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Web-based Assessment at UNL: Promise and Challenges

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Abstract for DBER Group Discussion on 2012-03-13

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Dr. Kevin Lee, Research Associate Professor
Department of Physics and Astronomy
Center for Science, Mathematics & Computer Education
College of Arts and Sciences

Title:
Web-based Assessment at UNL: Promise and Challenges

Abstract:
This presentation will provide an overview of the web-based assessment engine MapleTA. This is a product that began at UNL in 1996 as eGrade, was developed as EDU in partnership originally with Wiley and later with Brownstone Learning, and very recently we began purchasing from MapleSoft as an enhancement to Blackboard. We will explore the tremendous promise of web-based assessment and acknowledge the educational research documenting this. Examples from UNL classes will be shown that require pre-class preparedness, provide unlimited practice opportunities through randomization, offer feedback, emphasize time management, and demonstrate the possibilities of high-tech content. I will also detail many of the challenges we face including shortcomings in MapleTA/Bb integration, a shortage of support resources, the challenges facing faculty in finding time for development and the lack of a reward structure for doing so, the need for centralized leadership (especially in testing centers), and the lack of commitment by administration to this technology.
Web-based Assessment at UNL: Promise and Challenges

Kevin M. Lee
Center for Science, Mathematics, & Computer Education
Chair of the MapleTA Advisory Board
Goals of Today's Presentation

- Convey the Tremendous Power of Web-Based Assessment
- Overview of EDU/MapleTA
  - History (Usage, Ownership, Management)
  - Present Usage
  - Present Problems
- Shortcomings of Present Policies
- Options/Recommendations for the Future
Long History

- John Orr created EDU in 1996 for the Math Gateway Exams
  - Very Flexible, Tremendously Powerful
  - A & S Testing Center came Online in 2000
- Partnerships
  - Brownstone – 2001
    - We were tops in the nation at this time!
  - Brownstone & MapleSoft – 2004
  - Big Fight – Corporate Divorce – 2007
    - MapleSoft – still under development
    - Brownstone/Horizon Wimba – no longer under development
    - We recently purchased access to the MapleSoft version
Broad Recent History

- **2004 – 2007 Golden Age**
  - EDU runs with reliability
  - ASA Grant - A 3-year 0.5 $million NSF grant to determine “best practices”
  - 4 week-long summer workshops

- **2008 – 2010 Non-stop Problems**
  - MapleTA has algorithmic problem
  - MapleTA institutes question repository
  - Developmental workflows turned upside down

- **2011 – 2012 Mild Competence**
Web-based Assessment: What Is it?

- Web-based Delivery & Grading of Assignments 24/7
- Restrictions (Due Dates, Time Limits, etc.) Automatically Enforced
- Many Question Types -- Multiple Choice, True/False, Numeric, Clickable Image, Fill-In-The Blank, Inline (Freeform Assessment)
- Questions are "Reusable" through Randomization
  - Selection of Items from a Pool of Questions
  - In an individual Item through Numerical Values & Text Strings
- Feedback
- Effectiveness Demonstrated by Educational Research (on randomized practice with feedback)
Web-based Assessment Usage

- Proctored Exams
- Practice – Homework with feedback
  - Emphasize Iteration – Only the Highest Score Counts
- Mastery Learning (big in Psychology)
- PreClass Preparedness (big in Physics)
Overheard Comments

- It Saves Money – Nope!
- It Saves Time – Not Really!
- It Enables you to Teach more Effectively – It Sure Can!
  - But the emphasis should be on randomized practice with feedback
- It is Absolutely Vital for Distance Education – True!
Astronomy 103 Learning Cycle

- PreClass Lecture – Get prepared for Class
  - Supplement with web resources (or textbook)
- PreClass Quiz (MapleTA)
- In Class
  - Summation by Instructor
  - Peer Instruction
  - Lecture Tutorials
  - Data Analysis Exercises
  - Group Discussion
  - Working with Simulations
- PostClass Online Exercises – Extensive practice
- Activities – NAAP Labs, Observatory, Planetarium, Public Lectures, TV Documentaries
MapleTA Demonstration

- Physics 151 Materials
  - Public Testbank w/feedback in mathml
  - PreClass Quizzes (Inline)
- Astronomy 103
- Hi-End Content (Java Physlets)
- Future Endeavor: Excel-like randomized Plots
Usage Statistics

Exams

<table>
<thead>
<tr>
<th>Year</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2009</td>
<td>60000</td>
</tr>
<tr>
<td>Fall 2009</td>
<td>50000</td>
</tr>
<tr>
<td>Spring 2010</td>
<td>40000</td>
</tr>
<tr>
<td>Fall 2010</td>
<td>70000</td>
</tr>
<tr>
<td>Spring 2011</td>
<td>60000</td>
</tr>
<tr>
<td>Fall 2011</td>
<td>50000</td>
</tr>
</tbody>
</table>
Undergrads

47.3%

Students Using Arts & Sciences Testing Center 2010-11
Students Not Using A&S Testing Center 2010-11
Maple T.A. Typical Weekday Usage Curve, Fall 2011
'CAPACITY REACHED' refers to the total capacity of the Testing Center. This is represented by a red band due to variance in the total number of usable computers.

'2ND ROOM OPENED' refers to the point at which the Testing Center has to open the second room. This is represented by an orange band due to variance in the total number of usable computers in the main room.
Arts & Sciences Testing Center - Concurrent Usage Per Minute
Sunday, March 11, 2012

'CAPACITY REACHED' refers to the total capacity of the Testing Center. This is represented by a red band due to variance in the total number of usable computers.

'2ND ROOM OPENED' refers to the point at which the Testing Center has to open the second room. This is represented by an orange band due to variance in the total number of usable computers in the main room.
Obstacles to Ongoing Development of Web-based Assessment at UNL

- Lack of Administrative Commitment
- Convoluted Oversight at UNL
- Limited resources for support
- Difficulties with Content Authorship
- Poor MapleTA/Bb integration
- Testing Centers not under common management
MapleTA Support
Administrative Commitment

- Financial support from AA presently runs under a yearly agreement
- No commitment to the technology from administration
- No understanding that this isn’t a nicety – but a vital component of a modern instructor’s toolbox
- Makes it hard for an instructor to make a commitment to development
UNL Support Organizations

- Academic Affairs – provides annual funds for 0.4 FTE server support person, 0.5 user support person, hardware replacement to IS
- IS supervises servers supporting software, integration with Bb
- Arts & Sciences – supports testing center that supports most of campus
  - Other testing centers under other organization
- Center for Science, Mathematics, & Computer Education – provides some oversight, hosts MapleTA Advisory Board, Testing Center, and MapleTA support desk.
Testing Centers

- Arts & Sciences Testing Center (Burnett 127) – 64 computers, open 73 hours/week
- East Campus Testing Center (CASNR, 218 Biochemistry) – 15 computers, open 20 hr/wk
- CBA Testing Center (36 CBA) – 25 computers, ~30 hr/wk
- Extended Education (2100 Vine) -- 4 computers, 51 hr/wk, by appointment

- So far the collaboration between A&S, CASNR, & EE &O has been pretty good.
- There are a lot of exams -- with fees
Content Authorship

- Code-based (in a text editor) or Question Designer (online in MapleTA)
- MapleSoft is pushing the question designer
  - Code-based method disappeared for 1.5 years
  - Had no debugging info when it returned
  - Question Designer has limited functionality
- MapleSoft expects developers to do “fancy” stuff with Maple code, not MapleTA code
Counting Authorship/Usage

- Major Developers – creators (and sharers) of substantial testbanks
  - a few, most have retired/moved on
- Major Users – users of testbanks developed by others
  - quite a few
- Contributors – faculty who pitch in and make a contribution toward development
  - none?
Poor Integration with Bb

Hope to Ride UNL's commitment to Blackboard – chose to deploy inside Bb as opposed to standalone

Shortcomings

- Assessment Links must be created in each class
- Setting Deadlines
  - MapleTA has no Adaptive Release
  - Bb Adaptive Release is very cumbersome, no way to verify
- Grades not always reliably posted to Bb Gradebook
Training Scheme

- focus on undergrads who are
  - inexpensive, costs are easily distributed
  - have time
  - know html, are tech savvy
- create a high-tech, developmental army
- faculty pay their undergrad (that we train and support) that make the content that they storyboard
Recommendations

- Web-based Assessment must be declared a Campus-Wide Resource!
  - It is vitally important for our teaching and will be even more important in the future!
- Support Resources must be increased, Server Resources (and offered platforms) should be scrutinized
  - Is MapleTA the only platform for UNL? I say NO!
- An official Advisory Board should be formed -- with better faculty representation
- Testing Centers must run under a unified set of policies