GRAND CHALLENGES FOR LEARNING ANALYTICS AND OPEN & ONLINE EDUCATION

By **Jocelyn Manderveld**

This contribution addresses the challenges that are encountered when learning analytics is applied within open and online education. Firstly, the prospects of learning analytics within open and online education will be described, before detailing the challenges that we must face during the large-scale application of learning analytics within open and online education. Finally, an indication will be given of how we should proceed. This article is a revision of the SURF report 'Grand Challenges for Learning Analytics and Open and Online Education – a Study'

Introduction

The phenomenon of learning analytics is attracting more and more national and international interest (Horizon Report, 2014-2015). Learning analytics focuses on gathering and analysing data from learning environments in order to improve students' learning processes. This information is then made available for various stakeholders, such as the student him/herself, the lecturer or the programme managers (see also Manderveld & De Wit, 2015).

This definition of learning analytics is based on the use of data to define actions that improve the learning process. It is therefore more than just automated data analysis – the goal of learning analytics is to realise optimised learning processes and environments.

The relationship between open and online education and learning analytics is an interesting new area. Due to the developments in open and online education and the large numbers of visitors and users of the educational material made available, enormous amounts of data have been collected. This data can be analysed and used as feedback for students and other stakeholders, such as lecturers and education developers. The previous trend report presented a number of opportunities for using learning analytics to boost the quality of open and online education (Latour & Schuwer, 2014).

Using learners' behaviour and performance data from open online environments in the context of Learning Analytics enables others to determine, visualise, and create frameworks such as hierarchies of the strengths and weaknesses of individual learners and larger groups. In principle that has always been the case in educational environments such as schools; however, Learning Analytics enables the provision of this information in larger quantities, real time and on demand. In addition, it is no longer only an educational institute that has access to the data. Especially in open online education, new educational players such as various MOOC providers that are private companies have access to the data and can also pass these data on to third parties for research purposes (Prinsloo & Shane, 2015).

The prospects of learning analytics

This trend report is about open and online education. However, the degree of openness of the education is of lesser importance to learning analytics. The most vital factor for the application of learning analytics is that the education is conducted online. This enables data to be collected such as every mouse click that a particular student makes in an online environment.

This is the power of learning analytics: every online action made by students within a particular online environment is automatically registered. This creates large data sets that can be used to make predictions about aspects like students' study behaviour, the quality of the teaching materials used, the use of the digital learning and working environment, the quality of test items, and study progress.

The following parties benefit from the use of learning analytics within open and online education[1]:

• Students: They can reflect on their results and compare their performance with other students.
• Lecturers: They can conduct interventions for individual students or groups of students.
• Management: Based on the data, they can make decisions regarding the positioning of a particular programme.
• Functional groups, such as educational development teams, who wish to improve the education or develop a new curriculum.

Learning analytics within education is a very promising development. However, is there any evidence that large-scale analysis of educational data actually has a positive effect on study success? Within the scope of the European project LACE (Learning Analytics Community Exchange), an 'evidence hub' has been developed that collects evidence of the effectiveness of learning analytics in education. This provides excellent examples of institutions that are now using learning analytics. One of these is Georgia State University. Thanks to the use of learning analytics, the average time taken for students to graduate has reduced, and 1,700 extra students graduate each year.

Despite these wonderful examples, we should manage our expectations with regard to learning analytics. There are a number of major concerns with regard to learning analytics, particularly its impact on the privacy of the people about whom data is being collected, linked and analysed (see also Ministry of Education, Culture and Science, 2015). The possible impact of learning analytics goes much further than simply an evaluation procedure in the classroom, and it may not be clear to the student what data is used. With learning analytics, you can calculate the relationship between students based on their interactions: the time that one student spends on the learning materials can be compared to other students.

Thus, Learning Analytics goes far beyond traditional assessment procedures and affects the privacy rights of learners in a new manner. This urgently calls for a clarification of the concept of privacy in relation to Learning Analytics in the education system. It also raises ethical questions, such as: where do you draw the line when creating student profiles? Do we do any harm to our students when drawing up those profiles? Are we actually allowed to collect this kind of data, and if so, for what purposes? How can we make those analytics transparent and understandable to the data subjects involved?

For the higher education institutions, clear legal directives must be set that can be used as a point of departure for the application of learning analytics within education. Best practices are also required for the reuse, storage and security of educational data used for learning analytics.

In addition to these privacy issues, there are other challenges that will have to be examined and addressed.

Challenges for learning analytics and open and online education

• What data actually helps the learning and education process?
Based on data from all kinds of digital systems, learning analytics can be used to give students feedback on their own learning process. In addition, it can give feedback to lecturers regarding their students' performance, the effectiveness of the learning environment and areas in which improvement is needed. However, the selection and interpretation of data from the systems used is a complex task.

What data will reflect the learning and education processes of students and lecturers in the most meaningful way? So far, the main focus is on data that displays the students' presence within a particular online environment or their progress when carrying out assignments. Are these aspects truly the most important factors for predicting study success within open and online education?

• Connection between online and offline education
The assumption of open and online education is that the students' learning takes place online. However, a large proportion of the learning process often takes place either offline or in unmonitored online environments. Therefore, is the analytical data collected from the online education the right kind of data? And how can you monitor learning activities conducted by students outside the online environments and ensure they facilitate the prediction of study success? This will be one of the major challenges of learning analytics in the years to come.

• How can learning analytics be visualised effectively and efficiently?
When large quantities of data become available with which you can monitor the student's learning process in detail, the demand for a convenient dashboard within the learning environment increases. The ideal lecturer's dashboard would be visual, intuitive, well-organised, personalised, compatible with different devices and display not only data, but also analysis. There are a number of examples of dashboards within open and online education, although as of yet, little is known regarding which visualisations are viewed as effective and efficient by both students and lecturers.

• Applying learning analytics within open and online education in practice.
Various higher education institutions already offer open and online education via a wide range of platforms. Currently, these platforms are collecting and updating data on a large scale. The enormous volumes of data have pushed learning analytics into the domain of big data, which brings with it a number of challenges relating to data management and infrastructure. Learning analytics at the institutional level requires data centralisation, access to data silos, collection and analysis of data and the application and validation of interventions within teaching practice.

It is useful for education institutions to consult with the suppliers of their learning management system to examine whether learning analytics can be conducted and what data they should collect for this purpose. Be sure to get a clear picture of whether open standards are used and how this data can be extracted from the systems and used to give feedback to students and lecturers.

How to proceed from here?

The information above illustrates the enormous potential of learning analytics.
It can make an important contribution to study success, preventing study delay
and reducing the drop-out rate. In order to capitalise on this potential, knowledge
development is required on many fronts. This relates to didactics, the design of
learning arrangements in which learning analytics are designed together with the
learning arrangement, technology, privacy and the ethics of learning analytics within
open and online education.

It is important that SURF critically assesses the aforementioned challenges and
knowledge development together with higher education institutions and determines
whether and how these can be included in a national agenda in which the synergy
of learning analytics and open and online education can be further elaborated in the
coming years.

When determining this agenda, it is also important that sufficient room for
experimentation is included for education institutions to enable them to gain
more experience with learning analytics in practice. This will give us a clear picture
of what data and interventions have a positive effect on study success. These
experiments could eventually lead to further innovation of open and online education
as we progress towards data-supported education. This can help take customised
education to the next level.

Jocelyn Manderveld
(jocelyn.manderveld@surfnet.nl)
works for SURFnet and is involved in
the Learning Analytics project within
SURFnet's Customised Education
programme. She has a background in
educational psychology and in recent
years, she has worked as a project
manager on various innovation projects
and studies focusing on the use of ICT
in education.

Endnote

1 http://www.laceproject.eu/faqs/learning-analytics/

Literature

• Berg, A., Drachsler, H., Filius, R., Manderveld, J., van den Boogaard, M., & Schuwer, R. (2015). Grand Challenges learning analytics & open en online onderwijs: Een verkenning. Obtained on 2 September 2015 via https://www.surf.nl/kennis-en-innovatie/kennisbank/2015/rapport-grand-challenges-learning-analytics--open-en-online-onderwijs---een-verkenning.html.
• ELI (2015). Horizon report. Obtained on 20 March 2015 via http://www.educause.edu/library/resources/2015-horizon-report.
• Ministry of Education, Culture and Science (2015). Big data in onderwijs & wetenschap. Obtained on 20 March 2015 via https://www.rijksoverheid.nl/documenten/kamerstukken/2015/06/05/kamerbrief-over-big-data-in-onderwijs-en-wetenschap-inventarisatie-en-essays.
• Latour, S. & Schuwer, R. (2014). Open Education, Big Data en Learning Analytics. In: Woert, N. van der, Jacobi, R. & Jelgerhuis, H. (eds). Trendrapport Open Education 2014. SURF, Utrecht.
• Manderveld, J., & de Wit, M. (2015). Innovatieprogramma Onderwijs op Maat. Project Learning Analytics: Activiteitenplan 2015. Obtained on 2 September 2015 via https://www.surf.nl/binaries/content/assets/surf/nl/2015/plan-learning-analytics-2015.pdf.
• Prinsloo, P. & Slade, S. (2015). Student privacy self-management: implications for Learning Analytics. In Proceedings of the Fifth International Conference on Learning Analytics (83-92). New York, NJ: ACM.