Adapting Adaptive Learning for Africa

World Bank

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This presentation will explore challenges and opportunities to consider when evaluating and implementing adaptive learning systems. I will describe their benefits, costs, and potential to transform the learning process based on my implementation experience at Arizona State University.

At the end of the seminar, the participants will be able to:

Explain adaptive systems and terminology,
Describe how they can be used in courses,
Assess the challenges and opportunities of using them, and
Analyze their costs and benefits.

Our Experience

2011 → 2018

Biology - CogBooks

Chemistry - McGraw Hill Connect

College Algebra - McGraw Hill ALEKS

College Math – McGraw Hill ALEKS

Economics – Cengage Learning Objects

General Science - SmartSparrow

History - CogBooks

Physics - Pearson Mastering Physics

Psychology – Cengage Learning Objects

Where is Arizona State University?

What is Arizona known for?

What is Arizona State University like?

Public university

100,000 students

70,000 on-ground
30,000 online

Urban population 4.7 million

What is Arizona State University known for?

How is ASU already helping African students?

Education for Humanity East Africa

Deliver high-quality online education for refugees and host communities

Address systemic and technical barriers refugees face in accessing education

Facilitate refugee integration through university partnerships

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Research Article

Evaluation of an adaptive learning technology in a first-year extended curriculum programme physics course

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ABSTRACT

Personalised, adaptive online learning platforms that form part of web-based proficiency tests play a major role in the improvement of the quality of learning in physics and assist learners in building proficiency, preparing for tests and using their time more effectively. In this study, the effectiveness of an adaptive learning platform, Wiley Plus ORION, was evaluated using proficiency test scores compared to paper-based test scores in a first-year introductory engineering physics course. Learners' performance activities on the adaptive learning platform as well as their performance on the proficiency tests and their impact on the paper-based midterm averaged test were investigated using both qualitative and quantitative methods of data collection. A comparison between learners' performance on the proficiency tests and a paper-based midterm test was done to evaluate whether there was a correlation between their performance on the proficiency tests and the midterm test. Focus group interviews were carried out with three categories of learners to elicit their experiences. Results showed that there was a positive relationship between high-performing learners' proficiency score in the midterm averaged test and that the proficiency test enhanced learners' performance in the paper-based midterm averaged test.

Keywords: adaptive, metacognitive report, online assessment, productivity reports, Wiley Plus ORION

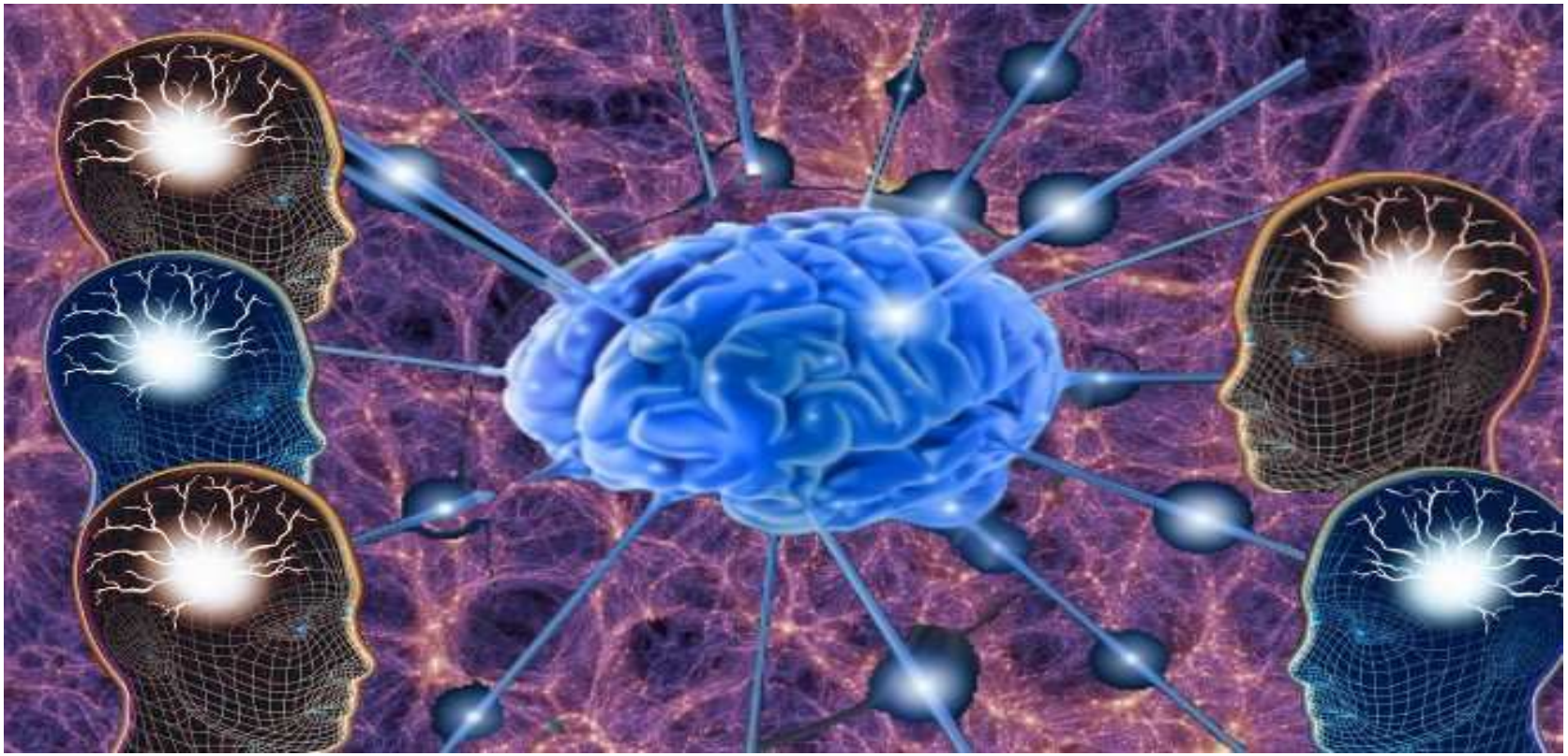
Categories: • **Human-centred computing** ~ **Interaction design theory, concepts and paradigms** • *Applied computing* ~ *Education* • *Applied computing* ~ *Computer-managed instruction* • Applied computing ~ Collaborative learning

Where are we in the technology cycle?

Adaptive knowledge networks could scale like cellular technology in Africa.

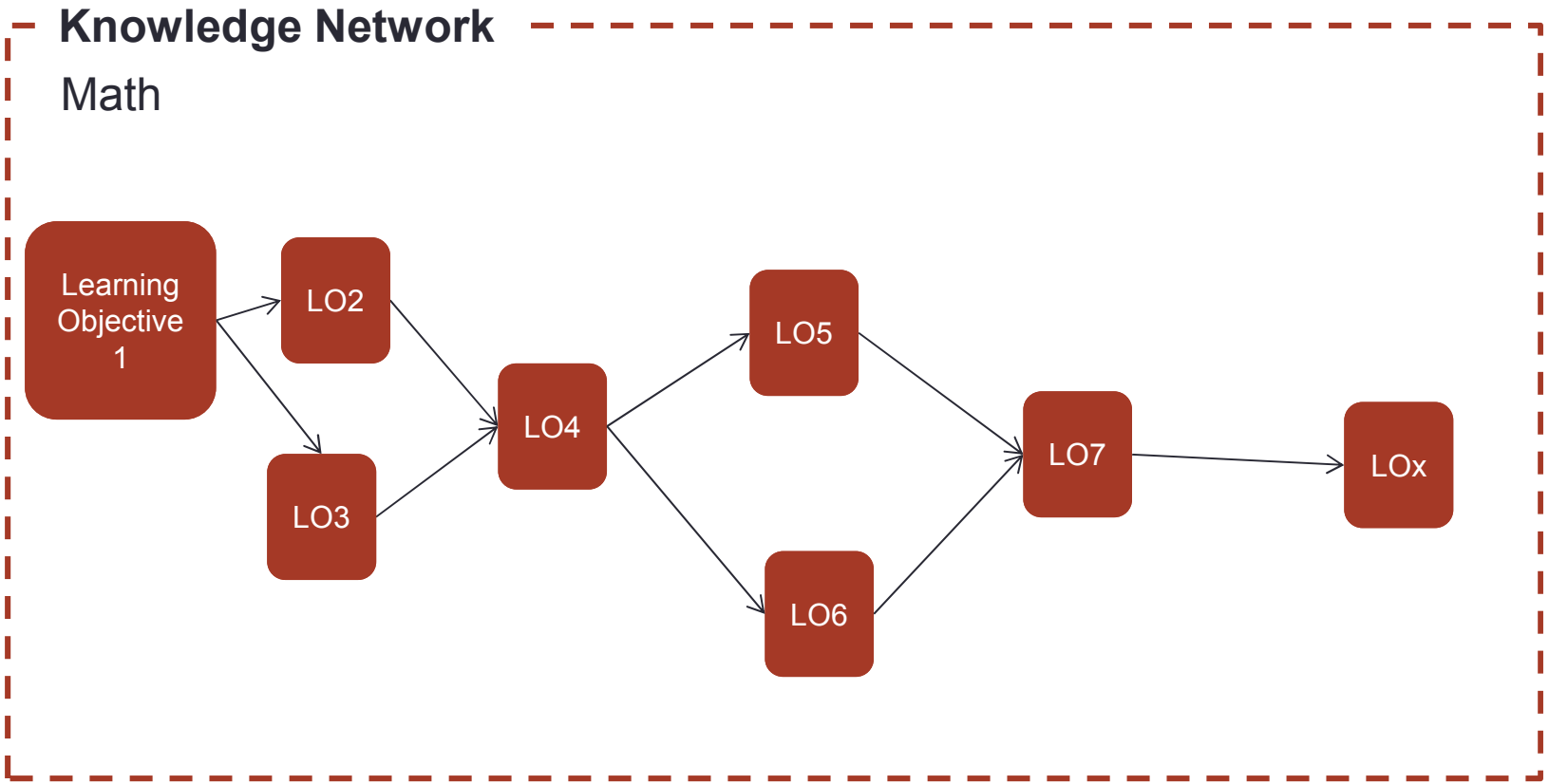
What is the future of educational technology?

Adaptive knowledge networks are being built to be configured by teachers and personalized for students.



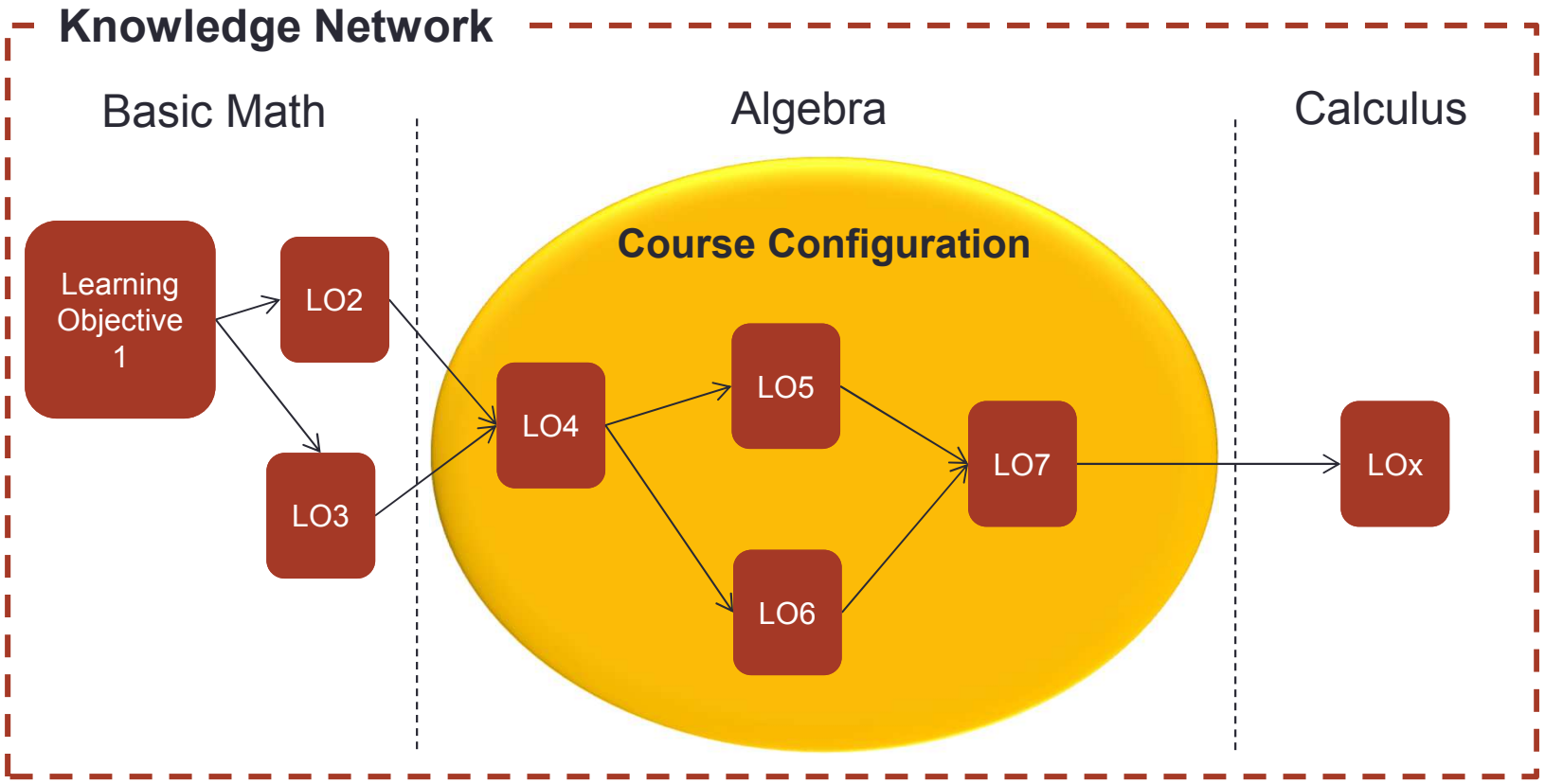
What is the first investment?

Adaptive knowledge networks are being built to be configured by teachers and personalized for students.



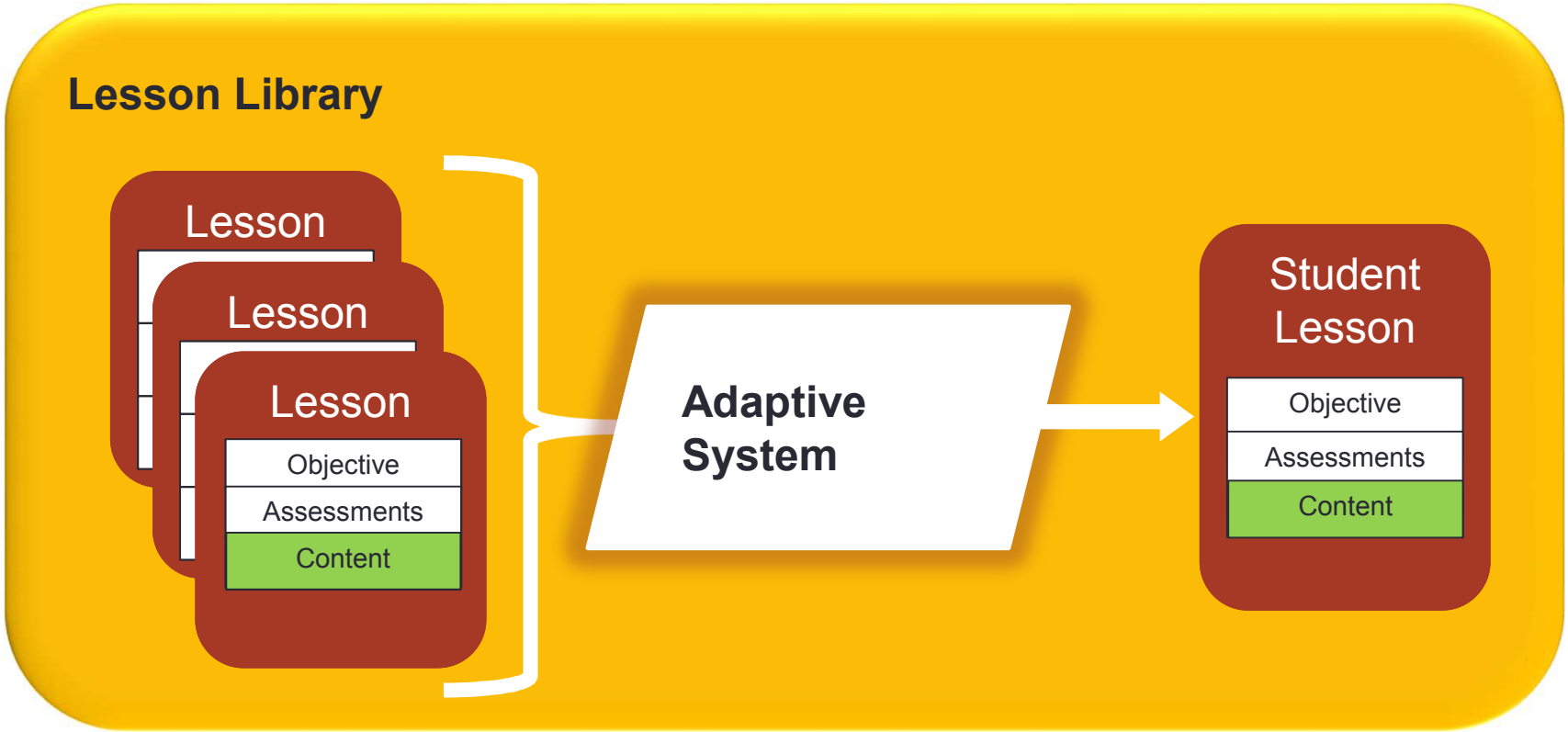
How will it work in practice?

Adaptive knowledge networks are being built to be configured by teachers and personalized for students.



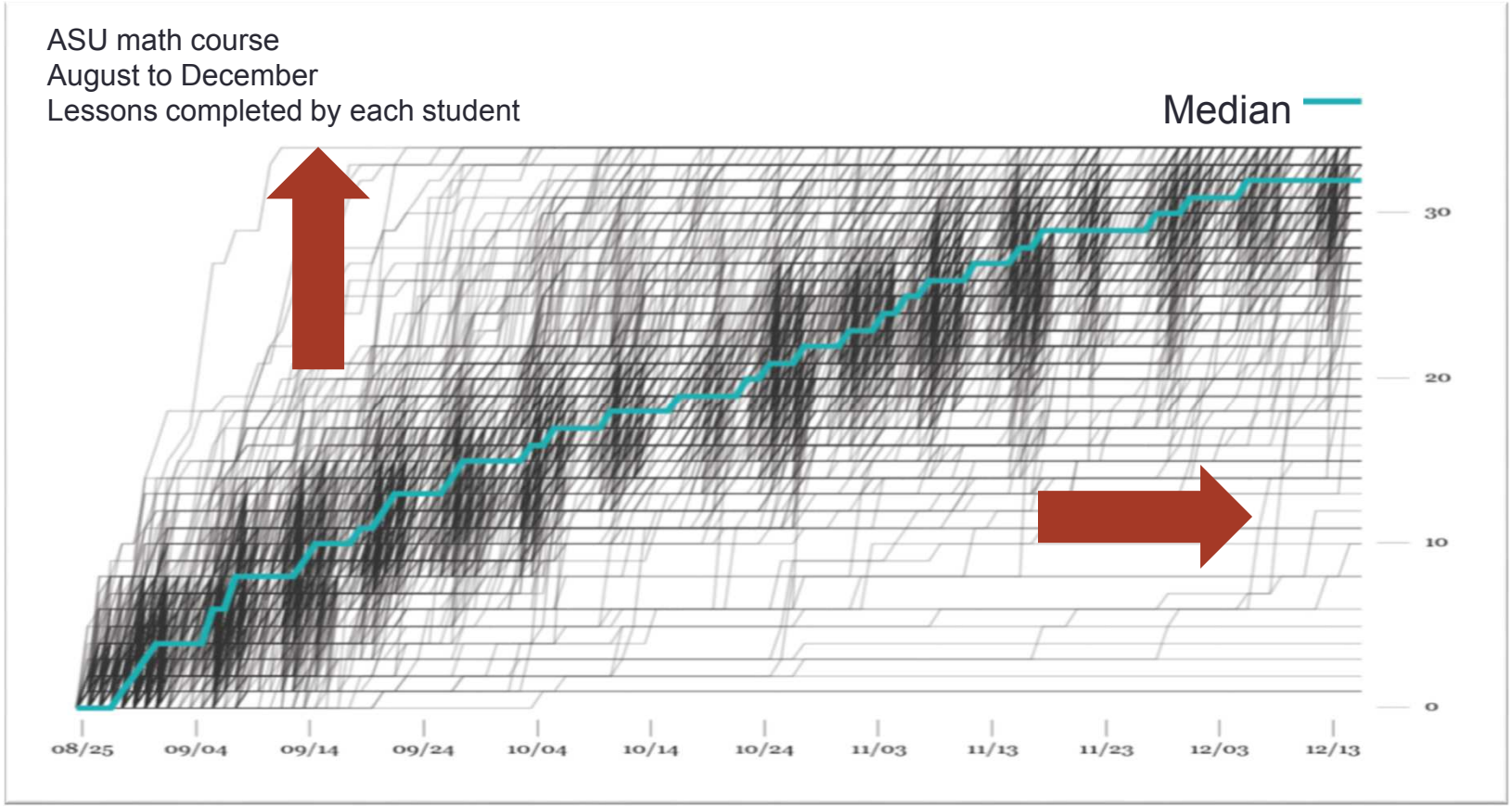
What will students experience?

Adaptive knowledge networks are being built to be configured by teachers and personalized for students.



What does adaptive courseware do?

Why are adaptive learning systems needed?



- **Students get a personalized lesson plan**
- **Professors get data to help focus on individuals**

What is the value of adaptive systems?

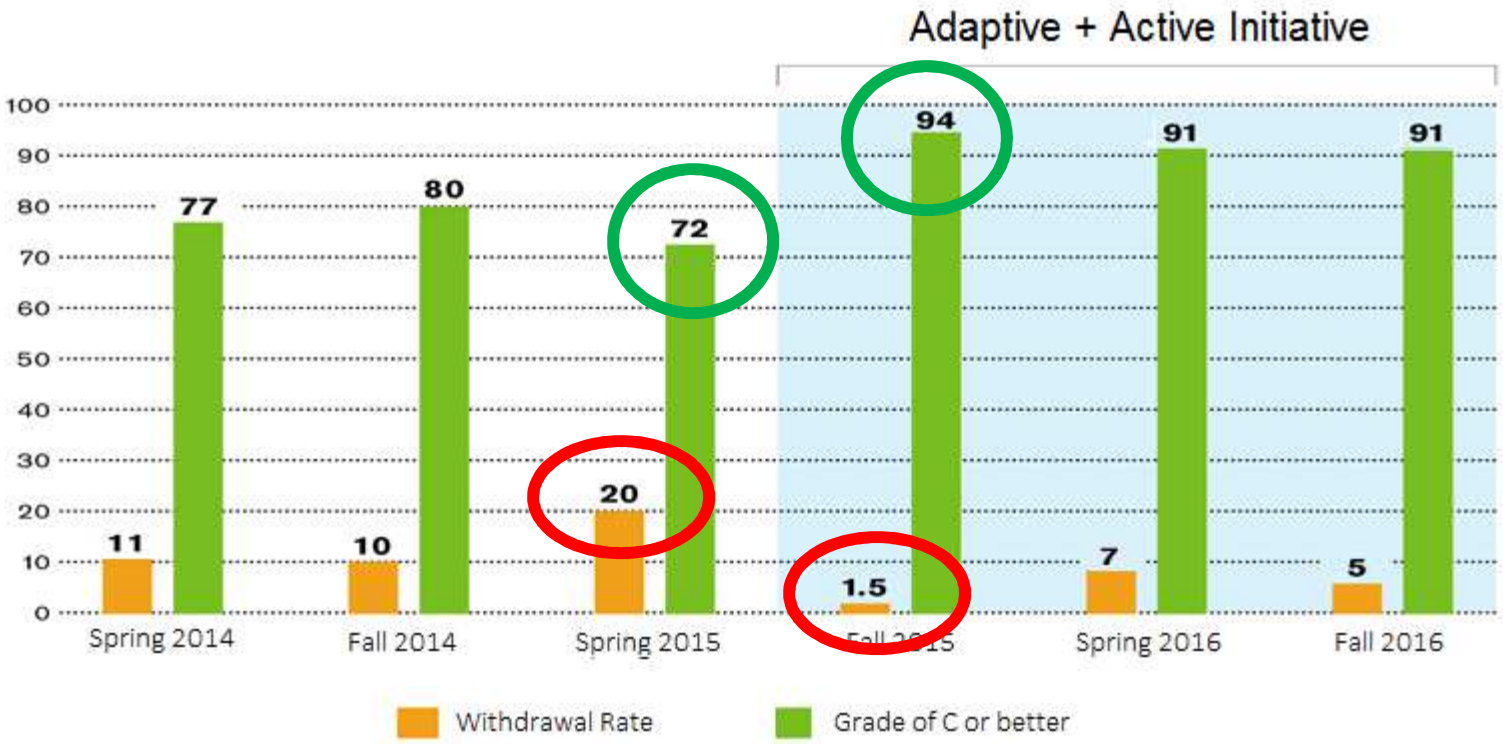
Mass Personalization

How has it worked at ASU?

Introduction to Biology ~ 850 students

Fall 2015 implemented CogBooks

Same instructor, curriculum and assessments

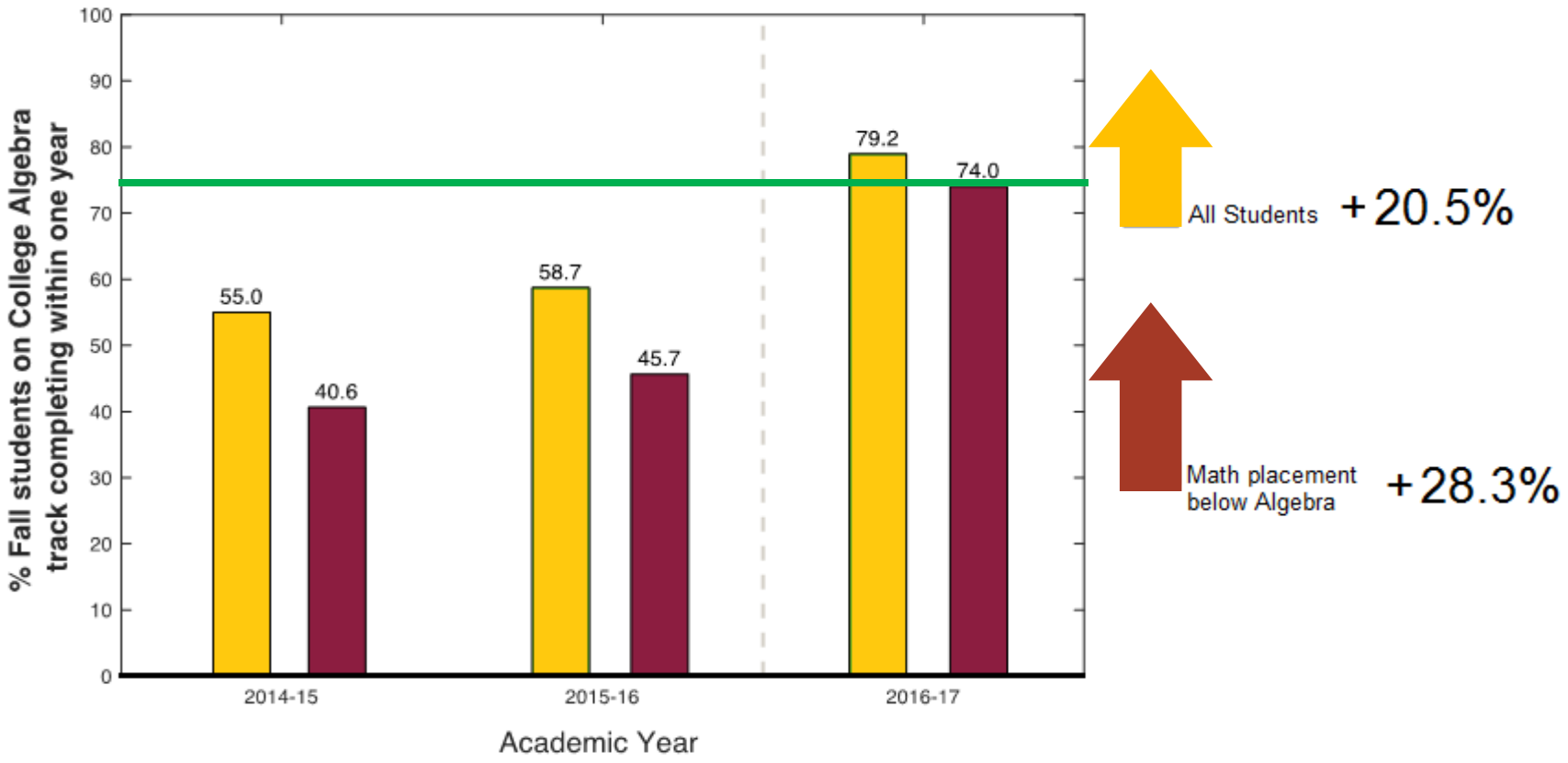


How has it worked at ASU?

College Algebra ~ 5,000 students

Fall 2016 implemented McGraw Hill ALEKS

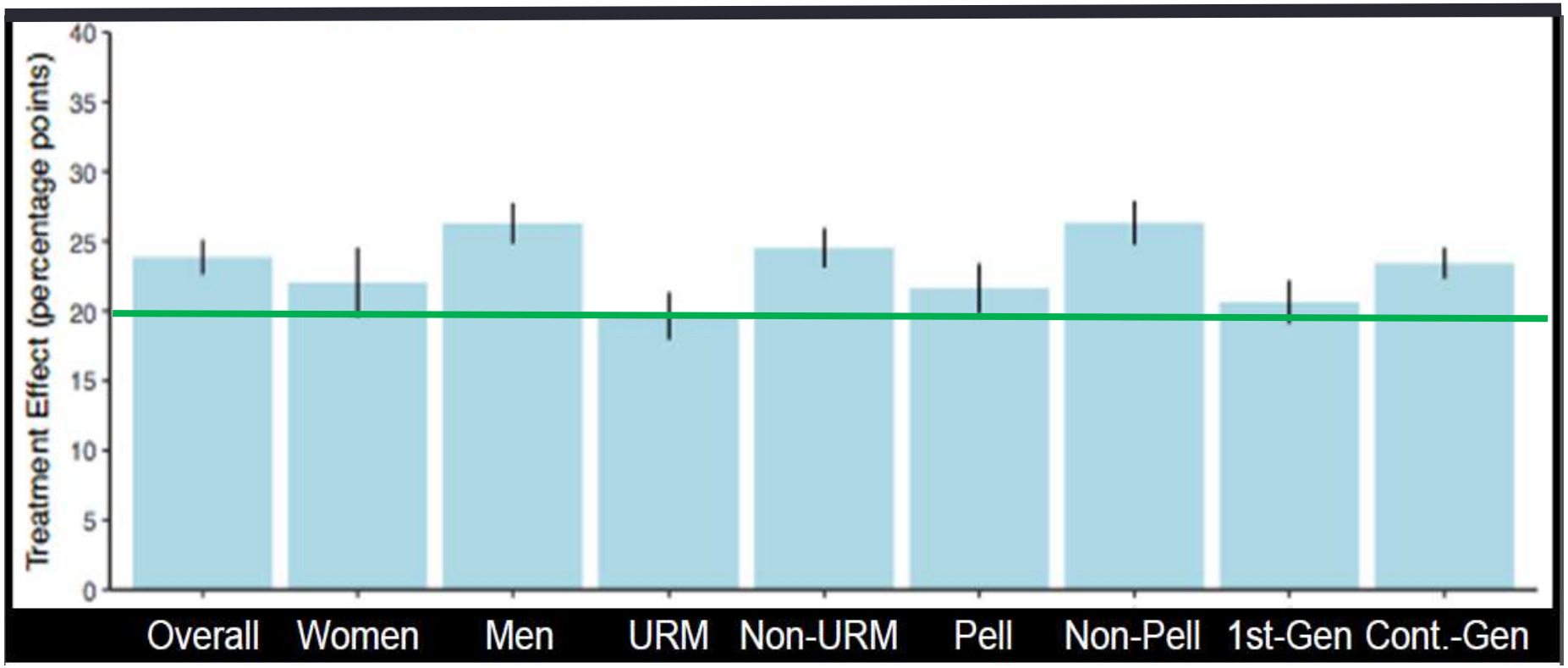
Same instructors, curriculum and assessments



What about different demographic groups?

College Algebra

AY 2016-17 increases in success rates among all groups

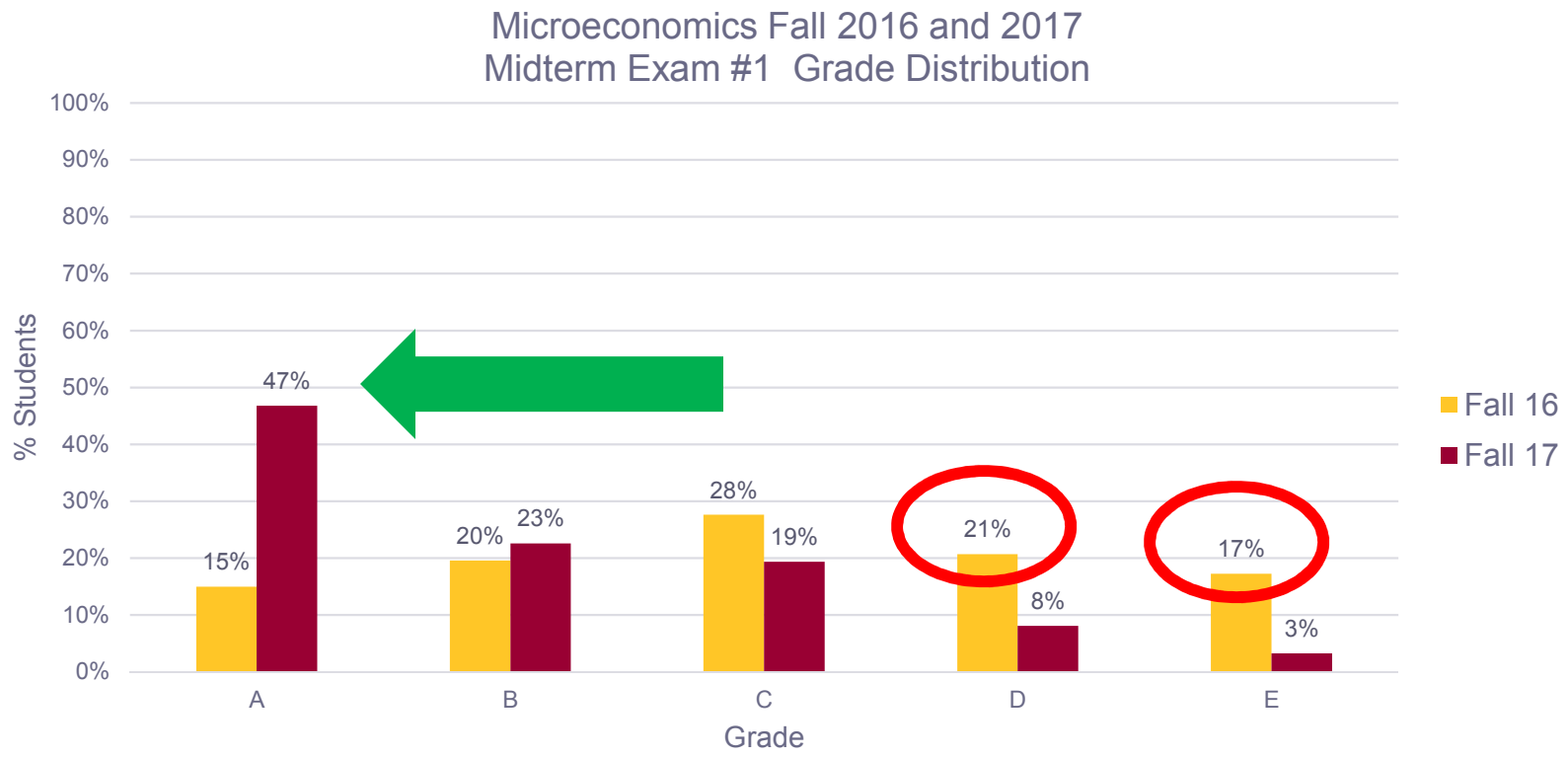


How has it worked at ASU?

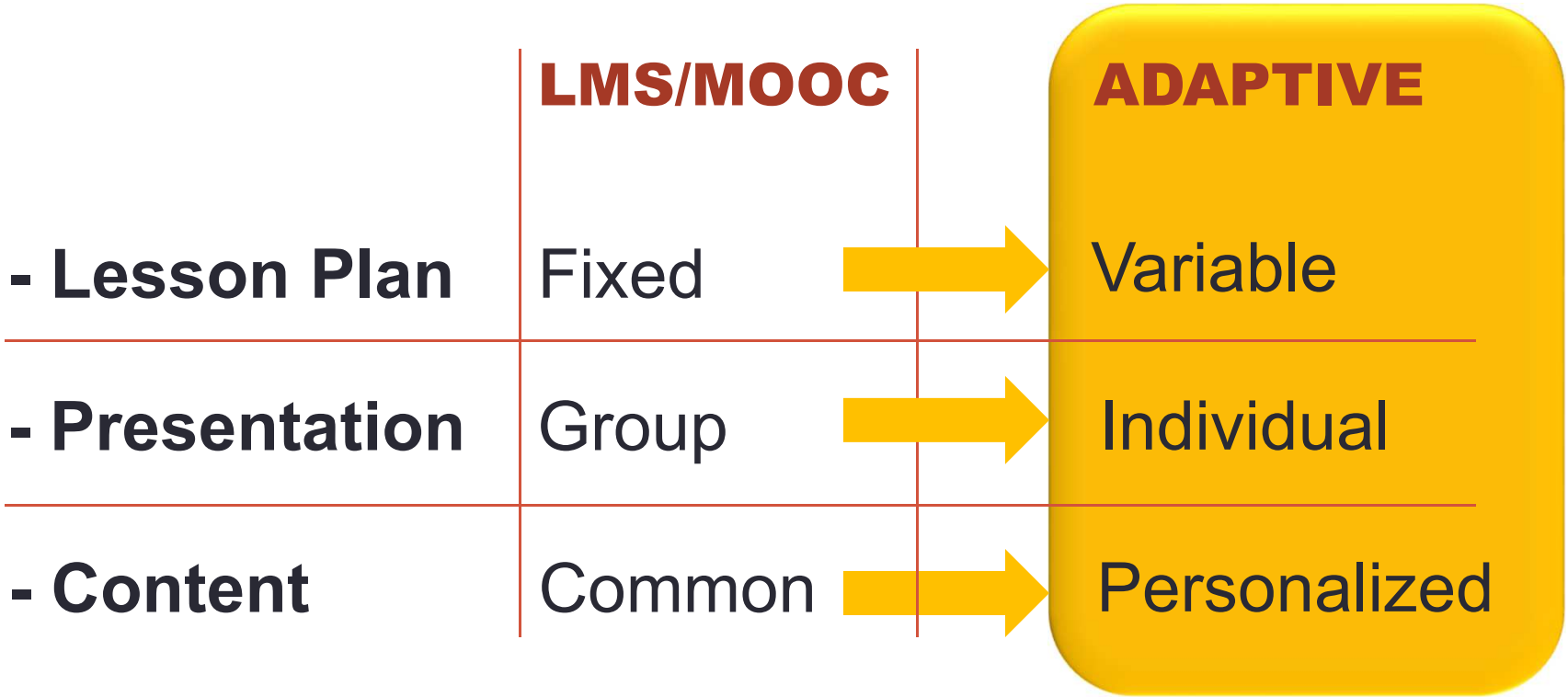
Microeconomics ~ 2,000 students per year

Fall 2017 Cengage Learning Objects

Same instructor, curriculum and assessment



How are the adaptive systems different?



How do the systems help students?

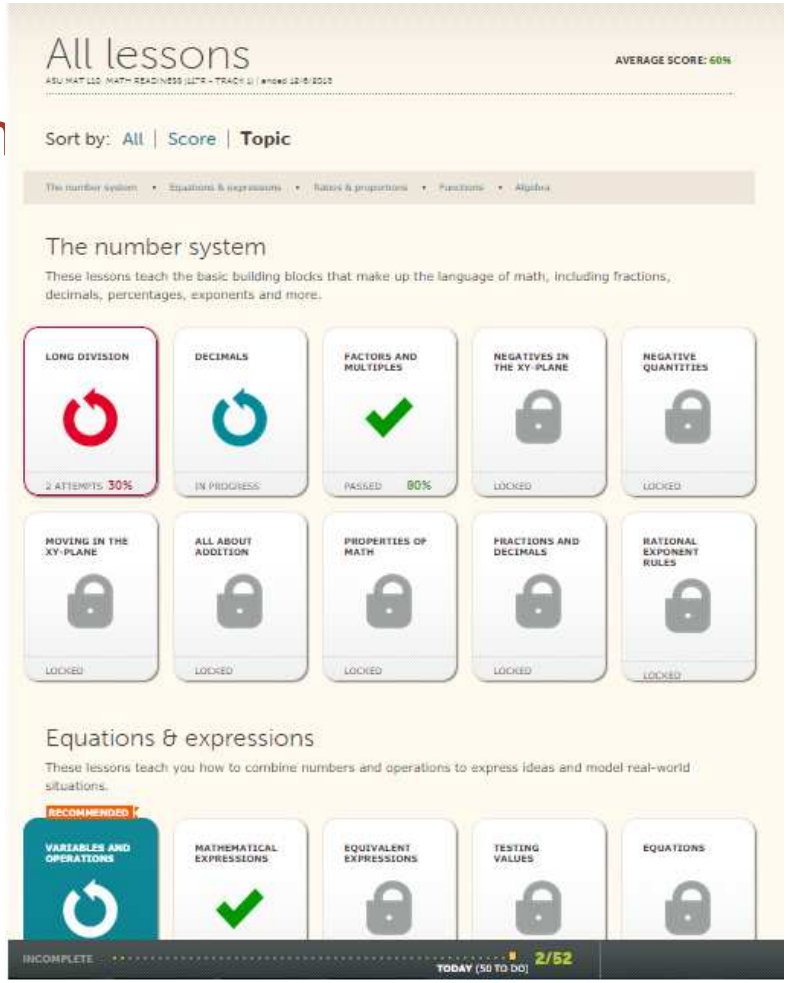
3 Rs

Respect their

Respond to th

Reduce gaps

Personalize



How do the systems help teachers?

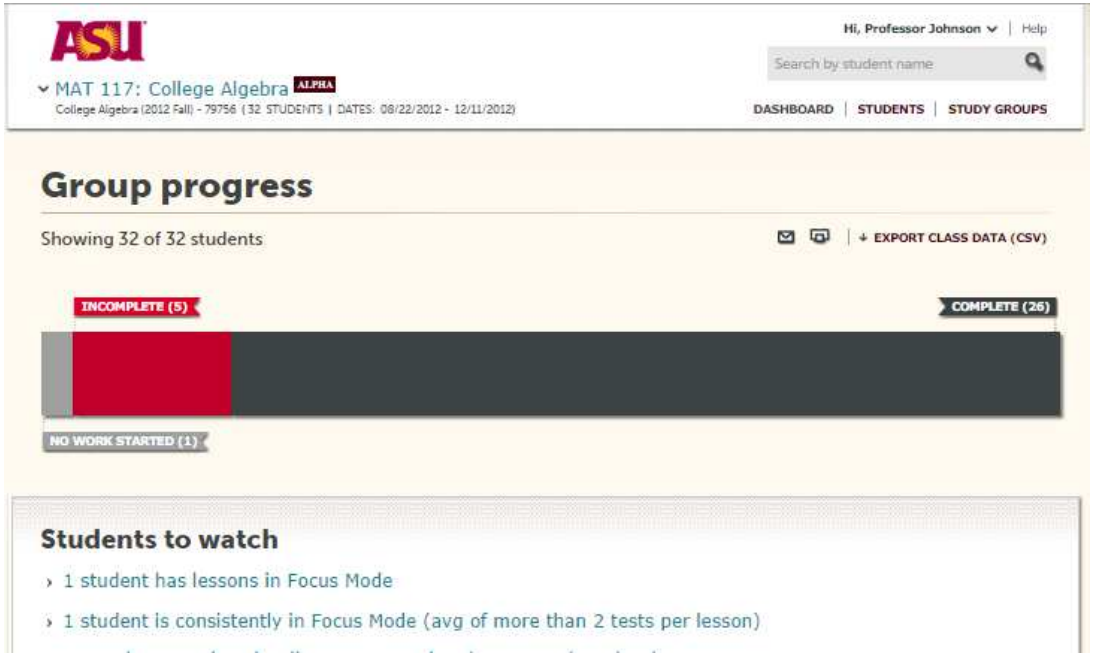
3 Ms

Monitor which students need assistance

Measure curriculum performance

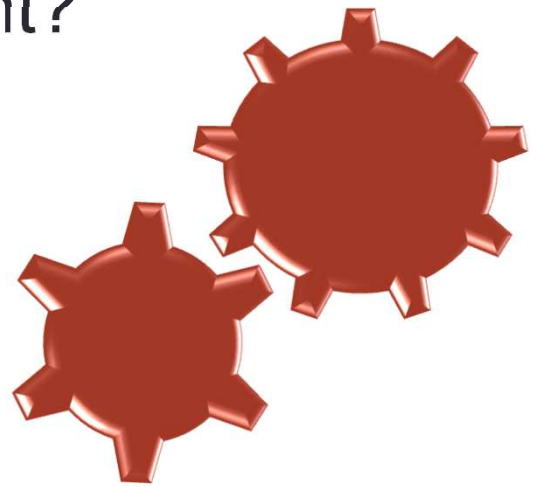
Maximize course outcomes

Tracking



What is adapting to the student?

- **Lesson sequence**
- **Content selection**

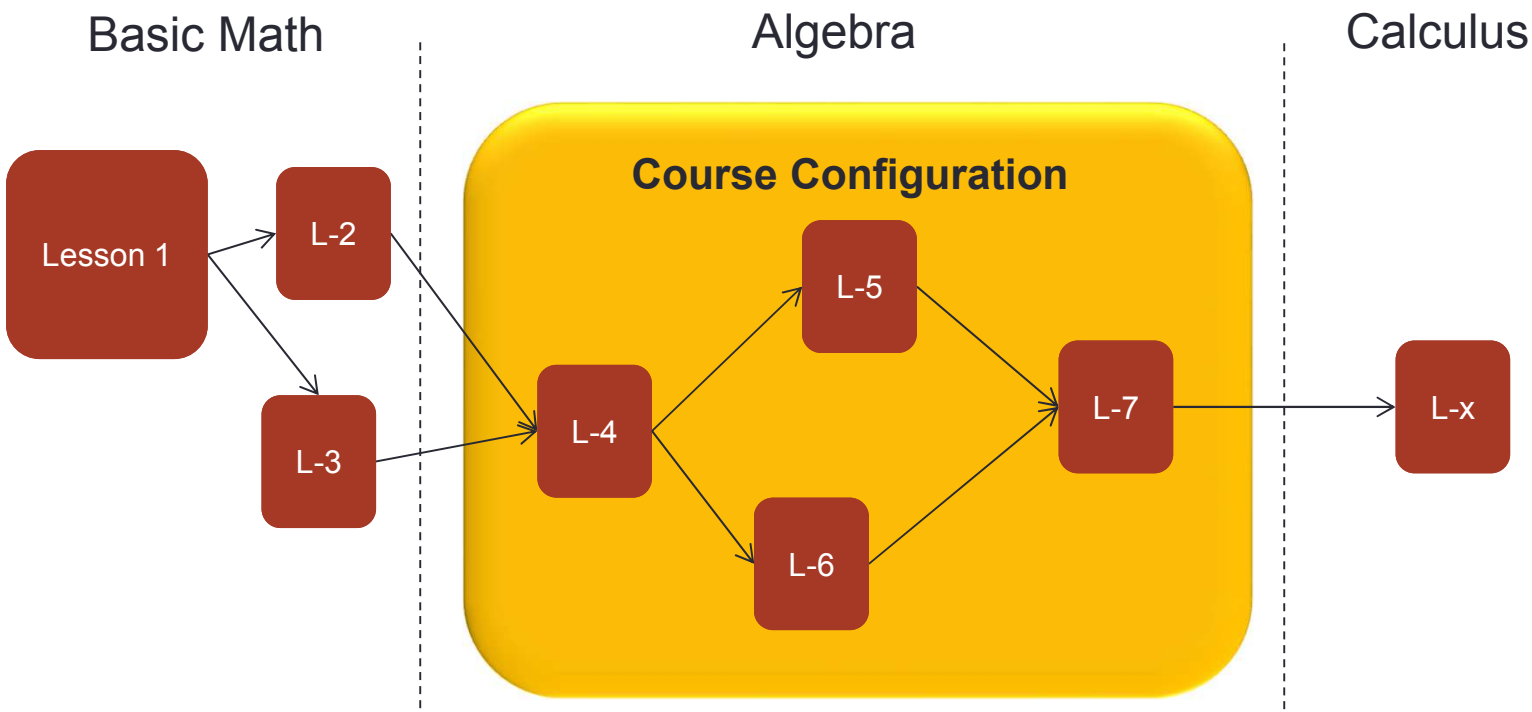


What is guiding the adaptation?

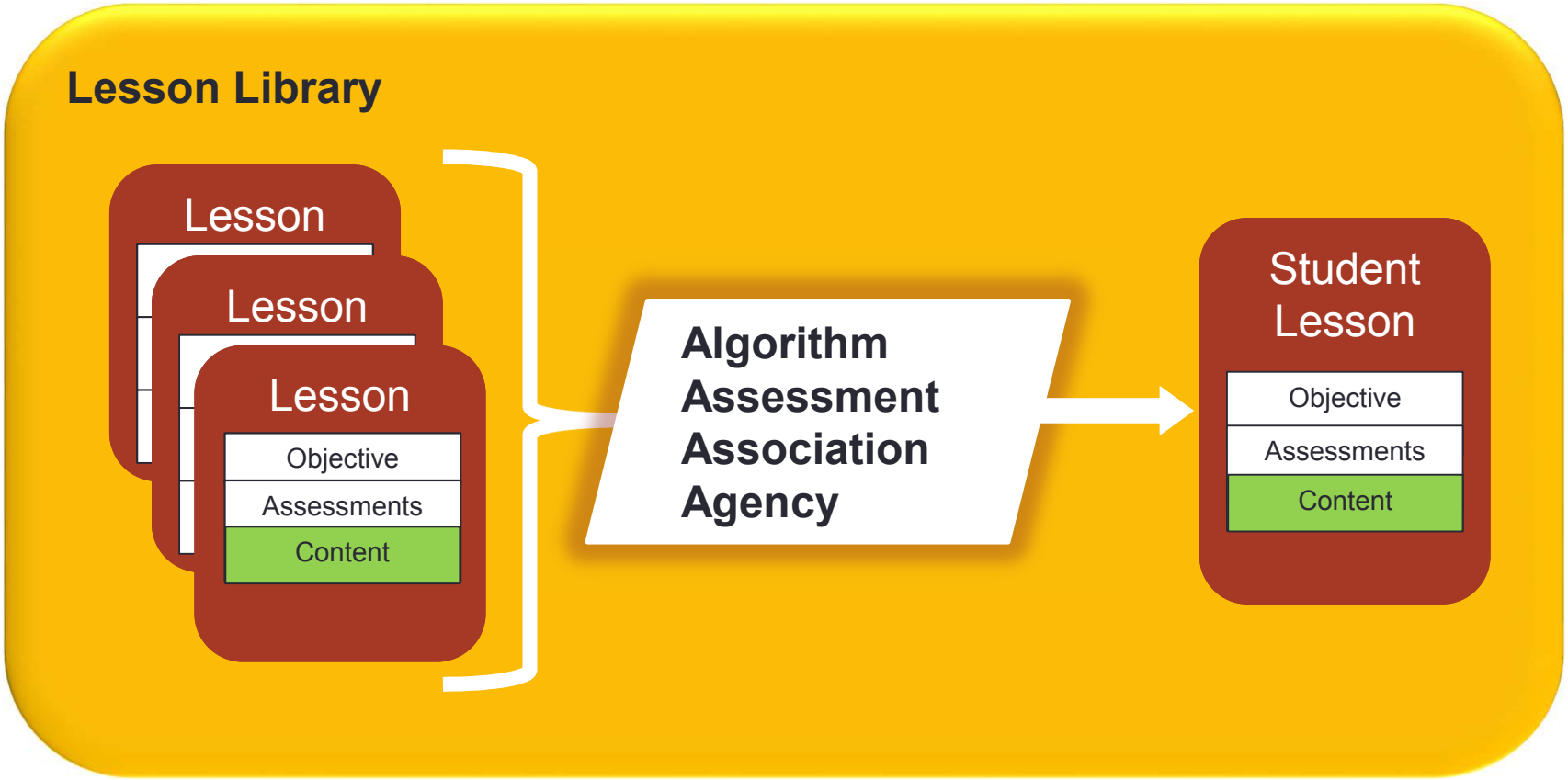
- **Algorithm** (analytics) – recommendations
- **Assessment** – rapid remediation
- **Association** – knowledge network
- **Agency** – student chooses

How does Lesson Sequencing work?

- **Knowledge Network**



How does Content Selection work?



What is an example of a vendor?

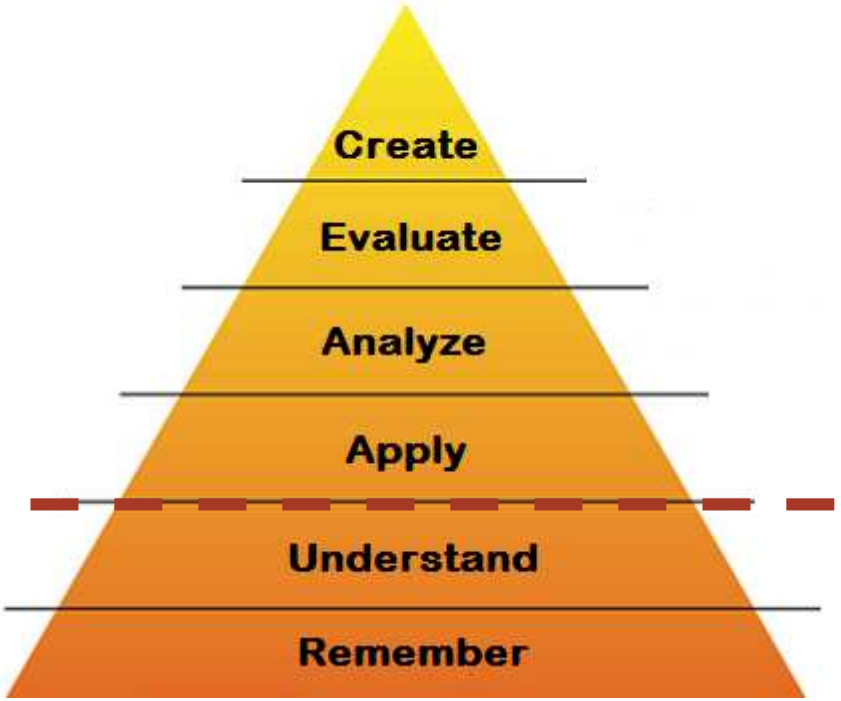
Vendors use a mix of the different techniques:

How is ASU using the adaptive systems?

- **Best results with "Adaptive and Active" approach**

Active Learning in class

Adaptive Learning before class



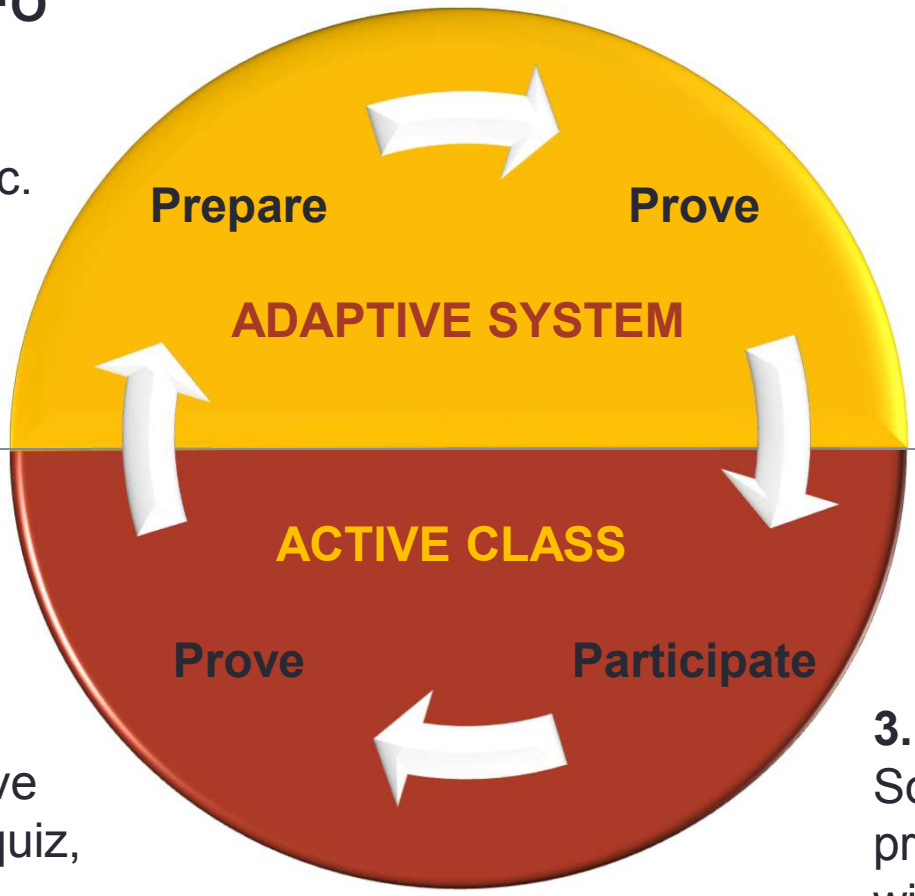
Bloom's Taxonomy

Optimize high-tech (adaptive) and high-touch (active) learning

How does this process work in practice?

1. ACQUIRE INFO
Read textbook, watch video, do simulation, etc.

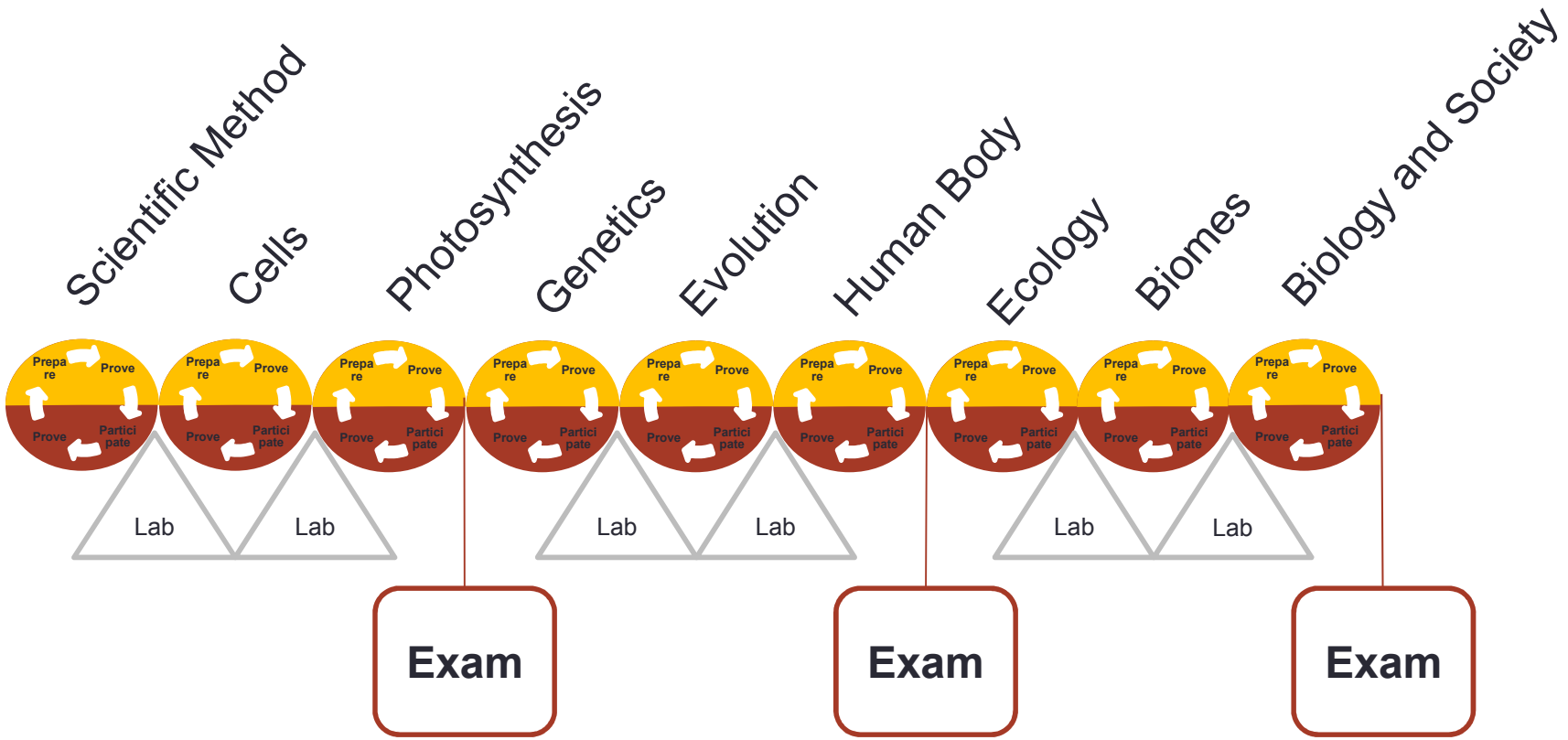
2. ASSESS
Do practice problems, take quiz before class



4. ASSIMILATE
Write essay, solve problems, take quiz, etc.

3. APPLY
Solve an applied problem (case study) with classmates.

What does a sample course look like?



Adaptive and Active learning are symbiotic in the educational ecosystem.

How are the classrooms organized?

Students work in small teams to solve problems.

What is the new role of the teacher?

Teachers guide students through the group activities.

How does ASU evaluate our efforts?

MISSION: **Achieve 90% freshman retention**

OBJECTIVES:

- *Do Applied Concept Exercise every class*
- *Help 90% of students get C or better*
- *Lower withdrawal rate to less than 5%*
- *Identify struggling students by week 2*

What factors do we evaluate?

- **Macro indicators**
  - Persistence (lower withdraw rate)
  - Performance (higher pass rate)
  - Satisfaction
    - Student
    - Instructor
    - Administrator
  - Financials
    - Money saved or spent

- **Micro indicators**
  - Assessment data (lesson or exam level)

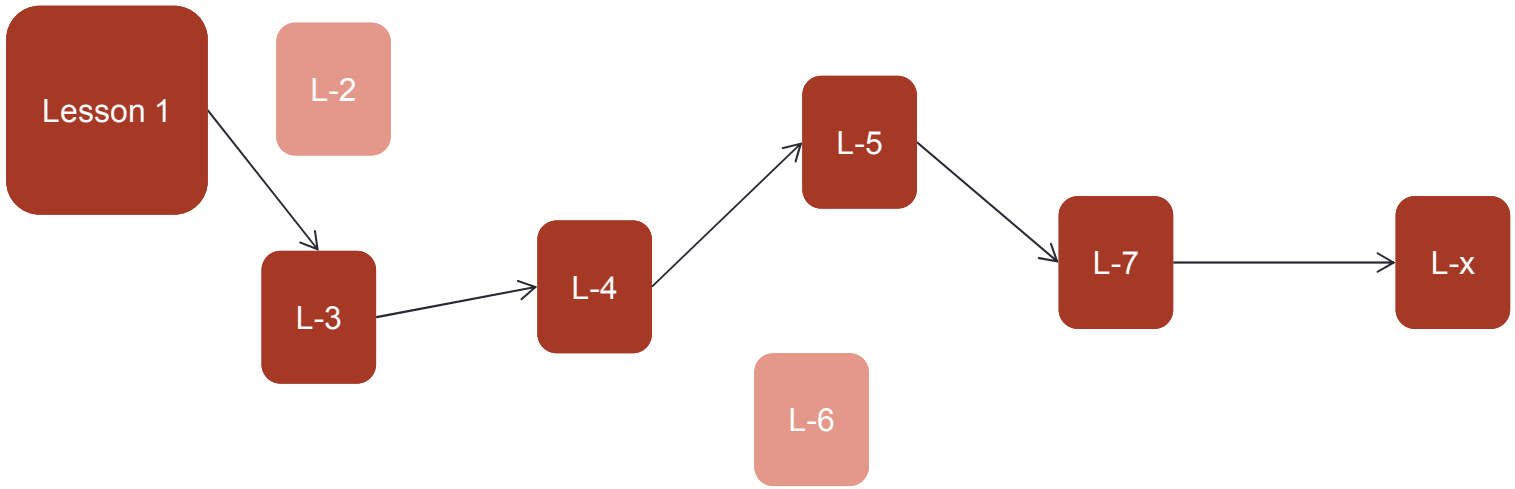
What has course development cost ASU?

- **Implementation**
  - Construct ~ $50,000
    - Faculty time ~ 9 months
    - Staff time ~ 12 months
    - Systems integration ~ 1 month
    - Content development and licensing
  - Configure ~ $5,000
    - Faculty time ~ 1 month
    - Staff time ~ 3 months
- **Operation**
  - Student license $35 - $100
  - Faculty training – every semester

Additional Slides for Reference

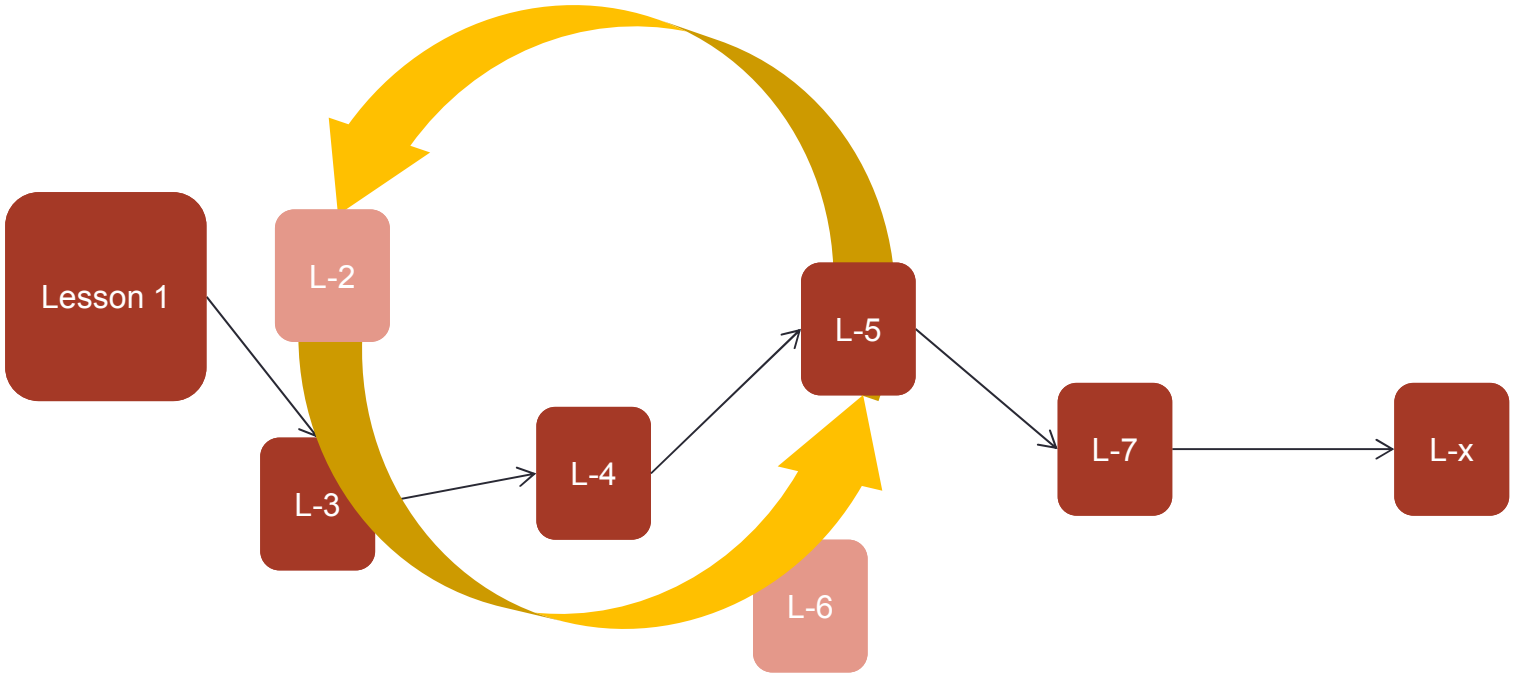
How are these techniques implemented?

Personalized Lesson Sequence (Algorithm, Association, Agency)



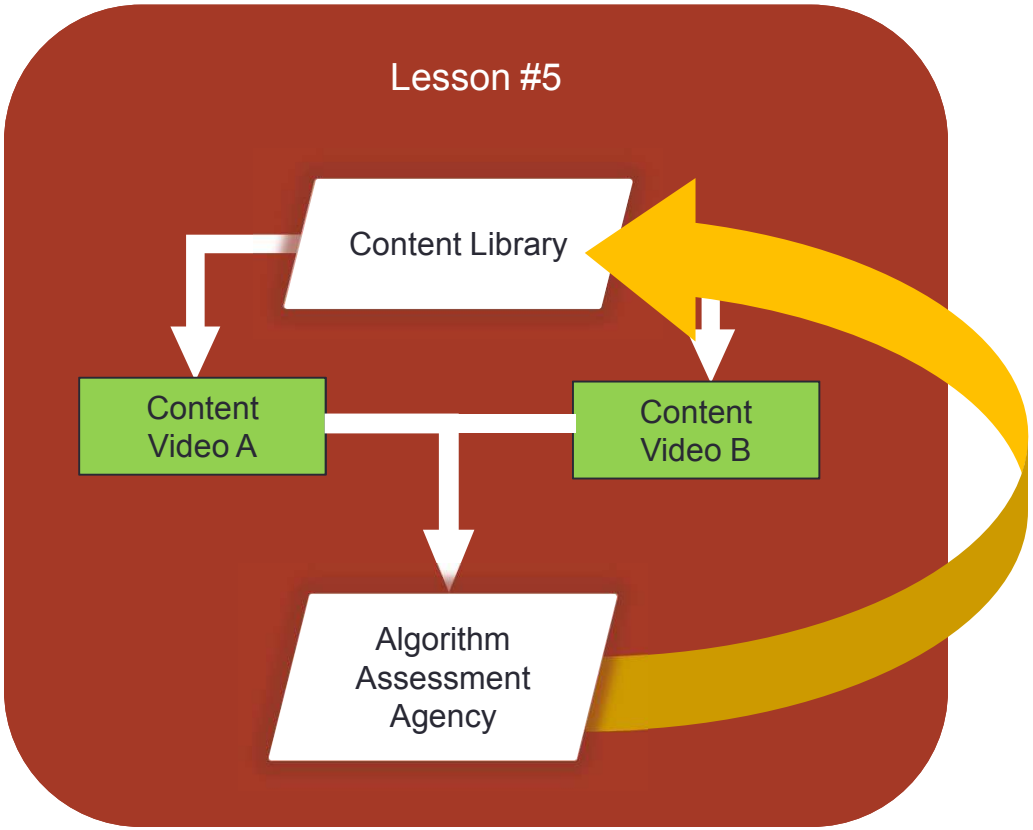
How are these techniques implemented?

Rapid Remediation (Assessment)



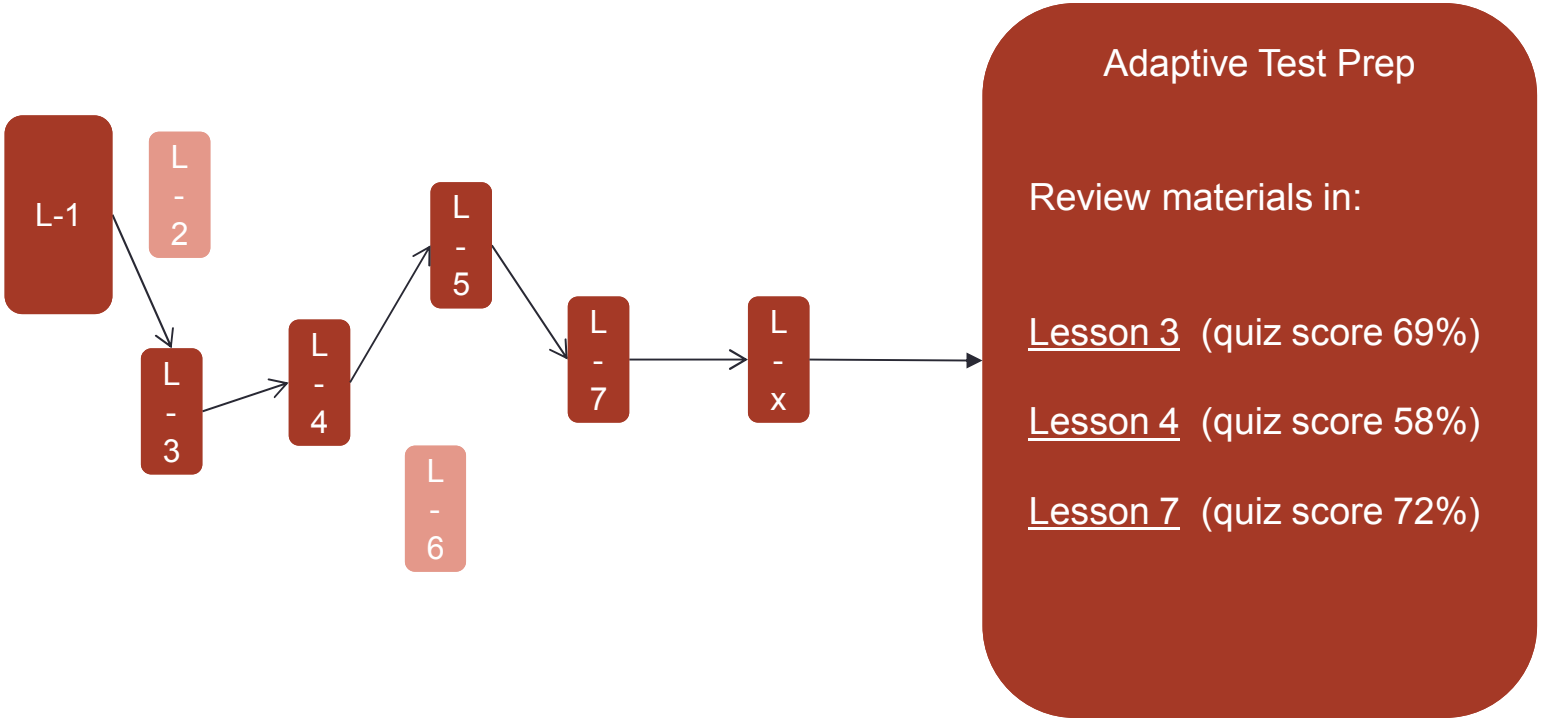
How are these techniques implemented?

Content Selection (Algorithm, Assessment, Agency)



How are these techniques implemented?

Personalized Review (Algorithm, Assessment)



What are the major challenges and decisions?

- **Pedagogy**
- **System**
- **Course Development**
- **Faculty**
- **Facilities**

can the system support your Pedagogy?

- **Lecture - practice and assessment**
- **Flipped - instruction and assessment**
- **Online - instruction, practice and assessment**

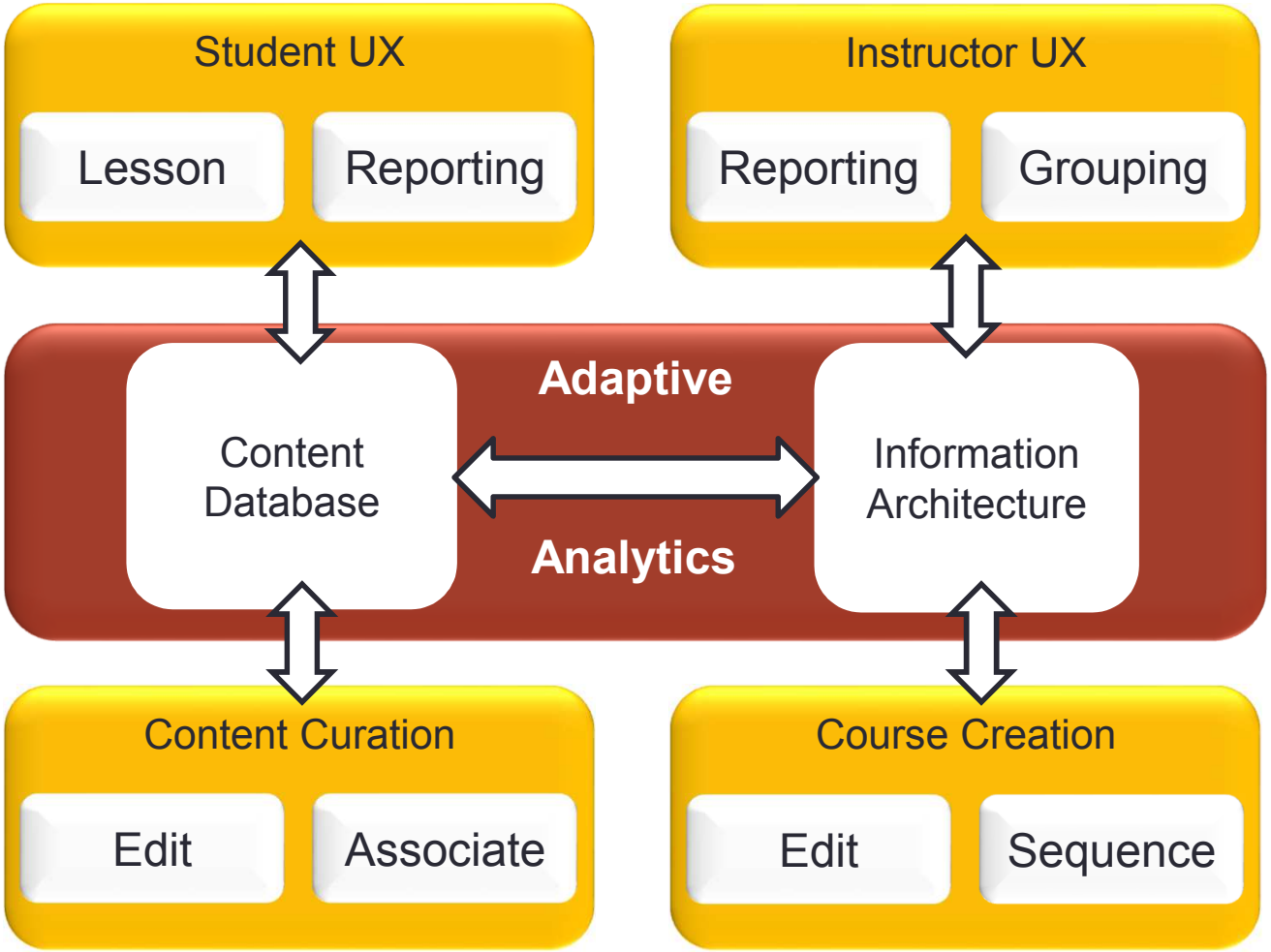
What other Pedagogical decisions matter?

- **Student learning**

Self-paced	***or***	***Synced***
Complex tracking		*Lesson alignment*
Flexible exam dates		*Fixed exam dates*
Independent		*Interactive*
Competency		*Completion*

Faculty need to make these decisions first.

What are the major System components?



What are some key System development issues?

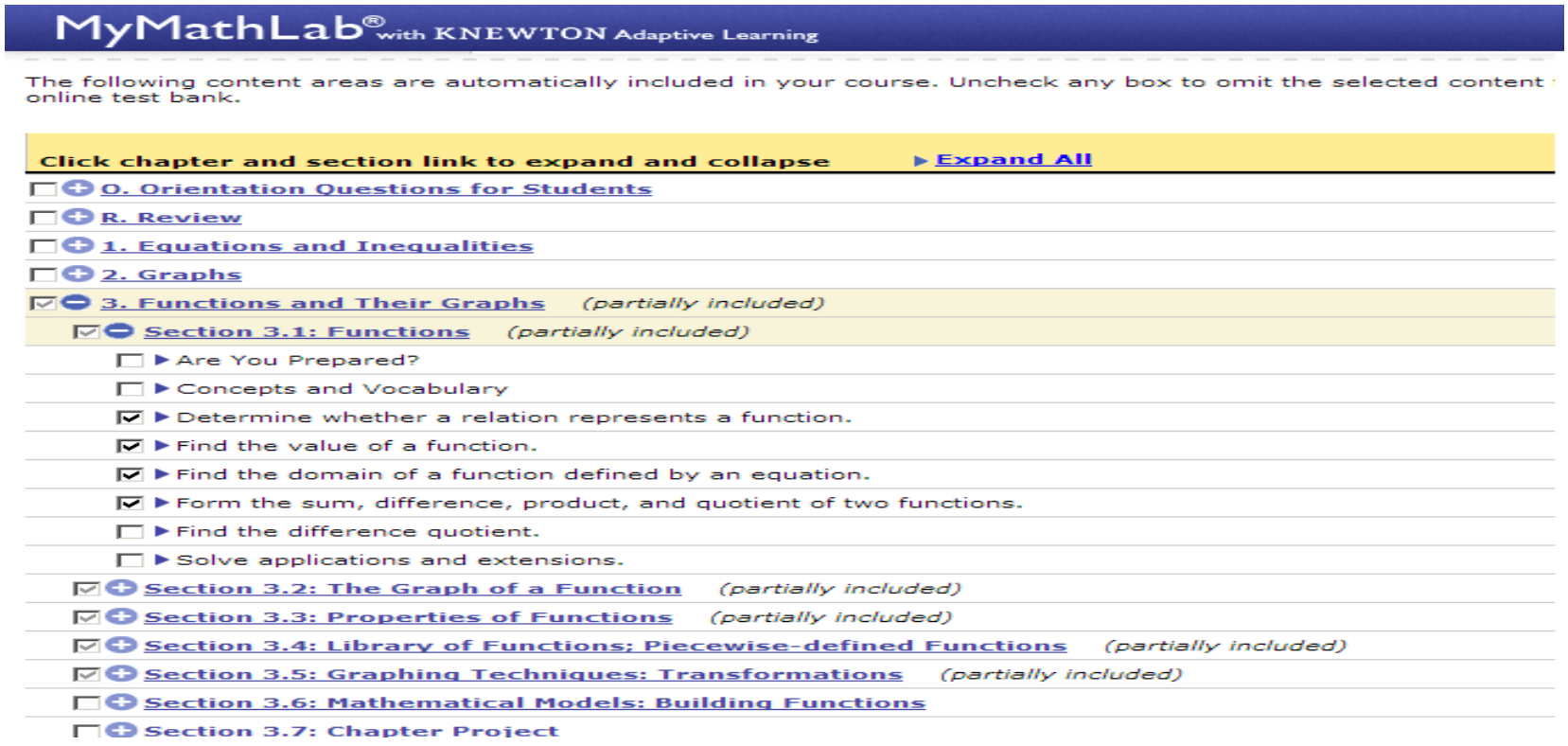
- **Course Creation**

Construct	***or***	***Configure***
Time consuming		*Quick*
Flexible		*Constrained*
Costly		*Cheaper*
Riskier		*Safer*

Consider the amount of effort before committing to a strategy.

How are different Systems implemented?

- **Course Creation – Configure**



Adaptive systems are moving toward modularity.

How can you manage content in the System?

- **Content Curation**
  - **Vendor Resources**
    - **Prebuilt courses**
    - **Library of materials**
  - **Other Resources**
    - **Teacher produced content**
    - **Open Educational Resources (OER)**

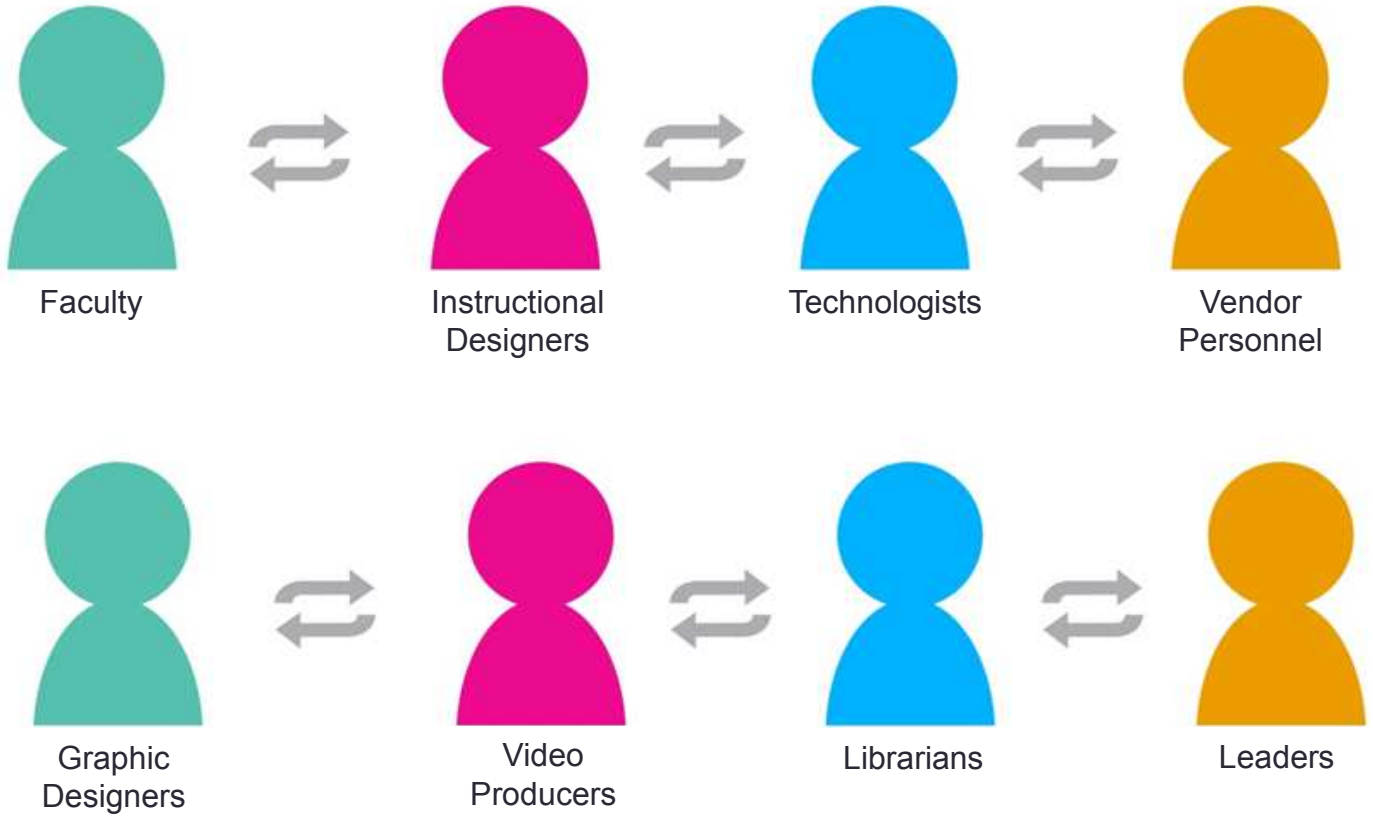
Will the vendor allow locally produced content in their system?

does the System handle different subjects?

- **Course Creation – Subject Matter**
  - **Math Model**
    - **Assess, learn, assess**
    - **Predicated on 12 years of prior math education**
  - **Other Disciplines**
    - **More traditional presentation**
    - **Learn, assess, remediate, assess**

Adaptive logic is not the same for all subjects.

How can you manage Course Development?



Adaptive tech is a team sport, so plan accordingly.

What can help Faculty succeed with AL?

- ✓ **Strong academic leader support (and $)**
- ✓ **Faculty leadership for each course**
- ✓ **Instructor peer mentoring for training**
- ✓ **"Guide on the Side" is not for everyone**
- ✓ **Be patient, it's a learning process**

Success of the technology depends on the teacher!

types of classroom Facilities will you need?

- ✓ **Flat floors**
- ✓ **Round tables**
- ✓ **White boards**
- ✓ **High speed Wifi**
- ✓ **A/V system with microphones**

How will you get the classroom Facilities ready?

- ✓ **How many active learning classrooms?**
- ✓ **How big do they need to be?**
- ✓ **How long will they take to build?**
- ✓ **How much will they cost?**
- ✓ **Who is going to pay for them?**
- ✓ **How will you support them?**

Think the project all the way through.

For More Information

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