Student Learning and Learning Analytics

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DLA-CRLD
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Photo by Timur Saglam bilek. https://www.pexels.com/photo/analytics-text-185576/
Limiting “Bycatch” through use of data: EcoCast

Student Learning and Learning Analytics: The Black Box
Student Learning and Learning Analytics: Opening the Black Box
Student Learning and Learning Analytics: Opening the Black Box

Does a student’s academic performance improve through the use of library resources?

Does a student learn through the use of library resources?
Student Learning and Learning Analytics: Opening the Black Box
Three crucial elements

Student Information Systems (SIS)
Learning Management Systems (LMS)
Other (library databases, ebooks, social networks, etc.)

Data
- Basic asset. Raw material to be transformed into analytical insights.

Analysis
- Process to add intelligence to data using algorithms.

Action
- Critical step towards achieving the purpose: Improving students’ performance

Learning Analytics
Forms of Learning Analytics

- **Descriptive Analytics**: What happened?
- **Diagnostic Analytics**: Why did it happen?
- **Predictive Analytics**: What will happen?
- **Prescriptive Analytics**: How can we make it happen?

**Axes**
- **VALUE**
- **DIFFICULTY**

**Legend**
- **Information**
- **Hindsight**
- **Insight**
- **Optimization**
- **Foresight**

*Boyer & Bonnin, Higher Education and the Revolution of Learning Analytics*
What is learning analytics?

'The measurement, collection, analysis, reporting and use of data about learners and their contexts, for purposes of understanding and enhancing learning and the environments in which it occurs'.

Ferguson (2018)
Table 1. Major differences between learning analytics, educational data mining and academic analytics as suggested by (Baker & Inventado, 2014; Ferguson, 2012; Siemens & Long, 2011; van Barneveld et al., 2012). This table extends upon the original table of Siemens and Long (2011).

<table>
<thead>
<tr>
<th>Type of analytics</th>
<th>Focus</th>
<th>Scale of analysis</th>
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</thead>
<tbody>
<tr>
<td>Academic analytics</td>
<td>Improving learning opportunities and educational results</td>
<td>Institution, region, national, international</td>
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<tr>
<td>EDM</td>
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<tr>
<td>Educational data mining</td>
<td>Extraction of data from large sets of learning-related data</td>
<td>Multiple</td>
</tr>
<tr>
<td>LA</td>
<td>Learning analytics</td>
<td>Course, subject, department</td>
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</table>
Predicting Student Outcomes

Course Signals

• **Goal:** produce “actionable intelligence”.

• **Predictive algorithm:**
  - Performance
  - Effort
  - Prior academic history
  - Student characteristics

Predicting Student Outcomes

Social Networks Adapting Pedagogical Practice (SNAPP)
Learning Analytics Cycle (Clow, 2012)
Learning Analytics Stakeholders
Lots of Library Data but Disconnected
Learning Analytics and the Library

• **Students benefit from library instruction in their initial coursework.** Information literacy instruction provided to students during their initial coursework helps them perform better in their courses than students who do not.

• **Library use increases student success.** Students who used the library in some way (e.g., circulation, library instruction session attendance, online database access, study room use, interlibrary loan) achieved higher levels of academic success (e.g., GPA, course grades, retention) than students who did not use the library.
Learning Analytics and the Library

• **Collaborative academic programs and services involving the library enhance student learning.** Academic library partnerships with other campus units, such as the writing center, academic enrichment, and speech lab, yield positive benefits for students (e.g., higher grades, academic confidence, retention).

• **Information literacy instruction strengthens general education outcomes.** Library instruction improves students’ achievement of institutional core competencies and general education outcomes such as inquiry-based and problem-solving learning, including effective identification and use of information, critical thinking, ethical reasoning, and civic engagement.
Learning Analytics and the Library

• *Library research consultations boost student learning.* One-on-one or small-group reference and research assistance with a librarian enhances academic success, as documented by such factors as student confidence, GPAs, and improved achievement on course assignments.
Learning Analytics and the Library

• **Students are too often ignored** in these conversations, except as the subject of learning analytics — or the object of actions we might take. But if this is indeed the students’ data and if we want students to become not just objects of our teaching, but reflective, self-regulated learners in their own right, students should come first.

Jared Stein
Understanding how Library Resources are used in the Course

Library Alternatives to Textbooks

- Comparing the required course materials with our currently licensed digital content
- TESOL textbooks: Teaching L2 composition, Monograph for TEL 7330
- History 301, History 324 LibGuides
- Environmental Science Chair Milton Muldrow is using Credo Environmental Science Essential Collection. This is an EBA initiative.
- Human Resource program. Classes using online Library content/stream. Discover Library Resources and More:
  - OPENSTAX OER
  - Homeland Security and Forensics Ebook Collection
- Nursing 313 Ethics
- IST Core Courses
- HS - Research for Evidence-Based Practice in Healthcare
Reading Traces & Learning Analytics

Trace data alone are insufficient to explain students’ behavior. (Wong, et al., 2019)
Understanding how Library Resources are used in the LMS – Why?

• Operational competence – Recognizes or discovers organization, features, and affordances of the digital learning environment

• Learning competence – Varies or adapts behavior depending on reading purpose, learning purpose, or affordances of the digital environment.

• Plans next learning steps.
Operational & Learning Competence

Operational
• Reader recognizes affordances such as:
  • Navigational tools
  • Discovery through clicking
  • Highlighting
  • Notetaking
  • Troubleshooting

Learning
• Reader navigates digital space making intentional choices
  • Previewing
  • Scanning
  • Notetaking
  • Accessing Content
  • Returning to Task

A deeper understanding of strategies and processes employed by more proficient users can be used for training those who are more emergent

Bikowski & Casal, 2018
“The basic question is not what can we measure? The basic question is what does a good education look like?”

• “Students read at very low rates.”
  (Junco & Clem, 2015; Seaton et al., 2014)

• “There is no precise threshold that differentiates reading from navigating.”
  (Gyllen et al., 2018)

• If we want to effectively measure library resource impact on student learning, digital text viewing time must be linked to tasks related to test requirements and/or course grading.
## Electronic Resource Usage – ezProxy Logs

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Request Details</th>
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<tbody>
<tr>
<td>22/May/2018:19:29:41</td>
<td>GET <a href="https://mylibrary.wilmu.edu:443/login?user=svukoivc001&amp;ticket=6fbf32e0a1e1da8f88b586d5d3e15bbbe1fff10f9%24u1527031f">https://mylibrary.wilmu.edu:443/login?user=svukoivc001&amp;ticket=6fbf32e0a1e1da8f88b586d5d3e15bbbe1fff10f9%24u1527031f</a> HTTP/1.1</td>
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## Electronic Resource Time on Task (ezProxy Logs)

<table>
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<tr>
<th>Session</th>
<th>Time</th>
<th>Log In Start</th>
<th>URL</th>
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<tr>
<td>Session 1</td>
<td>1 hr 36 mins</td>
<td><a href="https://search.credoreference.com/content/entry/sagegwcca/climate_change">22/May/2018:20:53:27 GET</a></td>
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<td>Session 5</td>
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University of Wollongong’s Cube showed a very strong relationship between the average marks for each level of resource usage and student grades.
LMS Data

<table>
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<tr>
<th>Description</th>
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<tr>
<td>Total number of times student logged into the system.</td>
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<tr>
<td>Total number of times student viewed general course information.</td>
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<tr>
<td>Total time spent on all course assignments.</td>
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<tr>
<td>Total number of times student opened one of the course assignments.</td>
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<tr>
<td><strong>Total time spent on reading the course resources.</strong></td>
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<tr>
<td>Total number of times student opened one of the course resource materials.</td>
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</table>
COUNTER provides the standard that enables the knowledge community to count the use of electronic resources.

Known as the Code of Practice, the standard ensures vendors and publishers can provide their library customers with consistent, credible and comparable usage data.

**BR1**
This report is labelled by COUNTER as ‘number of successful title requests by month and by title’ and as such is explicitly used for reporting on book content (this includes reference works). It is only to be used when books are delivered in their entirety; where book sections (e.g. chapters) are viewed separately, use BR2.

**BR2**
This report is labelled by COUNTER as ‘number of successful section requests by month and by title’ and as such is explicitly used for reporting on book content delivered in sections. It is complemented by BR3 and BR5. If a complete book is viewed or downloaded as a single file, the usage is recorded against BR1, unless the vendor does not offer a BR1, in which case the downloading of a whole book would report in the BR2 as a single request against each of the Book Sections (Chapters).
## Vendor/Publisher Data

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Learning Analytics & Data Interoperability – The Future

- **Technological**
  - Hardware and code that allows connection

- **Data**
  - Ability of interconnected systems to understand each other

- **Institutional**
  - Effective engagement of societal systems

- **Human**
  - Ability to understand and act on data exchanged

**Interoperability**
The “Quantified Learner”

How SCORM Works

The “Quantified Learner”

How Tin Can API Works

- LMS
- Mobile Apps
- Classroom Trainings
- Business Systems
- eLearning Courses
- Simulations
- Games
- Learning Analytics
- Open Badges
- Reports
- Dashboards

LRS
The “Quantified Learner”

• Noun (Actor - or the ‘who’ part of an action)
• Verb (The action)
• Object (The ‘what’ part of an action)

For example:
• “I - did - this”
• “Mary - completed - health and safety training”
• “John - read – PSY101 help guide”.
Challenges

Learning Analytics Challenges
A Word about Ethics

The LACE DE-LI-CI-ATE Checklist to implement trusted Learning Analytics
“The process of learning has as its foundation the systemic, dynamic, and interactive relation between the nature of the learner and the object of the learning as ecologically situated in a given time and place as well as over time.”


https://coastwatch.pfeg.noaa.gov/ecocast/map_product.html


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Thank You!

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