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

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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)
- Ongoing trace data on student learning behaviors collected from University servers using Splunk application, performance data from LMS gradebook
- 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 (Eagen, Hurtado & Chen, 2006)
- Learning sciences provide insight about ways learning skills can be built and motivation can be supported
- Learning TAGs + 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
  - Prompt to evaluate course resources that afford use of the learning principle
  - Plans study: set goals & subgoals, enact strategies
  - 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
- Learning sciences provide insight about ways learning skills can be built
- 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.
- 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.

RESULTS & FUTURE DIRECTIONS

Module 1: Introduction & Learning Principles

- Opening Vignette: Emily the struggling student

Module 2: Planning, Organizing & Monitoring Learning

- Training in self-regulated learning

Module 3: Regulating Behavior & Environment

- Regulate their environment to avoid distraction

Table 1

<table>
<thead>
<tr>
<th>Instructional Design of Science of Learning to Learn Modules</th>
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<tbody>
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EXAM 1

- Students identified as unlikely to earn a B or better are notified via the LMS about their potential for a poor outcome in Week 5 – a full week before they take their first exam – and are directed toward learning resources.

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LMS behaviors.

RapidMiner and a prediction is using data mining tools like

undesirable grades (C or worse) desirable (B or Better) or

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learning resources.

Students’ activity in a LMS course site is monitored during the first 4 weeks of the semester using tools like Splunk and a prediction is made based on similarities in LMS behaviors.

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