Learning Analytics: Notes on the Future

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The lost key

One night a neighbor of Mullah Nasrudin was walking home and found Mullah squatting on the ground beside a lamp post evidently looking for something.

"What's the matter mullah?" asked the concerned neighbor. "I have lost my keys" replied mullah

"Oh! Here let me help you" and the kindly neighbor got down on his knees and started searching for Mullah's keys as well.

After some time spent looking the neighbor straightened up and quite puzzled asked, “Are you sure you dropped your keys here?"

"Oh, I didn't drop them here" replied Mullah.

"Where did you drop them?!!" exclaimed the now bewildered neighbor.

"Over there…” and Mullah pointed to the front of his house that was in darkness.

"So why are you looking for them here??!!" shouted the angry neighbor.

"Because there is light here." replied mullah.
Ethics

Predictions
commoditization
institutionalization
academic shaping

Emerging Examples
On the ethics of analytics, and acting on them

Analogous to the ethics of constructing any simplifying abstraction of reality, and acting on it: cf. economic modelling, migration simulations, insurance risk… — what can we learn from such fields?
Ethical Dilemmas

- Ensuring that what’s “good” for the organization is not bad for students/staff — or learning/real work
  - learning is a mysterious process: beware the lamp-post
  - institutions love to count stuff and demonstrate “impact”
  - models only provide probabilities and averages, but in the hands of people with a little knowledge…

- Ensuring that students are aware of and have consented to the use of data
  - in possible tension with our ethical duty to understand students, and use that knowledge to maximise their success
  - reporting student feedback in an unbiased way, protecting confidentiality
Prediction 1:
Commoditization of analytics services and tools
Social analytics start to become a commodity service

http://www.mzinga.com/software/tour.asp
Social analytics start to become a commodity service

OmniSocial Suite.

http://www.mzinga.com/software/tour.asp
Organizational network analytics start to become a commodity service

http://www.orgnet.com
Organizational network analytics start to become a commodity service

SNA & ONA Training

We provide both general and customized training for all types of network analysis & visualization. First time users of SNA/ONA like our approach, where they get software, training and hands-on assistance, in one simple purchase. Our InFlow software is easy to use and requires very little instruction. Our highest value training, based on experience from almost 500 SNA/ONA projects, provides expert mentoring to our customers with their initial projects.

Client feedback...

I was lucky enough to be trained for three days by

SNA & ONA Projects, Cases & Research

We have provided custom network analysis following areas:

- social network analysis
- organizational network analysis
- network analysis for entrepreneurs
- influence networks and key opinion
- business networks and industry
- contagion and disease networks
- alumni & association networks
- covert and criminal networks

SNA & ONA Projects, Cases & Research

Local Communities

- Network Mapping and Network Weaving [Blog...]
- Building Local Economic Networks [PDF]
- SNA supports Economic Justice [Read...]

Influence, Diffusion & Contagion

- Social Networking in Academia [Read...]
- Contact Tracing and the Spread of Disease [Read...]
- Co-Authorship Networks [Read...]
- Key Opinion Leaders [Read...]

Politics & Power

- Social Networks and Voting [PDF]
- Lobbying and Influence in Government [Read...]
- Interactive Network Map of the Middle East [Read...]
- Knowledge exchange amongst EU countries [Read...]
- Russia v. Ukraine - Pipeline Politics & Power [Read...]
- Understanding Power in Networks [PDF]
- Political Book Networks [Read...]

Organizations, Projects, & Teams

We have participated in 500+ diverse consulting projects applying social network analysis (SNA) and organizational network analysis (ONA). We have worked with large, medium, and small businesses, governments, universities, not-for-profits and their funders, and many consulting firms.

Hidden Networks
Commodity analytics/recommendation services?

- Browsing, discussing, tagging, friending, following, shopping, rating, media consumption…

- Because intense effort is going into these, the associated analytics and recommendation engines will become commodity services, including open source and publicly available algorithms

- There will be a value-added service industry to help tune these to your needs
Prediction 2:

Embedding of institutional analytics services and diffusion of lessons learnt from robust patterns
OU Analytics service: Predictive modelling

- Probability models help us to identify patterns of success that vary between:
  - student groups
  - areas of curriculum
  - study methods
- Previous OU study data – quantity and results – are the best predictors of future success
- The results provide a more robust comparison of module pass rates and support the institution in identifying aspects of good performance that can be shared and aspects where improvement could be realised
OU Analytics service: Effective Interventions

- Proactive measures targeted at specific points in the student journey are associated with improved retention and progression
  - Telephone contact with students considered to be potentially ‘at risk’ before the start of their first course is associated with around a 5% improved likelihood of course completion.
  - Additional tutor contact mid-way through a course is associated with between 15% to 30% improved likelihood of course completion.
  - Additional tutor contact around course results is associated with between 10% to 25% improved likelihood of registering for a further course.
  - Contact with students intending to withdraw before course start is associated with retaining 4% of students on their current course.
OU Analytics service: Engaging faculties

- Various delivery methods:
  - Self-guided presentations on a website
  - Workshops and briefings
  - Ad-hoc queries: available and approachable
- Graphics help non-experts use complex statistics
Prediction 3:

Emergence of analytics and recommendation engines grounded in theories of learning and sensemaking
Do we simply take what the vendors offer?

While we can gratefully reuse generic web/business/social analytics in educational and business institutions — isn’t there anything special about...

learning

scholarship

sensemaking

?
Moreover, are many of us not also questioning conventional definitions of “authentic learning” and “scholarship”?...

- In learning/research/org-life, there are conventional success indicators which are easy to measure
  - course completions, passes, withdrawals…
  - citations, grants, editorial boards, invited keynotes…
  - no. customers, contracts secured, projects completed…
Moreover, are many of us not also questioning conventional definitions of “authentic learning” and “scholarship”?...

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- But the emerging “2.0” landscapes for learning, scholarship and knowledge work, and new pedagogies, demand new, more meaningful indicators
  - social capital, critical questioning/reasoning, citizenship values, habits of mind, resilience, collaboration skills, creativity, emotional intelligence…
Raising our game

Investigate analytics that build on lower level events to define higher level patterns tuned to the dimensions of learning/scholarship/knowledge work which distinguish it from other activity.
Raising our game

Lower level events $\rightarrow$ Higher level patterns

People like you…

People *not* like you in particular ways…

(because you need to be stretched out of your comfort zone)
Raising our game

Lower level events  →  Higher level patterns

Other webinars with matching keywords…

Other tutorials in which the mentor played a decreasing role and newcomers played an increasing role…
Video conference analytics (OU’s Flashmeeting)
http://fm.ea-tel.eu/public

Scott, Castaneda, Quick & Linney (2008) Synchronous symmetrical support: a naturalistic study of live online peer-to-peer learning via software videoconferencing. Interactive Learning Environments. 10.1080/10494820701794730
Video conference analytics (OU’s Flashmeeting)

Video conference foreign language tutorials:
Which mentor would you want to have?...

Mentor 1

Mentor 2
Video conference analytics (OU’s Flashmeeting)

Speech-to-text transcript and semantic analysis

Raising our game

Lower level events  →  Higher level patterns

Other blogs with matching keywords to your post…

Villa, Mosaic, Hadrian, Picts, Romans

Other scholars working on the same open question that you blogged about:

“Why Hadrian did not invade Scotland sooner remains a matter of debate”
Raising our game

Lower level events → Higher level patterns

Viewed 5 comments
Replied to 3
Posted 2 new ones

Challenged a peer’s assumption with a good critical question
Introduced a counter-example
Socio-cultural discourse analysis (Mercer et al)

- **Disputational talk**, characterised by disagreement and individualised decision making.
  - Few attempts to pool resources, to offer constructive criticism or make suggestions. Disputational talk also has some characteristic discourse features - short exchanges consisting of assertions and challenges or counter assertions ('Yes, it is.' 'No it's not').

- **Cumulative talk**, in which speakers build positively but uncritically on what the others have said.
  - Partners use talk to construct a 'common knowledge' by accumulation. Cumulative discourse is characterised by repetitions, confirmations and elaborations.

Socio-cultural discourse analysis (Mercer et al)

- **Exploratory talk**, in which partners engage critically but constructively with each other's ideas.
  - Statements and suggestions are offered for joint consideration.
  - These may be challenged and counter-challenged, but challenges are justified and alternative hypotheses are offered.
  - Partners all actively participate and opinions are sought and considered before decisions are jointly made.
  - Compared with the other two types, in Exploratory talk knowledge is made more publicly accountable and reasoning is more visible in the talk.

Structured deliberation and debate in which Questions, Evidence and Connections are first class entities (linkable, addressable, embeddable, contestable...)

How can we build a robust evidence base to support and enhance the design, evaluation and use of OERs?

7/6/10
Analyst-defined visual connection language
Q4: What can be done about climate change

Responding to climate change predictions: What if anything can be done about it?

Short answer

We have seen that the world’s climate is changing, in part at least, because of the anthropogenic emissions of greenhouse gases, primarily carbon dioxide from fossil fuel. Humans have a choice that must be made soon; we will either mitigate the problems of climate change by a massive reduction of greenhouse gas emissions or adapt by changing our life style. Mitigation is the stabilization of the climate by the removal of some or all of the fossil fuel derived atmospheric carbon dioxide from the energy equation. Adaptation is action taken to cope with increased rainfall, higher temperatures, scarce water, and more frequent storms. Adaptation may need to tackle present problems or to anticipate changes in the future, aiming to reduce risk and damage cost-effectively, and perhaps even exploiting potential benefits.

Detailed answer

Some of the ways that we can reduce our emissions of fossil fuel carbon dioxide and mitigate climate change are presented below.

Immediately Implementable with several tangible benefits

- Increase the efficiency of vehicles and reduce the use of these vehicles.
- Build more energy efficient buildings and equip them with energy efficient appliances.

Available technologies with some added costs

- Increase the efficiency of coal and gas power plants, for example, by combining the production and use of both heat and power.
Structured deliberation and debate in which Questions, Evidence and Connections are first class entities (linkable, addressable, embeddable, contestable...)

- Clip: How can we build a robust evidence base to support and enhance the design, evaluation and use of OERs?
  - http://people.kmi.open.ac.uk/anna/OLnet_Proposal_OU_and_public.htm visit site

Tags:
- OLnet
- Project Proposal
- research question
Structured deliberation and debate in which Questions, Evidence and Connections are first class entities (linkable, addressable, embeddable, contestable...)

34
seeing the connections people make as they annotate the web using Cohere

Visualizing all the connections that a set of analysts have made — but unfiltered, this may not be very helpful
Visualizing multiple learners’ interpretations of global warming sources

Connections have been filtered by a set of semantic relationships grouped as Consistency

an agent reports a connection of interest

Network Search Agent on: Top ten claims of climate sceptic dep 1

Search connection network on my data starting from What are the top ten claims of climate sceptics?
Following links of type: responds to
In both directions, to a depth of 1
Looking for new connections added after: 08 Sep 2010 - 14:11

Gravity 300.0 Length 200.0 Depth 30

Idea Icons User Images

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## Node Types

<table>
<thead>
<tr>
<th>Name</th>
<th>Count</th>
</tr>
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<tbody>
<tr>
<td>Idea</td>
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<tr>
<td>Opinion</td>
<td>11</td>
</tr>
<tr>
<td>International perspective</td>
<td>9</td>
</tr>
<tr>
<td>Action</td>
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<td>Data</td>
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<tr>
<td>Con</td>
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<tr>
<td>Utilisation</td>
<td>4</td>
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<tr>
<td>Illustration</td>
<td>3</td>
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<tr>
<td>Response</td>
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<td>Extension</td>
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<td>Question</td>
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<td>Theory</td>
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<td>Note</td>
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<td>Assumption</td>
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</table>
Next step…

*introducing automated analysis of discourse moves which may signify deep/shallow learning and knowledge construction*
Analytics for identifying Exploratory talk

Elluminate sessions can be very long – lasting for hours or even covering days of a conference.

It would be useful if we could identify where learning seems to be taking place, so we can recommend those sessions, and not have to sit through online chat about virtual biscuits.

Useful Links

- The Course Wiki: http://climatechangecourse.wetpaint.com
- sideCAP wiki (with resources): http://sidecap.wetpaint.com
- The course on OpenLearn: http://openlearn.open.ac.uk
- The sideCAP report: http://www.blurb.com/bookstore/detail/1267854
## Analytics for identifying Exploratory talk

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
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</thead>
<tbody>
<tr>
<td>Challenge</td>
<td>But if, have to respond, my view</td>
</tr>
<tr>
<td>Critique</td>
<td>However, I’m not sure, maybe</td>
</tr>
<tr>
<td>Discussion of resources</td>
<td>Have you read, more links</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Good example, good point</td>
</tr>
<tr>
<td>Explanation</td>
<td>Means that, our goals</td>
</tr>
<tr>
<td>Explicit reasoning</td>
<td>Next step, relates to, that’s why</td>
</tr>
<tr>
<td>Justification</td>
<td>I mean, we learned, we observed</td>
</tr>
<tr>
<td>Reflections of perspectives of others</td>
<td>Agree, here is another, makes the point, take your point, your view</td>
</tr>
</tbody>
</table>

Discourse analysis with Xerox Incremental Parser (XIP)

Detection of salient sentences based on rhetorical markers:

**BACKGROUND KNOWLEDGE:**
Recent studies indicate ...
... the previously proposed ...
... is universally accepted ...

**NOVELTY:**
... new insights provide direct evidence ...
... we suggest a new ... approach ...
... results define a novel role ...

**OPEN QUESTION:**
... little is known ...
... role ... has been elusive
Current data is insufficient ...

**CONPARASTING IDEAS:**
... unorthodox view resolves ...
paradoxes ...
In contrast with previous hypotheses ...
... inconsistent with past findings ...

**SIGNIFICANCE:**
studies ... have provided important advances
Knowledge ... is crucial for ...
understanding
valuable information ... from studies

**GENERALIZING:**
... emerging as a promising approach
Our understanding ... has grown exponentially ...
... growing recognition of the importance ...

**SURPRISE:**
We have recently observed ... surprisingly
We have identified ... unusual
The recent discovery ... suggests intriguing roles

**SUMMARIZING:**
The goal of this study ...
Here, we show ...
Altogether, our results ...
indicate

Ágnes Sándor & OLnet Project: http://olnet.org/node/512

Xerox Research Centre Europe
The primary goal of this project was to conduct an exploratory research study to determine if providing a professional development program using open education resources (OER) would help teachers begin to transform their curriculum and teaching through the use of technology. Our eight-year Maine Learning Technology Initiative (MLTI) experience had shown us that while providing laptops to all middle school teachers and students has had many positive impacts on schools, classrooms and learning, many mathematics teachers still had not fully integrated the laptop technology into their teaching. Accordingly, this research study was designed to determine the impacts of helping a group of middle school and high school mathematics teachers, through professional development with mathematics OER, to teach targeted algebra topics using technology.

Several key activities were undertaken in this project over an 18-month time period. First, we attempted to conduct an environmental scan to determine the challenges teachers encounter in using OER. Although the use of OER has grown quite extensively in higher education and K-12 settings in developing countries, OER use by K-12 teachers in the United States appears to be limited. The purpose of this activity was to explore why this was the case, to identify challenges teachers encounter in using OER, and to develop strategies for overcoming these challenges through our professional development program and research. This environmental scan consisted of several activities, including interviews with leading OER experts and proponents, survey of teachers, and a limited number of focus groups. Through these activities we began to draw conclusions about the use of OER in K-12 school settings, and these conclusions are discussed below under Lessons Learned.

Document 1  19 sentences annotated

Document 2  71 sentences annotated

Ágnes Sándor & OLnet Project:
http://olnet.org/node/512
Raising our game

Lower level events → Higher level patterns

People like you who watched “Roman Britain” also viewed these videos…

People like you who are working on their critical thinking rated these discussion groups as challenging but supportive…
Raising our game

Lower level events  Higher level patterns

Failed 1 assignment
Passed 2 with merit
Passed 1 with distinction
Graduated with honours

Demonstrates increased resilience when challenged
Demonstrates ability to apply learning across contexts
Reports a growing sense of herself as a learner
Learning to Learn: 7 Dimensions of “Learning Power”

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)

- Being Stuck & Static ↔ Changing & Learning
- Data Accumulation ↔ Meaning Making
- Passivity ↔ Critical Curiosity
- Being Rule Bound ↔ Creativity
- Isolation & Dependence ↔ Learning Relationships
- Being Robotic ↔ Strategic Awareness
- Fragility & Dependence ↔ Resilience

Professional development in schools, colleges and business: ViTaL: http://www.vitalhub.net/vp_research-elli.htm
ELLI profile showing pre/post stretch following mentoring and targeted intervention

ELLI: Effective Lifelong Learning Inventory (Ruth Deakin Crick, U. Bristol)
A web questionnaire generates a spider diagram summarising the learner’s self-perception: the basis for a mentored discussion and strategic priorities

ViTaL: http://www.vitalhub.net/vp_research-elli.htm
EnquiryBlogger (Learning Futures programme)
Wordpress multisite plugins tuning it for learning to learn and personalised enquiry

http://people.kmi.open.ac.uk/sbs/2011/01/digital-support-for-authentic-enquiry
The blobs on the EnquirySpiral and ELLI Spider plugins will change size and colour when you categorise blog posts, as shown.
(ELLI profiles can be added to the blog using the images plugin)
Users with *teacher* status can view the group’s EnquiryBlogger plugins in their Dashboard.
Users with *teacher* status can view the group’s EnquiryBlogger plugins in their Dashboard.
Raising our game

Lower level events ➔ Higher level patterns

Students assigned to groups based on balancing gender and age

Students assigned based on predicted vulnerability, in order to balance mentor workload, and match mentor skillsets
Raising our game

Lower level events → Higher level patterns

In the week prior to every Assignment, forum posts and Helpdesk calls spike.

Both successful and failing students showed stressful status updates, but the successful ones engaged in more informal interaction, while the failing students stopped talking to anyone.
OU Facebook app: My OU Story

Tony Hirst, Liam Green-Hughes, Stuart Brown
http://apps.facebook.com/myoustory
EnquiryBlogger: Changing your “mood” in the Mood View plugin prompts you to explain why, which will then be added as a new blog post.
future trajectories
Institutional Analytics: the future

Analysis and dissemination
including modelling pass & progression rates, analysing effectiveness of student support interventions

Strategic review and business planning
Future trajectories we’re working on…

- **Triangulating data sources** to enrich context: e.g. staff skills, curriculum design, student profile, real time usage, course feedback, CRM transcript analysis… (linked data)
- **Just in time interventions** using analysis of online engagement
- **Greater personalisation** using demographic details and previous study history
- **Multimedia indexing** to detect the use of common images/videos
- **Merging data from cloud applications** to which the user grants access
- **Data mining and recommendation engines** around social learning

...balanced by the ethical principles around data fusion, confidentiality, conflicting interests…

...and the intellectual challenge: does what we are measuring have integrity as indicators of authentic learning?