Revolution for Digital Learning

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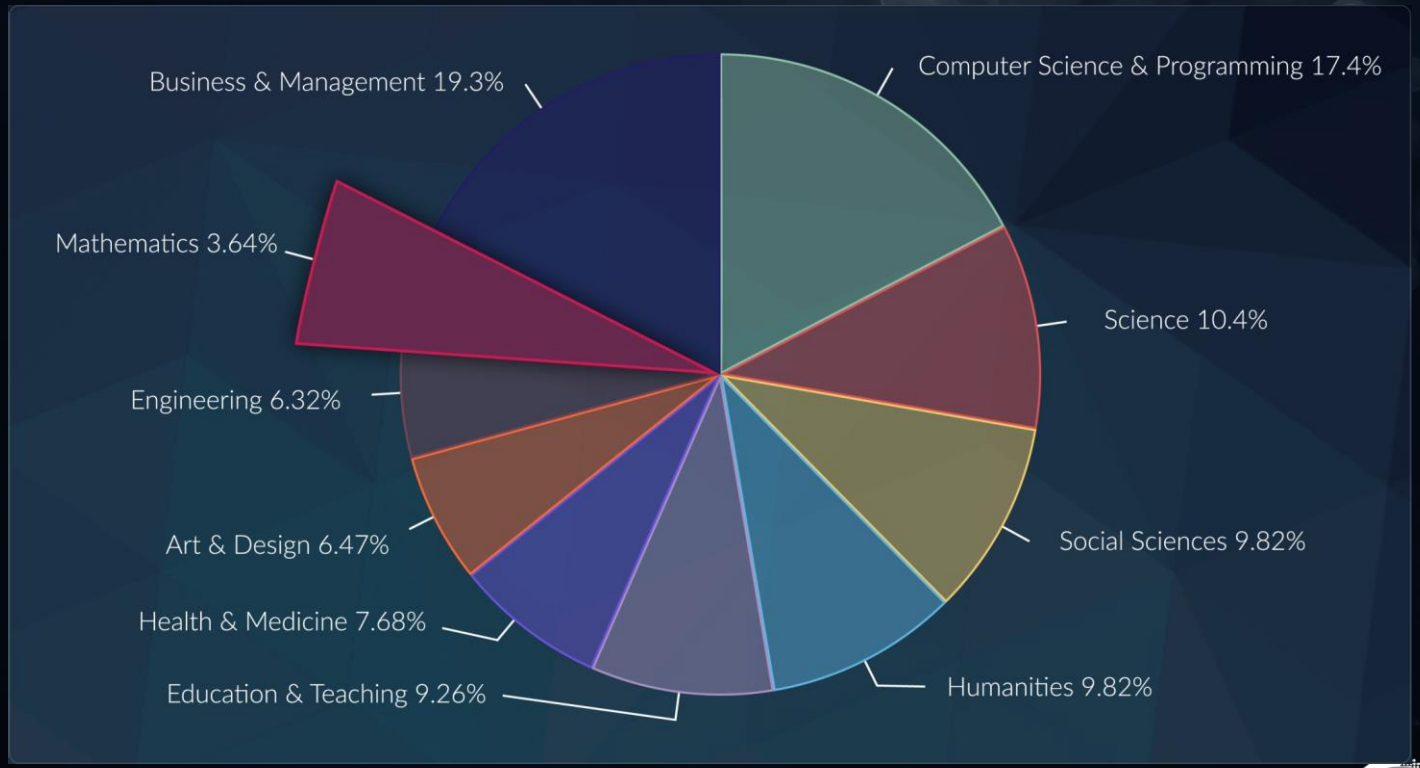
VP – Asia Pacific Digital Education

Emergence of Online Learning



Emergence of Online Learning

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“Modularized Learning Components”

Active Learning → Recall → Interactivity → Application → Assessment

Evaluation

Testing & Analytics
Evaluation of skills

Exposition

Here’s the concept
‘Mathematical storytelling’

Exercises

Real-time Drill & Practice
Test what we know

Exploration

Dynamic Interactive Content
We learn by doing

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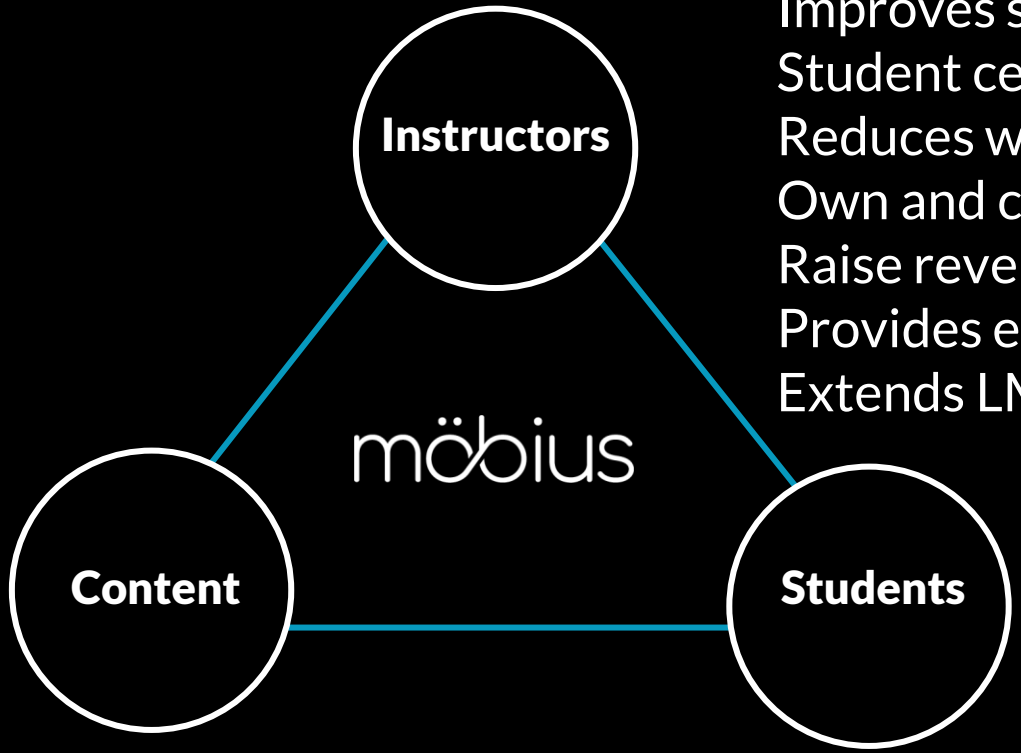
Used by > 260 schools worldwide

Strong community sharing of content & best practices

Möbius Platform – Creation & Deployment of Content



Unique STEM capabilities
Improves student learning
Student centric adaptive learning
Reduces workload
Own and control your own content
Raise revenues
Provides empirical evidence of improvements
Extends LMS capabilities

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Assessments Performed

Measure of the reliability of the Möbius cloud platform

9,659,171 assessments as of May 2019

6,419,171 assessments since Jan 2019

>275,000 Active students

Growing at > 40-45%

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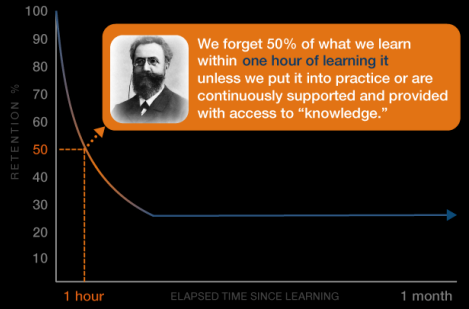
STEM presents *unique* challenges

Science of successful learning:

Repetitive review is a poor learning method

Continuous Testing

- Calibration of knowledge level – The 'Illusion of Knowing'
- Active Processing: Application of knowledge to creatively solve problems
- Interrupts our process of forgetting / strengthens recall
- Objective: Create desirable difficulties in the classroom
  - Spacing
  - Pre-testing
  - 1:2 ratio (Exposition : Testing)
  - Goal: 15% wrong
- Visualization anchors concepts
  - Interactive Narrative format



Abstract Concepts & Notations

Complex Visualizations

Application of Concepts & Assessment

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Testing and Retrieval: Key to Learning

Create desirable difficulties in the classroom

Continuous Testing: Learning is deeper and more durable when it's effortful

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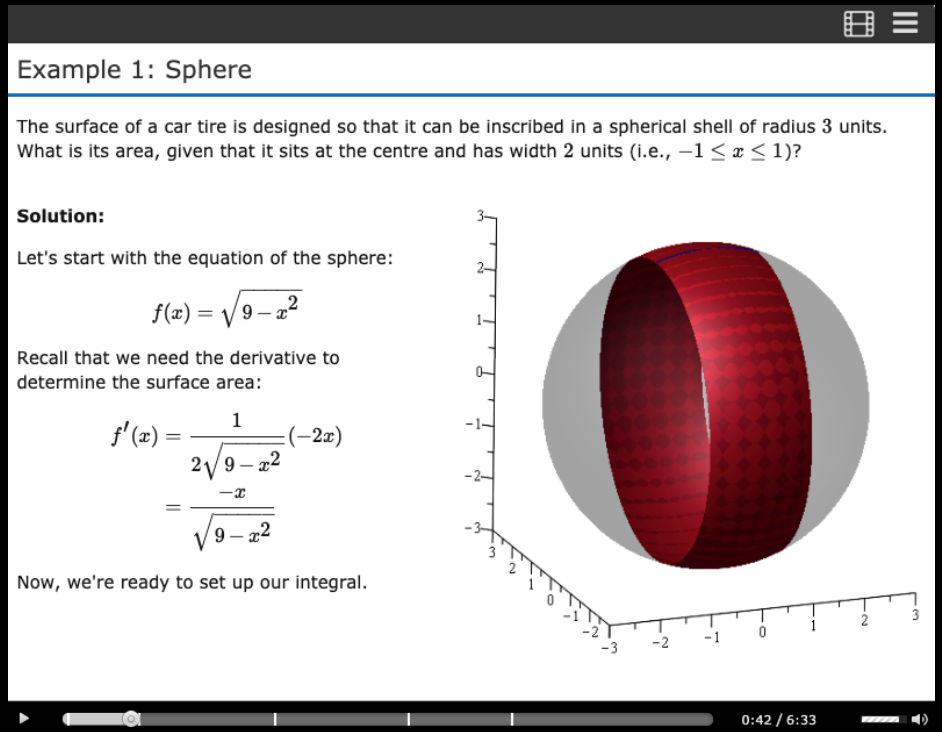
100%

Visualization: Retention

Visualizations anchors concepts in memory



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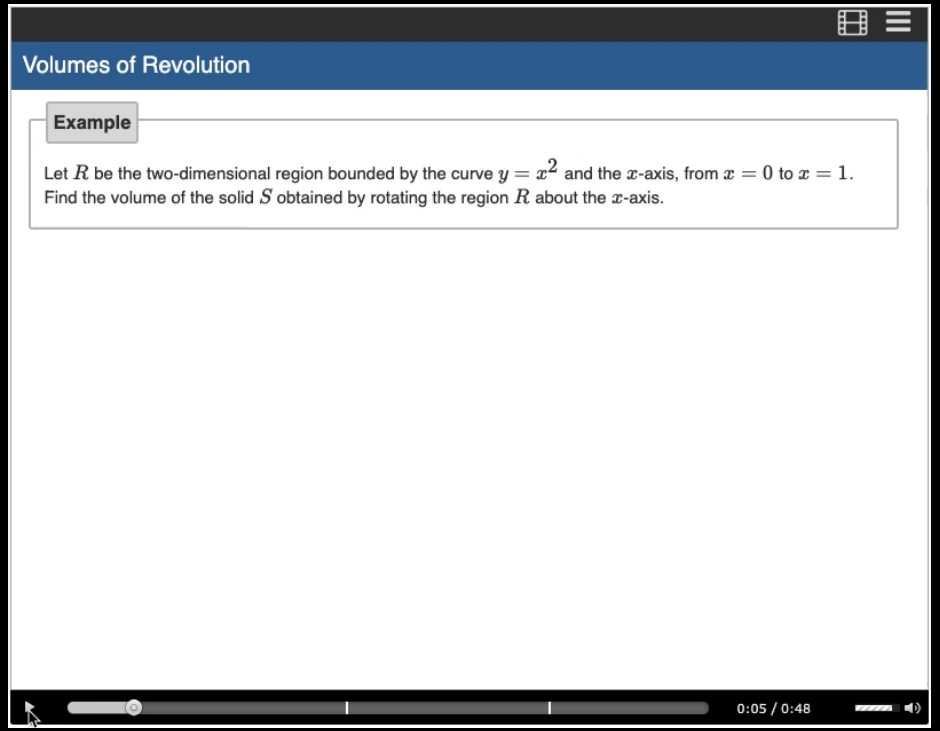
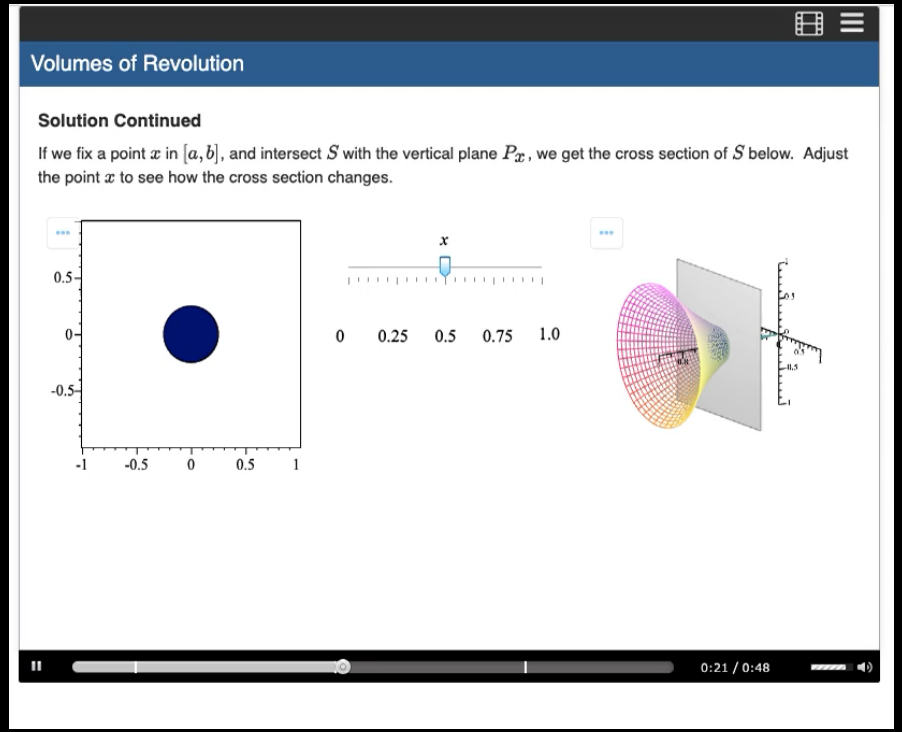
Interactivity: Improves Student Engagement



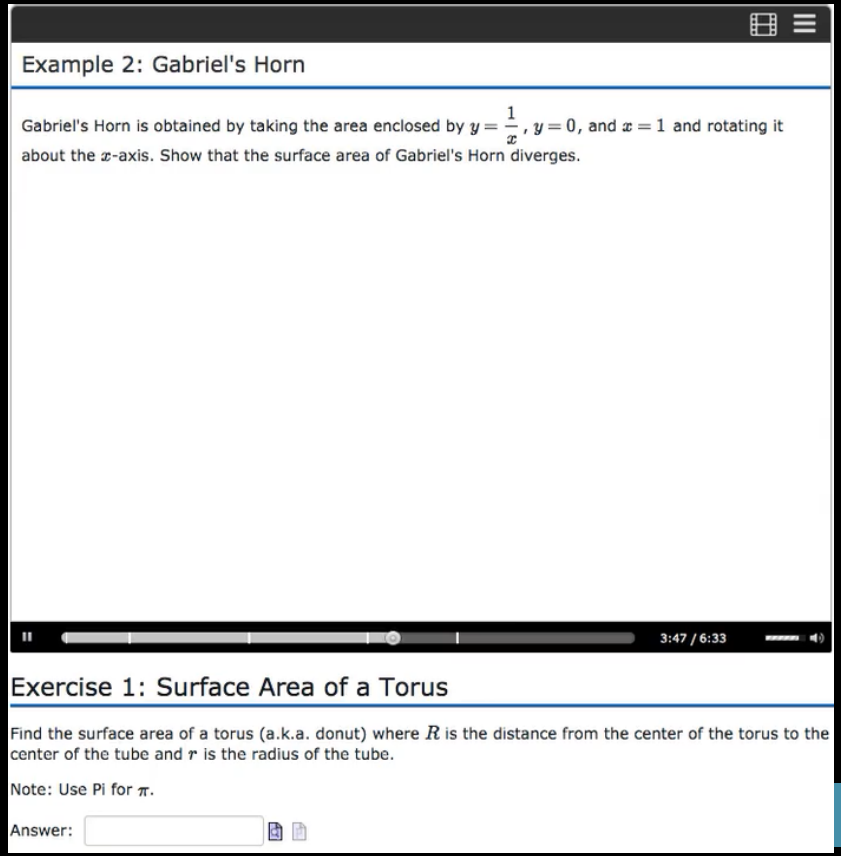


Interactive Narrative: Encapsulation

Cadence

Dual Channel

Interactive



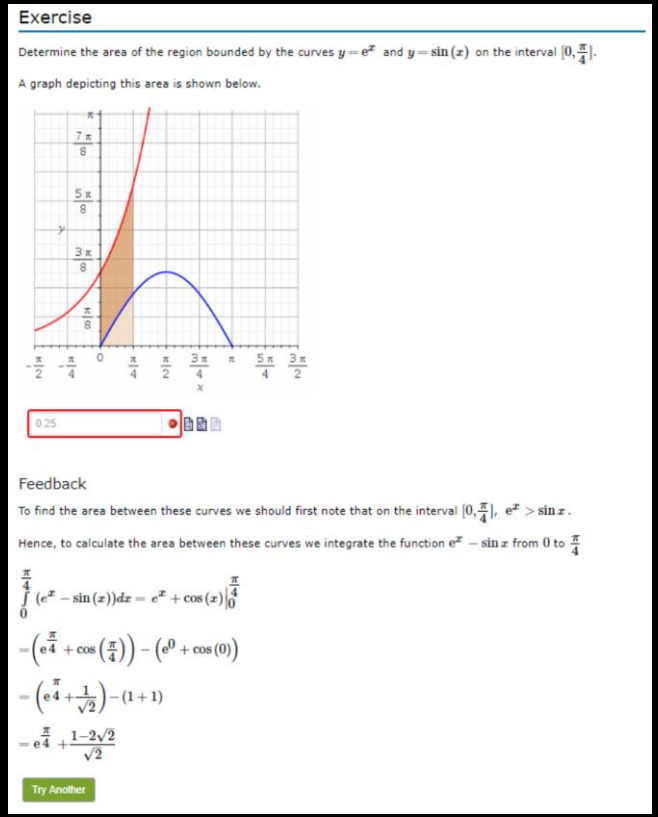
Unique STEM Capabilities

Ask a sophisticated math question

Receive a graded answer with sophisticated feedback

Interactive Math Applications

World's best STEM online platform (full capabilities of Maple included on platform)



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Continuous testing allows the gathering of detailed data on student progression and understanding…

…enabling
Data-Based Decisions

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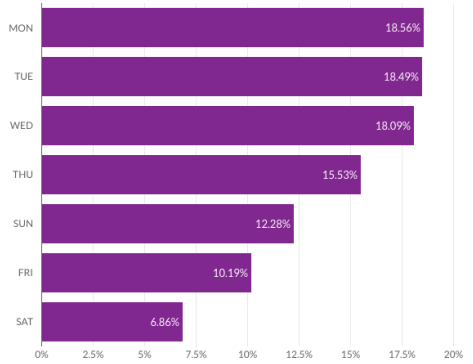
Usage Patterns

DAY / TIME / ACTIVE USERS

TIME	Sund...	Mon...	Tues...	Wed...	Thur...	Friday	Satu...
00:00 - 02:00	735	1.1K	1.2K	1.2K	1.3K	1K	514
02:00 - 04:00	426	524	504	543	491	491	297
04:00 - 06:00	356	513	485	616	449	422	262
06:00 - 08:00	644	1.7K	1.6K	1.7K	1.7K	1.4K	480
08:00 - 10:00	1.5K	5.3K	5.6K	5.5K	5.8K	4.4K	1K
10:00 - 12:00	2.9K	6.4K	6.3K	6.2K	5.7K	4.9K	2.1K
12:00 - 14:00	3.6K	6.4K	5.9K	6.1K	5.1K	4.4K	2.5K
14:00 - 16:00	4.1K	4.6K	4.8K	4.4K	4.1K	3K	2.7K
16:00 - 18:00	4K	4.3K	4.8K	4.3K	3.9K	1.9K	2.4K
18:00 - 20:00	4.5K	5.5K	5.9K	5.4K	4.7K	1.6K	2.3K
20:00 - 22:00	4.8K	5.2K	5.6K	5.2K	4.4K	1.7K	2.2K
22:00 - 24:00	2.9K	3.1K	3.3K	3.1K	2.5K	1.1K	1.5K

DAY OF THE WEEK



Historical Usage

Time Spent

Most

1. All Exercises, Answers, and Soluti...
2. Relations and Functions
3. Introduction to Calculus: Limits a...
4. The Reciprocal of a Polynomial F...
5. Interval Notation and Definitions

Least

1. Technical Considerations
2. Counting in geometry
3. Typical Lesson Structure
4. Lesson 8: Revisiting Independent ...
5. Wrap-up of problem solving techni...

Slideshows Viewed

Lessons with Most

1.	Inverses	7
2.	Lesson 1: What Are Rational Numbe...	7
3.	Equations of Polynomial Functions i...	7
4.	Solving Linear Inequalities	7
5.	Relations and Functions	7

Lessons with Fewest

1.	Solving Separable Differential Equa...	0
2.	Enrichment, Extension, and Applica...	0
3.	The Quotient Rule	0
4.	Problem solving wrap-up	0
5.	Roots of polynomials	0

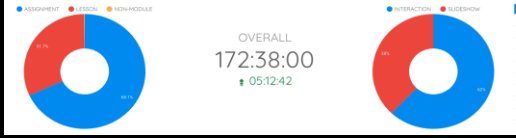
Total Viewers

Most

...	Relations and Functions	11,060
...	All Exercises, Answers, and Solutions	10,677
...	Introduction to Calculus: Limits and ...	6,075
...	Lesson 1: What Are Rational Numbe...	4,909
...	Enrichment, Extension, and Applicati...	4,545

Fewest

1.	Lesson 8: Revisiting Independent ...	45
2.	QM-AM-GM-HM inequality	46
3.	Eliminate possibilities	47
4.	Consider cases	49
5.	Wrap-up of problem solving techn...	49



The University of Waterloo

UNIVERSITY OF WATERLOO

Conviction:

Digital course delivery could provide superior education

Goal:

To become the leading provider of digital online materials

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UNIVERSITY OF WATERLOO

7,000 undergraduate

1,000 graduate

240 faculty

34th world ranking

Environment

5,000 students Differential Calculus students each term with both remedial / enrichment options

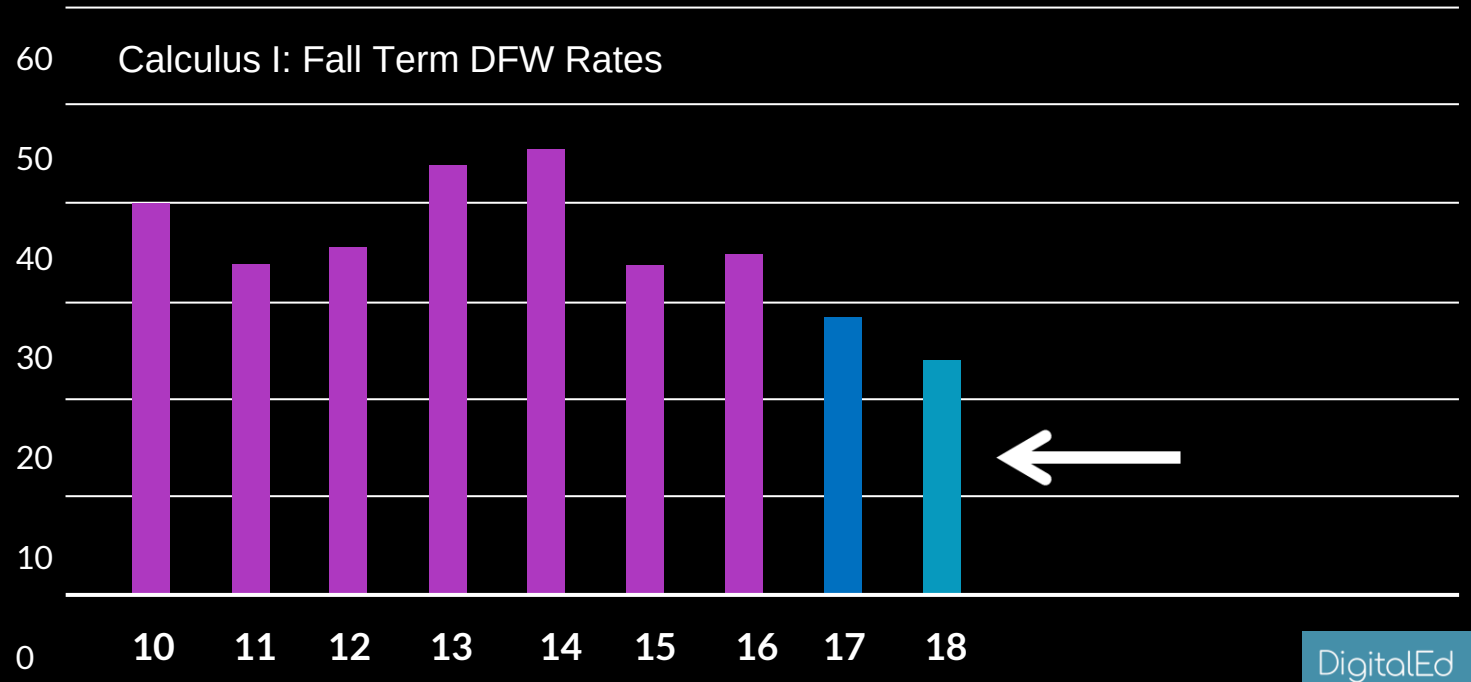
26 different calculus courses

Need for a rich set of question types and tools for visualizations and interactivity

Maintain and update > 300 online courses

How to collect empirical evidence that students are learning; supporting evidence for specific changes?

37%



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500,000 — Questions per term

70,000 — Auto-marked assignments per term

3,000 — Increased class enrollments

"Instant feedback is a strong tool for learning and practice,"

University of Gothenburg

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Northern Alberta Institute of Technology

60,000 — Questions converted from Moodle to Möbius in 30 days

10,000 — Interactive Examples

"The ability to quickly create and share interactive content across the institution held tremendous appeal for us."

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Summary of Best Practices:

Continuous testing with automatic marking and feedback improves learning and retention.

Multimedia visuals and interactivity anchors key concepts and promotes active engagement.

Detailed student progression and comprehension data allows evidence-based optimization of learning.

Q&A

Thank-you

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