How do Learning Analytics “act” in Education?

Simon Buckingham Shum
Knowledge Media Institute, Open University UK

simon.buckinghamshum.net
twitter @sbskmi

https://twitter.com/Wiswijzer2/status/414055472451575808
Siri is smart...

“Find code acts in education”
Siri is smart...

“Find code acts in education”

Searching the web for ‘code accident education’...
Searching the web for ‘code accident education’…

“Note: check the huge difference between knowing and measuring…”
A word of introduction...

What does this tell you?
A word of introduction...

What does this tell you?
Critical scepticism to economic modelling

Watch out for George Osborne's 'dynamic scoring' wheeze
With plan A in tatters the chancellor is looking to a Bush-era tax-cut tactic that would hurt Britain's finances for a generation
Critical scepticism to economic modelling

Osborne courts right with ‘dynamic scoring’ research on tax cuts
By Chris Giles In Washington

George Osborne will appeal to the base of the Conservative party on Monday with the publication of further government research that seeks to demonstrate the economic benefits of tax cuts.

Using a “dynamic scoring” technique the Treasury and HM Revenue & Customs show that the government’s real tax duties will generate enough economic growth to recover half the lost revenue.

The chancellor is keen to promote this type of analysis to build a research agenda that he has said will “shift debate in a positive way” in favour of tax cuts.

Dynamic scoring, which seeks to estimate the full effects of any tax change, is controversial in the UK and the US, where it is backed by rightwing Republicans.

Few disagree that the idea is good in principle, but many economists worry that the assumptions used are so optimistic that the results are unreliable.
The conversation you don’t want to have with your learning analytics wonk

John Behrens
(Pearson)

LAK13 Panel: Educational Data Scientists: A Scarce Breed
http://people.kmi.open.ac.uk/sbs/2013/03/lak13-edu-data-scientists-scarce-breed
The idea of using data-mining to tailor learning for students may be promising. But the story of inBloom suggests that many parents remain leery.
Data ethics and societal readiness

The New York Times

BIG DATA

InBloom

By NATASHA SINGH
In what senses do learning analytics “act” in education?
In what senses do learning analytics “act” in education?

Educational (indeed all) Researchers

- make the invisible visible
- make solids permeable
- make the ephemeral persistent
In what senses do learning analytics “act” in education?

Learning Analytics

- make the invisible visible
- make solids permeable
- make the ephemeral persistent

Educational researchers have always done this — what’s new is that these tools are now in the hands of those who actually produce the activity
In what senses do learning analytics “act” in education?

By changing the system dynamics

outcome

curriculum theories
pedagogies
assessments
tools

intent

researchers / educators / instructional designers
administrators / leaders / policymakers
In what senses do learning analytics “act” in education?

By changing the system dynamics

Faster feedback loops could enable more rapid adaptation: of agents’ behaviour, and of learning resources and designs
In what senses do learning analytics “act” in education?

Delegation of authority to define goals, analytics, and implications

Distribution of power between educators, learners, leaders, community...?
In what senses do learning analytics “act” in education?

 Ontologically

What data, concepts and relationships do the analytics designers seek to model?
“Classification systems provide both a warrant and a tool for forgetting […] what to forget and how to forget it […] The argument comes down to asking not only what gets coded in but what gets coded out of a given scheme.”

“A marker of the health of the learning analytics field will be the quality of debate around what the technology renders visible and leaves invisible.”
In what senses do learning analytics “act” in education?

Algorithmically

What thresholds, samples, relationships, patterns, etc. do the algorithms encode and seek?

On what basis is a recommendation engine proposing interventions?
In an increasingly algorithmic world [...] What, then, do we talk about when we talk about “governing algorithms”?
A technology or an epistemology?

Secrecy, obscurity, inscrutability

Agency, automation, accountabilities

A typology of algorithms by genre?

The inscrutability of algorithms

Normativity, bias, values

In what senses do learning analytics “act” in education?

Semiotically

What meaning-making does the representation and interaction design encourage?
In what senses do learning analytics “act” in education?

What epistemological assumptions are shaping the assessment regime, and hence the pedagogy? What questions are analytics used to help answer?

In what senses do learning analytics “act” in education?

Politically

Analytics reports at the organisational and national levels come with consequences at different scales – sometimes punitive, often impacting millions of people.
In what senses do learning analytics “act” in education?

All of the above are encapsulated in any learning analytics deployment.
In what senses do learning analytics “act” in education?

- What kinds of learners? What kinds of learning?
- What data could be generated digitally from the use context? How is it ‘cleaned’?
- Does your theory predict patterns signifying learning?
- What analytical tools could be used to find such patterns?
- How to render the analytics, for whom, and will they understand them?
- What human +/- software interventions / recommendations?
Learning Analytics approaches act in education...

Ontologically

Algorithmically

Semiotically

Politically

Systemically

Authority?
## Learning Analytics Approach

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontology</td>
<td></td>
</tr>
<tr>
<td>Algorithms</td>
<td></td>
</tr>
<tr>
<td>Semiotics</td>
<td></td>
</tr>
<tr>
<td>Epistemology</td>
<td></td>
</tr>
<tr>
<td>Pedagogy</td>
<td></td>
</tr>
<tr>
<td>Assessment regime</td>
<td></td>
</tr>
<tr>
<td>System Dynamics</td>
<td></td>
</tr>
<tr>
<td>Authority</td>
<td></td>
</tr>
<tr>
<td>Politics</td>
<td></td>
</tr>
</tbody>
</table>
examples
English primary school data

RAISEonline statistics for a school, on ‘core’ subjects (maths, literacy), attendance and demographics
Visualising “attainment” and “progress”
Which analytics could reflect the progress that ‘Joe’ has made on so many other fronts other than his SATS?
student modelling by an adaptive tutor
Intelligent tutoring for skills mastery

http://oli.cmu.edu
Adaptive platforms generate fine-grained analytics on curriculum mastery
analytics for learning dispositions
Qualities of effective learners

Factor analysis of the literature plus expert interviews: identified seven dimensions of effective “learning power”, since validated empirically with learners at many levels. (Deakin Crick, Broadfoot and Claxton, 2004)

**Resilience**

**Definition**
Resilient learners like a challenge. They accept that everyone can find learning hard sometimes and are not frightened by finding something difficult. They have a high degree of ‘stickability’. They are not fragile and can tolerate the feelings of anger, fear, frustration and anxiety that sometimes accompany learning.

**Strategic awareness**

**Definition**
Strategic learners think about how they learn. They talk about how they will go about something and consider the habits, preferences, strengths and weaknesses they bring to the task. They are aware of their own feelings about learning and know how to manage them. They can talk about personal learning preferences.

**Critical Curiosity**

**Definition**
Effective learners in this dimension like to delve deeper to find out what is going on. They like to ‘get at the truth’ by asking questions such as Why? What? When? Where? How? etc. They are less likely to accept information uncritically or just because someone says so.

**Creativity**

**Definition**
Creative learners are playful, they like a challenge and are willing to take risks. They like to look at a problem from many different perspectives and will use their imagination, letting their mind ‘float free’ to find creative solutions. They listen to their intuition and follow hunches in their learning.
Qualities of effective learners

### Meaning Making

**Definition**
Students who effectively make meaning can link information between subject areas and across learning contexts. They connect learning at home with learning in school and learning from previous years with learning occurring now. Effective learners in this dimension engage their own values and stories in learning and create personal relevance from information they learn.

### Learning Relationships

**Definition**
Learners who have quality learning relationships find it useful and exciting to share thoughts and ideas with others, yet they can work equally effectively on their own. They make good use of adult sources of support and guidance at home and in the community. They draw on their community's worldviews and traditions.

### Changing and Learning

**Definition**
Learners who are strong in this dimension know that learning is learnable. They believe that through effort their minds can get bigger and stronger just as their bodies can. They gain pleasure and self-esteem from expanding their capacity to learn.
## ELLI: Effective Lifelong Learning Inventory

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>No, not at all like me</th>
<th>A little bit like me</th>
<th>Quite a lot like me</th>
<th>Yes, very much like me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I like it when I have to try really hard to understand something.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>When I am really interested in something I find it easy to learn.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>There is at least one person at home who is an important guide for me in my learning.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I like to question the things that I am learning.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I prefer to work on a problem on my own.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quantifying learning dispositions
agency; identity; motivation; responsibility

A wholistic visual, intended to build intrinsic motivation, inviting stretch, providing a new language, provoking conversation that ties to the learner’s identity

http://learningemergence.net/2012/04/30/learning-powered-learning-analytics
Quantifying learning dispositions
agency; identity; motivation; responsibility

http://learningemergence.net/2014/03/01/assessing-learning-dispositions-academic-mindsets
2020? personal data cloud generates my dispositional profile for reflection

>>> help me take responsibility for my own learning

Questioning, arguing and search behaviours reveal intrinsic curiosity and epistemic commitments

Social network patterns, teamwork effectiveness and initiation of relationships

Perseverance, grit, tenacity; overcoming panic/stress when challenged – through behavioural and somatic traces

Tagging/sharing/blogginging/social patterns reveal how you see connections between ideas

http://learningemergence.net/2014/03/01/assessing-learning-dispositions-academic-mindsets
Open source approach to analytics: towards true transparency and emergence for complex systems?

http://www.solaresearch.org/mission/ola
conclusion

analytics act in education
— on multiple dimensions an analytics approach perpetuates an educational worldview

— so let’s ensure this is intentional – not accidental...