



# Using Learning Analytics: Benefits & Pitfalls

Karen Swan, University of Illinois Springfield



# Analytics can save higher education. Really.



“The Association for Institutional Research (**AIR**), **EDUCAUSE**, and the National Association of College and University Business Officers (**NACUBO**) stand together with a strong sense of urgency to reaffirm higher education’s commitment to the use of data and analytics to make better strategic decisions.”

<https://changewithanalytics.com/statement/>



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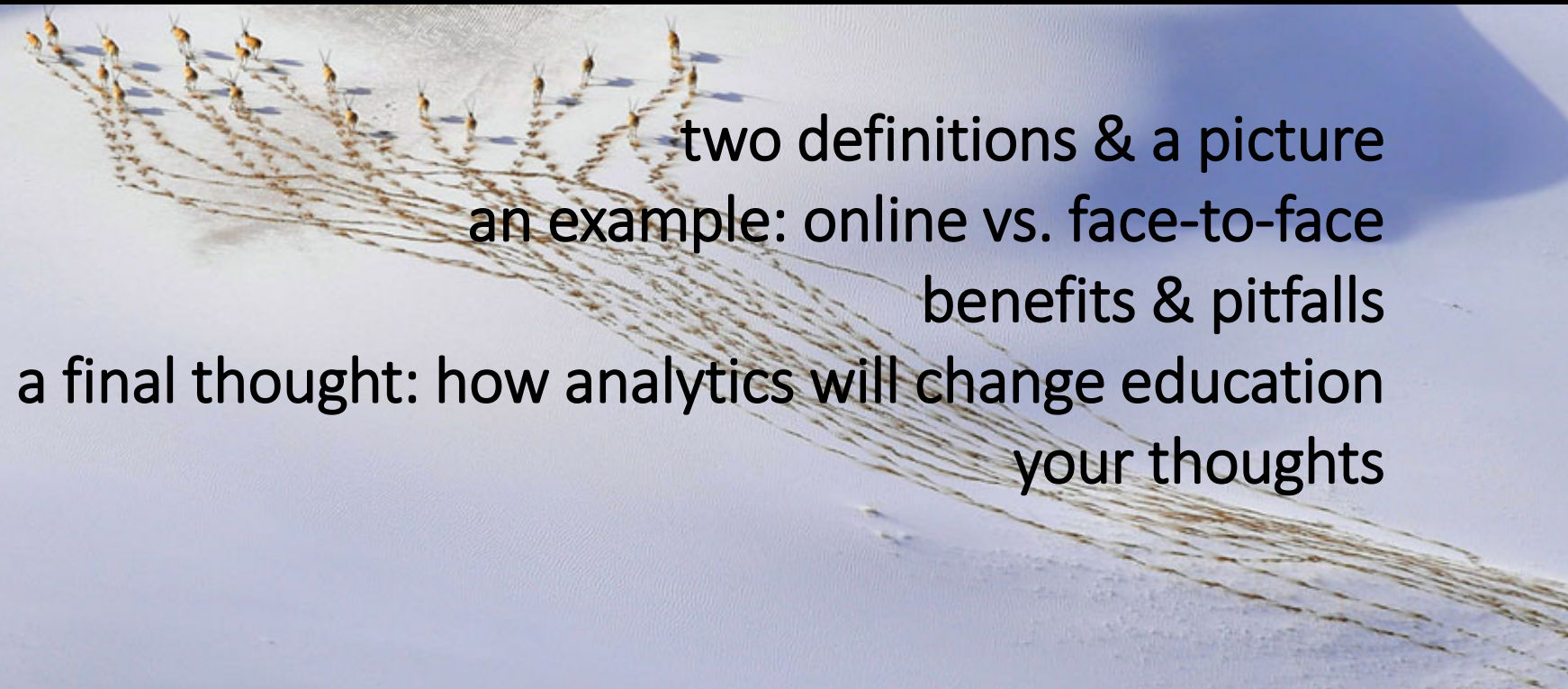
## Analytics can save higher education. Really.

“We strongly believe that using data to better understand our students and our own operations paves the way to developing new, innovative approaches for improved student recruiting, better student outcomes, greater institutional efficiency and cost-containment, and much more.”



# Using Learning Analytics: Benefits & Pitfalls

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two definitions & a picture  
an example: online vs. face-to-face  
benefits & pitfalls  
a final thought: how analytics will change education  
your thoughts



**Analytics** is the use of data, statistical analysis, and explanatory and predictive models to gain insight and act on complex issues.



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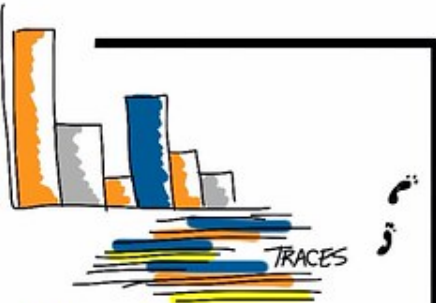
**Learning analytics** is the measurement, collection, analysis and reporting of data about **learners** and their contexts, for purposes of understanding and optimizing **learning** and the environments in which it occurs.



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# Learning Analytics

STIAN HÅKLEY @HOUSHUANG



## Personalization

QUANTIFIED SELF

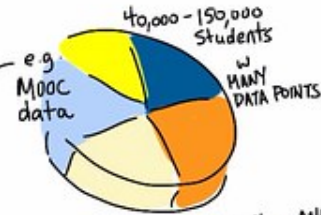
**LIVE ANALYTICS**

engagement

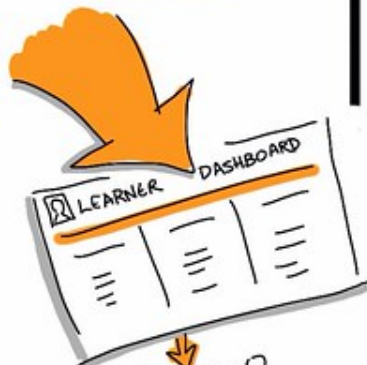
NOT ALWAYS USEFUL BY DEFAULT

**POST HOC ANALYTICS**

MASSIVE TEXT FILE - 20GB



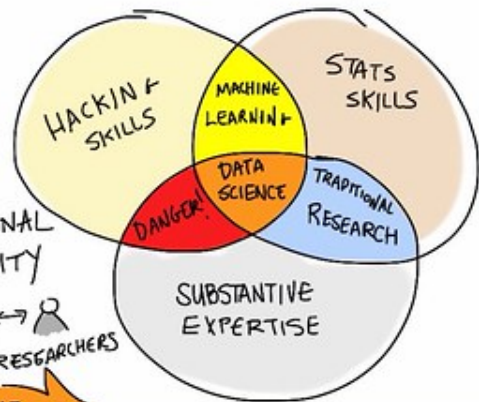
APPLY STATS METHOD → ANALYZE BASED ON PROBLEM



COMMON FORMAT

**OPEN ANALYTICS**

PREDICTIVE MODELING → APPLY IN MANY CONTENTS



ANONYMOUS IMPOSSIBLE?

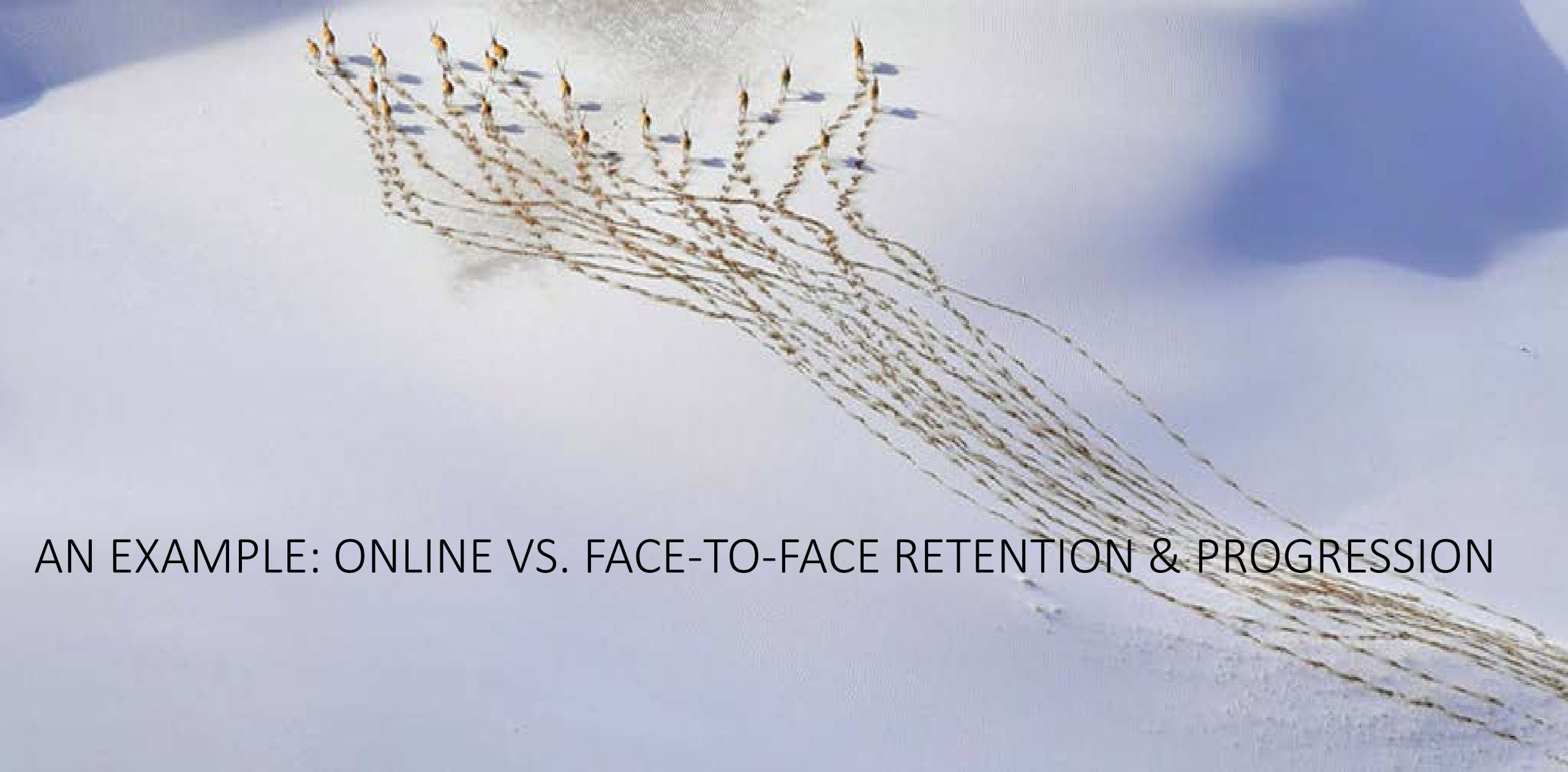
SHARE WITH STUDENT OPENNESS

## ETHICS



NEED SHARED BEST PRACTICES

@giuliaforsythe #OUCEL15



# AN EXAMPLE: ONLINE VS. FACE-TO-FACE RETENTION & PROGRESSION



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Jaggars, Edgecombe, & Stacey, 2013; Jaggars & Xu, 2010; Xu & Jaggars, 2011; 2014)

Series of CC studies by CCRC found:

- students were **more likely to withdraw from or fail online courses**
- that online course completers had **lower grades**
- that students enrolled in online courses were **less likely to persist and complete a degree**

And that these negative effects were more pronounced for males, African-Americans, younger students, students taking developmental courses, students w/ lower GPAs, and those majoring in the social sciences or applied professions

Jaggars, 2011; 2014)



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Jaggars, Edgecombe, & Stacey, 2013; Jaggars & Xu, 2010; Xu & Jaggars, 2011; 2014)

online = “ever online”

could be that students taking online courses have different characteristics than students taking only face-to-face courses so CCRC researchers included only “ever online” in their analyses



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(Hart, Friedmann, & Hill, 2016; Johnson, Cuellar Mejia, & Cook, 2015; Shea & Bidjerano, 2014; 2016)

Parts of this research **replicated & extended** with **CC students in New York & California**; researchers found online students similarly had lower course grades, higher course withdrawal, lower retention rates & amplification of achievement gaps between majority & minority students enrolled in online classes

Kept “ever online” designation, but used full datasets & some controlling for risk factors

However, in both California & New York CC students who took at least some online courses were **more likely to earn an associate's degree or transfer** to a four-year institution than those who did not



looked at students enrolled in online & face-to-face classes at 5  
CCs, 5 four-year universities, & 4 primarily online universities

examined data by institution

split groups into only online, only onground, & some of each  
(mixed)

controlled for factor known to predict retention

No differences in retention between students taking all of their courses onground & students taking some or all of their courses online for students enrolled in four-year colleges, primarily online colleges, or for community college students taking some of their courses online & some face-to-face, when confounding factors controlled for

### ODDS RATIOS FOR BETTER RETENTION OF CC STUDENTS

	INST 1	INST 2	INST 3	INST 4	INST 5
only OG vs. mixed	NSD	NSD	NSD	1.1	NSD
mixed vs. only OL	1.5	1.6	1.5	1.2	NSD
only OG vs. only OL	1.6	1.5	1.6	1.3	NSD

Also patterns of retention similar across institutions regardless of gender &/or Pell status

However, older students taking only online courses more likely to be retained than younger students taking only online courses at CCs & primarily online colleges

Results suggest taking online courses is not necessarily harmful to students' chances of being retained, & may provide course taking opportunities that otherwise might not be available, especially for non-traditional students

James, Swan, & Daston, 2016



## Who takes online courses?

In relation to students taking just OG courses, students mixing or taking only OL course were more likely to be **female, older, Pell recipients, transfer students, &/or taking classes part-time**

And **less likely to be any minority**, especially African-American &/or undeclared

## ODDS OF STOPPING OUT

		INST 1	INST 2	INST 3	INST 4	INST 5	INST 6	INST 7
mixed vs. only OG	FULL T	1.15**	1.06	1.14**	1.11	1.30**	1.06	1.34**
mixed vs. only OL	FULL T	0.81	0.55***	0.70	0.89	0.73*	0.86	0.75
only OL vs. only OG	FULL T	1.42**	1.92***	1.63**	1.32	1.79***	1.24	1.80
mixed vs. only OG	PART T	0.96	0.76	0.80	0.50***	0.69*	0.77	2.04***
mixed vs. only OL	PART T	1.25	0.74	0.64*	0.41***	0.66*	1.27	0.87
only OL vs. only OG	PART T	0.77*	0.98	1.25	1.23	1.06	0.61***	2.36***

While full time students taking online courses had slightly greater odds of stopping out than full time students taking courses onground, this result was reversed for part-time students at 2 institutions, non-existent at 4





## BENEFITS & PITFALLS



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## BENEFITS & PITFALLS

- with analytics no need to worry about representative sample
- can use existing data
- possibility of discovering new relationships in the data because large number of variables included
- increases number of significant but meaningless findings
- meaningful risk of overfitting the model

## BENEFITS & PITFALLS

- analytics have practical value
- analytics can give real time predictions
- analytics have little explanatory value
- unbalanced models can have good predictive value for majority but poor predictive value for minority populations
- analytics are always based on past performances no matter how timely
- analytics are very dependent on data definitions

## BENEFITS & PITFALLS

- supports personalization of learning
- improved advising
- uncovers new areas for research
- can preserve bias in data
- other ethical issues
- privacy issues

## MUST statements for learning analytics (Dringus, 2012)

### Effective learning analytics in online courses MUST:

1. develop from the stance of getting the right data and getting the data right.
2. have transparency.
3. yield from good algorithms.
4. lead to *responsible* assessment and *effective use* of the data trail.
5. inform *process* and *practice*.

## 3 tiers of intelligence needed to understand analytics results (Terenzini, 2013)

1. technical/analytical intelligence
2. issues intelligence
3. contextual intelligence



# A FINAL THOUGHT: HOW ANALYTICS **WILL** CHANGE EDUCATION



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# Analytics shape education epistemologically.

Epistemology is the study of knowledge & knowing.

There is a difference between knowing and measuring knowing.

The use of analytics narrows knowing to what can be measured.

How do you measure curiosity, resilience, the consideration of multiple perspectives, love of learning, awe?



# Analytics shape education ontologically.

Ontology is the study of being, existence, reality.

New quantifiable meanings assigned to existing educational practices change our common understandings of those practices.

*What are the broader societal and economic factors that produce an educational concern for retention over that of enjoyment, for example, and how is the image of the traffic light amplifying this concern?*

(Jeremy Knox, 2015, p.55)

# Analytics shape education systemically.

Analytics shape education systemically in the way their use percolates through all levels of the educational establishment, and in how that which is measured becomes the currency of the realm.



# Analytics shape education politically.

Analytics shape education politically through the changing power relationships that develop around measurement and data collection,

and through the mandating of not only data collection, but specific measurable results.





YOUR THOUGHTS / QUESTIONS



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