Scalable, web-delivered supports to help students "Learn to Learn"

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Scalable, web-delivered supports to help students “Learn to Learn”

Matthew L. Bernacki
University of Nevada Las Vegas

PROJECT OVERVIEW: Learning Theory and Analytics as Guides to Improve Undergraduate STEM Education (Learning TAGs)

The Need
• Many graduate K-12 without skills necessary to manage learning (ACT, 2008)
• Incoming STEM majors typically fail to complete a STEM degree; more pronounced trend in underrepresented populations (Eagen, Hurtado & Chen, 2006)
• 6-year completion rate:
  - All STEM majors
  - From underrepresented groups
• Primary reasons for leaving STEM include
  • perceived lack of skills to perform critical STEM tasks
  • lack of motivation to continue with training (Perez, Cromley & Kaplan, 2013)

The Project
• Learning management systems (LMSs) are ubiquitous in higher education, provide a platform for scalable, web-delivered support
• Learning sciences provide insight about ways learning skills can be built and motivation can be supported
• LMSs + Learning Theory + Analytics provide an opportunity to
  1. Provide resources to students
  2. Teach students how to use resources effectively
  3. Observe & adaptively respond to student learning data
  • Capture learning behaviors using log files
  • Develop prediction models that accurately identify students likely to struggle, obtain poor grades
  • Provide adaptive, personalized feedback to students via the LMS, directing resources to those likely to struggle

THE SCIENCE OF LEARNING TO LEARN
• Web-delivered set of training modules delivered via LMS
• Embedded in students’ course site, teach students (in 30-45 min per module):
  1. cognitive strategies known to improve learning outcomes
  2. methods of managing their learning process
  3. methods of managing self, behaviors, & one’s environment
• Instructional methods aligned to research on learning (Table 1)
• Ongoing trace data on student learning behaviors collected from University servers using Splunk application, performance data from LMS gradebook

Table 1

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Opening Vignette: Emily the struggling student</td>
<td>Training in self-regulated learning</td>
<td>Training to help students</td>
</tr>
<tr>
<td>Instruction: Introduction to, evidence for learning principles</td>
<td>Assess their course’s learning objectives</td>
<td>Make implementation intentions</td>
</tr>
<tr>
<td>Self Testing • Spacing • Self Explanation</td>
<td>Plan study: set goals &amp; subgoals, enact strategies</td>
<td>Engage in mental contrasting</td>
</tr>
<tr>
<td>Worked examples demonstrating how to use them</td>
<td>Monitor learning process &amp; progress … and adapt.</td>
<td>Regulate their environment to avoid distraction</td>
</tr>
<tr>
<td>Practice: Identify Resources. Use what you’ve learned!</td>
<td></td>
<td>Make efficient use of study time, avoid pitfalls</td>
</tr>
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</table>

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1. Introduction & Learning Principles
2. Planning, Organizing & Monitoring Learning
3. Regulating Behavior & Environment

RESULTS & FUTURE DIRECTIONS
• Learning to Learn training had a demonstrable impact on biology students’ (N = 205) learning behavior & achievement in a lecture course
• Struggling students – students with poor prior exam scores – experienced the greatest benefits from Learning to Learn.
• Learning to Learn training benefits struggling students, burdens others
• NEW CHALLENGE: 1) identify students who need help
• 2) deliver timely help to them and only them
• A pilot project (underway) targets training to students in need.

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