



Libraries and Learning Services

University of Auckland Research Repository, ResearchSpace

Suggested Reference

Gunn, C., McDonald, J., Donald, C., Milne, J., Nichols, M., & Heinrich, E. (2015). A practitioner's guide to learning analytics. In T. Reiners, B. R. von Konsky, D. Gibson, V. Chang, L. Irving, & K. Clarke (Eds.), *Globally connected, digitally enabled. Proceedings ascilite 2015* (pp. 672-675). Perth, Australia.

Copyright

This is an open-access article distributed under the terms of the [Creative Commons Attribution](#) License.

Items in ResearchSpace are protected by copyright, with all rights reserved, unless otherwise indicated. Previously published items are made available in accordance with the copyright policy of the publisher.

<https://researchspace.auckland.ac.nz/docs/ua-docs/rights.htm>

A practitioner's guide to learning analytics

A growing body of literature identifies learning analytics as an emergent field of research that can deepen our understanding of learning and inform learning design practice. However, realizing the potential is not straightforward, as even defining learning analytics is vexed. For teachers and learning designers, the practical issue of how to engage with learning analytics data is problematic. This discussion paper begins by outlining the background to learning analytics at practice level. Next, we introduce learning analytics frameworks, and one in particular that serves our aim to develop a guide for practitioners wishing to engage with learning analytics for different purposes. We will develop and refine the guide by mapping it to case-studies at NZ tertiary institutions, and through discussion with practitioners internationally. Our goal is to make analytics data more accessible and useful to teachers, learning designers and institutions.

Keywords: Learning analytics; learning technology research; case study

Background

Learning analytics has been variously defined (e.g. Barneveld, Arnold & Campbell, 2012; Elias, 2011; Society for Learning Analytics Research, 2012). Cooper (2012a) suggests that a single definition is impossible because of the broad range of perspectives and motivations involved. For our purpose, which is working with teachers, learning designers and learners, Cooper's description is useful:

Analytics is the process of developing actionable insights through problem definition and the application of statistical models and analysis against existing and/or simulated future data. (p.7)

Analytics data provides opportunities for informed decision-making at both institutional and practice level. Davenport et al (2010; p1) noted that 'putting analytics to work is about improving performance in key domains using data and analysis'. While this quote refers to the business world, the same principle can be applied to education, with potential benefits including:

- Increased understanding of the effects of learning design decisions, learning contexts and what works in relation to stated learning objectives;
- Deeper insight into the impact of different processes and practices in learning environments;
- A rationale and agility to respond to changing circumstances;
- Ability to detect patterns and trends;
- Enhanced decision-making where logic and supporting data is consistently applied.

However, as Lockyer, Heathcote and Dawson (2013) point out, learning analytics studies reported thus far tend to focus on relatively coarse indicators such as student retention and progression. The means and methods for more fine-grained analysis have yet to be fully explored, to:

... inform teachers on the success and outcomes of their design of learning experiences and activities alongside monitoring student learning for direct support during the academic semester. (Lockyer, Heathcote and Dawson, 2013, p1441)

Many educational technology researchers (e.g. Reeves, 2011; Gunn & Steel, 2012) have noted the limitations of subjective data and the high level objective sources that reveal what is happening but not why, or lack meaningful ways to interpret trends that the numbers reveal at the level of practice. Learning analytics could be an important missing link for evidence-based practice if it offers ways to leverage insights from objective and passively collected data sources. The aim to develop evidence-based educational practice has been on the agenda for many years (e.g., Biesta, 2007; Clegg, 2005; Denzin, 2009); whether learning analytics is the means to move this agenda forward remains to be seen.

Learning analytics frameworks

Frameworks designed to map the landscape of analytics in general and learning analytics in particular represent a range of application levels and perspectives (e.g. Davenport, Harris, & Morison, 2010; Greller & Drachler, 2012; Lockyer, Heathcote and Dawson, 2013). We have chosen to adopt as a starting point for our project, *A Framework of Characteristics for Analytics* (Cooper, 2012b: Figure 1). Cooper identifies two key uses for his

framework: first, to analyze existing applications and second, to develop principled designs for new projects. He also notes that some of the framework dimensions, which move from simple information gathering and extrapolation to actionable insight, may require capability beyond that currently available within educational institutions. Mapping to the simple framework from Davenport, Harris, & Morison, 2010 (Table 1) highlights the move from more straightforward reporting and extrapolation to actionable insights such as modeling, experimentation, recommendations and predictions.

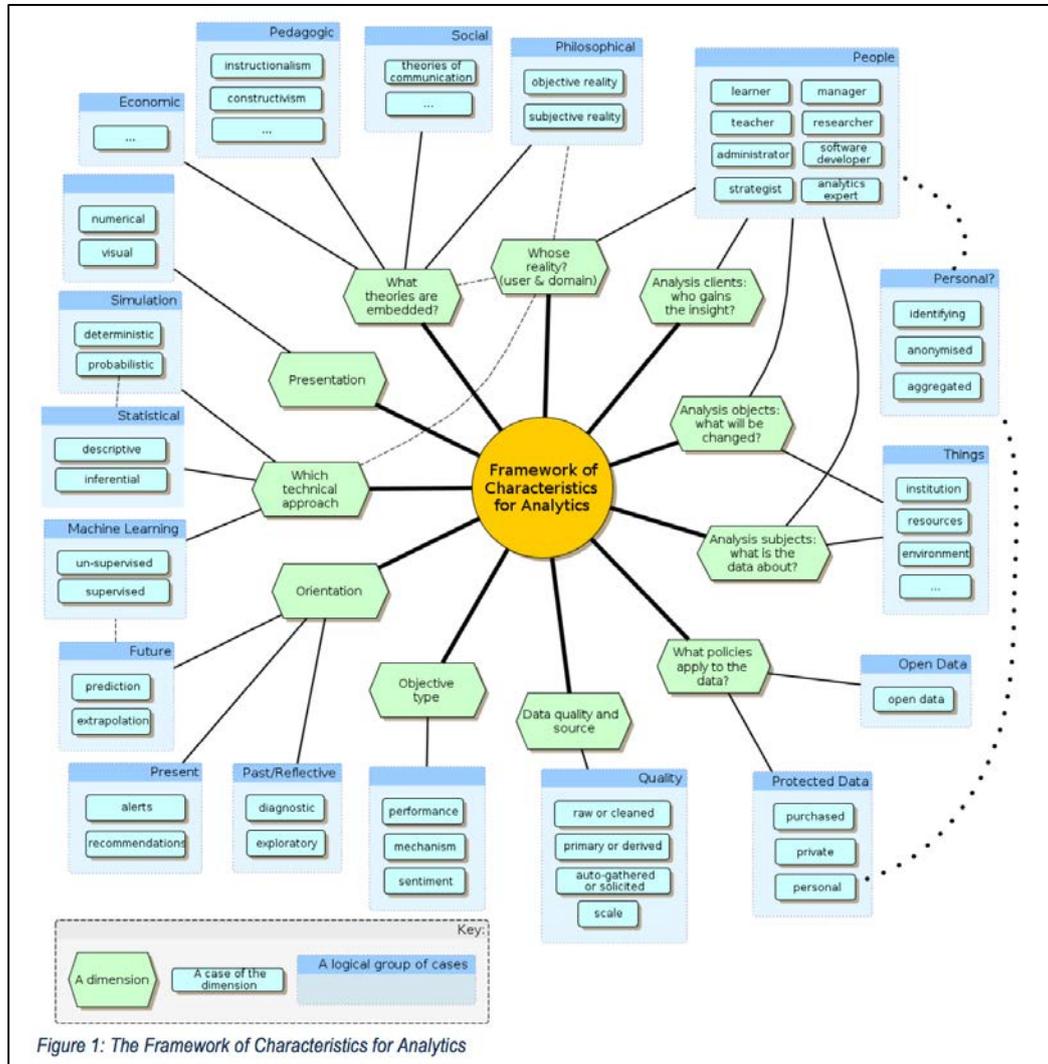


Figure 1. The Framework of Characteristics of Learning Analytics (From Cooper, 2012b p.5)

While frameworks are useful to educational technology researchers and early adopters with a reasonable grasp of analytics capabilities, they are too conceptual for most teachers and learning designers to use as a basis to develop an analytics practice. Our experience shows that a degree of translation is required to make the application of learning analytics concepts accessible to those who might benefit most. A central goal of our project is to support that translation through development of reporting templates and guidelines.

	Past	Present	Future
Information	What happened? (Reporting)	What is happening now? (Alerts)	What will happen (Extrapolation)
Insight (Purpose)	How and why did it happen? (Modeling, experimental design)	What is the next best action? (Recommendation)	What is the best / worst possible outcome? (Prediction, optimization, simulation)

Table 1: Key Questions Addressed by Analytics (From Davenport, Harris & Morison, 2010 p7)

Our project and case studies

A scan of four participating institutions and the New Zealand tertiary sector identified a **number of** early adopters working on the analytics capabilities of different elearning systems. An invitation to become case studies for a national initiative attracted **a number of** willing participants. The formal project includes eight case studies covering a range of educational aims and contexts, including:

- Development and enterprise-wide implementation of a reporting system to identify and record action taken with at risk students;
- Design analytics functions and reports to answer specific questions posed by lecturers in an iterative learning design process;
- Analyze data from different sources to identify course elements most strongly associated with student engagement in large lectures;
- Explore the data produced by online skills development modules to determine the extent to which it can inform learning re/design;
- Process student free text responses to identify features indicative of developing disciplinary fluency;
- Translate LMS log data to inform students about their learning and help teachers design more effective teaching strategies.

We were aware early on that the field is complex; the data we will use has many dimensions and characteristics, various possible interpretations and different methods we may use for the process. The case study method maintains the focus on practice, and creates the opportunity for intended users of the analytics tools to help us shape the data collection and reporting capabilities. In some cases, we have the ability to modify the elearning systems we are using to generate the data we want, while in others we are constrained by what is available through tools such as the institutional LMS. We are also aware that learning analytics is not just about numbers and statistical analysis. Various forms of feedback, observation, discussion, focus groups and interviews can all help to deepen our understanding. The use of Cooper's framework does not preclude this and we endorse the point in the Open University's Guide to Learning Analytics (The Open University n.d.) that students should never be judged on their data alone.

Our aims are modest compared to researchers such as Greller & Drachsler (2012). We do not aim to scope an entire field of research, but to develop a practical guide for teachers without specialist data analysis skills and institutions making tentative moves into the field of learning analytics to make use of data they already have. A current challenge is to manage access, analysis and interpretation of the data in a timely manner. Adding this dimension to elearning practice is a formidable task for some academics who may lack confidence in the applications of technology in education. Like all other areas of elearning practice, we believe it is important to lower the barriers to entry to a level where non-technical users can participate. Open access is also a significant shift for institutions where privacy concerns and security measures had become the guiding principles of data management. These changes to individual and institutional practice require evidence to inform decisions as well as the subsequent actions.

We appreciate Cooper's invitation to make creative use of his framework to scaffold development of a design rationale and functional aspects of our own analytics practice. In turn, we hope readers find this discussion paper a useful step towards the co-construction of meaning and methods to make learning analytics an integral part of more soundly evidence-based learning design practice.

References

- van Barneveld, A., Arnold, K. E., & Campbell, J. P. (2012). Analytics in higher education: Establishing a common language. *EDUCAUSE learning initiative*, 1, 1-11.
- Biesta, G. (2007). Why "what works" won't work: Evidence-based practice and the democratic deficit in educational research. *Educational Theory*, 57 (1), 1–22. Retrieved from <http://dx.doi.org/10.1111/j.1741-5446.2006.00241.x> doi:10.1111/j.1741-5446.2006.00241.x
- Clegg, S. (2005). Evidence-based practice in educational research: A critical realist critique of systematic review. *British Journal of Sociology of Education*, 26 (3), pp. 415-428. Retrieved from <http://www.jstor.org/stable/30036076>
- Cooper, A. (2012a) "What is 'Analytics'?: Definition and Essential Characteristics, *CETIS Analytics Series*, vol. 1, no. 5
- Cooper, A. (2012b) A Framework of Characteristics for Analytics, *CETIS Analytics Series*, vol. 1, no. 7

- Davenport, T.H., Harris, J.G and Morison, R. (2010) *Analytics at Work: Smarter Decisions, Better Results*. Harvard Business Press, 2010.
- Denzin, N. K. (2009). The elephant in the living room: or extending the conversation about the politics of evidence. *Qualitative Research*, 9 (2), 139-160. Retrieved from <http://qrj.sagepub.com/content/9/2/139.abstract> doi: 10.1177/1468794108098034
- Elias, T. (2011). Learning analytics: Definitions, processes and potential. Retrieved from <http://learninganalytics.net/LearningAnalyticsDefinitionsProcessesPotential.pdf>
- Greller, W and Drachsler, H. (2012) Translating Learning into Numbers: A Generic Framework for Learning Analytics, *Educational Technology & Society*, vol. 15, no. 3, pp. 42-57
- Gunn, C. and Steele, C. (2012) Linking theory to practice in learning technology research. *Research in Learning Technology* 2012, 20.
- Lockyer, L., Heathcote, E., and Dawson, S. (2013) Informing Pedagogical Action: Aligning Learning Analytics With Learning Design. *American Behavioral Scientist* 57(10) 1439–1459
- Society for Learning Analytics Research (2012) About. Retrieved from <http://www.solaresearch.org/about/>
- Reeves, T. C. (2011). Can Educational Research be Both Rigorous and Relevant? *Educational Designer* 1(4). <http://www.educationaldesigner.org/ed/volume1/issue4/article13/>
- The Open University (n.d.) Using Information to Support Student Learning, Retrieved from <http://www.open.ac.uk/students/charter/sites/www.open.ac.uk.students.charter/files/files/ecms/web-content/using-information-to-support-student-learning.pdf>