How to

Apply Evidence to Tackle Misconceptions in Medical Education

May 5, 2021
Online Seminar

Welcome to the Durable Learning Seminar Series

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An Era of Medical Education Challenges

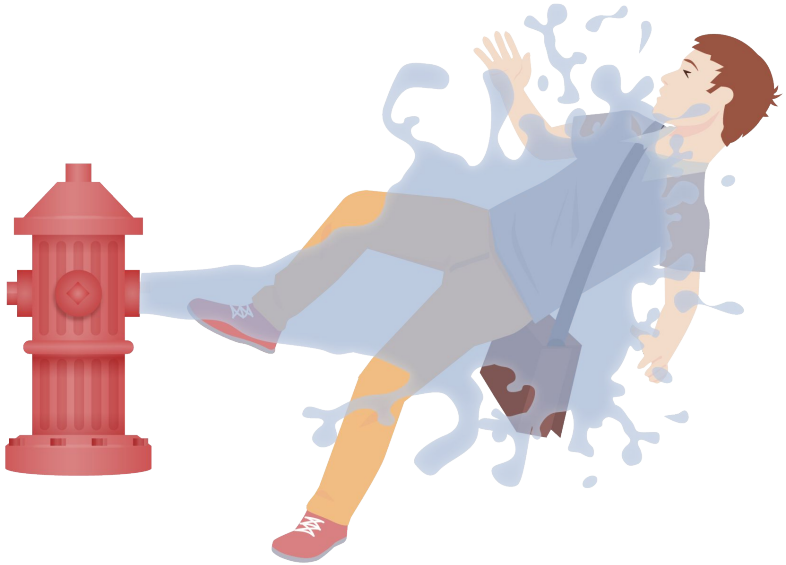
Primary School

Snacks & recess

Secondary School

A few papers & readings

Medical School



Make it stop!

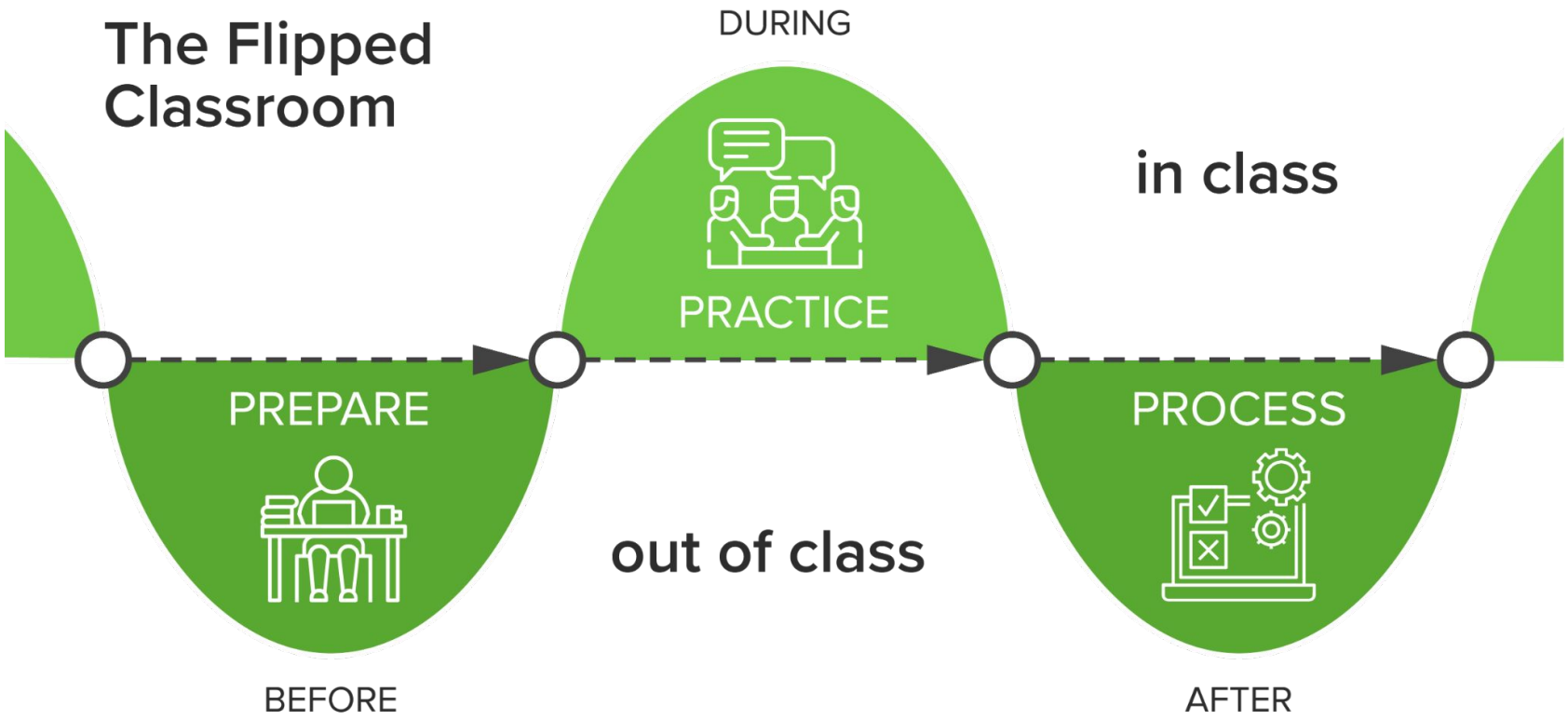
An Era of Innovative Solutions

Application of learning strategies to improve the process of knowledge acquisition, retention, and understanding

Medical School

Optimized Learning

Seminar Methodology



Durable Learning Course Outline (1/3)

Section 1: The Basics of Learning

- What Is Learning
- Challenges in Medical Education and How to Solve Them
- Role of the Teacher
- How Learning Happens
- Memory Categories
- Steps of Learning
- Common Learning Misconceptions

Section 2: Basic Learning Science Techniques

- Learning Science and Theories in History
- Trials in Classroom Settings
- Best-Evidence Medical Education
- Learning Science Strategies: **Interleaving, Elaboration, Generation, Dual Coding, Spaced Learning, Spaced Retrieval,** Testing Effect, Reflection, Instructional Design
- Metacognition in Learners

Durable Learning Course Outline (2/3)

Section 3: Applied Learning Science

- Active Learning
- Learning Objectives and Outcomes
- Assessments
- Flipped Classroom
- Inquiry-Based and Direct Instruction
- Simulation
- Group Learning
- Problem Based Learning and Case Based Learning

Durable Learning Course Outline (3/3)

Section 4: Practical Tips in Application

- Patient as Educator
- Blended Learning
- Change/Work Management
- Student Well Being
- Leveraging Technology in Education
- Metacognition - Artificial Intelligence
- Scheduling / Time Management
- Data Tracking for Students and Faculty
- Flipped Classroom Tips
- Simulations
- Assessment Types
- Continuing Medical Education

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Seminar Learning Outcomes

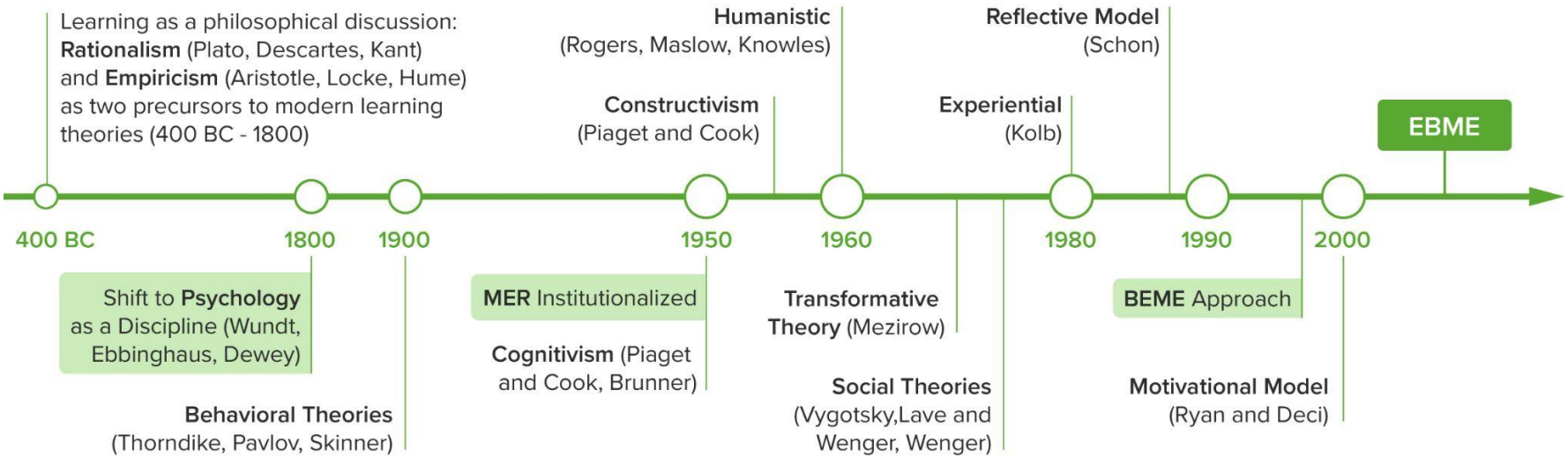
1. Participants will be able to **define** what a learning theory is and **recognize** its importance in teaching

2. Participants will be able to **list** some common but ineffective conventions, **describe** the evidence against them, and **apply** the evidence to improve instructional strategies

3. Participants will be able to **list** the 5 steps of the Best Evidence Medical Education model (BEME), **describe** how it is done, and consider **applying** the BEME approach in their own teaching

History of Learning

Learning Evolved from a Conceptual Discussion to an Experimental Subject[1]



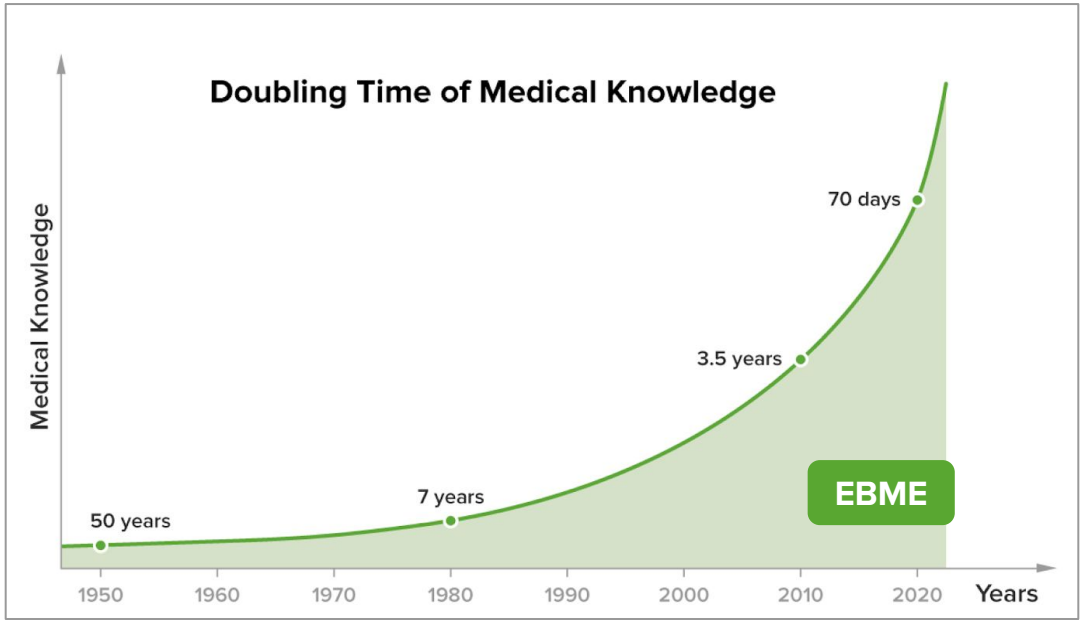
1. Mukhalalati BA, Taylor A. Adult Learning Theories in Context: A Quick Guide for Healthcare Professional Educators. J Med Educ Curric Dev. 2019 Jan;6:238212051984033.

*) **Not** to scale representation of the history of learning theories. Marked based on when they *first* appeared

Evidence-Based Medical Education is Key

An explosion of knowledge

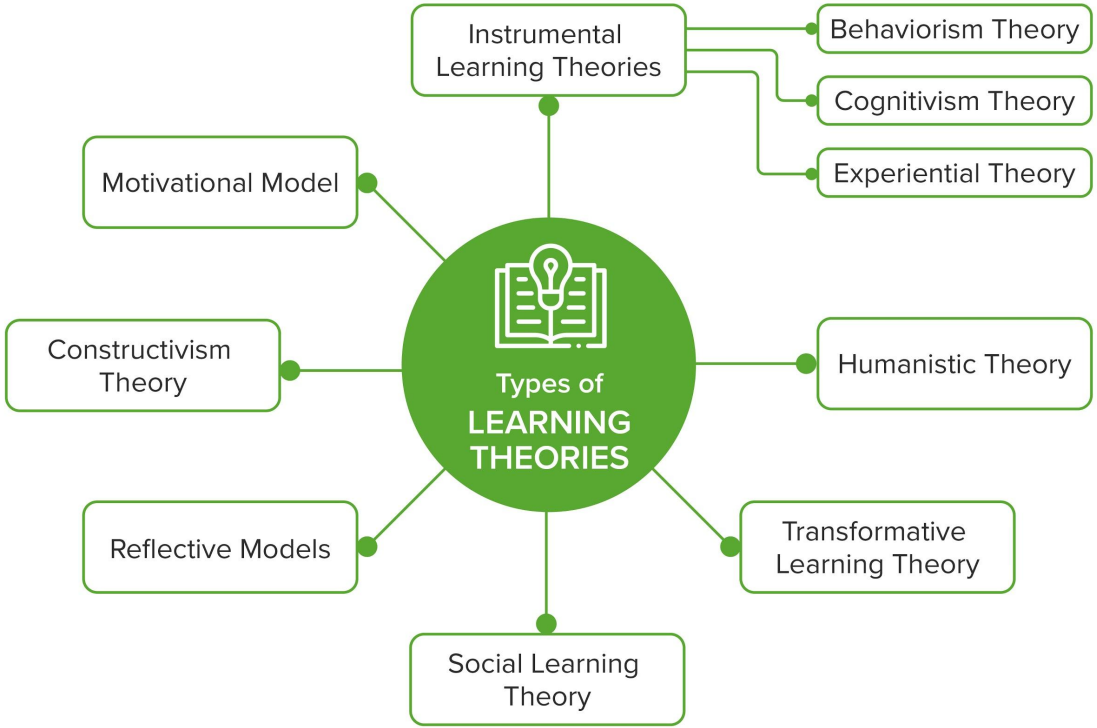
As of 2020, medical knowledge doublings are estimated to occur every 73 days[1]



1. Densen P. Challenges and opportunities facing medical education. Trans Am Clin Climatol Assoc. 2011;122:48–58.

Importance of Learning Theories in Medical Education

Learning Theories Help Describe How Learning Happens



An Example of How Theories Fit in Teaching: Cognitivism

Definition	Learning comes from **within;**[1] concerns itself more with **information processing**, **internal reflections**, and the student's process of **breaking down concepts** that are being learned **to understand their roots.**[1,2]
Med-Ed Application	Construction of **concept maps** and the facilitation of **reflective thinking** in students.[1]
Teacher's Role	Facilitates **"*learning how to learn*"** in students.[1]

1. Torre DM, Daley BJ, Sebastian JL, Elnicki DM. Overview of Current Learning Theories for Medical Educators. Am J Med. 2006 Oct;119(10):903–7.
2. Taylor DCM, Hamdy H. Adult learning theories: Implications for learning and teaching in medical education: AMEE Guide No. 83. Med Teach. 2013 Nov;35(11):e1561–72.

Learning Theories Help Educators Teach, Orient, and Evaluate Better

1. Combine elements of different theories and implement them appropriately
2. Set better learning objectives as well as choose appropriate instructional and evaluation strategies
3. Understand the significance of individual differences

Medical Education Research (MER) and the Best Evidence Medical Education (BEME) Approach

Medical Education Research was Institutionalized in the 1950s Due to Socio-historical Factors[1]

1. An increased importance on scientific research in the 1950s
2. Improved funding availability from various grants
3. Policy changes in accreditation allowing for a more flexible design
4. The need to keep up with the exponential growth of knowledge
5. A focus on accountability from regulatory bodies and the general public
6. Other factors (e.g. need to license foreign physicians and system changes)

1. Kuper A, Albert M, Hodges BD. The Origins of the Field of Medical Education Research: Acad Med. 2010 Aug;85(8):1347–53

Best-Evidence Medical Education (BEME)

"The implementation by teachers and educational bodies in their practice, of methods and approaches to education based on the best evidence available"[1]

1. Haig A, Dozier M. BEME guide no. 3: systematic searching for evidence in medical education--part 2: constructing searches. Med Teach 2003;25(5):463-84
2. RM. Harden, Janet Grant, Graham Buck R. BEME Guide No. 1: Best Evidence Medical Education. Med Teach. 1999 Jan;21(6):553–62.
3. Masoomi R. What is the Best Evidence Medical Education? Res Dev Med Educ ISSN 2322-2719 [Internet]. 2012 [cited 2021 Apr 6]; Available from: http://journals.tbzmed.ac.ir/RDME/Abstract/RDME_20121022074916

Ineffective Conventions vs Evidence-Based Learning Principles

Conventions That are Popular are Not Always Effective. Evidence-Based Techniques Feel Counterintuitive but Provide More Effective Learning

Conventions	Evidence-Based
Traditional didactic lectures are an appropriate and cost-effective way to teach medicine	Sessions focused on having students retrieve and elaborate, not simply receive information, are far more effective
Students learn best using their preferred learning styles	Students learn best using a variety of styles, not by accommodating their learning style preferences
Highlighting text passages is the best way to remember something	To be beneficial, highlighting must be strategic and guided by clearly defined objectives
Studying all material close to an exam (cramming) can help students recall it better during the exam	Massed practice, as used in cramming, can produce positive results in the short term and feels effective, but leads to poor long term retention

Discussion

1

Poll

Which of the following common misconceptions would you like to discuss first?

- Traditional Lectures
- Cramming / Massed Practice
- Learning Styles
- Highlighting

Closing Questions

Key Findings on Traditional Lectures

Current Situation	• Has dominated education in general for *centuries* • Preferred due to its cost-effectiveness and proven benefits in conveying a large body of information to large number of students
Evidence	• Active teaching components have been proven to deliver better learning outcomes • Benefits of active participation include: ease in paying attention, increased participation, higher overall scores on tests • Teachers increasingly prefer a “delegator teaching style”
Adaptive Measures	• Institutional involvement is **key** in facilitating any change in teaching styles • Include in-class **discussions** to promote participation of students • Implement the **flipped classroom** approach in a more holistic way • Use class time to **retrieve** information, not deliver it

1. Freeman S, Eddy SL, McDonough M, Smith MK, Okoroafor N, Jordt H, et al. Active learning increases student performance in science, engineering, and mathematics. Proc Natl Acad Sci. 2014 Jun 10;111(23):8410–5.
2. Alaagib NA, Musa OA, Saeed AM. Comparison of the effectiveness of lectures based on problems and traditional lectures in physiology teaching in Sudan. BMC Med Educ. 2019 Dec;19(1):36
3. Dash NR, Guraya SY, Al Bataineh MT, Abdalla ME, Yusoff MSB, Al-Qahtani MF, et al. Preferred teaching styles of medical faculty: an international multi-center study. BMC Med Educ. 2020 Dec;20(1):480.

Key Findings on Cramming / Massed Practice

Current Situation	• Cramming is popular among medical students as an exam-preparation strategy • Widely used due to following reasons: metacognitive bias, illusion of mastery, better results in the **short term**, feeling that cramming takes less time than spaced practice
Evidence	• Cramming has been shown to produce equivalent results in the short term, but underperforms spaced practice in longer retention intervals[1] • Spaced learning produced better test results when compared to massed practice[2,3]
Adaptive Measures	• Institutional commitment is important in facilitating the shift • Incorporate spaced learning principles into course and curriculum development • Encourage and mentor students in applying spaced learning in their studies

1. Dunlosky J, Rawson KA, Marsh EJ, Nathan MJ, Willingham DT. Improving Students' Learning With Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology. Psychol Sci Public Interest. 2013 Jan;14(1):4–58.
2. Breckwoldt J, Ludwig JR, Plener J, Schröder T, Gruber H, Peters H. Differences in procedural knowledge after a "spaced" and a "massed" version of an intensive course in emergency medicine, investigating a very short spacing interval. BMC Med Educ. 2016 Dec;16(1):249.
3. Kumar Kommu P, Sahoo S, Kapoor A, Sharma A, Thomas V. Impact of a spaced learning initiative in an undergraduate student teaching program in pediatrics. J Curr Res Sci Med. 2018;4(1):37.

Key Findings on Learning Styles

Current Situation	• Many believe that students learn better under certain conditions or by using certain material / instructional styles • A very popular convention that sprouted an industry of learning style determination tests and guides
Evidence	• The concept can box student in their preferred styles and limit their potential[1] • Research shows that it does not yield a positive modality effect[2] • Another study showed that many of the current research on the convention is not methodologically sound[3]
Adaptive Measures	• Help students learn using a variety of learning styles • Fit the “teaching style” to the **content** and not the students’ preference

1. Coffield F, Learning and Skills Research Centre. Should we be using learning styles? What research has to say in practice. London: Learning and Skills Research Centre; 2004.
2. Kavale KA, Forness SR. Substance over style: Assessing the efficacy of modality testing and teaching. Except Child. 1987;54(3):228–39.
3. Pashler H, McDaniel M, Rohrer D, Bjork R. Learning Styles: Concepts and Evidence. Psychol Sci Public Interest. 2008 Dec;9(3):105–19.

Key Findings on Highlighting

Current Situation

- Students believe highlighting or marking important passages to be an easy, low-effort, go-to studying technique that helps them learn better
- Students may mark very little or almost all the text when they use this technique, affecting its effectiveness as a result

Evidence

- The **isolation effect:** differentiated text appears prominently in memory[1]
- Studies found that [*indiscriminate*] highlighting does not yield better recall[2]
- Highlighting with specific intent (actively) can produce better outcomes[1]
- Overmarking leads to a reduction in beneficial outcomes[1]

Adaptive Measures

- Provide clear learning objectives to help students understand what to focus on
- Prevent overmarking among your students and promote **active highlighting** by encouraging them to think about what they need to highlight

1. Dunlosky J, Rawson KA, Marsh EJ, Nathan MJ, Willingham DT. Improving Students' Learning With Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology. Psychol Sci Public Interest. 2013 Jan;14(1):4–58.
2. Idstein P, Jenkins JR. Underlining versus Repetitive Reading. J Educ Res. 1972 Mar;65(7):321–3.

Discussion Question

1

After participating in this session, do you think that some of the teaching and learning techniques you've been using could be improved even further?

Discussion Question

2

If **yes**, please share what are these techniques and how you think they can be improved.

Takeaway Message

- The disconnect between **“knowing”** that some techniques are ineffective and **“applying”** effective techniques can be bridged by institutional commitment
- Even if students **know** that some techniques are ineffective they continue to use them because they feel rewarding
- A teacher’s pivotal role is to **ensure effective, evidence-based techniques** are used in education, both by students and by themselves

Are You Interested in Further Events on This Topic?

Join Our Upcoming Event

Lecturio Global Demo

May 12, 2021

Join Us as a Panelist in Our Upcoming Use-Case Webinar Series

Contact us: learning-science@lecturio.com

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