Personalizing the Learning Experience: Integrating Adaptive Elements in Online Courses

Faculty Seminars in Online Teaching

Center for Distributed Learning
“We need to prepare students for their future, not our past.”
–Ian Jukes
Agenda

• Overview of adaptive learning
• Examples at UCF
• The instructor’s role and experience
• How to get involved
Adaptive Learning Approaches and Examples
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Center for Distributed Learning
Adaptive Learning

Adaptive learning systems provide each student with a personalized learning experience, adapting the presentation of content and possibly assessment according to differences in student skill sets caused by an increasingly diverse population.
Adaptive Learning with RealizeIT

• UCF using adaptive learning system called RealizeIT
• System adjusts content based on student performance in real-time
• Allows for acceleration and remediation within a course
• Focuses on student needs and what they need to know
• System “learns” how students learn and adjusts presentation of content
Adaptive Learning Approaches

Use can range from in-class individualization to online adaptive systems

- One module or topic
- Every module – simple use with feedback
- In-depth, detailed full course
- A few modules or concepts
- Every module – advanced use
Examples at UCF

• Pilot using RealizeIT began in Fall 2014
  • Three courses: General Psychology, College Algebra, Pathophysiology
• Use of RealizeIT continues
  • College Algebra, Intermediate Algebra
  • Pathophysiology (undergraduate), Pathophysiology (graduate)
  • Bachelor of Applied Science Program – Software Track and IT Track
  • Statistics for Educational Data (graduate)
Examples at UCF

• Pathophysiology case studies
  • Built-in assessment
    • Adaptive interactions within case study
  • Enhanced Interactions
    • Various question types
    • Variables
    • Conditions
    • Feedback
### Examples at UCF

<table>
<thead>
<tr>
<th>CHEM panel</th>
<th>CBC</th>
<th>ABG</th>
</tr>
</thead>
<tbody>
<tr>
<td>glucose</td>
<td>WBC</td>
<td>pH</td>
</tr>
<tr>
<td>Na⁺</td>
<td>Hgb</td>
<td>CO₂</td>
</tr>
<tr>
<td>K⁺</td>
<td>HCT</td>
<td>O₂</td>
</tr>
<tr>
<td>Cl⁻</td>
<td>neut</td>
<td>HCO₃</td>
</tr>
<tr>
<td>BUN</td>
<td>lymph</td>
<td>Anion gap</td>
</tr>
<tr>
<td>Creatinine</td>
<td>w1creat</td>
<td>w1anion</td>
</tr>
<tr>
<td>BUN/Creatinine ratio</td>
<td>w1buncreatra</td>
<td>w1anion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHEM panel</th>
<th>CBC</th>
<th>ABG</th>
</tr>
</thead>
<tbody>
<tr>
<td>glucose</td>
<td>832 mg/dL</td>
<td>16292</td>
</tr>
<tr>
<td>Na⁺</td>
<td>140 mEq/L</td>
<td>Hgb</td>
</tr>
<tr>
<td>K⁺</td>
<td>3.3 mEq/L</td>
<td>HCT</td>
</tr>
<tr>
<td>Cl⁻</td>
<td>91 mEq/L</td>
<td>neut</td>
</tr>
<tr>
<td>BUN</td>
<td>51 mg/dL</td>
<td>lymph</td>
</tr>
<tr>
<td>Creatinine</td>
<td>1.83 mg/dL</td>
<td>Mono</td>
</tr>
<tr>
<td>BUN/Creatinine ratio</td>
<td>27.9</td>
<td>Eos</td>
</tr>
</tbody>
</table>
Examples at UCF

The patient is hypochloremic because $Cl^-$ is \( w_{1cl} \) mEq/L which is less than 96 mEq/L.

$w_{1na}<135$

$w_{1na}>145$

The patient is hyponatremic because $Na^+$ is \( w_{1na} \) mEq/L which is less than 135 mEq/L.

The patient is hypernatremic because $Na^+$ is \( w_{1na} \) mEq/L which is greater than 145 mEq/L.

$w_{1k}<3.3$

$w_{1k}>5.2$

The patient is hypokalemic because $K^+$ is \( w_{1k} \) mEq/L which is less than 3.3 mEq/L.

The patient is hyperkalemic because $K^+$ is \( w_{1k} \) mEq/L which is greater than 5.2 mEq/L.
Examples at UCF

What electrolyte abnormalities are present? Check all that apply.
- hypernatremia
- hyponatremia
- hyperchlorinria
- hypokalemia
- hyperkalemia
- hypochlorinria

That is incorrect.

This one takes some thought. How did you do?

The patient is hypochloremic because Cl⁻ is 87 mEq/L which is less than 96 mEq/L.

The patient is hypokalemic because K⁺ is 3 mEq/L which is less than 3.3 mEq/L.
Instructor Role and Experience
Debbie Hahs-Vaughn, PhD
Professor, Methodology, Measurement & Analysis
College of Education and Human Performance
How I Got Involved

• I was asked!
• It was an easy sell
  • Differentiation to students with wide ability levels
  • Gave ownership to students
    • Allowed students to self-pace (within the confines of a semester)
    • Increased engagement with the content
My Experience in Adapting to Adaptive Learning

• My course
  • Graduate level introductory statistics course—online
  • 11 modules
    • 4 modules: descriptive statistics
    • 7 modules: inferential statistics

• Converted part of the course to adaptive learning
  • This is a time commitment to build!
My Experience in Adapting to Adaptive Learning

• Components of adaptive learning
  • Content/material (i.e., what students need to learn)
  • Assessment items

<table>
<thead>
<tr>
<th>Before Personalized Learning</th>
<th>After Personalized Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Voice over slides (i.e., movies)</td>
<td>• Voice over slides (i.e., movies)</td>
</tr>
<tr>
<td>• End-of-chapter homework</td>
<td>• End-of-chapter homework</td>
</tr>
<tr>
<td>• Discussion assignments</td>
<td>• Discussion assignments</td>
</tr>
<tr>
<td>• Midterm</td>
<td>• Midterm Personalized learning</td>
</tr>
<tr>
<td>• Final exam</td>
<td>• Final exam</td>
</tr>
<tr>
<td>• Research study</td>
<td>• Research study</td>
</tr>
</tbody>
</table>
“Adaptive learning forces the rethinking of structure, organization, and timing in contemporary higher education...”
(Dziuban, Moskal, & Hartman, 2016)
Faculty Perspective

[Diagram showing statistical concepts and measures, including Mean, Median, Mode, Range, Variance, Standard Deviation, and related terms such as Transformation to Unit Normal Distribution and Unit Normal Distribution Table.]
The instructions for completing the Personalized Learning assignment can be found in the homework assignment link for module 1.

This tool needs to be loaded in a new browser window.

Load Personalized Learning - Mod 1: Intro to Statistics in a new window.
Student’s Perspective

1. First step:
   - Your first step is to let the system determine your level of knowledge.
   - Determine knowledge

2. How well do you think that you know the material in Module 2: Data Representation?
   - It is important that you take the time to answer the questions; the system uses your responses to figure out your path through the material. You could end up with more work to do if you don’t try your best now.

   - Not at all
   - Small amount
   - Reasonable amount
   - A lot
   - All of it

   Determine knowledge
Student’s Perspective

• My performance on ‘determine knowledge’ directs me to the appropriate learning path.

I need more engagement with the content.
Student’s Perspective

Measurement Scales

Measurement is assigning numerical values to persons or things (i.e., the unit of analysis, whatever that may be) according to explicit rules.

Understanding the measurement scale of variables is important because the measurement scale helps determine the type of statistical procedure that can be used with your data.

Measurement scales, in order from simplest to most complex, are: nominal, ordinal, interval, and ratio. We’ll talk about each in detail.

- Nominal
- Ordinal
- Interval
- Ratio

Types: Categorical, Continuous
Student’s Perspective

Which one of the following is an example of a variable that is interval measurement scale?

- temperature (measured on a Fahrenheit scale)
- employment status: employed full or part time, unemployed, retired, other
- income (measured in dollars and cents)
- average: far above average, slightly above average, average, slightly below average, far below average

You answered 1 out of 1 correctly. Asking up to 12.
I have shown mastery of this content

The learning path directs me to a few more assessment items (not content), which were answered correctly and...

We can stop now, I think. That was some good work. Of course, you can always practice again, if you want. Your knowledge state for this module has increased from 94% to 99%.
Faculty Perspective: Student Details

EDF6401-16Fall 0W61 » Mod 4: Normal Distributions & Standard Scores

Status

Due date reached
The due date of 9/26/2016 has been reached. You can access summary information by using the Grading button. Grading information should have been transferred by 9/26 if it is overdue.

Question answer queries
There are some queries on answers that were judged incorrect from people in this section. Press Questions to examine the queries that have not been responded to.

Knowledge covered
This module was due on 9/26/2016.
3 people have not started.
25 people are finished.
3 people have not yet done determine knowledge for this module.

Items of the graph are colored by knowledge state:
- 0% - 29%
- 30% - 59%
- 60% - 59%
- 70% - 89%
- 90% - 100%

Symbols used: (prior items are faded)
- Complete
- Locked
- Available
“What are you MOST enjoying about the class so far?” (Fall 2016)

• “What I liked most so far is that there are **multiple ways to learn the material**. Reinforces what we are learning. If you don't understand it one way you have a chance to get it another way. Especially like the personalized learning modules.”

• “The personalized learning modules. Those really help a lot and I do enjoy it. **They are difficult** however, the practice questions **really help me know if I actually understand the concept.**”

• “The **interactive lessons** in the personal learning modules.”
“What are you MOST enjoying about the class so far?” (Fall 2016)

• “This is my first class ever using the adaptive learning feature and it has been a fantastic experience. **Without the adaptive learning, I would have never learned the material.** It sets a direct path for you based off your current knowledge of the subject, teaches you the material, and then quizzes you on it. If it doesn't think you have learned enough, it will send you back for more practice. I have truly enjoyed this experience with adaptive learning and I would highly recommend using adaptive learning. It's easy to use and helpful for learning. I would 100% take a course that uses adaptive learning. To me, it is a real benefit to any class and it is a great tool to help students succeed.”
“What are you LEAST enjoying about the class so far?” (Fall 2016)

• “That sometimes the personalized learning modules can be difficult to increase your grade even if you understand the concept and are doing things right. Getting one wrong out of 10 can bring your grade down and it takes a while for some sections to get them all right. I will say though I got it down very well in those areas. It was frustrating getting there sometimes.”
Challenges

• Self-inflicted problems
• Confines of a ‘regular’ semester
  • “Students’ challenges regarding adaptive learning indicated a dissonance between a ‘linear’ course and an adaptive one... Although adaptive learning allows students to progress at their own pace, the nature of semesters and course rhythms meant that there was a time schedule for exams that required students to complete a certain amount of work beforehand” (Dziuban, Moskal, & Hartman, 2016)
• Not one-size-fits-all—there are courses for which adaptive learning is likely not a good solution
Resources

• Personalized Learning at UCF
  • https://online.ucf.edu/support/realizeit/

• How do I get involved?
  • Fill out the following brief Google Form: https://goo.gl/forms/KJZ6FiuCjDrtbwQI3
References


