Stand Up and (not) be Counted: Data Analytics in Education

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Learning analytics is the process of developing actionable insights through the application of statistical models and analysis of student performance data.
(Learning analytics) is especially persuasive because so many people are awed by mathematics and do not understand it: a dangerous combination.

Ewing (2011)
Our Rationale

- Implement tools to track student performance
- Provide teachers with insights into the learning needs of students
- Promote timely intervention with students
- Foster improved academic performance, of both individual students and cohorts.
Does our data just tell us where we have been?
Is our data a statistical selfie?
How can we use student data to influence where we are going?
Gartner Analytics Ascendancy Model

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

Value vs. Difficulty graph:
- Information: Hindsight
- Insight: Optimization
- Foresight: Prescriptive Analytics

Source: Gartner (March 2012)
Learning Analytics

Stakeholders:
- Institution
- Teachers
- Learners
- Other

Internal Limitations:
- Competences
- Acceptance

External Constraints:
- Conventions
- Norms

Instruments:
- Technology
- Algorithm
- Theories
- Other

Objectives:
- Reflection
- Prediction

Data:
- Open
- Protected

Greller and Draschler (2012)
External Environment + School Culture = Approach to data analytics
Our External Environment

External measures of success

Social contract with parent community

Reliance on traditional forms of assessment

Prescriptive curriculum

Prescriptive reporting

Competitive environment
Broadening our pathways and outcomes

Research into and adoption of alternative pedagogy

Restlessness

Evolving use of technology

Ongoing curriculum change

Significant investment in professional learning

Our Cultural Forces
Fletcher (09MENTFLRTU)

Stanine Level - 6

Past Merit Rankings

A student with a stanine level of 6 should be working at a merit ranking between 43 and 20.

Learner Profile Information - The average result for each LP across all subjects...

Note: LPs changed slightly in 2015 and an extra LP added...

Report Mark in specific subjects over time

For Years 7 to 10, all students complete English, Maths, Science, PE and PHS. This graph shows the change in report mark in these subjects over time.
Performance Relative to Others

Max/Min Graph - LHS = Average of Course. RHS = Student's Mark

Z Score Analysis - a 0 means the student has achieved an ave mark
### Performance Relative to Others

**Years 7 to 9 do not receive a Mark or Rank on their report. Below is confidential for them.**

**For Year 10 - this mark and rank will appear on their report.**

**Mark** = The weighted moderated progressive mark based on all completed assessment points. Raw marks are moderated according to our common mark scale.

<table>
<thead>
<tr>
<th>Class</th>
<th>Mark</th>
<th>Rank</th>
<th>Class</th>
<th>Mark</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>09CIVGEOS1</td>
<td>90</td>
<td>13/121</td>
<td>09CIVHIS2</td>
<td>72</td>
<td>63/123</td>
</tr>
<tr>
<td>09ECOCOM</td>
<td>88</td>
<td>50/111</td>
<td>09ENG</td>
<td>73</td>
<td>125/234</td>
</tr>
<tr>
<td>09GEO</td>
<td>69</td>
<td>30/40</td>
<td>09MATPAB</td>
<td>86</td>
<td>2/68</td>
</tr>
<tr>
<td>09PED</td>
<td>90</td>
<td>11/234</td>
<td>09PRS</td>
<td>87</td>
<td>33/233</td>
</tr>
<tr>
<td>09SCI</td>
<td>79</td>
<td>90/232</td>
<td>09VAR</td>
<td>81</td>
<td>20/29</td>
</tr>
</tbody>
</table>

**Centile Ranking by subject**

- 09MATPAB: 98
- 09PFDO: 94
- 09CIVGEOS1: 87
- 09CIVHIS2: 85
- 09SCI: 58
- 09ECOCOM: 52
- 09ENG: 45
- 09GEO: 23
- 09PED: 18

% Rank

0 10 20 30 40 50 60 70 80 90 100
A student with a stanine level of 6 should be working at a merit ranking between 43 and 20.
Performance Relative to Standards

Average KUS Level by Subject

- **09PED**: 4.6
- **09CIVGEOS1**: 4.4
- **09ECOCOM**: 4.3
- **09MATPAB**: 4.0
- **09SCI**: 4.0
- **09CIVHISS2**: 3.4
- **09GEO**: 3.3
- **09ENG**: 3.2

Average KUS Level /5
Learner Profile Information - The average result for each LP across all subjects...

- Always
- Usually
- Sometimes
- Rarely

Legend:
- Blue diamond: Respects the learning environment
- Orange star: Meets homework expectations
- Green square: Works collaboratively and effectively with others
- Red square: Demonstrates self-directed learning qualities
- Purple diamond: Inquisitive about this subject
- Yellow circle: Critically reflects on his learning
Confirmation Bias??
But, what does success look like???

- External vs Internal Indicators?
- Absolute vs Relative achievement?
- Performance vs Growth?
- Quantitative vs Qualitative measures?
- Exam performance vs Alternative Assessments?
- Learning skills vs Assessment results?
What can happen when the analytics conversation is about achievement?

- Works to entrench structures based on achievement.
- Reinforces gaps between high and low achieving students
- Focuses on extrinsic motivation for success
- Squeezes formative assessment out of schools
- Allows assessment to drive the academic cycles in a school
Does analytics work against what it sets out to measure?

• Rewarding success does not necessarily lead to academic success in students

• Academic success is a function of process, not of achievement

• How do we measure the process? (And, hence change the conversation?)

• Making the ‘holy trinity’ of curriculum work towards that aim:
  • Teaching and Learning
  • Assessment
  • Reporting
Measuring learning as a process

- Self-Directed Learning
  - Independent
  - Responsible
  - Resilient

- Reflective Learning
  - Engaged
  - Ethical
  - Critical

- Inquisitive Learning
  - Creative
  - Collaborative
  - Passionate

- Visible Thinking
  - Blended Learning
  - Positive Psychology
  - Project Based Learning

- Guided Inquiry
  - Flipped Learning

- Guided Inquiry
  - Critical Reflection

Key indicators:
- Is respectful of their learning environment
- Meets homework expectations
- Works collaboratively and effectively with others
- Demonstrates self-directed learning qualities
- Is inquisitive about this subject
- Critically reflects on his learning
Effort and Engagement by Subject
What Data do we want on them to ensure that we are teaching to their needs?
Crick Learning for Resilience Agency (CLARA) Profile
In a climate of benchmarks, comparisons, accountability, and league tables, it is important to ensure that students are not excluded from access to academic ‘success’ or denied a sense of what academic progress entails.

(Nichols & Berliner, 2007)