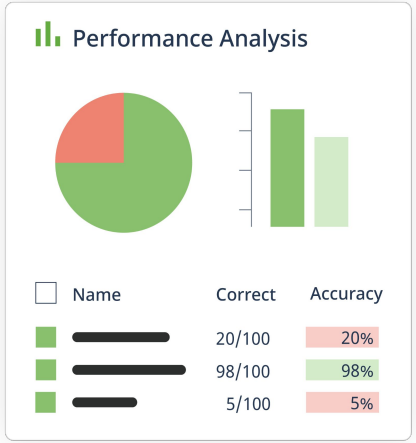


6

Self-directed Learning

Lecturio Resources

Adaptive Review

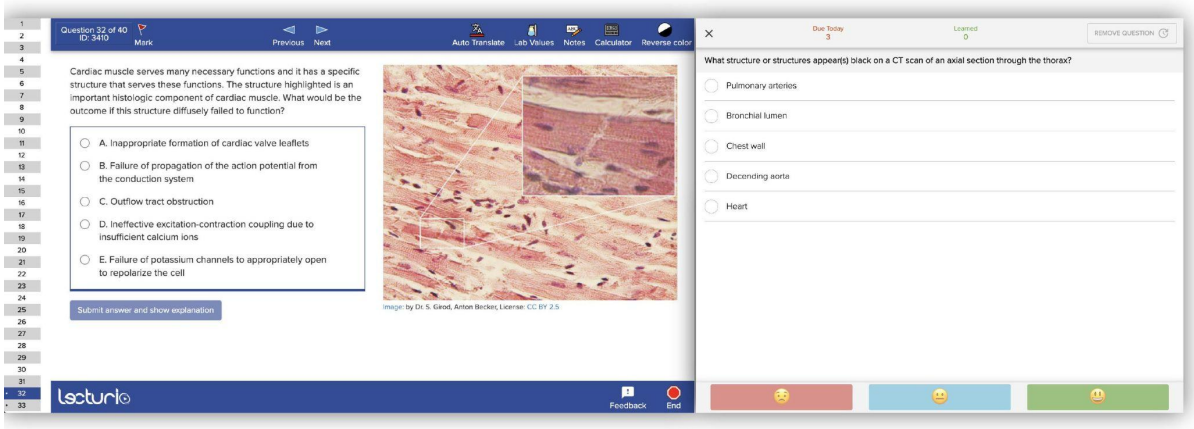


8

Evaluation/ Assessment

Lecturio Resources

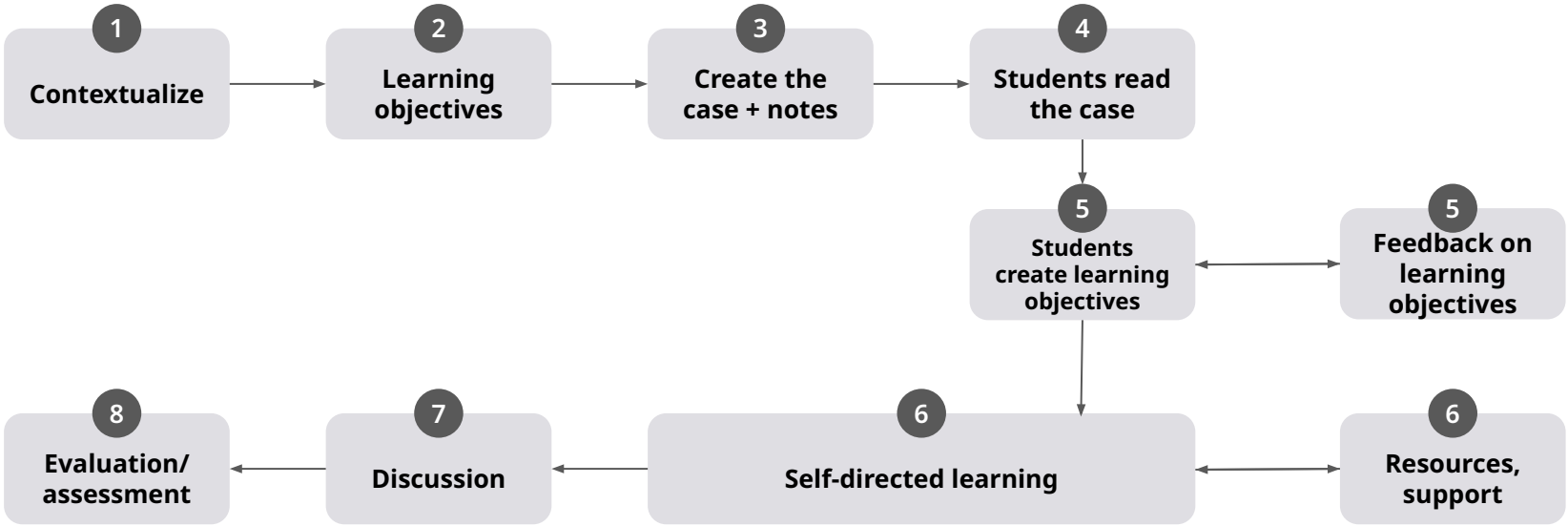
Question Bank



Qbank and Quiz Questions repository can act as springboard for educators to align assessments from. Pre-mapped Qbank helps take burden off of educators.

Designing a PBL exercise

with Lecturio



Today’s Agenda

1. Introduction to Lecturio
2. What is Problem-Based Learning (PBL)?
3. Why use PBL?
4. How to use PBL
5. How Lecturio can support

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