Using Data Analytics to Improve Student Performance: In All Learning Environments
Techniques & Methods of Learning Analytics

• Learning analytics draws upon techniques from a number of established fields:
  • Statistics
  • Artificial Intelligence
  • Machine Learning
  • Data mining
  • Social Network Analysis
  • Text Mining and Web Analytics
  • Operational Research
  • Information Visualization

• Learning analytics encompasses support for teaching functions of the learning institution.
Data Types

**Structured data** – stored in databases or spreadsheets and usually requires some type of management.

**Unstructured data** –
Text audio, imagery, video
This also includes student email, chat rooms, pagers, lectures
Data Visualization

Structured Data

Unstructured Data
Districts Georgia Virtual School Serves

A Trusted Educational Partnership: Georgia Virtual School and Your District
Power in Visual Data

Fall 2016

Students: 5453
Enrollments: 7690
Segments: 9217

Segments by Subject:
- Math: 1008
- Science: 604
- Social Studies: 399
- English: 220
- Other: 87

Segments by Grade:
- Grade 9: 872
- Grade 10: 265
- Grade 11: 346
- Grade 12: 149

Target Segments:
- Fall 2016 Segments
  - 0
  - 1000
  - 2000

Session Starts:
- 2373
- 127
- 79

Male/Female:
- Male: 237
- Female: 313
- Total: 709

Courses:
- Economics: 262
- U.S. History A: 236
- Personal Fitness: 190
- British Literature and Composition: 164
- Health: 129

Services:
- Study
- Sales
- Virtual

GEORGIA VIRTUAL LEARNING
In House Tools From Your SIS or LMS

The idea of using data to drive decisions in the classroom is not new.

So What’s the Problem?
The data tends to be untimely
The data is unactionable

So What’s the Solution?
A Better Question: How Can I Make the Data I Have Actionable?

The critical questions that K-12 school leaders want answered are rarely captured in a single data set.

Data on interconnected issues such as

- student performance
- behavior
- attendance

typically housed in dozens of disparate legacy data systems that have limited functionality and lack integration. (EdSurge, 2014)
GaVS finds student performance success through Brightspace Insights™ Tools Provided in our LMS
What is Insights?

• Data reporting tool found within Brightspace
• Set specific parameters to see where students are succeeding and/or struggling
• Data presented in easy to read reports
• Reports may be viewed within the LMS and downloaded
Course Access Report

• Select desired parameters for filters
• Click Run Report
<table>
<thead>
<tr>
<th>Role</th>
<th>Ratio Of Participants (All)</th>
<th>Access Days For All Participants</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lowest</td>
<td>Highest</td>
</tr>
<tr>
<td>Student</td>
<td>9 of 9 (100%)</td>
<td>0</td>
<td>32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name (Last, First)</th>
<th>Username</th>
<th>User ID</th>
<th>Days Accessed</th>
<th>Last Access Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td></td>
<td></td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>2016-03-20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>32</td>
<td>2016-04-10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>19</td>
<td>2016-04-10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>32</td>
<td>2016-04-10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>13</td>
<td>2016-03-28</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>26</td>
<td>2016-04-10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>2016-03-29</td>
</tr>
</tbody>
</table>
Course Access

Report showing access details for a specific course.

<table>
<thead>
<tr>
<th>Name (Last, First)</th>
<th>Username</th>
<th>User ID</th>
<th>Days Accessed</th>
<th>Last Access Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>1107037</td>
<td>22</td>
<td>1107037</td>
<td>2016-06-27</td>
</tr>
<tr>
<td></td>
<td>1105931</td>
<td>19</td>
<td>1105931</td>
<td>2016-06-27</td>
</tr>
<tr>
<td></td>
<td>1074007</td>
<td>18</td>
<td>1074007</td>
<td>2016-06-27</td>
</tr>
<tr>
<td></td>
<td>1108706</td>
<td>11</td>
<td>1108706</td>
<td>2016-06-27</td>
</tr>
</tbody>
</table>
Tool Access Course Report

Report shows the total page views per tool (e.g. Content, Discussions, Quizzes, Dropbox, etc.) for a given time period within a given course.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Percent views</th>
<th>Total views (Last 30 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dropbox</td>
<td>29%</td>
<td>236</td>
</tr>
<tr>
<td>Discussions</td>
<td>23.5%</td>
<td>185</td>
</tr>
<tr>
<td>News</td>
<td>2.1%</td>
<td>17</td>
</tr>
<tr>
<td>Classlist</td>
<td>0.2%</td>
<td>2</td>
</tr>
<tr>
<td>Grades</td>
<td>14.5%</td>
<td>119</td>
</tr>
<tr>
<td>Content</td>
<td>6.6%</td>
<td>54</td>
</tr>
<tr>
<td>Paper</td>
<td>0.2%</td>
<td>2</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10.6%</td>
<td>87</td>
</tr>
<tr>
<td>Homepages</td>
<td>14.4%</td>
<td>118</td>
</tr>
</tbody>
</table>

Days measured using Greenwich Mean Time (GMT 0:00)
User Tool Access

- Select desired parameters for report
- Click Run Report
You select tools to display on the report. Shows number of views for each user.
User Quiz Scores

- Select desired parameters for report
- Click Run Report
User Quiz Scores

Report displaying user details, attempt details, time spent, and scores achieved for a specific quiz.
## User Quiz Scores

**Mon Apr 11 21:34:13 EDT 2016**  
**Data Current as of:** Mon Apr 11 21:00:08 EDT 2016

**Organization:** Georgia State Department of Education  
**Role:** Student  
**Course:**  
**Course Code:**  
**Quiz:** Active and Passive Voice Quiz

### Top 15 User Quiz Scores (%)

<table>
<thead>
<tr>
<th>User Name</th>
<th>Full Name</th>
<th>Highest Attempt</th>
<th>Completed Attempts</th>
<th>In Progress Attempts</th>
<th>Total Attempts</th>
<th>Duration In Minutes</th>
<th>Score / Out Of</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.00%</td>
<td></td>
<td>100.00 %</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>15</td>
<td>10/10</td>
</tr>
<tr>
<td>90.00%</td>
<td></td>
<td>90.00 %</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>9/10</td>
</tr>
<tr>
<td>80.00%</td>
<td></td>
<td>80.00 %</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>11</td>
<td>8/10</td>
</tr>
<tr>
<td>70.00%</td>
<td></td>
<td>70.00 %</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>4/10</td>
</tr>
<tr>
<td>60.00%</td>
<td></td>
<td>60.00 %</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>6/10</td>
</tr>
<tr>
<td>50.00%</td>
<td></td>
<td>50.00 %</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>3/10</td>
</tr>
<tr>
<td>40.00%</td>
<td></td>
<td>40.00 %</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2/10</td>
</tr>
</tbody>
</table>

**Course Quiz Average:** 73.33 %  
**Total results:** 15
Quiz Item Analysis Report

- Select desired quiz for the report
- Click Run Report
## Quiz Item Analysis Report

**Organization Name:** Georgia State Department of Education (Georgia)  
**Department Name:** Language Arts  
**Semester Name:** Spring 2016  
**Course Name:** American Romanticism Unit Test  
**Quiz Date:** February 02, 2016

<table>
<thead>
<tr>
<th>Number of Examinees</th>
<th>16</th>
<th>Standard Deviation</th>
<th>2.43</th>
<th>Highest Score</th>
<th>30.00</th>
<th>Lower Quartile</th>
<th>25.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Questions</td>
<td>37</td>
<td>Reliability Coefficient (KR 20)</td>
<td>0.03</td>
<td>Upper Quartile</td>
<td>29.00</td>
<td>Lowest Score</td>
<td>22.00</td>
</tr>
<tr>
<td>Total Possible Points</td>
<td>30.00</td>
<td>Median Score</td>
<td>27.00</td>
<td>Average Score</td>
<td>26.34</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Correct Group | Response Frequencies | | | | | | |
|---------------|----------------------|---|---|---|---|---|---|---|
| Question ID   | Question Name         | Total % | Upper 27% | Lower 27% | Discrimination Index | Point Biserial | Standard Deviation | Correct | 1 | 2 | 3 | 4 | Total |
| 977070        | The narrator's first | 100.00% | 80.00% | 100.00% | -20.00% | N/A | 0.00 | 2 | 0 | 14 | 0 | 0 | 14 |
| 977071        | Rodrick asked kele to | 84.62% | 80.00% | 80.00% | 20.00% | 0.10 | 0.38 | 1 | 11 | 2 | 3 | 0 | 13 |
| 977072        | In *The Fall of the House* | 87.50% | 100.00% | 80.00% | 20.00% | 0.16 | 0.34 | 2 | 1 | 14 | 0 | 1 | 16 |
| 977073        | In *The Fall of the House* | 78.72% | 80.00% | 20.00% | -20.00% | 0.04 | 0.43 | 4 | 1 | 1 | 1 | 1 | 14 |
| 977082        | In *The Fall of the House* | 66.14% | 80.00% | 20.00% | -20.00% | 0.08 | 0.61 | 3 | 4 | 1 | 8 | 0 | 13 |
| 977063        | In *The Minister's Black* | 71.43% | 100.00% | 80.00% | 20.00% | 0.48 | 0.47 | 2 | 4 | 10 | 0 | 0 | 14 |
| 977064        | In *The Minister's Black* | 68.23% | 40.00% | 40.00% | 0.00% | 0.02 | 0.61 | 4 | 2 | 2 | 1 | 7 | 12 |
| 977065        | In *The Minister's Black* | 100.00% | 80.00% | 80.00% | -20.00% | N/A | 0.00 | 3 | 0 | 12 | 0 | 0 | 12 |
| 977060        | Though *The Minste...* | 65.71% | 100.00% | 80.00% | 40.00% | 0.30 | 0.30 | 1 | 12 | 0 | 1 | 1 | 14 |
| 977067        | "The Minister's Black" | 100.00% | 80.00% | 100.00% | -20.00% | N/A | 0.00 | 3 | 0 | 12 | 0 | 0 | 12 |
| 977065        | In *Thanatos" nature* | 100.00% | 100.00% | 80.00% | 20.00% | N/A | 0.00 | 2 | 0 | 13 | 0 | 0 | 13 |
| 977066        | Which statement *The...* | 100.00% | 80.00% | 80.00% | 20.00% | N/A | 0.00 | 1 | 11 | 0 | 0 | 0 | 11 |
| 977030        | "Thanatos" strongly | 32.31% | 80.00% | 100.00% | -20.00% | -0.04 | 0.28 | 3 | 0 | 1 | 12 | 0 | 13 |
| 977031        | Which facial | 61.67% | 80.00% | 80.00% | 0.00% | -0.01 | 0.29 | 1 | 11 | 1 | 0 | 0 | 12 |
Report has both a Summary view and a Detailed view. The quiz questions are sorted by most problematic questions first.

Report may show top students based on test results- grades.
Quiz Question Statistics (Detailed Report)

Report may show issues with content or course design.
Academic Risk

Report Filters
- Risk Domain: Calculated Grade
- Roles: Select Values, Clear Values
- Student
- Risk Threshold: 32

Run Report

Report Description

Desire2Learn Insights

Academic Risk
Tue Jun 28 17:19:42 EDT 2016

Organization: Georgia State Department of Education (georgia)
Risk Domain: Calculated Grade
Risk Threshold: 32

Spanish III AB - Summer 2016 -

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Semester</th>
<th>At Risk Proportion</th>
<th>Course Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>201603_641_1</td>
<td>Summer 2016</td>
<td>3 / 32 users</td>
<td>83 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Full Name</th>
<th>User Name</th>
<th>User Number</th>
<th>Role Name</th>
<th>Calculated Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1108415</td>
<td></td>
<td>Student</td>
<td>0 %</td>
</tr>
<tr>
<td></td>
<td>1109028</td>
<td></td>
<td>Student</td>
<td>16 %</td>
</tr>
<tr>
<td></td>
<td>1054753</td>
<td></td>
<td>Student</td>
<td>0 %</td>
</tr>
</tbody>
</table>
Grade Patterns (Large Format)

A heatmap showing grade results as a percent for grade items in an org unit. This large format report is optimized for org units with greater than 30 enrollees.
Course Enrollment and Withdrawal Status

Report displaying current enrollment and withdrawal figures aggregated for each role and course offering.
Discussion Statistics (Discussion Tool)

Class Overview, Individual Student
A comprehensive analysis of the structure of rubrics and achievement rates of their associated activities over time.
Course Overview Widget

**Class Engagement**
- View Class Engagement

**Course Access**
- 1 user visited this course today.
- View Course Access

**Tool Access**
- No quizzes have been submitted today.
- View Tool Access

Fast access to 3 reports: Class Engagement, Course Access, Tool Usage
Benefits of Brightspace Tools (Summary)

• Tool within LMS
• Data shows correlation, strength, weakness of course, of instruction, and effect on student mastery.
• Time-saver
• Reports - interactive
• Reports - not static, fluid
• Reports show specific roles and specific time range
• Reports drill down and show individual participants engagement in course.
What’s Coming Next?

Big Data
Questions?

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