

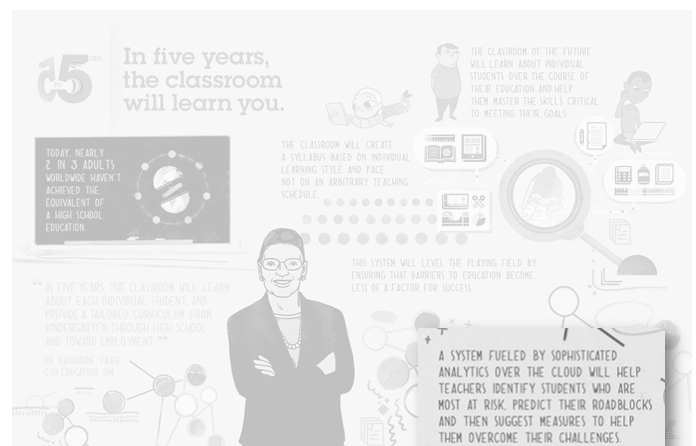
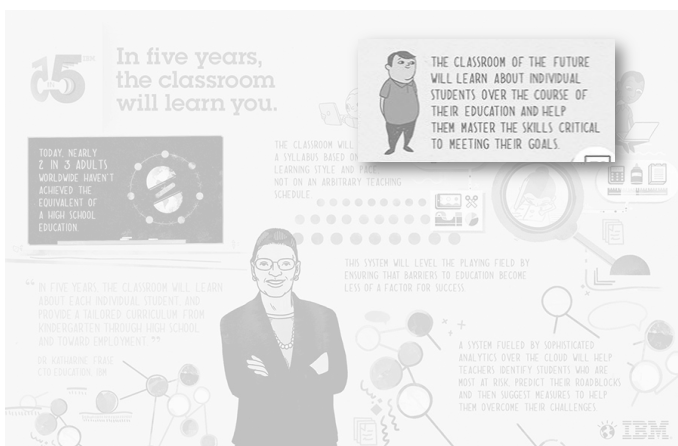
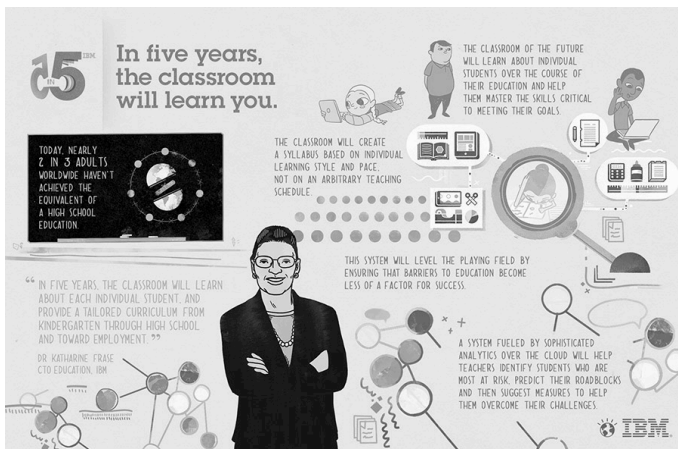
Learning Analytics

Dr. Rachel Niemer
Dr. Mary Wright

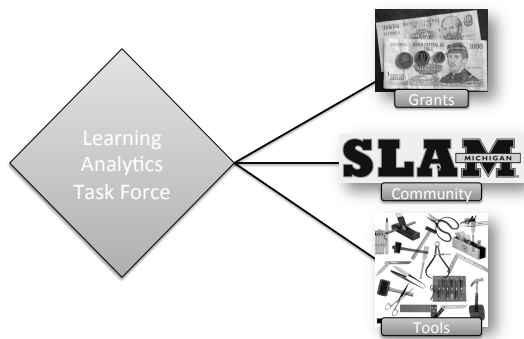
Center for Research on Learning and Teaching
University of Michigan, USA

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www.crit.umich.edu

...is the analysis and use of data,
generated through normal
administrative or academic activities,
for the purposes of improving
teaching and learning.

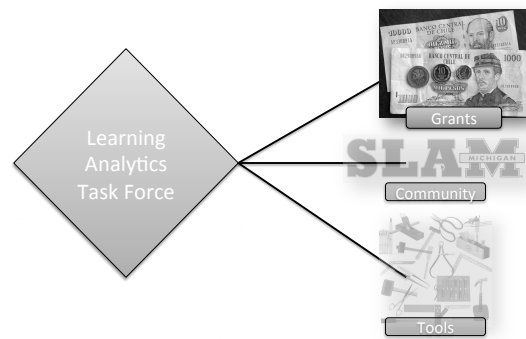


Learning Analytics at U-M



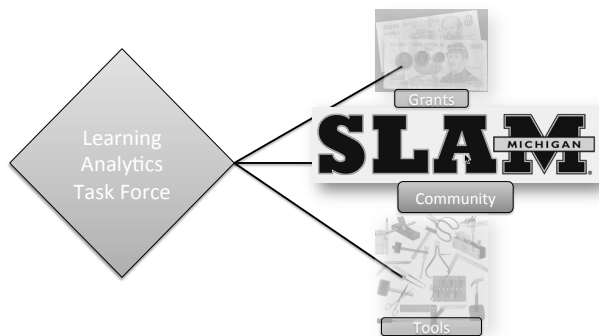
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Learning Analytics at U-M



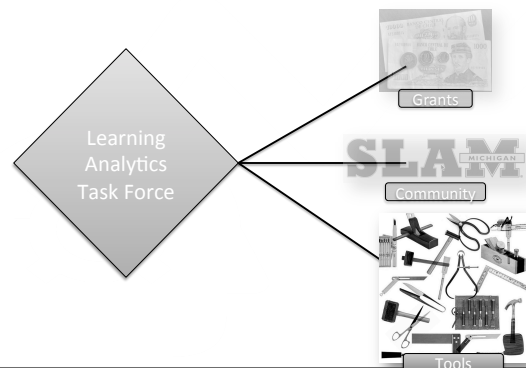
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Learning Analytics at U-M



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Learning Analytics at U-M



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Case Study: Screencasting in Materials Science & Engineering



Joanna Mirecki Millunchick
*Professor of Materials Science
& Engineering*

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Pedagogical Intervention: Supplemental Videos

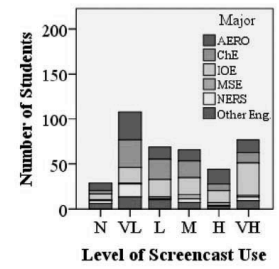
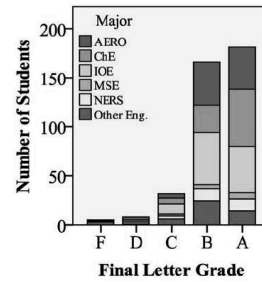
Is it worth it?

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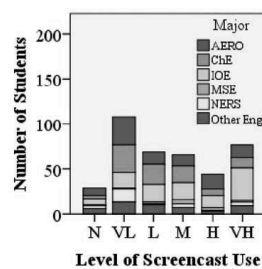
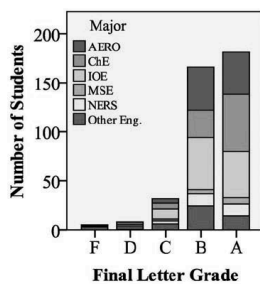
Data Sources

- Student perceptions
- Learning management system data
 - How many times videos were watched
 - Who watched videos
- Student grades

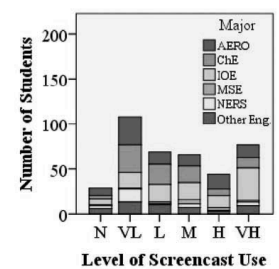
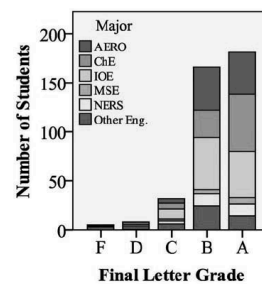
Screencast usage was positively and significantly correlated to overall performance in the course



ChE use screencasts at lowest levels, while receiving the highest grades



IOE use the screencasts the most, and receive average grades. Prior to the introduction of screencasts; IOEs received the lowest grades.



The ChE Curriculum covers many MSE topics

Materials Science & Eng.	Chemical Engineering	Aerospace Engineering	Industrial & Operations Eng.
<ul style="list-style-type: none"> Principles of Engineering Materials Physics of Materials Thermodynamics of Materials Kinetics & Transport Structure of Materials Mechanical Behavior 	<ul style="list-style-type: none"> Materials and Energy Balances Chemical Thermodynamics Fluid Dynamics and Heat and Mass Transfer Separation Processes Reaction Engineering and Design 	<ul style="list-style-type: none"> Intro to Aerospace Engineering Intro to Solid Mechanics and Aerospace Structures Intro to Gas Dynamics Aircraft and Spacecraft Structures Aerodynamics Aircraft and spacecraft Propulsion Space Flight Mechanics Aircraft Dynamics 	<ul style="list-style-type: none"> Economic Decision Making Operations Modeling Probability and Statistics Intro to Optimization Intro to Markov Processes Ergonomics Linear Statistical Models Data Processing

The IOE curriculum does not cover any material science topics

Materials Science & Eng.	Chemical Engineering	Aerospace Engineering	Industrial & Operations Eng.
<ul style="list-style-type: none"> Principles of Engineering Materials Physics of Materials Thermodynamics of Materials Kinetics & Transport Structure of Materials Mechanical Behavior 	<ul style="list-style-type: none"> Materials and Energy Balances Chemical Thermodynamics Fluid Dynamics and Heat and Mass Transfer Separation Processes Reaction Engineering and Design 	<ul style="list-style-type: none"> Intro to Aerospace Engineering Intro to Solid Mechanics and Aerospace Structures Intro to Gas Dynamics Aircraft and Spacecraft Structures Aerodynamics Aircraft and spacecraft Propulsion Space Flight Mechanics Aircraft Dynamics 	<ul style="list-style-type: none"> Economic Decision Making Operations Modeling Probability and Statistics Intro to Optimization Intro to Markov Processes Ergonomics Linear Statistical Models Data Processing



Brainstorm

Get into small groups:

What do you wish you knew about your students' behaviors?

Materials Science & Eng.	Chemical Engineering	Aerospace Engineering	Industrial & Operations Eng.
<ul style="list-style-type: none"> Principles of Engineering Materials Physics of Materials 	<ul style="list-style-type: none"> Materials and Energy Balances Chemical Thermodynamics 	<ul style="list-style-type: none"> Intro to Aerospace Engineering Intro to Solid Mechanics 	<ul style="list-style-type: none"> Economic Decision Making Operations Modeling
<p>Screencasts have a positive impact as a supplementary resource to aid student learning, especially for students with less familiarity with course content, all other things being equal.</p>			
		<ul style="list-style-type: none"> Aircraft and spacecraft Propulsion Space Flight Mechanics Aircraft Dynamics 	<ul style="list-style-type: none"> Data Processing



Student Explorer

An Early Warning System for Academic Advisors

Steven Lonn - Project Lead - slonn@umich.edu

Stephen Aguilar - Graduate Student Lead - aguilar@umich.edu

Stephanie Teasley - USE Lab Director - steasley@umich.edu



What is an Early Warning System?

...utilize **historical** and **current** educational data in order to determine, in **near real time**, **which students** might be at risk of academic failure... EWSs produce "**actionable intelligence**" that the user can utilize to direct students toward resources or changes in behavior in a timely manner (Arnold, 2010).

Unlike some other EWSs, Student Explorer uses a categorization scheme using live data and does **not** currently use a predictive model for student success.

Data Sources

1. Performance Data

Learning Management System Gradebook
Learning Management System Assignments tool
Math web homework/testing system

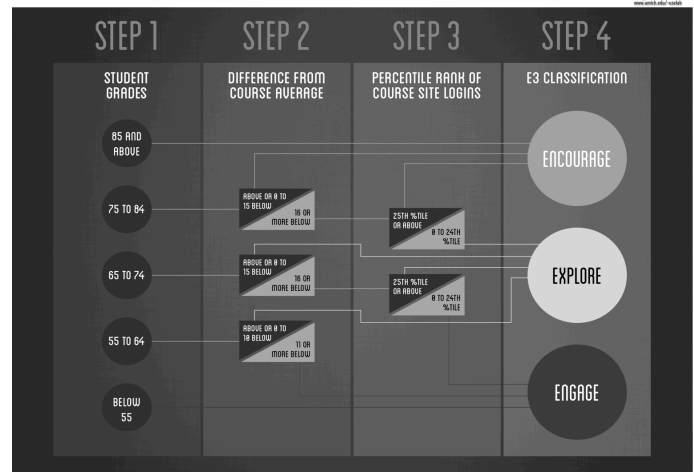
2. Usage Data (Proxy for "Effort")

Learning Management System login data

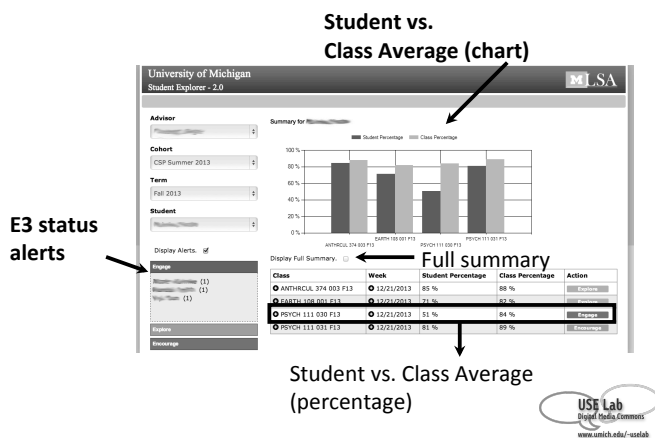
(In development: Other forms of usage data, e.g., file downloads)



Classification Scheme



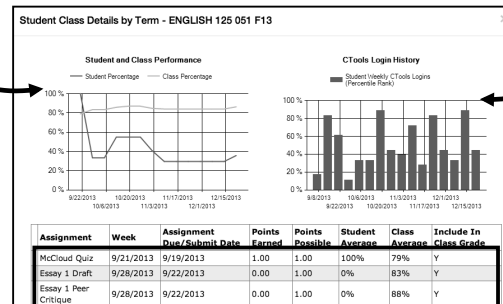
Summary Screen



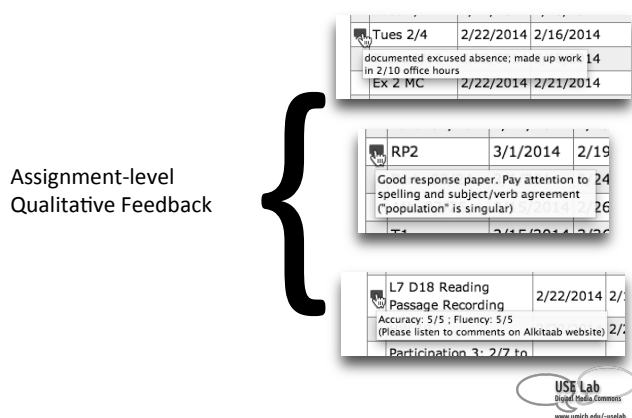
Course Detail

Student performance vs. Class (over time)

Student percentile rank of LMS login behavior

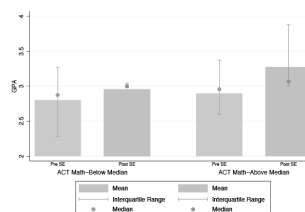


Comments



Does it Work?

1. Measured sophomore GPA gains for M-ENGIN population after introduction of Student Explorer.



2. Currently investigating impact of Student Explorer usage during SY 2013-2014 for M-ENGIN, M-BIO, and CSP Summer Bridge.

Reports / Findings

Lonn, S., Aguilar, S. J., & Teasley, S. D. (In Press). *Investigating Student Motivation in the Context of a Learning Analytics Intervention During a Summer Bridge Program*. Computers in Human Behavior. doi: 10.1016/j.chb.2014.07.013

Krumm, A. E., Waddington, R. J., Lonn, S., & Teasley, S. D. (2014). *A learning management system-based early warning system for academic advising in undergraduate engineering*. In (J. A. Larusson & B. White, Eds.) Learning Analytics: From Research to Practice (pp 103-119). New York: Springer. DOI: 10.1007/978-1-4614-3305-7_6

Aguilar, S., Lonn, S., & Teasley, S. D. (2014). *Perceptions and Use of an Early Warning System During a Higher Education Transition Program*. Proceedings of the Fourth International Conference on Learning Analytics and Knowledge (pp. 115-117). Indianapolis, IN: ACM.

Lonn, S., Aguilar, S., & Teasley, S. D. (2013). *Issues, challenges, and lessons learned when scaling up a learning analytics intervention*. Paper presented at the 3rd Learning Analytics and Knowledge Conference. Leuven, Belgium.

Lonn, S., Krumm, A. E., Waddington, R. J., & Teasley, S. D. (2012). *Bridging the gap from knowledge to action: Putting analytics in the hands of academic advisors*. Paper presented at the 2nd Learning Analytics and Knowledge Conference. Vancouver, BC, Canada. Available in the Proceedings (184-187). doi: 10.1145/2330601.2330647

Krumm, A. E., Waddington, R. J., Lonn, S., & Teasley, S. D. (2012). *Increasing Academic Success in Undergraduate Engineering Education using Learning Analytics: A Design-Based Research Project*. Paper presented at the Annual Meeting of the American Educational Research Association. Vancouver, BC, Canada.

Learning Analytics Readiness

Readiness

Ability **and** willingness to engage in an action



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Readiness

Data

Ability

Governance/
Infrastructure

Culture/
Process

Perception of
Readiness

- Existence
- “Easily” matched from different sources

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Readiness

Data

Ability

Governance/
Infrastructure

Culture/
Process

Perception of
Readiness

- Skill with
- Databases
 - Statistics
 - Learning Theories

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Readiness

Data

Ability

Governance/
Infrastructure

Culture/
Process

Perception of
Readiness

- Policies that support access to data
- Policies that protect student privacy
- Leadership at multiple levels (administration, faculty, staff)

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Readiness

Data

Ability

Governance/
Infrastructure

Culture/
Process

Perception of
Readiness

- Clear procedures for accessing data
- Support from those with ability
- Buy-in at all levels (student, faculty, staff, administration)

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Readiness

Data

Ability

Governance/
Infrastructure

Culture/
Process

Perception of
Readiness

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Learning Analytics Readiness Instrument

