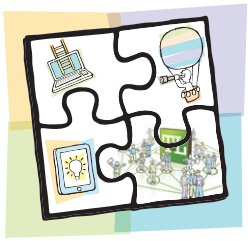
NATIONAL FORUM FOR THE ENHANCEMENT OF TEACHING AND LEARNING IN HIGHER EDUCATION



Forum Insight

An Introduction to the Learning Analytics and Educational Data Mining for Learning Impact Project

December 2016

This ***Forum Insight*** introduces the key concepts of learning analytics and educational data mining and summarises the National Forum's Learning Analytics and Educational Data Mining for Learning Impact Project, which runs from September 2016 to June 2017.

What are learning analytics/educational data mining?

Learning analytics (LA) and educational data mining (EDM) describe an evidence-based approach to decisions in higher education. Modelled on the principles of data analytics, they are based upon the premise that HEIs have access to vast quantities of data which contain patterns and relationships that can inform and enable timely, well-informed actions and decisions, with particular application to student learning.

Analytics can be a powerful tool for enabling students to remain informed of their current and projected progress through their modules or programmes of study. Giving students this capacity and automatically directing them to targeted, relevant learning resources can empower them to enhance their learning and improve their performance (e.g., Dietz-Uhler & Hurn, 2013).

Arguably the foremost use of LA involves analysing data from a variety of sources including the student information system, virtual learning environment, library systems, etc., to predictively identify students who may be at risk of failing their end-of-semester assessments and/or withdrawing from their programme early. This can enable targeted, pro-active interventions that direct students to essential learning resources while there is still time for them to change their potential academic trajectory (Arnold & Pistilli, 2012).

What are the differences between learning analytics and educational data mining?

Learning analytics

The most pervasive definition of LA is the *'measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs'* (Siemens, 2011). Most notably, LA consists of using student data from a variety of sources to enable the identification of at-risk students up to four months earlier than would be possible using traditional methods. This enables staff supporting students to make targeted interventions with a far higher chance of success (Seidman, 2005). It can also be used to facilitate students to optimise their own learning behaviour, thereby maximising the support each student receives, while minimising the resources required to provide that support (Arnold & Pistilli, 2012).

Educational data mining

Data mining is *'the process of seeking relationships within a data set'* (Hand et al, 2001, p. 3). As in the field of big data, it involves the analysis of large quantities of data to identify patterns and relationships between variables that may not otherwise be apparent. EDM is the application of these principles to educational settings.

The Learning Analytics and Educational Data Mining for Learning Impact Project

One of the national forum's pre-specified nationally coordinated projects, the Learning Analytics and Educational Data Mining for Learning Impact Project runs from September 2016 to June 2017. Its goal is to increase awareness of the benefits of analytics and to build institutions' capacity for developing and implementing their own analytics strategies.

One of the key outputs that will support this capacity building is the development of the Irish higher education analytics community; the project will help to draw together a community of researchers and practitioners with a view to generating a greater shared awareness of developments in the area and enhancing the opportunities for collaboration and the sharing of expertise.

Project outputs

The projected outcomes of the Learning Analytics and Educational Data Mining for Learning Impact Project are:

- A review of current trends in LA/EDM nationally and internationally
- A series of national and international case studies which will highlight best practice in the effective integration of LA/EDM into institutions' iterative business cycles
- A technical output that will include both an analysis of the architecture which is currently available to institutions and an assessment of what is needed to maximise the potential for LA/EDM
- An identification of opportunities for inter-institutional collaboration in LA/EDM infrastructure development and/or for the sharing of technical expertise
- A framework which will assist HEIs to develop LA/EDM policies that enable the implementation of LA/EDM practices in a context which is ethical, legal and in line with international best practice

The diagram above shows the three phases of the project:

The aim of the first phase, 'Building Context', is to develop an overview, through site visits and informal interviews, of current developments across the Irish HE sector. This is also an opportunity to track the opportunities and challenges facing the sector in this area. This phase will also inform the national case studies which are a deliverable of the project.

The second phase is 'Building Community'. The goal of this phase is to bring together those with an interest in LA/EDM from across Ireland, with a view to strengthening relationships and identifying opportunities for co-operation and collaboration. The National Forum's symposium on LA, which took place on 8th December 2016 and was attended by 74 higher education representatives from across the country, was a first step in this phase.

The final phase of the project, 'Building Capacity', will see the outputs of the project pulled together into an online resource that will assist HEIs in driving their analytics strategy along the continuum from first steps to full implementation.

Are the applications of analytics limited to retention?

Not at all!
Analytics are not just a tool to enhance retention, although they can be used very effectively to that end. They are part of an evidence-based approach that can be applied to virtually any challenge facing a HEI. The best decisions in any area are effective, timely and future-proof. Crucially, they are also well-informed. This is the role of analytics, an approach which uses proven data-analysis techniques to allow HEIs to capitalise on the abundance of data and metadata that they accumulate through their various systems and databases. They enhance a HEI's ability to predict the potential outcomes of a given decision or action and to iteratively review the accuracy of these predictions and the efficacy of actions taken. They can be used to enhance student learning and success (Arnold & Pistilli, 2012), to reduce institutional spending, to target resources and to prioritise strategic planning (Schierenbeck, 2013).

Fundamentally, analytics is an approach that informs an action or a decision; any application of an analytical approach should begin with the questions 'What do I need to do?' and 'What information (past, present or future) would shape my approach to doing it?'

References

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Siemens, G. (2011). *Learning and academic analytics.* Retrieved from: http://www.learninganalytics.net/?p=131

Further Information

Further information on this project can be found at: www.teachingandlearning.ie/priority-themes/mapping-digital-capacity/pre-specified-nationally-coordinated-projects/

Further reading:

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