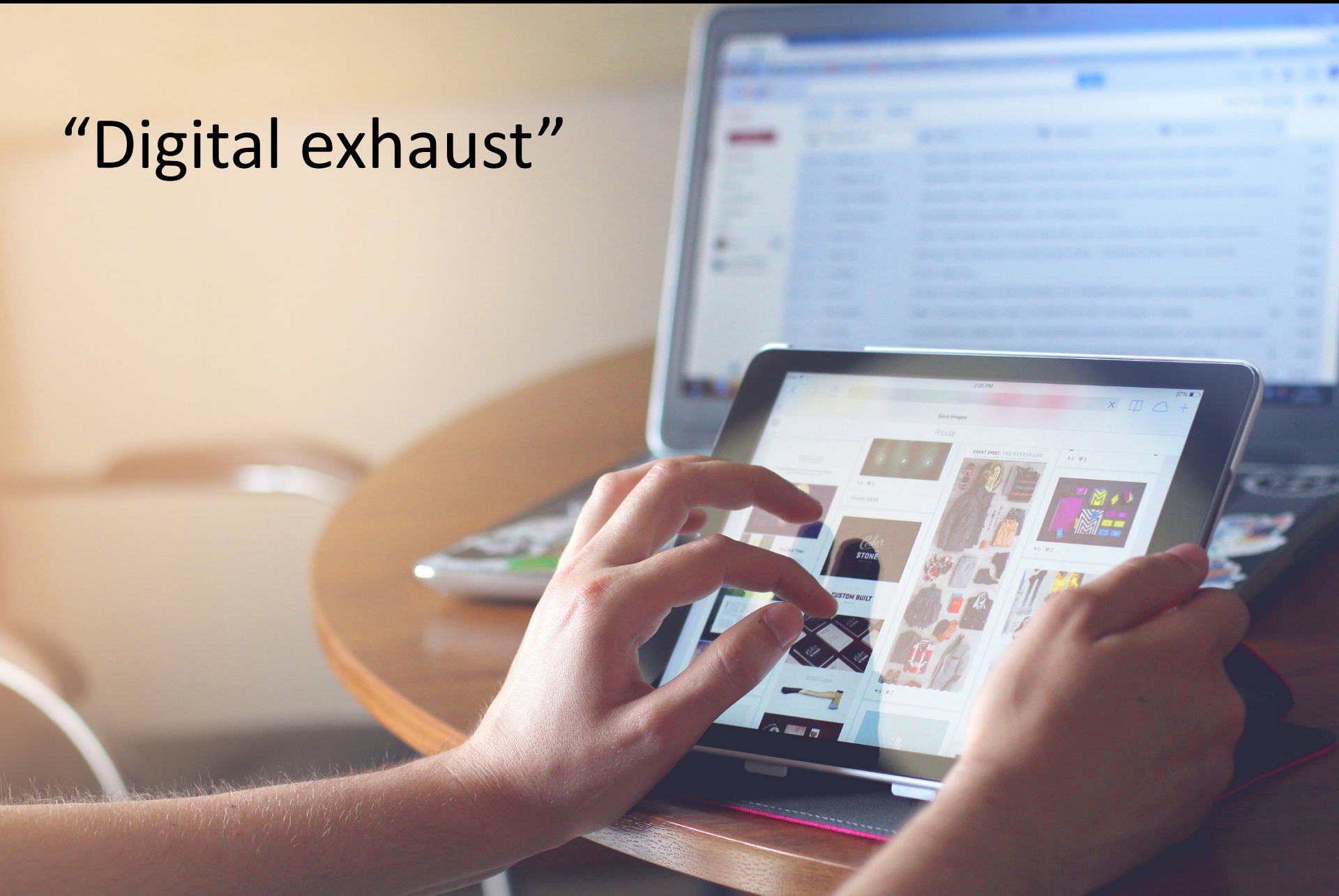
Using Data to Enhance the Student Experience

Niall Sclater @sclater

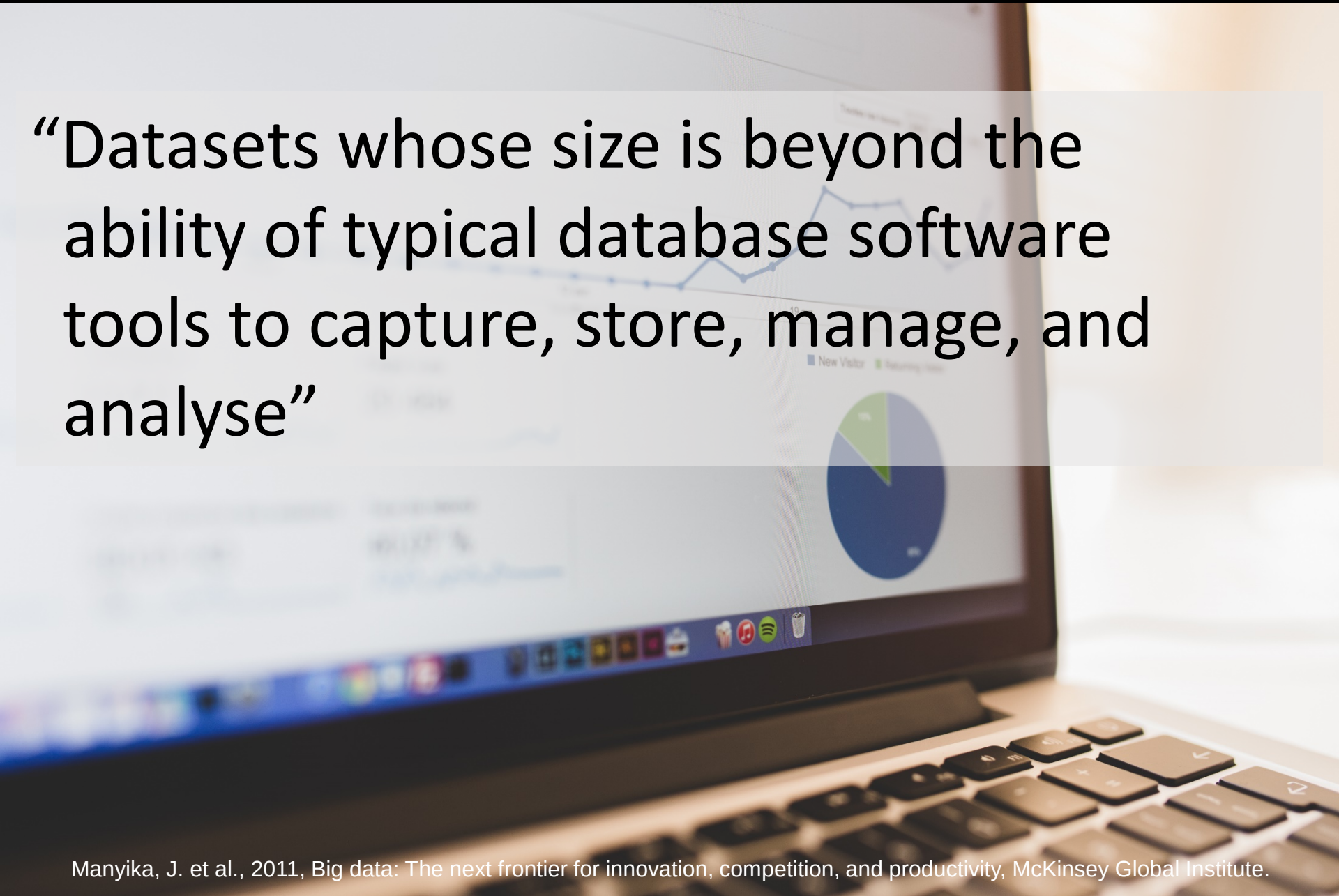
University of Amsterdam

Sclater Digital

Fiesole Retreat, Universitat Pompeu Fabra, Barcelona, 26th Apr 2018


“Digital exhaust”

Big data. Business intelligence. Analytics.



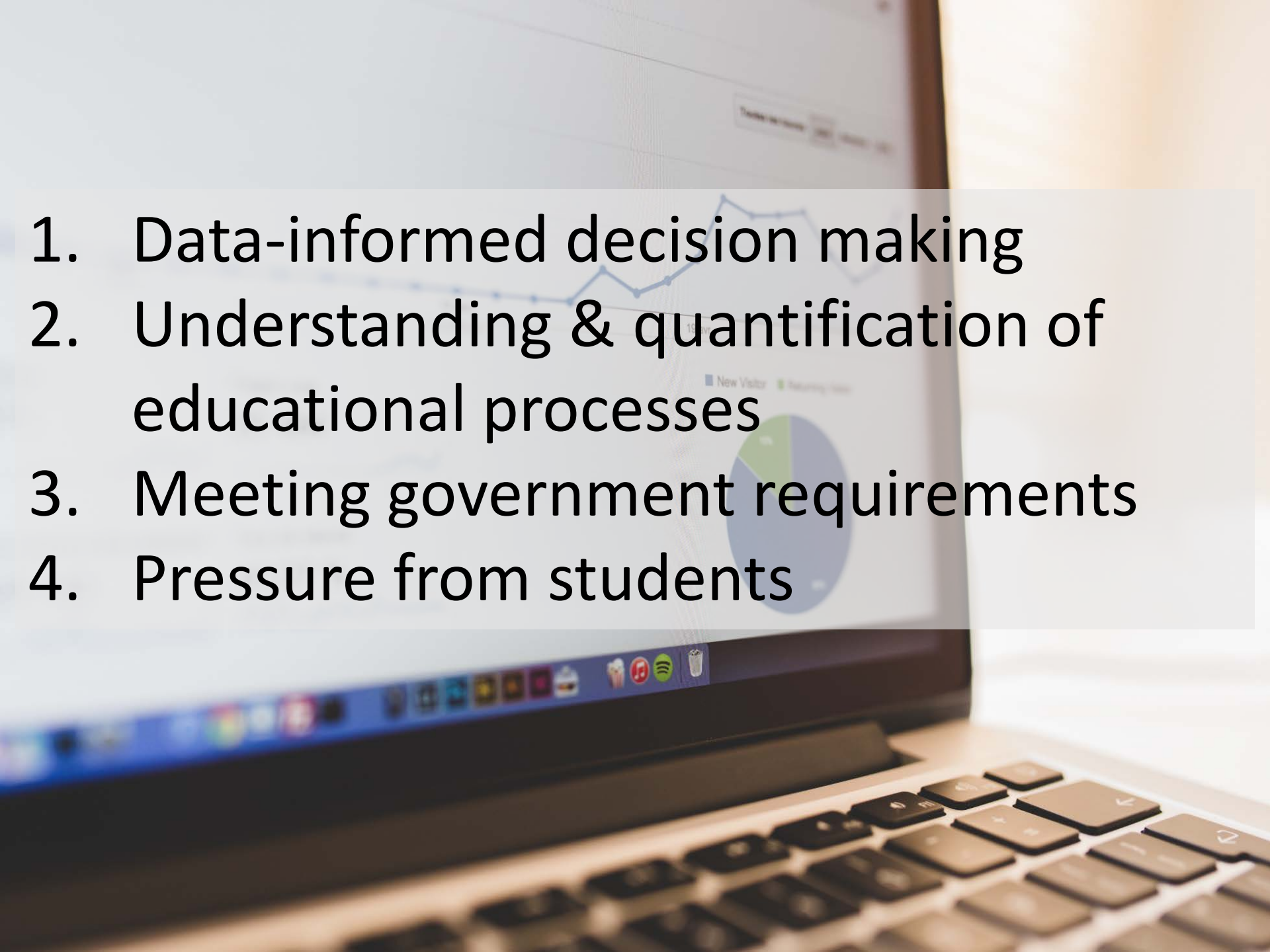
"Datasets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyse"

Manyika, J. et al., 2011, Big data: The next frontier for innovation, competition, and productivity, McKinsey Global Institute.

Learning analytics

The use of data about students and their activities to enhance education

Drivers

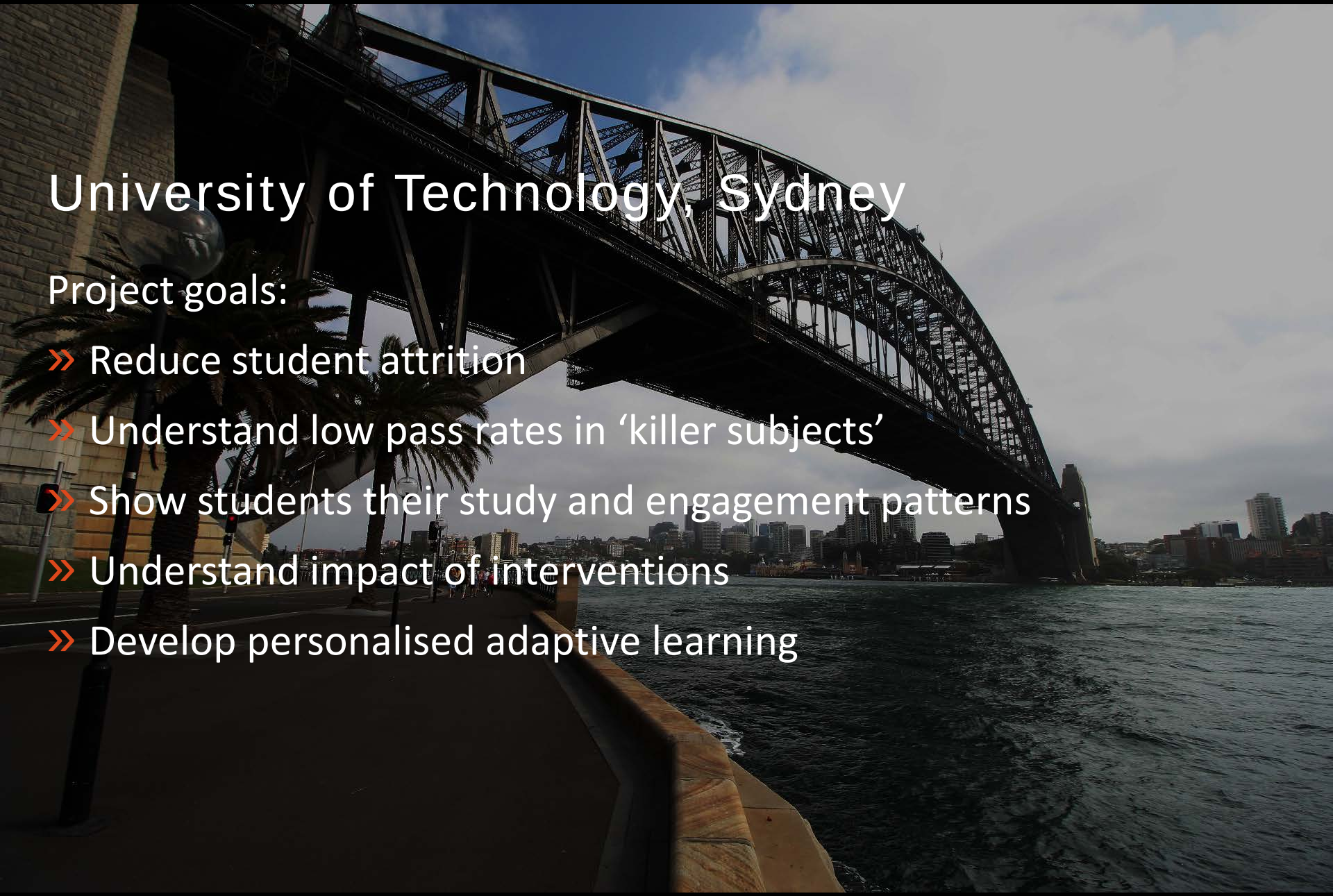


1. Data-informed decision making
2. Understanding & quantification of educational processes
3. Meeting government requirements
4. Pressure from students

Nottingham Trent University

Project goals:

- to enhance retention
- to increase a sense of belonging within the course community particularly with tutors
- to improve attainment



University of Technology, Sydney

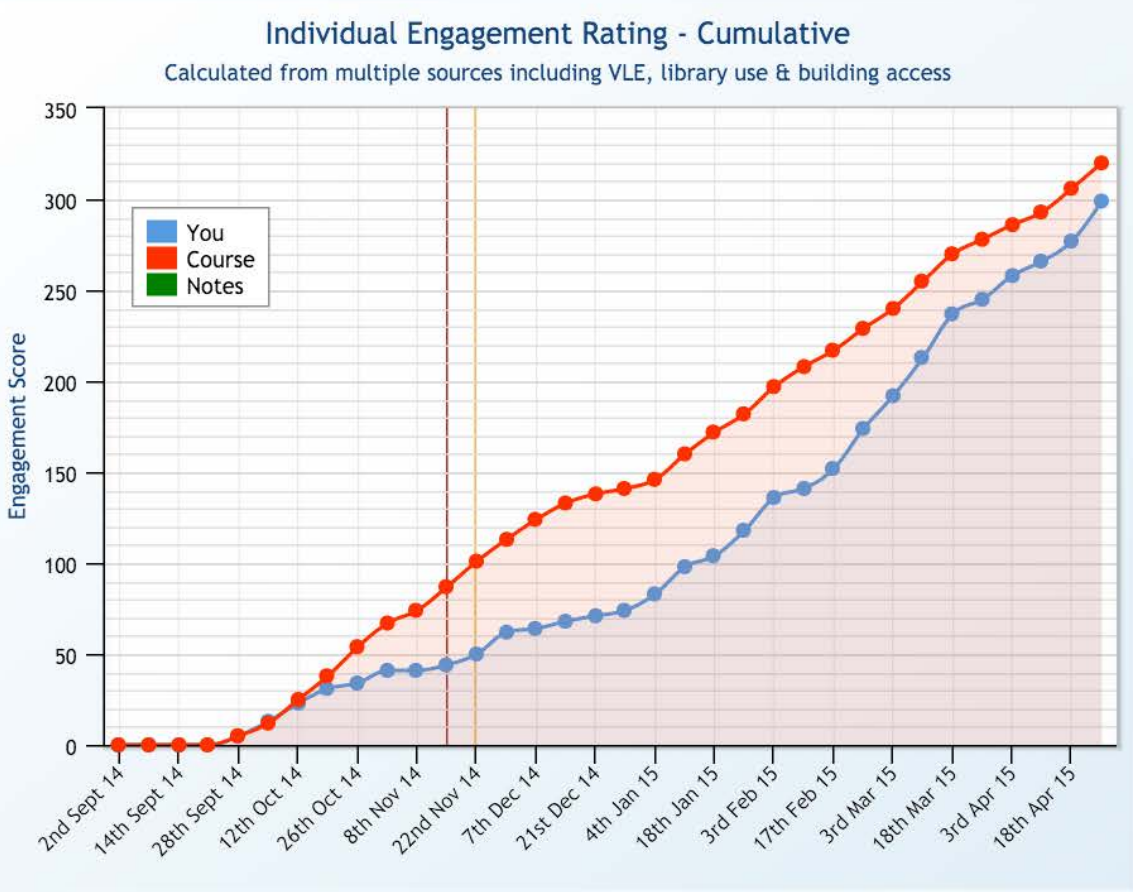
Project goals:

- Reduce student attrition
- Understand low pass rates in ‘killer subjects’
- Show students their study and engagement patterns
- Understand impact of interventions
- Develop personalised adaptive learning

Applications

1. Early alert and student success

Dakota Bergem



Dakota's current rating is

high

Dakota's current score is

315 up 28 on last week

Student detail view - DTP SolutionPath

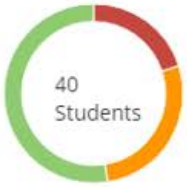
Detail	Student ID	First Name	Last Name	Home Address	Engagement Rating	Enrolment Status	Course Level	Course Year	Course	Study Mode
Detail	3242fcbe81	Sabine	Legarra	4908 Long Road Beijing	low	Enrolment	Undergraduate	1	Sociology	Full-Time
Detail	6b3a48cedf	Sheryl	Katsari	15371 Long Road Berlin	sat	Enrolment	Undergraduate	1	Sociology	Full-Time
Detail	ce92a24e45	Roldn	Berrocosa	19822 Long Road Dubai	low	Terminated	Undergraduate	1	Sociology	Full-Time
Detail	7411633792	Kimber	Banfi	13320 Long Road London	high	Enrolment	Undergraduate	1	Sociology	Full-Time
Detail	6971a16287	Sle	Godecke	7721 Long Road Dubai	good	Enrolment	Undergraduate	1	Sociology	Full-Time
Detail	eebc69cf53	Uasal	Edler	4431 Long Road Berlin	good	Enrolment	Undergraduate	1	Sociology	Full-Time
Detail	7890fbbcc9	Scott	Jashkov	4534 Long Road Madrid	good	Enrolment	Undergraduate	1	Sociology	Full-Time
Detail	b7025a8753	Laima	Feldstein	13609 Long Road Dubai	good	Enrolment	Undergraduate	1	Sociology	Full-Time
Detail	87d44b0071	Kelsey	Janka	16914 Long Road Paris	sat	Enrolment	Undergraduate	1	Sociology	Full-Time
Detail	f2b76caae2	Rachel	Nedellec	24157 Long Road Berlin	good	Enrolment	Undergraduate	1	Sociology	Full-Time

Intro to Predictive Analytics

Blackboard Predict Student Risk Reports

Probability of Student Passing This Course

Summer 2016 Week 6 5/22/16 - 8/18/16 (12 weeks)



8 High Risk **20%**

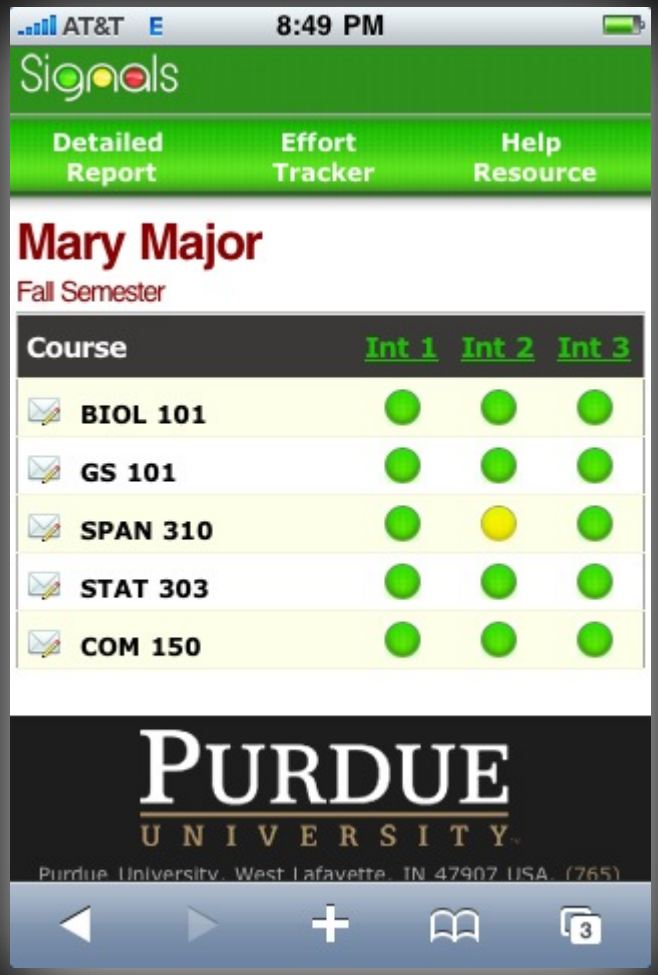
11 Medium Risk **28%**

21 Low Risk **53%**

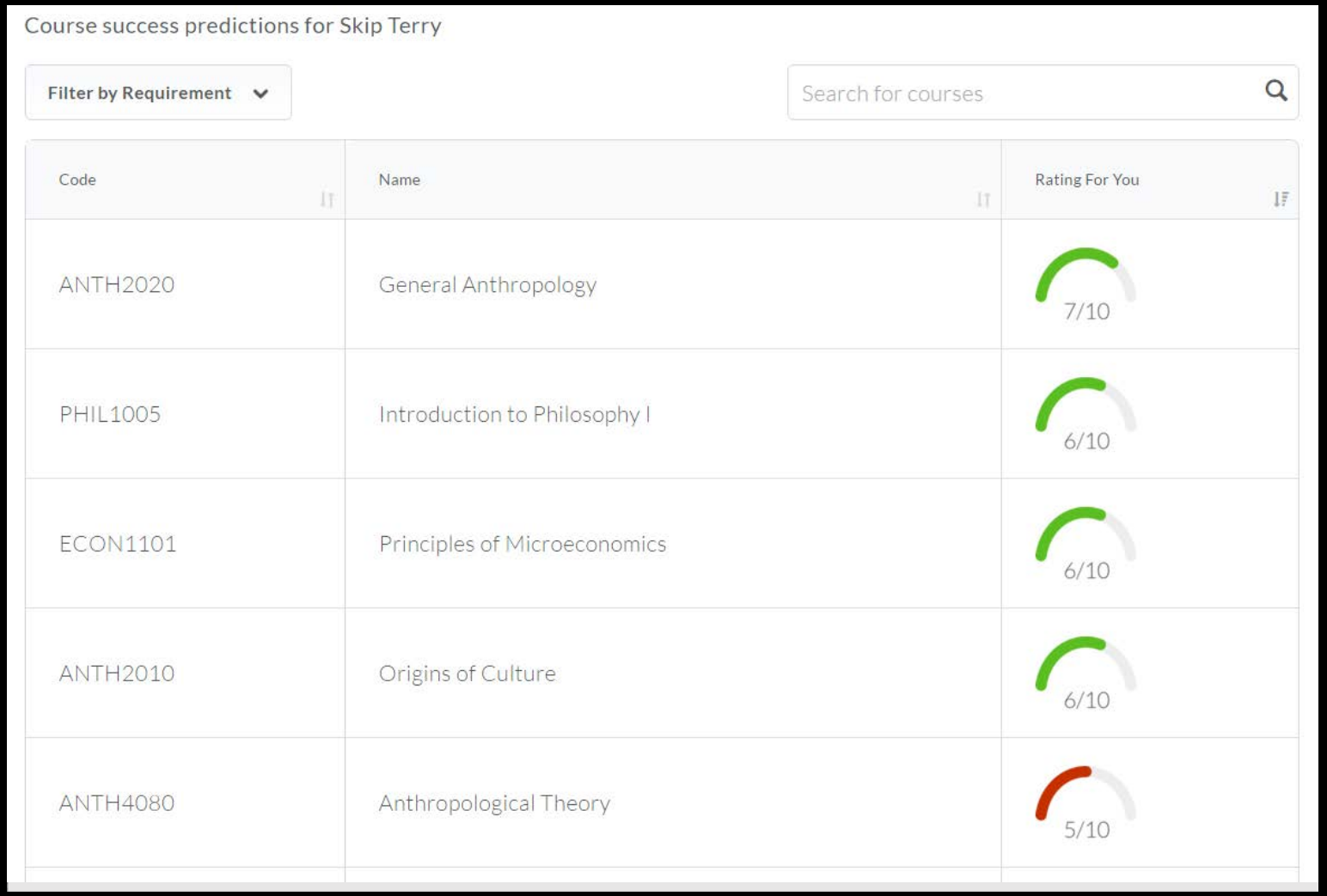
Student	Probability of Passing	Last Activity	Degree Programs	Current Grade
High Risk				
David Devereaux 10480572	0%	5 days ago	Computer Science - BS	D / 64%
Richard May 10065669	0%	5 days ago	Information Systems - BS	D / 61%
Mary Peake 10269006	13%	5 days ago	HealthAdmin & Policy Prog - BA	C / 75%
Evan McLean 10623711	14%	5 days ago	HealthAdmin & Policy Prog - BA	B / 82%
Lucas Fraser 10893133	25%	5 days ago	Information Systems - BS	F / 57%

Signals at Purdue

- Problems identified in 2nd week of semester
- Interventions include:
  - Posting signal on student's home page
  - Emailing or texting them
  - Arranging a meeting
- Courses that deploy signals see consistently better grades
- Students on Signals seek help earlier and more frequently

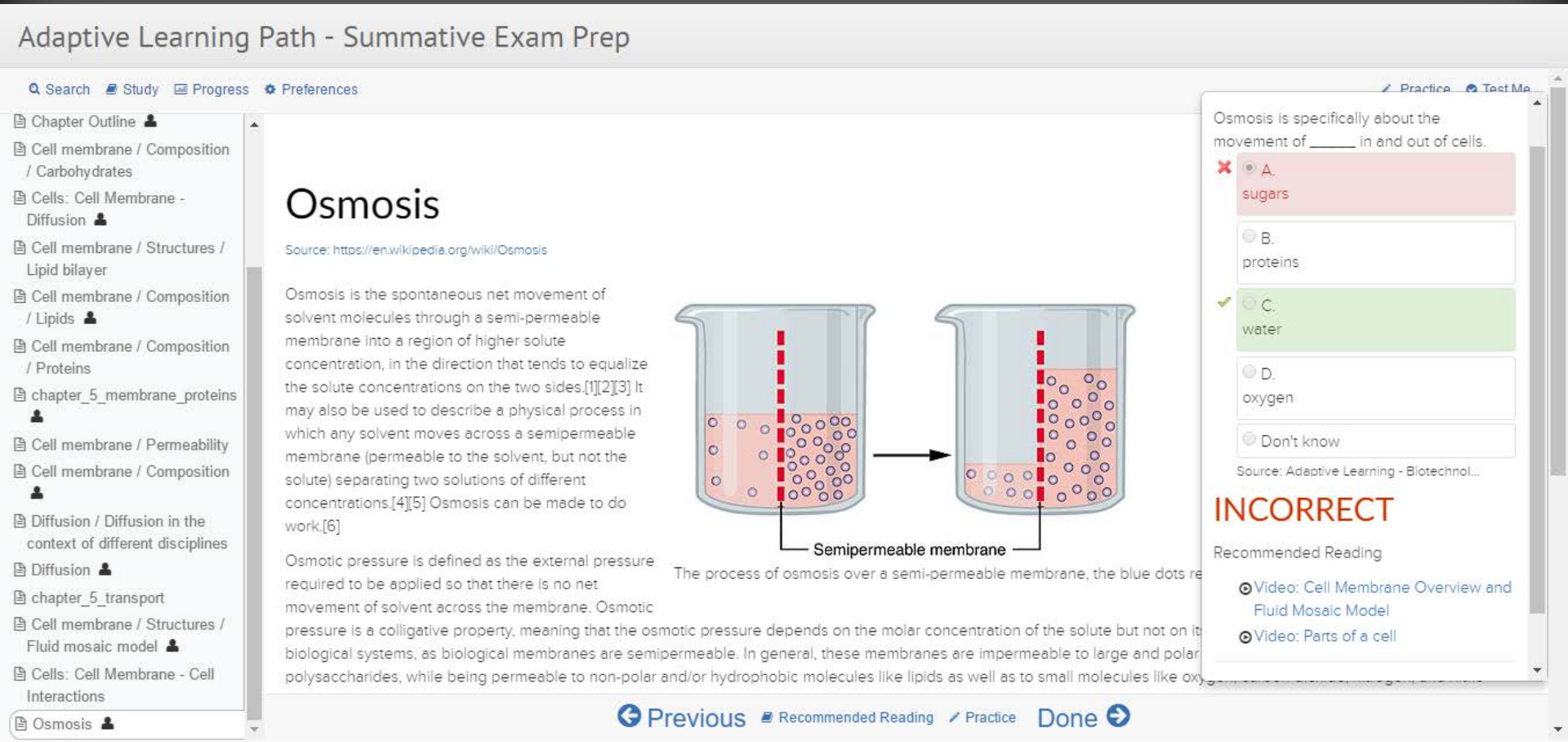


2. Course recommendation



Brightspace Degree Compass

3. Adaptive learning



LeaP Screenshot: D2L Corporation

Course Overview | Group Progress | Learner Paths

Medical Terminology Personalized Learning Course: Cardiovascular System - Advanced Path

Students Group

NVT Group

Less Filters

Concept Types: Normal, Test

Concept Status: Not reached, Understood, Skipped, Didn't Understand, Path Changed/Reset, Activities Performed

Course Completion Status

- Any status
- Students who have finished the course
- Students who haven't finished the course yet
- Students who haven't started the course yet

Inactivity

- Any status
- Students who haven't seen an activity in the last 7 days
- Students who haven't seen an activity in the last 28 days
- Students who haven't seen an activity in the last 365 days

Apply Filters

5 learners matched this criteria

Select a Learner

Stewie Griffin

Last Login : 31 Aug 2015 (30 days back)

Pathways taken in the course

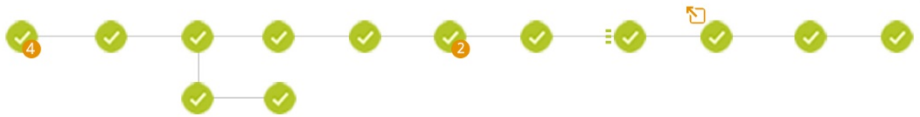
Cumulative- All Paths

Badges Earned

Actions

Rest Understanding Status

How to Use Cogbooks
Completed
6 concepts understood
2 tests skipped
1 concept not understood



Cardiovascular Capstone Definitions
Completed

Cardiovascular Reference Material
Completed
6 concepts understood
2 tests skipped
1 concept not understood

Cardiovascular Capstone Definitions
Completed

Cardiovascular Reference Material
Completed

Course Overview | Group Progress | Learner Paths

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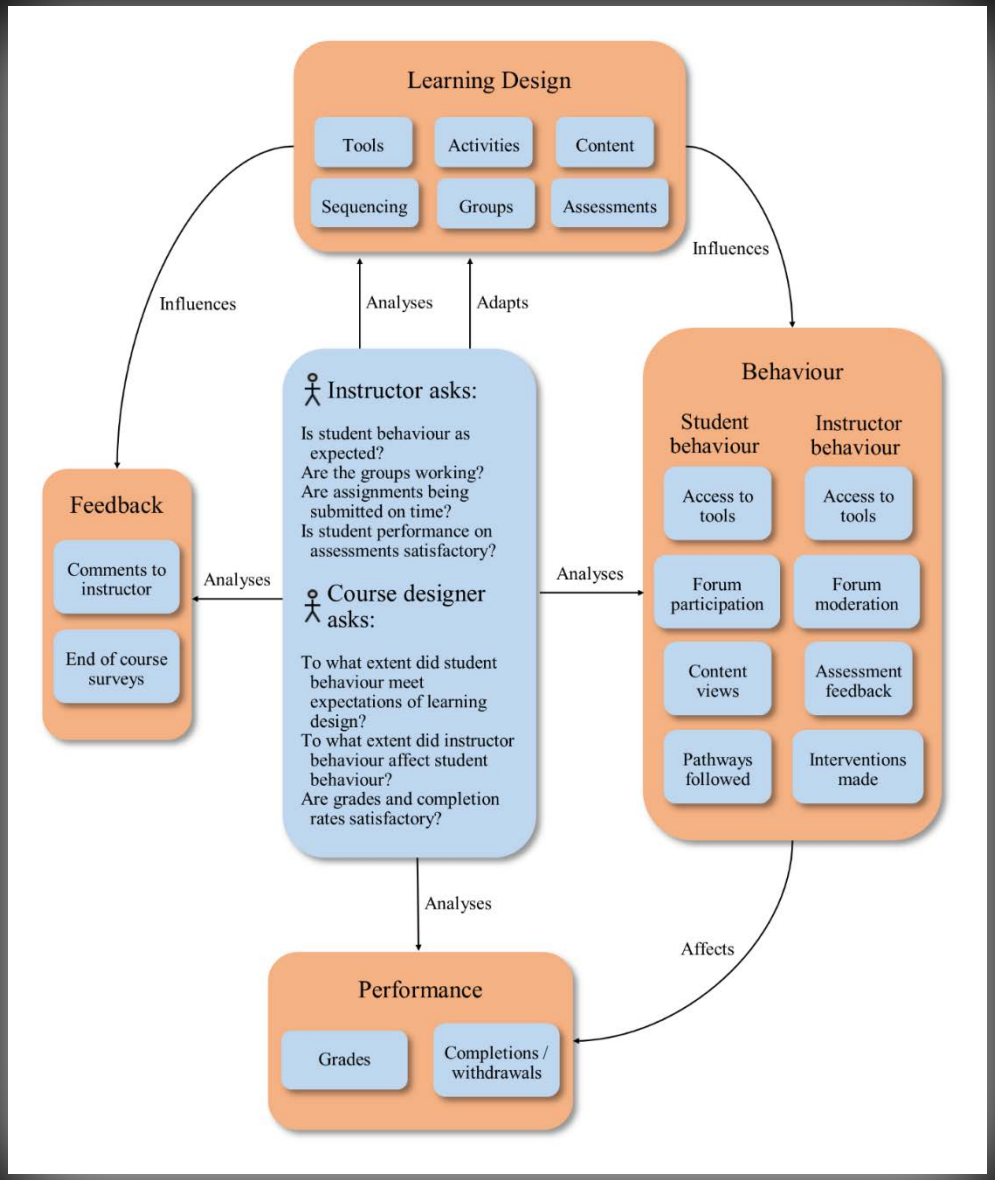
Cardiovascular Capstone Definitions
Completed

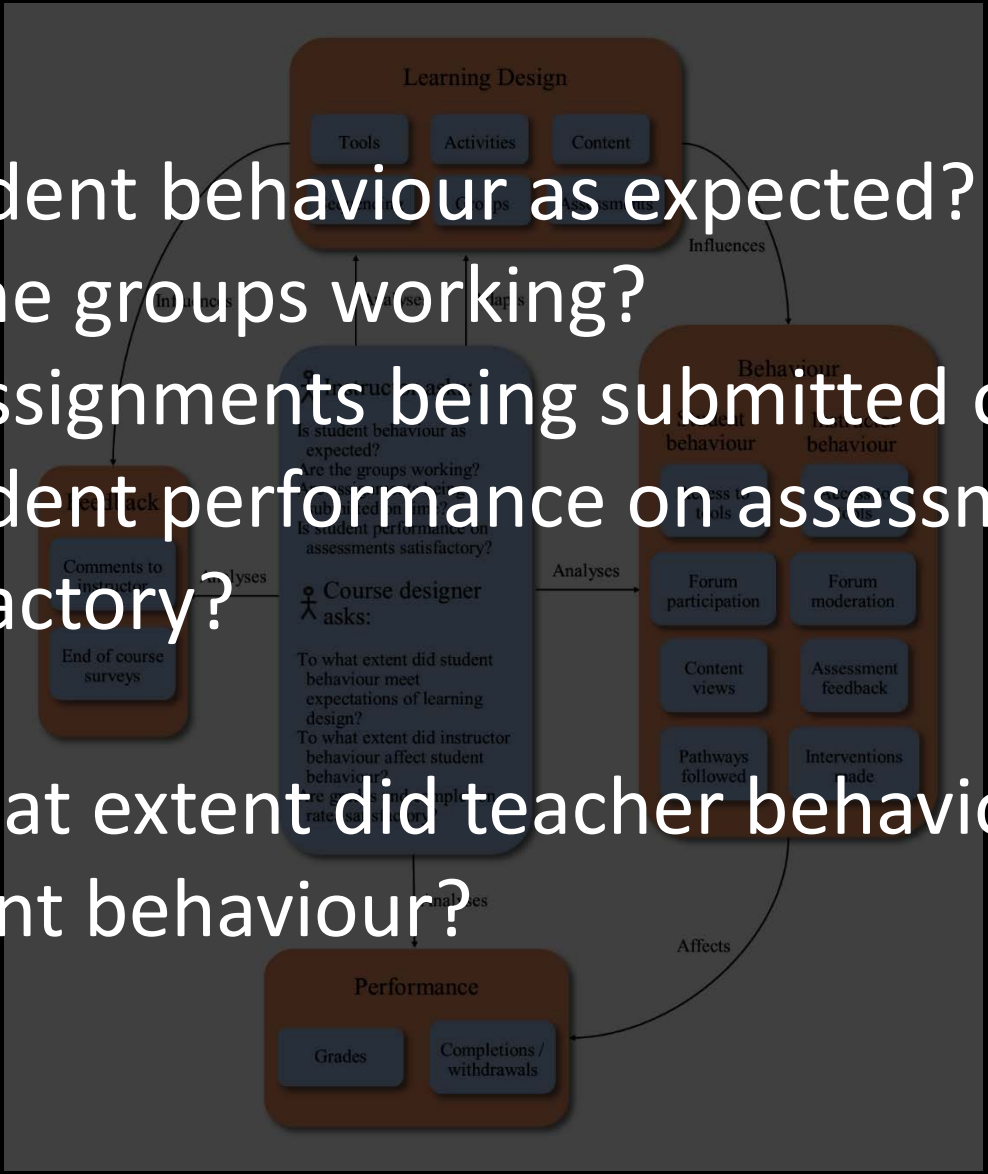
Cardiovascular Reference Material
Completed

4. Curriculum design



Is student behaviour as expected?
Are the groups working?
Are assignments being submitted on time?
Is student performance on assessments satisfactory?

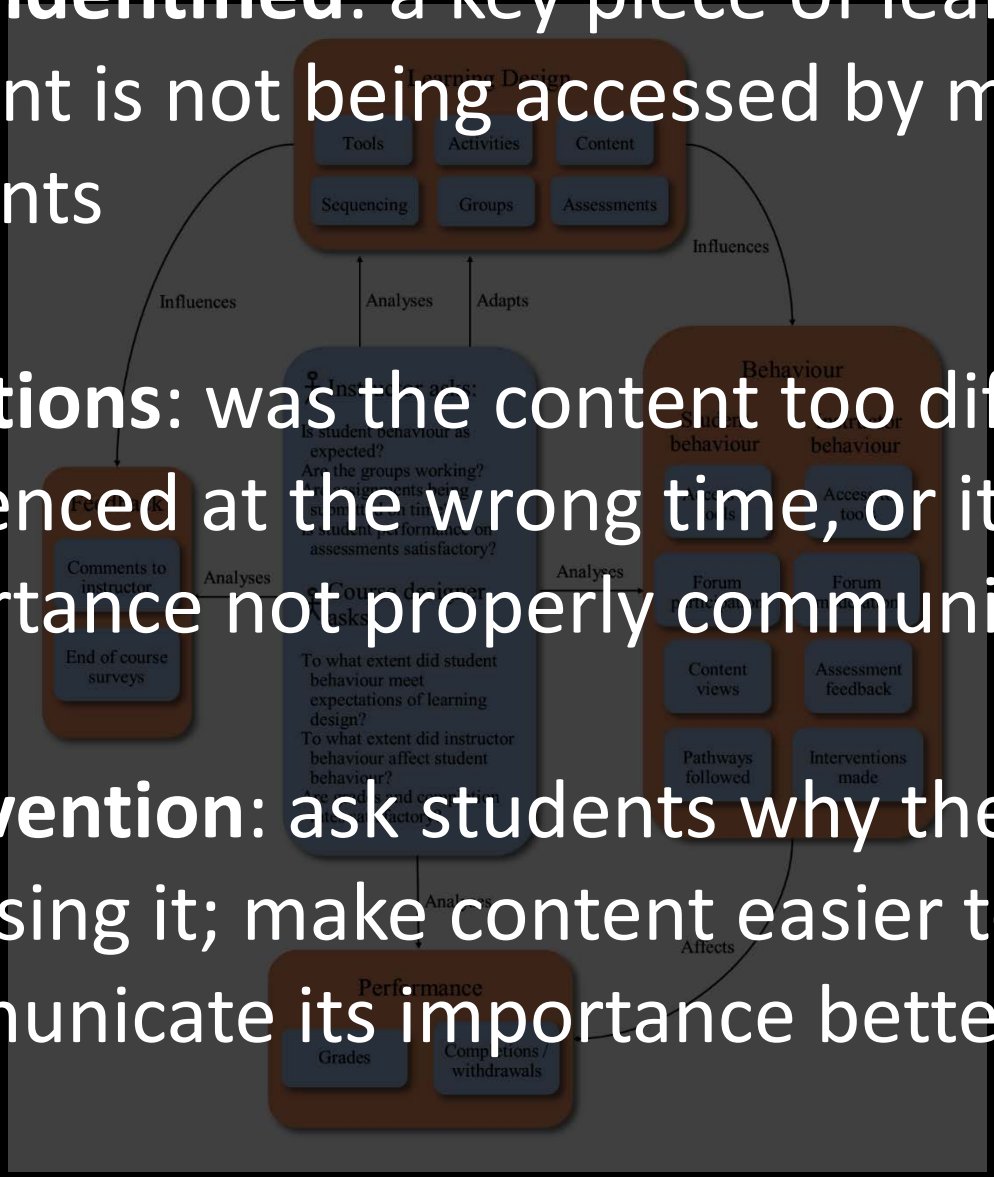
To what extent did teacher behaviour affect student behaviour?



Issue identified: a key piece of learning content is not being accessed by most students

Questions: was the content too difficult, sequenced at the wrong time, or its importance not properly communicated?

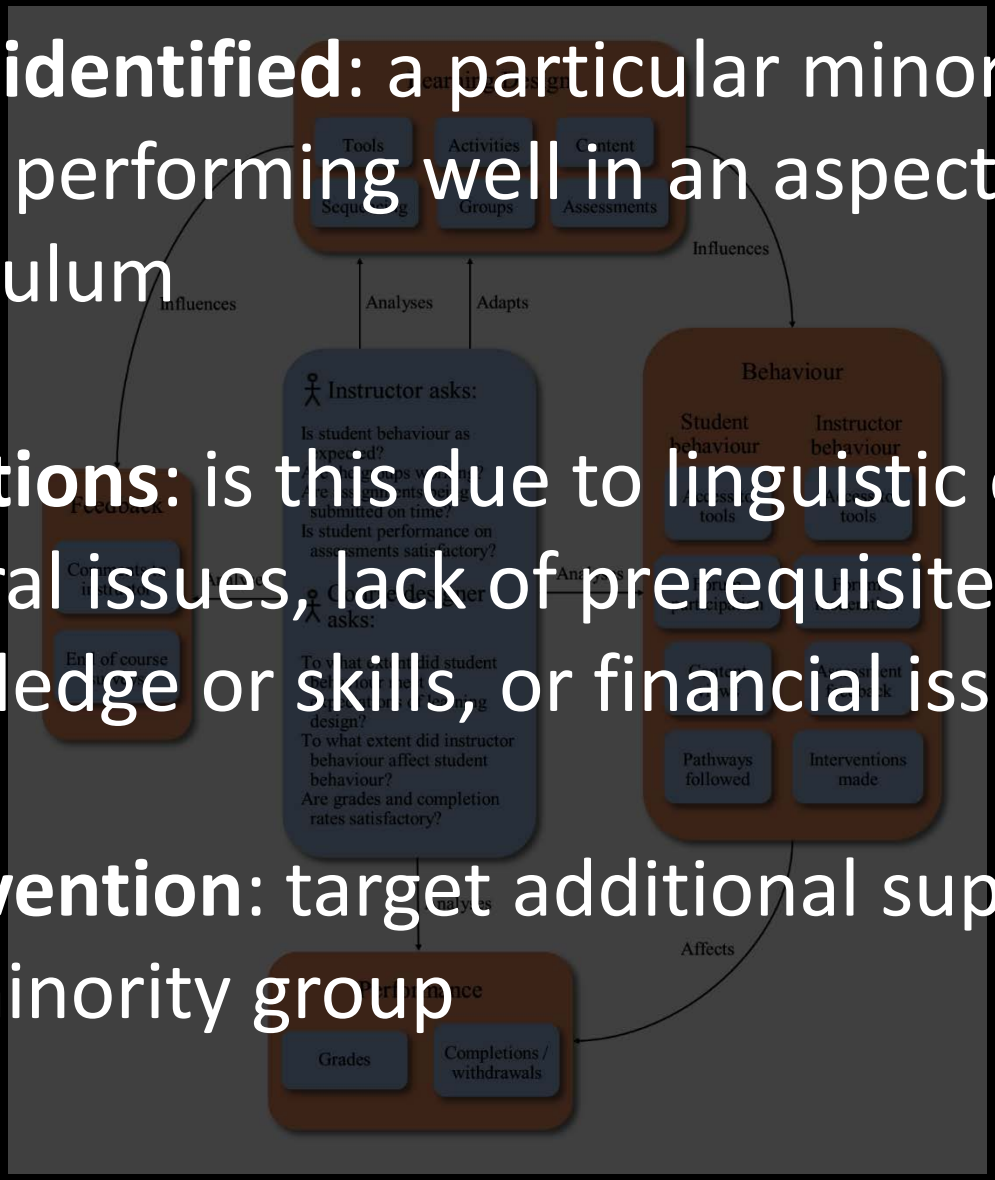
Intervention: ask students why they're not accessing it; make content easier to find; communicate its importance better



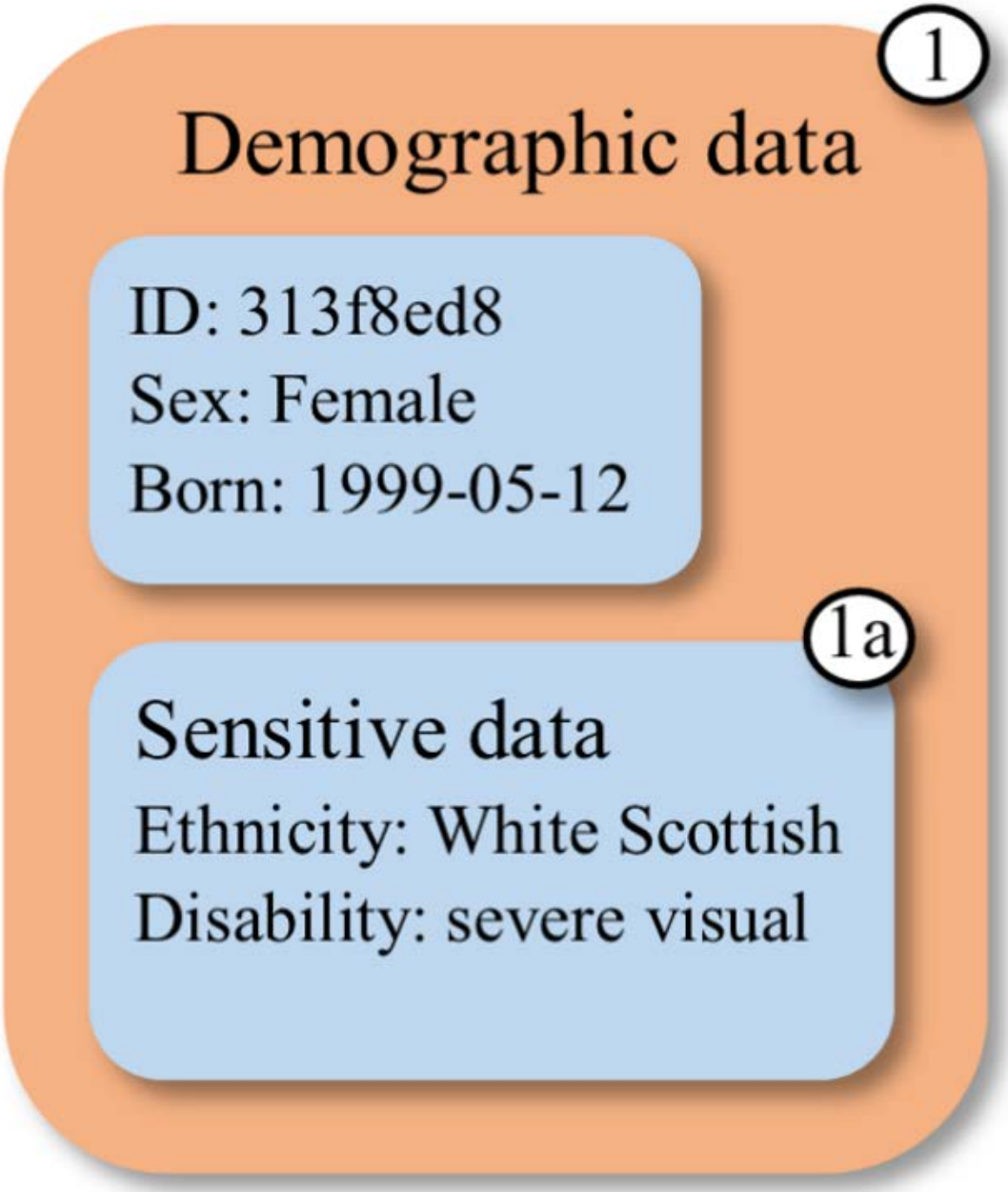
Issue identified: a particular minority group is not performing well in an aspect of the curriculum

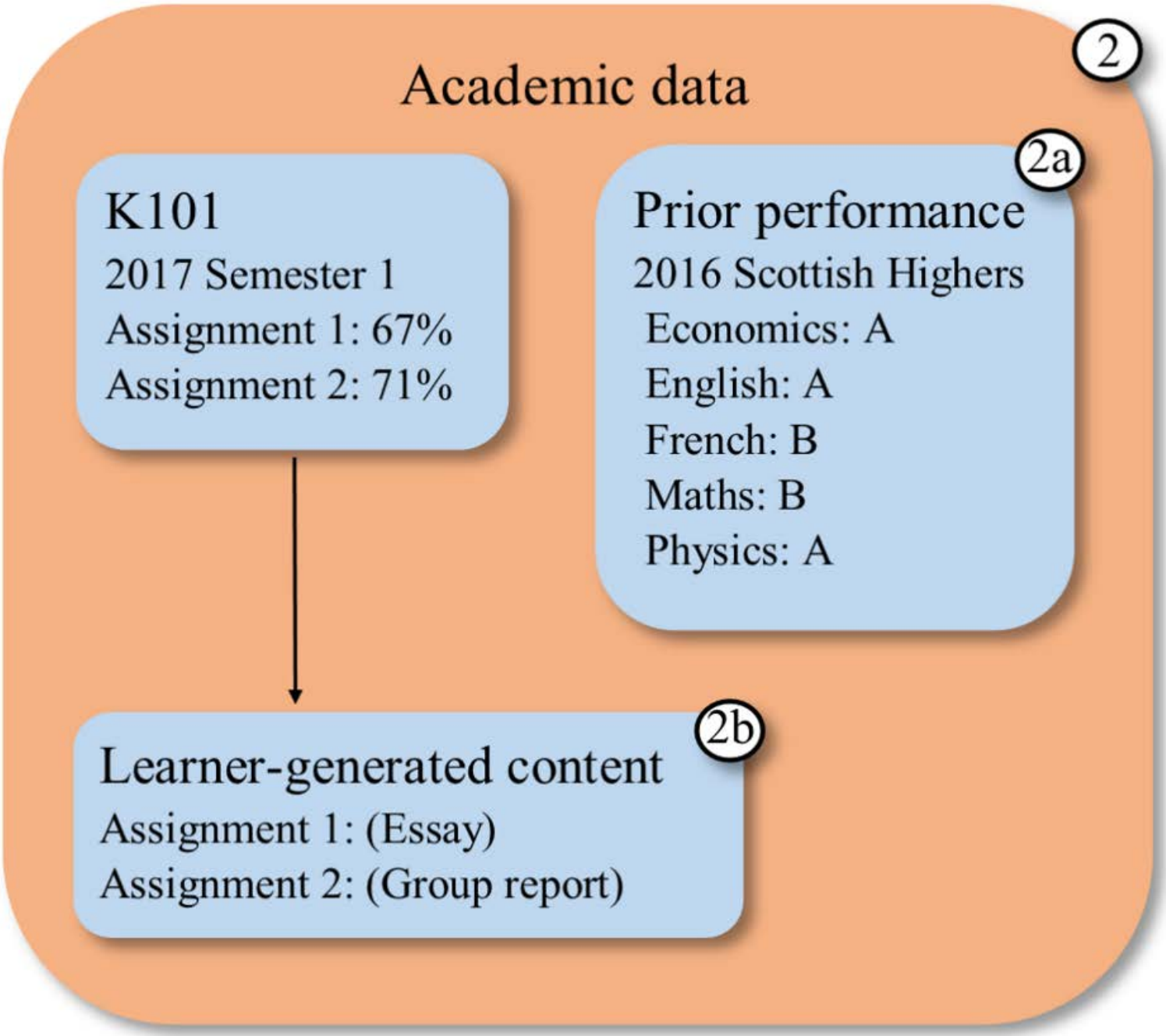
Questions: is this due to linguistic or cultural issues, lack of prerequisite knowledge or skills, or financial issues?

Intervention: target additional support at the minority group



Data


1
Demographic data
ID: 313f8ed8
Sex: Female
Born: 1999-05-12
1a
Sensitive data
Ethnicity: White Scottish
Disability: severe visual


2
Academic data
2a
K101
2017 Semester 1
Assignment 1: 67%
Assignment 2: 71%
Prior performance
2016 Scottish Highers
Economics: A
English: A
French: B
Maths: B
Physics: A
2b
Learner-generated content
Assignment 1: (Essay)
Assignment 2: (Group report)

Learning activity data

2016-02-01-12-45 left library
2016-02-01-12-44 borrowed ISBN 0224097377
2016-02-01-12-35 accessed library catalogue
2016-02-01-12-33 logged onto Wi-Fi in library
2016-02-01-12-27 entered library
2016-02-01-12-05 commented on blog post id 973948
2016-02-01-11-47 logged into LMS

4

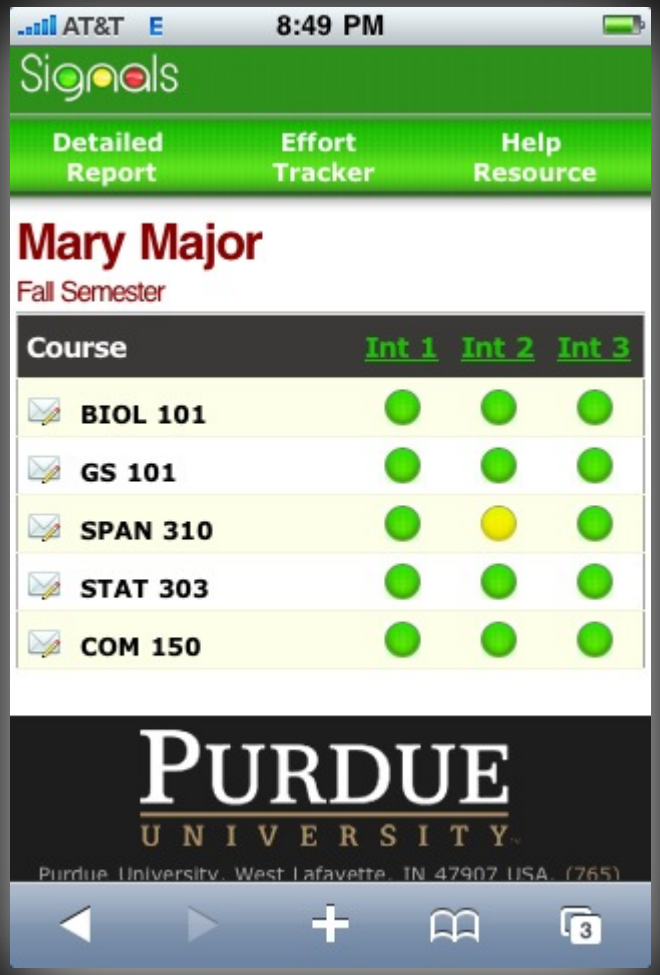
Educational context data

K101
Start date: 2017-10-01
Duration: 15 weeks
Instructor: K. McDonald
Assignment 1
Type: Essay
Due: 2017-10-27

Metrics

Signals at Purdue

- Performance
- Effort
- Prior academic history
- Student characteristics



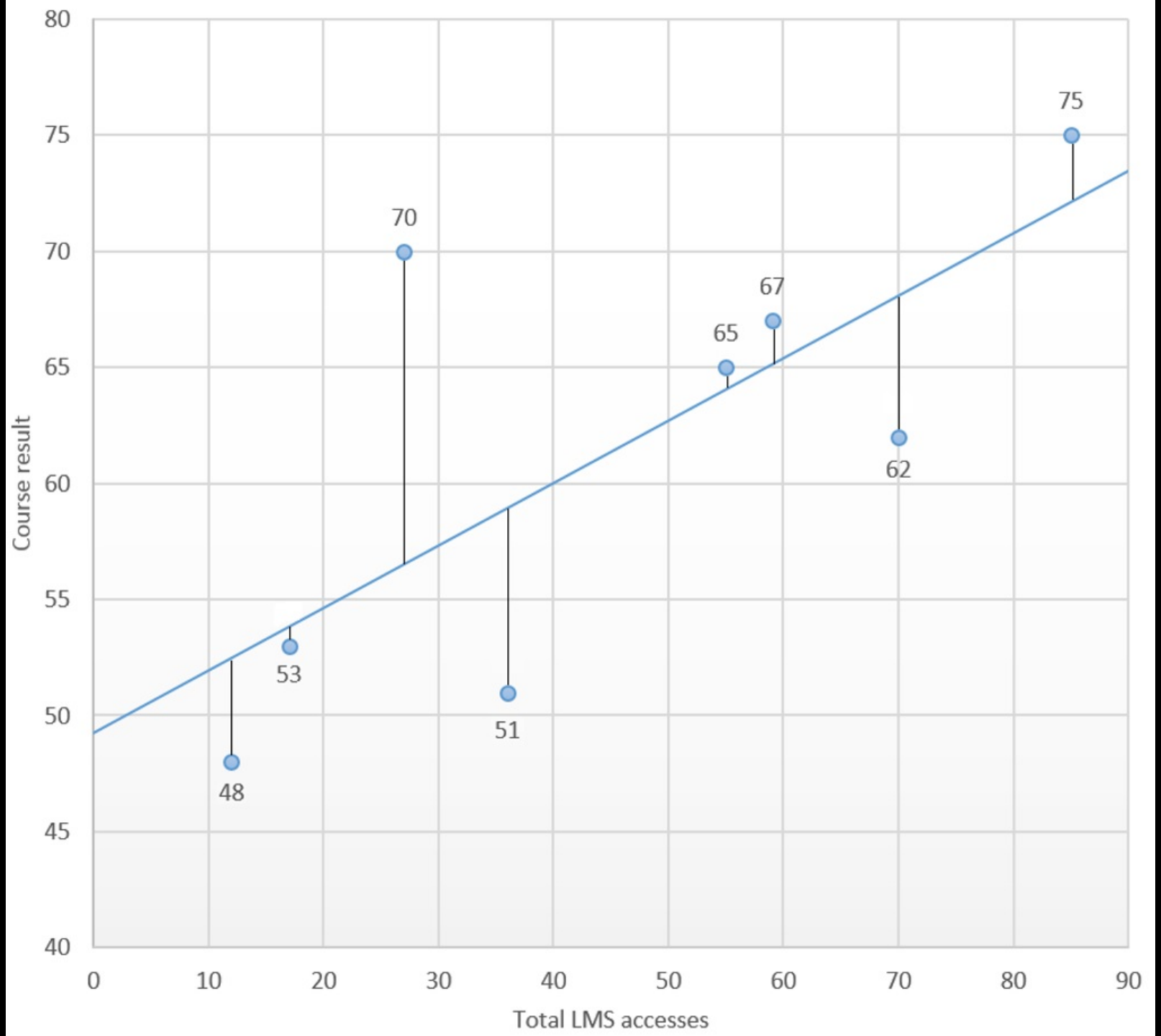
Composite metrics

- use of library
- attendance
- VLE engagement

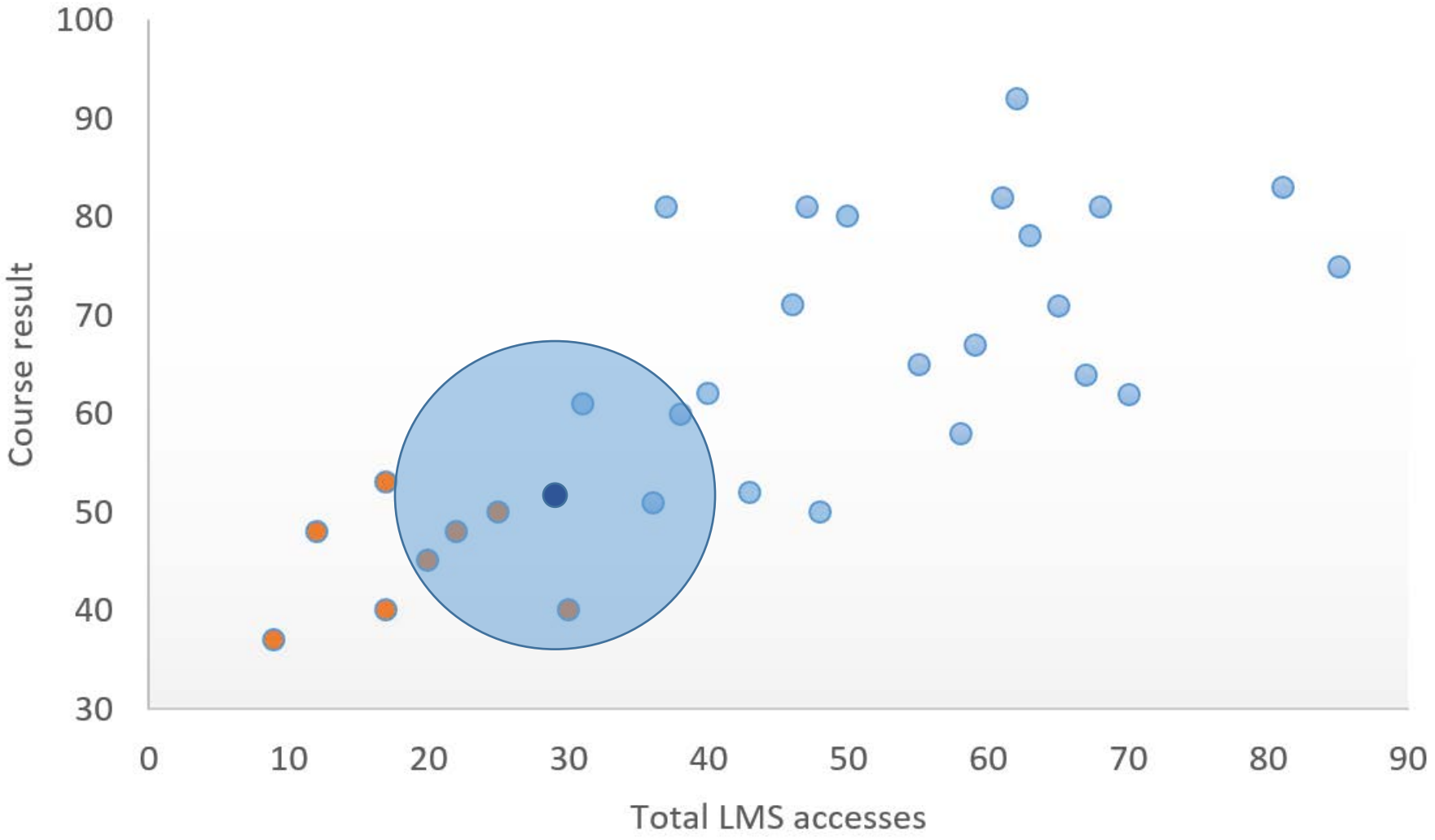
Predictive modelling

Linear regression

Student	LMS accesses (x)	Result (%) (y)
1	27	70
2	70	62
3	36	51
4	85	75
5	17	53
6	55	65
7	12	48
8	59	67

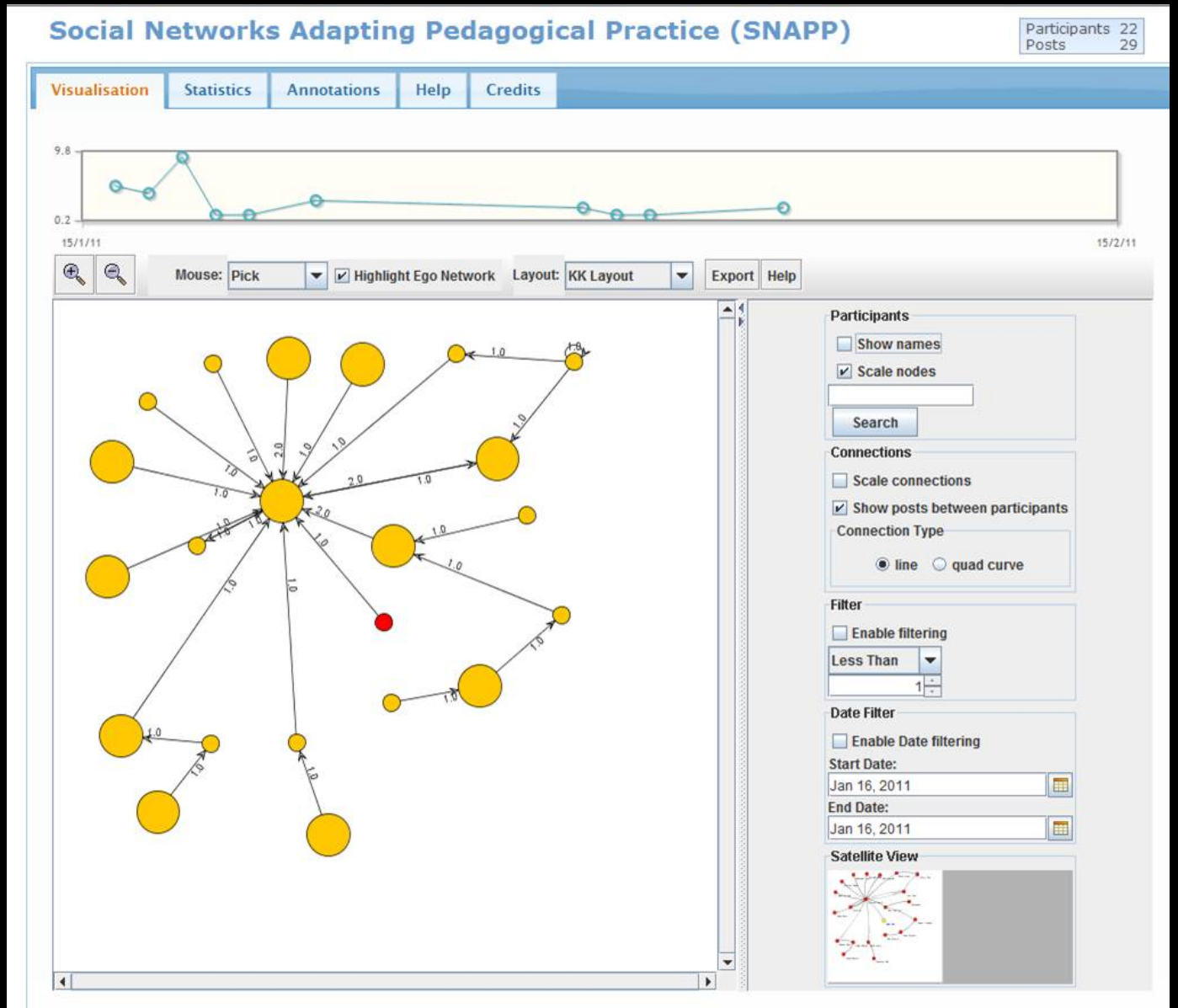

80
75
70
65
60
55
50
45
40
Course result
0
10
20
30
40
50
60
70
80
90
Total LMS accesses
75
70
67
65
62
53
51
48

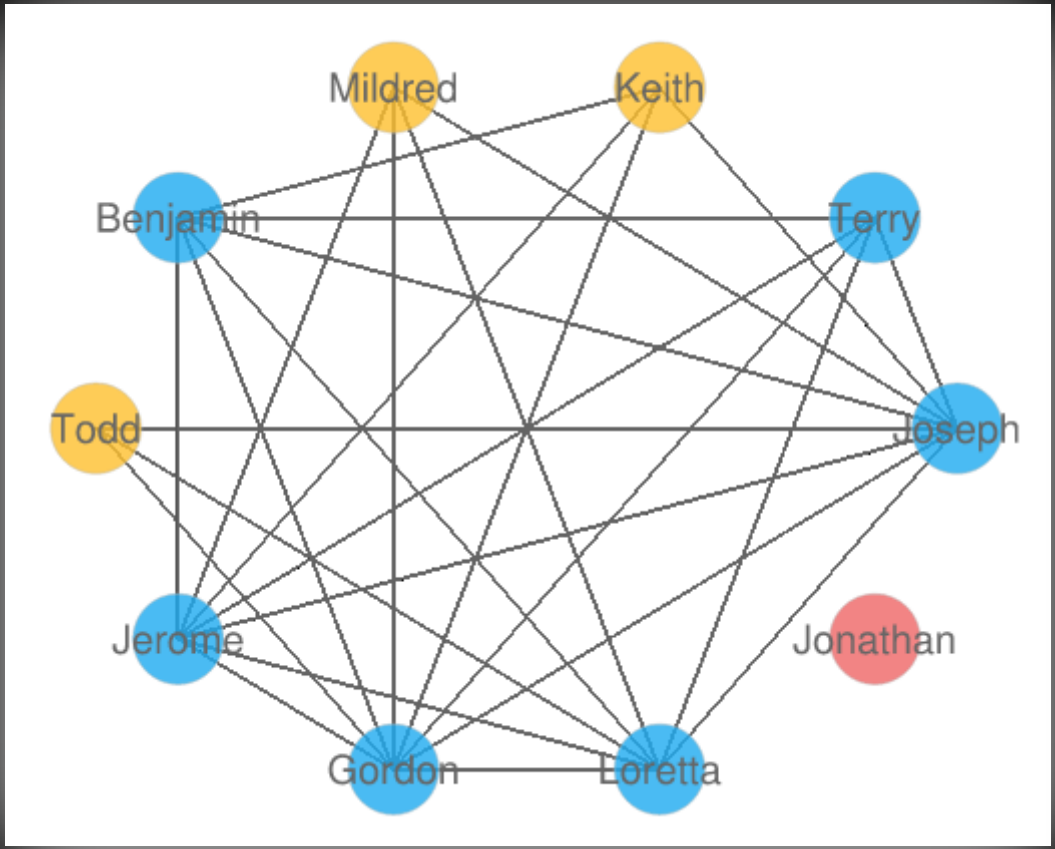
Naïve Bayes


100
90
80
70
60
50
40
30
Course result
0
10
20
30
40
50
60
70
80
90
Total LMS accesses

Techniques

Social network analysis





Interaction analysis – Blackboard X-Ray Learning Analytics

Sentiment and emotion analytics

Appreciation, Delight, Desire, Disappointment, Dislike, Emphatics, Enjoyment, Excitement, Fear, Frustration, Happiness, Hope, Humour, Irony / sarcasm, Like, Passion, Preference, Pride, Surprise, Thankfulness, Unhappiness, Wonder and Yearning.

Cleveland-Innes, M., 2012, Emotional presence, learning and the online learning environment, IRRODL: The International Review of Research in Open and Distributed Learning, 13(4), pp. 269-292.

Applications

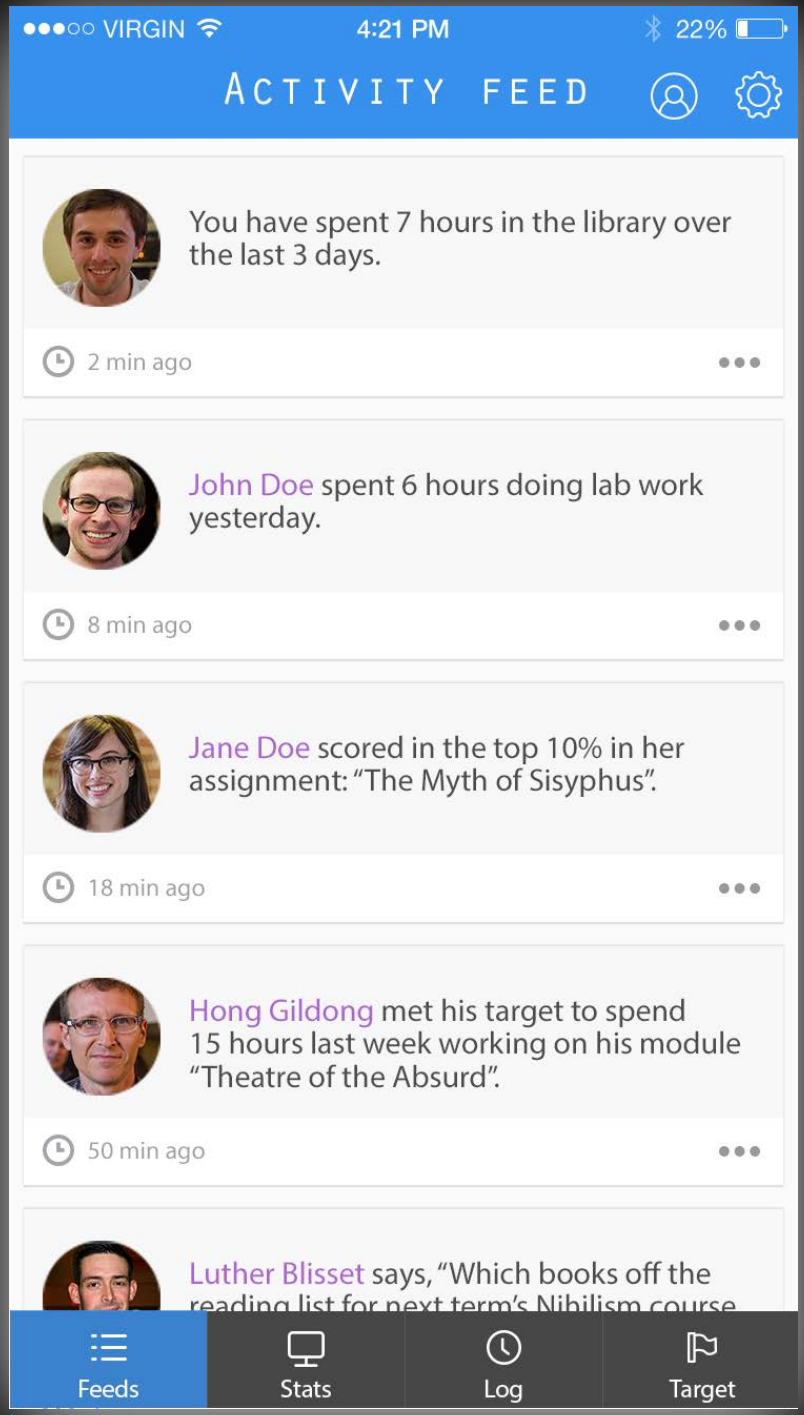
1. Early alert
2. Course recommendation
3. Adaptive learning
4. Curriculum design

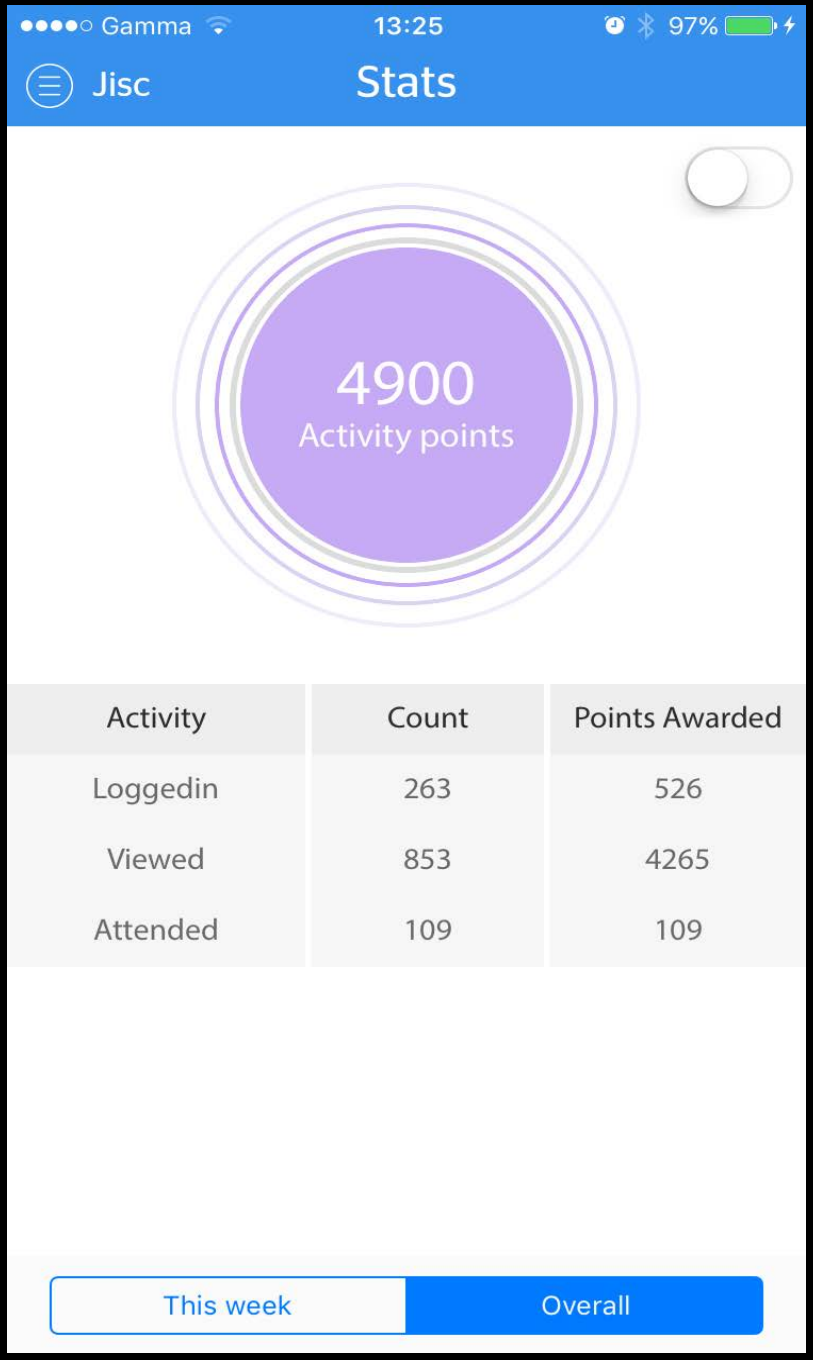
Techniques

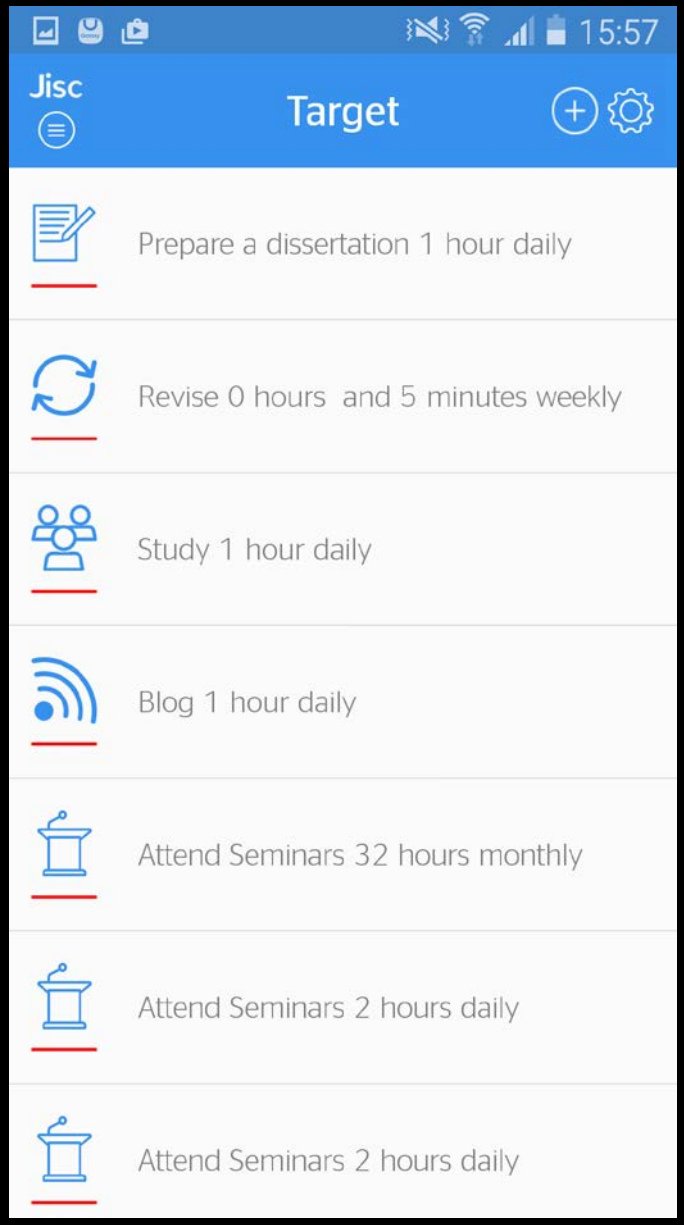
- Predictive analytics
- Social network analysis
- Discourse analytics
- Sentiment & emotion analytics
- Textual analytics

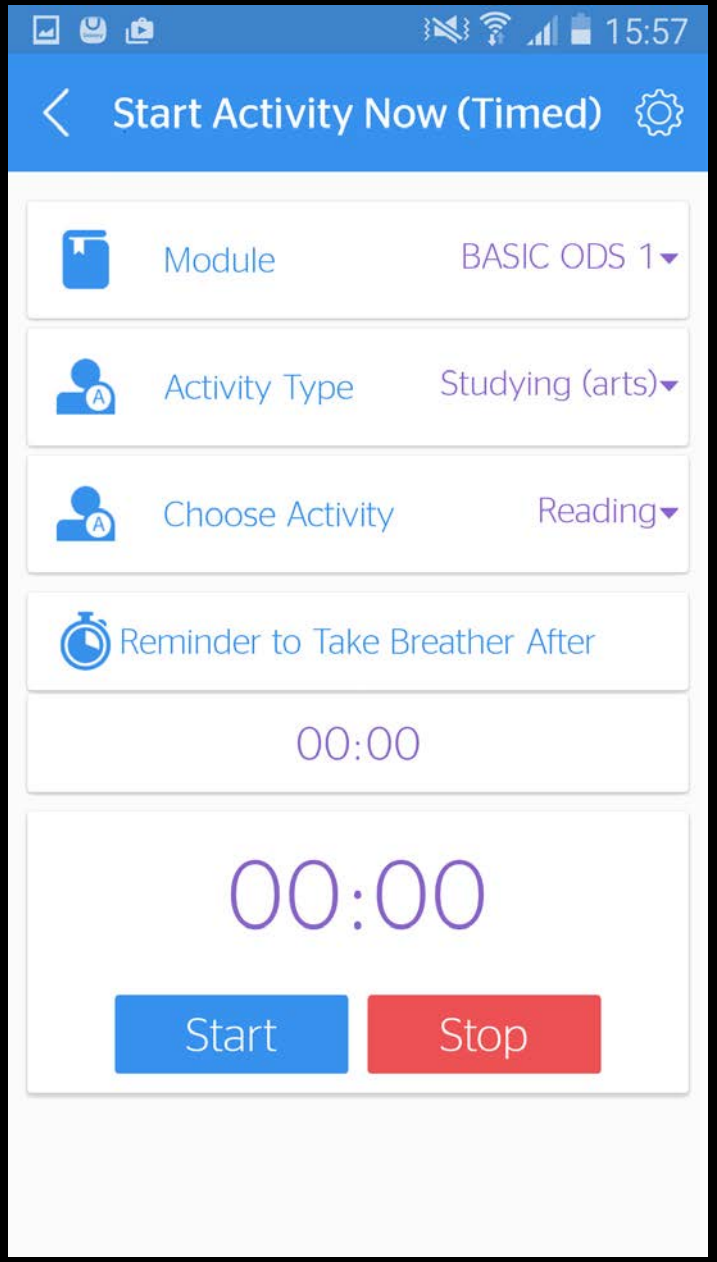
Student-facing analytics

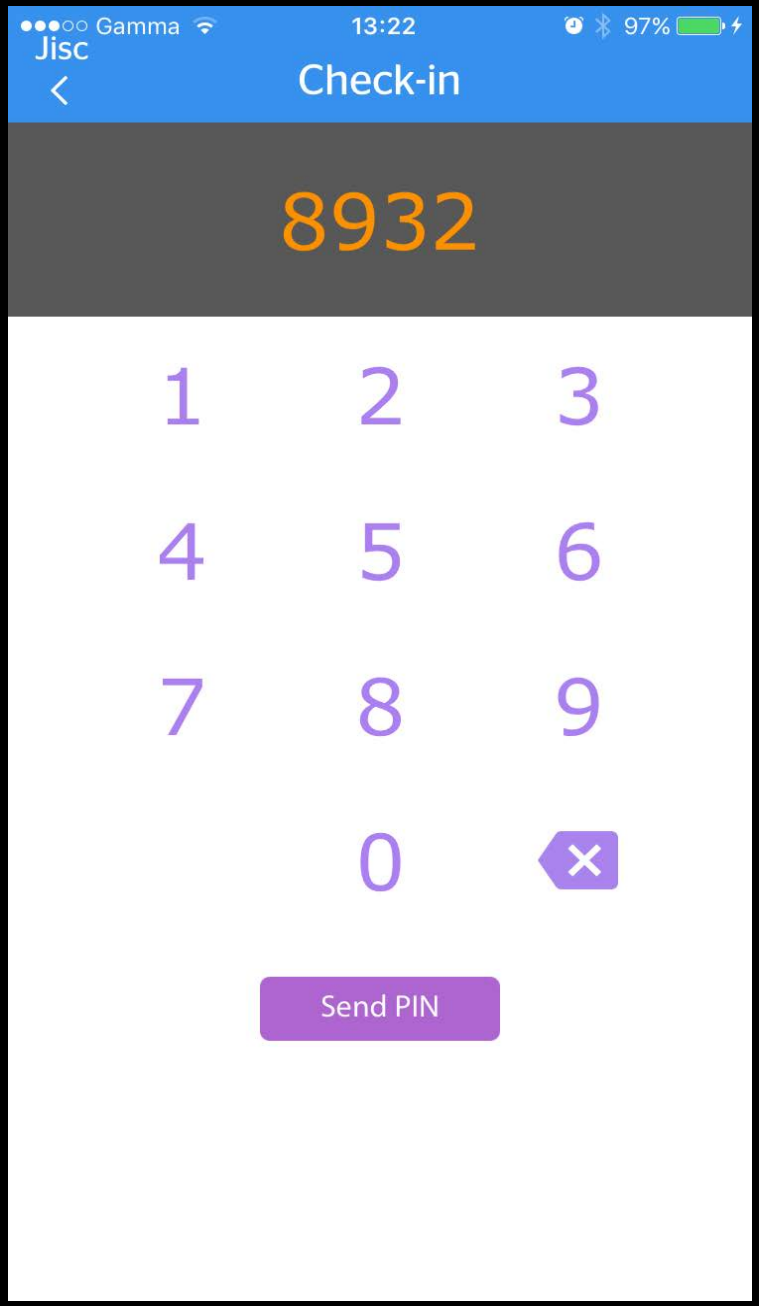
Comparative – social – gameified – private by default – usable standalone - uncluttered


VIRGIN
4:21 PM
22%
ACTIVITY FEED
You have spent 7 hours in the library over the last 3 days.
2 min ago
John Doe spent 6 hours doing lab work yesterday.
8 min ago
Jane Doe scored in the top 10% in her assignment: "The Myth of Sisyphus".
18 min ago
Hong Gildong met his target to spend 15 hours last week working on his module "Theatre of the Absurd".
50 min ago
Luther Blisset says, "Which books off the
Feeds
Stats
Log
Target


Gamma
13:25
97%
Jisc
Stats
4900
Activity points
Activity
Count
Points Awarded
Loggedin
263
526
Viewed
853
4265
Attended
109
109
This week
Overall


15:57
Jisc
Target
Prepare a dissertation 1 hour daily
Revise 0 hours and 5 minutes weekly
Study 1 hour daily
Blog 1 hour daily
Attend Seminars 32 hours monthly
Attend Seminars 2 hours daily
Attend Seminars 2 hours daily


15:57
Start Activity Now (Timed)
Module
BASIC ODS 1
Activity Type
Studying (arts)
Choose Activity
Reading
Reminder to Take Breather After
00:00
00:00
Start
Stop


Gamma
13:22
97%
Jisc
Check-in
8932
1
2
3
4
5
6
7
8
9
0
Send PIN

Ethical and legal issues

Technology

Privacy Fears Over Student Data Tracking Lead to InBloom's Shutdown

By Olga Kharif | May 01, 2014

Photo illustration by 731; Photograph by Getty Images

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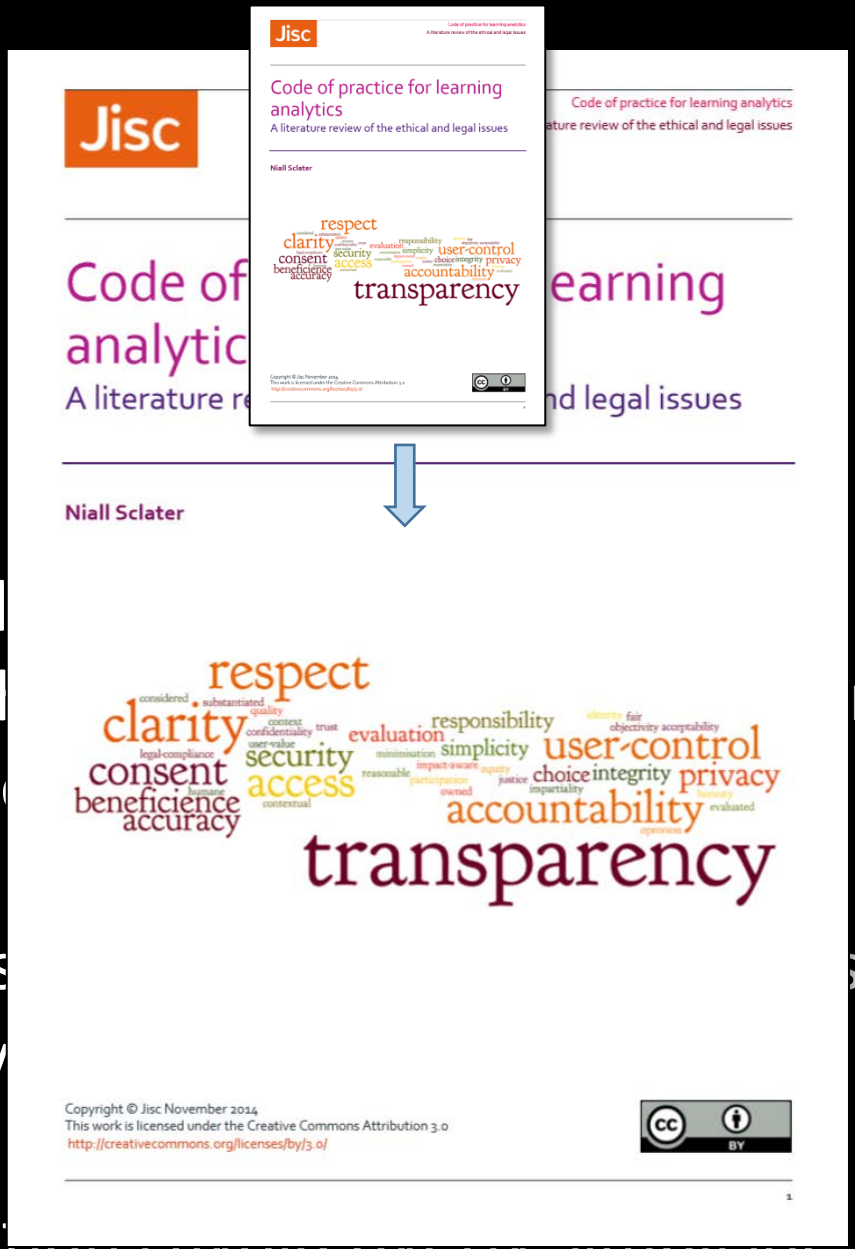
Denied Tenure, Professors Sue Over Discrimination

The Nine Worst Questions Your Parents Will Ask You This Week, and the Data You Need to Answer Them

Tim Cook Speaks Up

Companies Mentioned

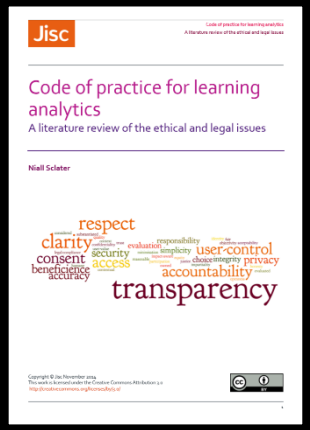
APO (Apollo Global Management LLC)
$23.24 USD 0.12 0.52%



If a student is al lection and analysis could tl n their academic progr

What should a s s are in conflict with their study

How can institutions avoid overly simplistic metrics and decision making which ignore personal circumstances?

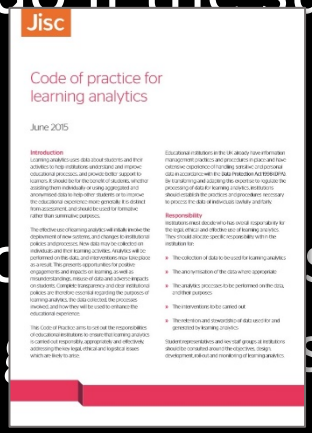


86 issues in 9 groups

Group	Name	Question	Main type	Importance	Responsibility
2 Consent	Adverse impact of opting out on individual	If a student is allowed to opt out of data collection and analysis could this have a negative impact on their academic progress?	Ethical	1	Analytics Committee
7 Action	Conflict with study goals	What should a student do if the suggestions are in conflict with their study goals?	Ethical	3	Student
8 Adverse impact	Oversimplification	How can institutions avoid overly simplistic metrics and decision making which ignore personal circumstances?	Ethical	1	Educational researcher

What should a student do if the suggestions are in conflict with their study goals?

How can institutions avo simplistic metrics and decision making which i sonal circumstances?



Group	Name	mportance	Responsibility
2 Consent	Adverse impact out on individu	1	Analytics Committee
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8 Adverse impact	Oversimplificati	1	Educational researcher

Jisc

Code of practice for learning analytics

June 2015

Introduction

Learning analytics uses data about students and their activities to help institutions understand and improve educational processes, and provide better support to learners. It should be for the benefit of students, whether assisting them individually or using aggregated and anonymised data to help other students or to improve the educational experience more generally. It is distinct from assessment, and should be used for formative rather than summative purposes.

The effective use of learning analytics will initially involve the deployment of new systems, and changes to institutional policies and processes. New data may be collected on individuals and their learning activities. Analytics will be performed on this data, and interventions may take place as a result. This presents opportunities for positive engagements and impacts on learning, as well as misunderstandings, misuse of data and adverse impacts on students. Complete transparency and clear institutional policies are therefore essential regarding the purposes of learning analytics, the data collected, the processes involved, and how they will be used to enhance the educational experience.

This Code of Practice aims to set out the responsibilities of educational institutions to ensure that learning analytics is carried out responsibly, appropriately and effectively, addressing the key legal, ethical and logistical issues which are likely to arise.

Educational institutions in the UK already have information management practices and procedures in place and have extensive experience of handling sensitive and personal data in accordance with the **Data Protection Act 1998 (DPA)**. By transferring and adapting this expertise to regulate the processing of data for learning analytics, institutions should establish the practices and procedures necessary to process the data of individuals lawfully and fairly.

Responsibility

Institutions must decide who has overall responsibility for the legal, ethical and effective use of learning analytics. They should allocate specific responsibility within the institution for:

- The collection of data to be used for learning analytics
- The anonymisation of the data where appropriate
- The analytics processes to be performed on the data, and their purposes
- The interventions to be carried out
- The retention and stewardship of data used for and generated by learning analytics

Student representatives and key staff groups at institutions should be consulted around the objectives, design, development, roll-out and monitoring of learning analytics.

jisc.ac.uk/guides/code-of-practice-for-learning-analytics

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Code of practice for learning analytics

A literature review of the ethical and legal issues

Niall Sclater

Jisc

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June 2015

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The effective use of learning analytics will initially involve the deployment of new systems, and changes to institutional policies and processes. New data may be collected on individuals and their learning activities. Analytics will be performed on this data, and interventions may take place as a result. This presents opportunities for positive engagements and impacts on learning, as well as misunderstandings, misuse of data and adverse impacts on students. Complete transparency and clear institutional policies are therefore essential regarding the purposes of learning analytics, the data collected, the processes involved, and how they will be used to enhance the educational experience.

This Code of Practice aims to set out the responsibilities of educational institutions to ensure that learning analytics is carried out responsibly, appropriately and effectively, addressing the key legal, ethical and logistical issues which are likely to arise.

Educational institutions in the UK already have information management practices and procedures in place and have extensive experience of handling sensitive and personal data in accordance with the **Data Protection Act 1998 (DPA)**. By transferring and adapting this expertise to regulate the processing of data for learning analytics, institutions should establish the practices and procedures necessary to process the data of individuals lawfully and fairly.

Responsibility

Institutions must decide who
the legal, ethical and effective
They should allocate specific
institution for:

- The collection of data to b
- The anonymisation of the
- The analytics processes to
  and their purposes
- The interventions to be ca
- The retention and stewardc
  generated by learning ana

Student representatives and k
should be consulted around t
development, roll-out and mo

Jisc Model Student Guide to Learning Analytics

Niall Sclater, Nov 2016, Draft v0.1

This guide sits alongside the [*University's / College's*] Learning Analytics Policy [*link*]. A key prin
Policy is to be completely transparent about all aspects of our use of learning analytics. We want yo
understand exactly what data is being collected, how it is being processed and what we will be doin
information. This document provides these details, and will be updated as our use of learning analy

What is learning analytics?

The "digital footprints" left when students use [*Moodle / Blackboard / the VLE*] and other institutio
can be combined with data such as grades and past academic history. We already collect most of the
required, and use it to review aspects of our courses and manage our use of resources more efficient
the use of this data for learning analytics is new, and will provide additional information to you, lec
and support staff.

The resulting picture can give you a better idea of how your learning is progressing. It can also help

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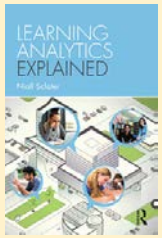
analytics.jiscinvolve.org



Book:

Learning Analytics Explained

Niall Sclater (Routledge, March 2017)

Jisc

University of Amsterdam

Sclater Digital