How Adaptive Learning Changes the Faculty and Student Role

Learning for the Individual

WCET June, 2015

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The Adaptive Learning Story

• We Don’t Know....

• The Variance Factor

• Swiss Cheese

• Let’s Get Personal
The Variance Factor

We don't know what they know
The Challenge: How do we know what they need?

What they bring....
- Educational experience
- Work experience
- Life experience
- Diversity
- Adult life responsibilities

What they need....
- Efficiency in learning
- An R.O.I.
- An impact on their lives, careers, and goals
The Answer: Demystify Learning through Science

Know what they know, what they don’t know, and where they need help.

I haven’t read the material

It has been a while since I have been a student

I need a challenge

I did the assignment but still don’t get it

I need remediation

I need a refresher on statistics

I know the 4 Ps of marketing

I did well in my last course, but I am worried about my next course
Adaptive Learning Transforms

TRADITIONAL

One-Size-Fits-All
Time in Class
Grades
Degrees

REVOLUTIONARY

Highly Personalized
Knowledge State
Knowledge Growth
Informed by Data

Swiss Cheese Effect: Individual Learning Gaps that exist and need to be filled for students to move forward.
The Personalized Student Experience

• Personalized interaction and engagement
• Informed and directed
• Real-time feedback
• Knowledge State, Knowledge Covered, Knowledge Growth
• Connected
A Personalized & Engaging Experience

• **Personalized:** A learning path that promotes learning efficiency:
  
  – Collapsing the known concepts
  – Filling individual knowledge gaps
  – Evidencing knowledge
  – Increasing personal knowledge growth
  – Traversing the map with directed learning in a non-linear environment unbound by time

• **Engaging:** Each learning node includes granular content presented in smaller bits of information, dynamic assessments that allow for a wide variety of question types, the use of variables in questions, and knowledge checking within short intervals. Students become knowledgeable decision makers in their learning.
Interactivity within the Environment

What Is Business?

public double calculateTotalRevenue()
{
    return (sideLength ** 2);
}

// main function call
double sideLength = 10;
System.out.println(calculateTotalRevenue());

You only have to know one thing:

You can learn anything

For free. For everyone. Forever.

Dynamic Questioning
An Informed and Directed Student Experience

• They Know
  – Students know what they know and what they don’t know quickly and continually without waiting for due dates or instructor feedback. They know their knowledge gaps and seek to overcome them.
  – They know their Knowledge State on concepts, lessons, and objectives.

• Informed by real-time feedback with granular details about strengths and weaknesses, continual assessment, and recommendations for improvement.

• Directed by the recommendation engine, they are able to work independently and gain learning efficiency through engine direction and real-time feedback for decision making.

  “Students become collaborators in their learning.”
Real-Time Feedback & Personalized Guidance for Students

Student Dashboard

How am I doing overall on my milestones?

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Knowledge covered</th>
<th>Knowledge state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institution Resources</td>
<td>10 of 10 done</td>
<td>73%</td>
</tr>
<tr>
<td>Developing a Success Plan</td>
<td>16 of 16 done</td>
<td>74%</td>
</tr>
<tr>
<td>Accepting Responsibility</td>
<td>28 of 28 done</td>
<td>74%</td>
</tr>
<tr>
<td>Moving Forward</td>
<td>27 of 27 done</td>
<td>78%</td>
</tr>
<tr>
<td>Overall</td>
<td>43 of 43 done</td>
<td>75%</td>
</tr>
</tbody>
</table>

Learning Analytic Engine
recommendations on how to improve

Steps to improve

You have completed the nodes, so these steps are to help you improve:

<table>
<thead>
<tr>
<th>Step</th>
<th>Item</th>
<th>Estimated time</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Resume Intro to Problem-Solving Techniques</td>
<td></td>
<td>Resume</td>
</tr>
<tr>
<td>2</td>
<td>Revise Intro to Communication</td>
<td>20 mins</td>
<td>Revise</td>
</tr>
<tr>
<td>3</td>
<td>Practice milestone</td>
<td></td>
<td>Practice</td>
</tr>
</tbody>
</table>

Personalized Grade Feedback on how to Improve

Your knowledge covered is 100%. Your knowledge state is 75%. Your improvement score is 0/5. These combine to give an overall score of 81%. You can increase your improvement score by doing more practice and revising some nodes.

You completed all of the material so you get full credit for your knowledge state of 75%. Your knowledge state values are varied in and different ranges. Your knowledge state for "Introduction to Reading Comprehension Strategies and Summarizing Skills" (97%) and "Case Study 1" (86%) is above your average but for "Elements of Academic Writing" (62%), "Intro To The Writing Process" (67%) and "Avoiding Plagiarism" (64%) it is below.
A New Way to Measure Learning

• **Knowledge State:** What the student has evidenced as knowledge about the lesson, objective, course, or program. Goal is to increase knowledge state through knowledge growth and demonstrate new knowledge through assessments and mastery.

• **Knowledge Covered:** What learning and assessments the student has completed in the learning map based on curriculum and designated outcomes.

• **Knowledge Growth:** The new learning—the difference between what the student knew before working on his or her personalized map and what he or she can evidence as knowledge when the map is completed.
Pathing through Learning Maps
Student Connections

- Pre-requisite network
- Pathing through the Learning Map
- Connected to their individual Knowledge, Progress, and Growth
- Connections to authentic assessments
- Connections across programs and competencies
### Time Spent for College Algebra Learning Activities

<table>
<thead>
<tr>
<th>Student Count</th>
<th>Total Activities*</th>
<th>Total Time Spent in Platform (measured in hours)</th>
<th>Average Time on each Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,142</td>
<td>123,350</td>
<td>51,127:23</td>
<td>23:52</td>
</tr>
</tbody>
</table>

*Activities include: Determine Knowledge Pre-Assessment, Lessons, and Revision Lessons

### Learning Activity Completion for College Algebra Objectives

<table>
<thead>
<tr>
<th>Algebra Essentials</th>
<th>Linear Equations and Inequalities</th>
<th>Functions and Graphs</th>
<th>Quadratic Equations and Quadratic Functions</th>
<th>Systems of Equations</th>
</tr>
</thead>
<tbody>
<tr>
<td>85.10%</td>
<td>82.70%</td>
<td>83.70%</td>
<td>85.70%</td>
<td>88%</td>
</tr>
</tbody>
</table>

**Average for all Objectives** 85.04%

### Instructor and Student Interactions for College Algebra

<table>
<thead>
<tr>
<th>Student Count</th>
<th>Total Activities</th>
<th>Total Interactions*</th>
<th>Average Number of Interactions per term</th>
<th>Average Number of Interactions per student</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,142</td>
<td>123,350</td>
<td>14,871</td>
<td>1,144</td>
<td>6.94</td>
</tr>
</tbody>
</table>
The Informed Instructor Experience

The instructor role changes when working in an Adaptive Learning environment; instructors know more about each individual student.

- Instructors can view their learning map at a glance and know the student’s strengths and weaknesses as well as progress in real time.

- As assessment is continual within the environment; instructors can spend less time grading and more time assisting students and making connections to additional course requirements.

- Instructors can intervene with informed decisions as they know in detail which piece(s) of granular content is a challenge for the student.

- Instructors receive informed student questions in real time that include the student’s work from the engine so they can assist quickly and easily.

Know what they know, what they don’t know, and where they need help.
Adaptive Instructional Strategies

• Real-time information changes instruction and instructional strategies.
• Instructional strategies can now be adaptive and instructors can instruct based on data and current state of students rather than on a linear, time-bound pre-planned lesson plan.
• Because Knowledge Growth is available, instructors can direct student improvement having students traverse the Learning Map to increase learning efficiency.
• Academic Leadership and instructors are informed on curriculum, content, and assessment through use of an Adaptive Learning Environment which leads to data-driven decision making.
Instructor Dashboard
5 Keys Pieces of Information

1. Student questions
2. Concepts the entire class is struggling with
3. Concepts the entire class is excelling in
4. Students who are struggling
5. Students who are excelling

- Individual students struggling
- Class struggling overall
- Class excelling overall
- Students in need of a challenge
- Action drop downs
- Pair a advanced student with a struggling student
Interactions & Interventions

- Student Questions and Messages attach current information on their work reducing time and effort for instructors to reply.
- Instructors can intervene earlier and faster—changing the student experience and giving the opportunity to influence the outcome.
- With the recommendation engine and the instructor recommending steps for improvement, the student is directed in improvement efforts (learning efficiency).
- Messages from instructors contain guidance so that students can proceed independently and in real time (learning efficiency).
Customized Reporting

- Customized reporting informs instructors and Academic Leadership on:
  - Program Outcomes
  - Curriculum
  - Course Changes
  - Pedagogy
  - Assessment Needs
  - Connection between Learning Map and Course Design
• Students have their own personalized learning path, which increases learning efficiency.
• Students are engaged and informed.
• Students given the chance to improve, do so at a high rate.
• Students thrive on the real-time feedback; it allows them to be decision makers in the learning process.
• Students complete Adaptive Learning activities at a higher rate than other types of learning activities.
• An improved student experience is possible within an Adaptive Learning Environment.

• Instructors are informed about student knowledge, strengths and weaknesses, and progress.
• Adaptive teaching strategies are possible adapting to the current group of students.
• Intervention in real time and as a deciding factor in student success is possible.
• Increased informed interactions with students.
• Academic Leadership and instructors are informed on curriculum, content, and assessment through the use of an Adaptive Learning Environment.
How We Know

45,000+ Students
500+ Trained Instructors
200+ Learning Maps Designed
15M Lessons Completed in the Adaptive Learning Environment
4.1M hours in learning time
145M assessment questions answered
5.2M Practice & Revision Lessons
4.4M additional interactions between instructors and students