@DrBartRienties

Professor of Learning Analytics

Keynote:

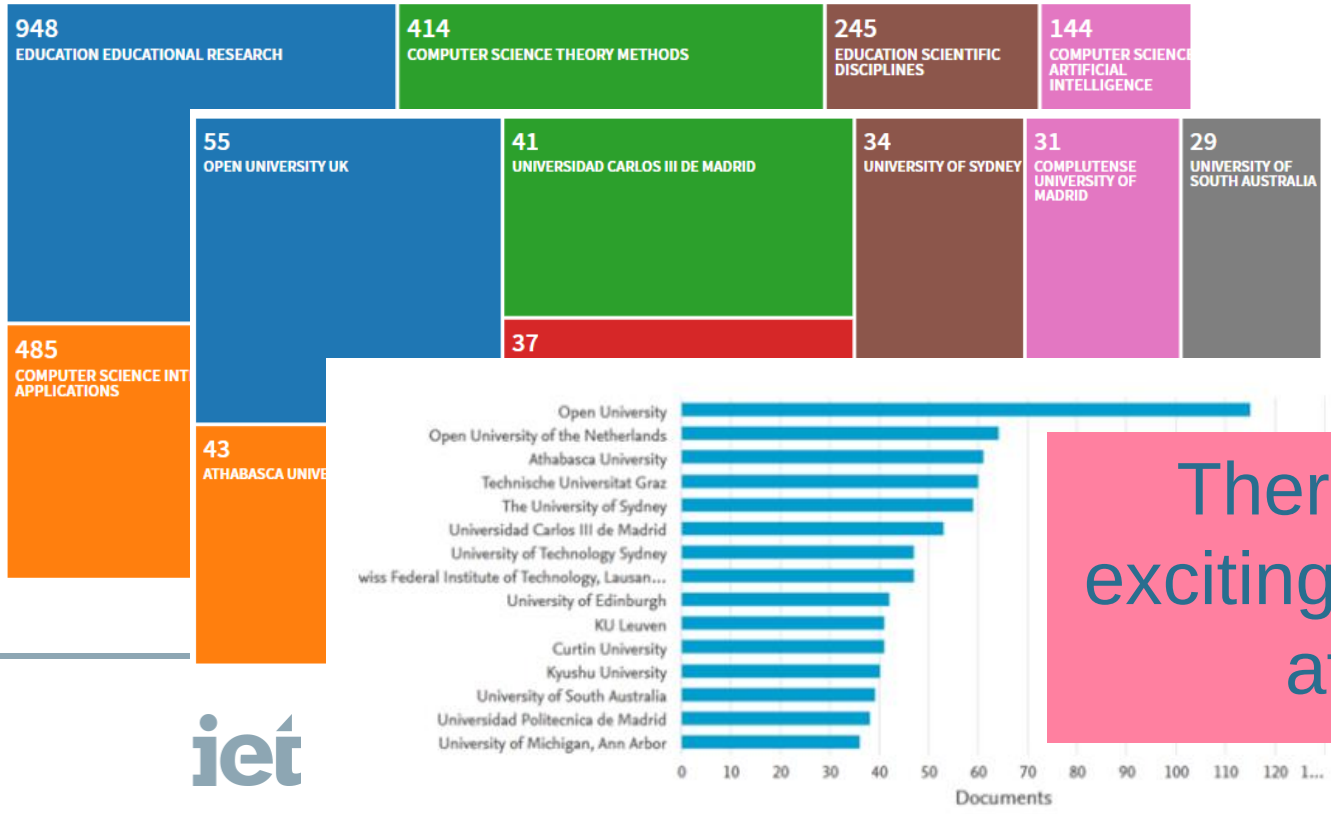
The power of learning analytics to visualise evidence of learning

9th of October 2019

Milton Keynes

Centre for Policing Research and Learning

First an apology

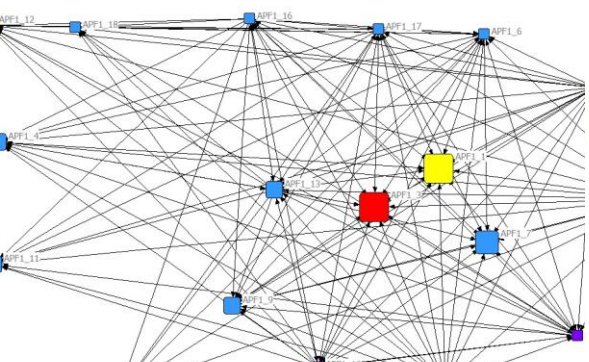


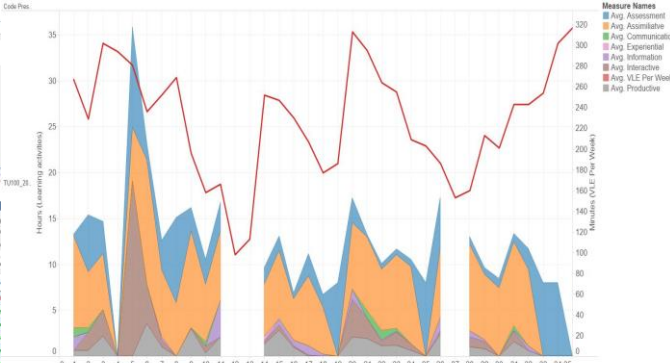
There is too much exciting stuff happening at the OU!!!

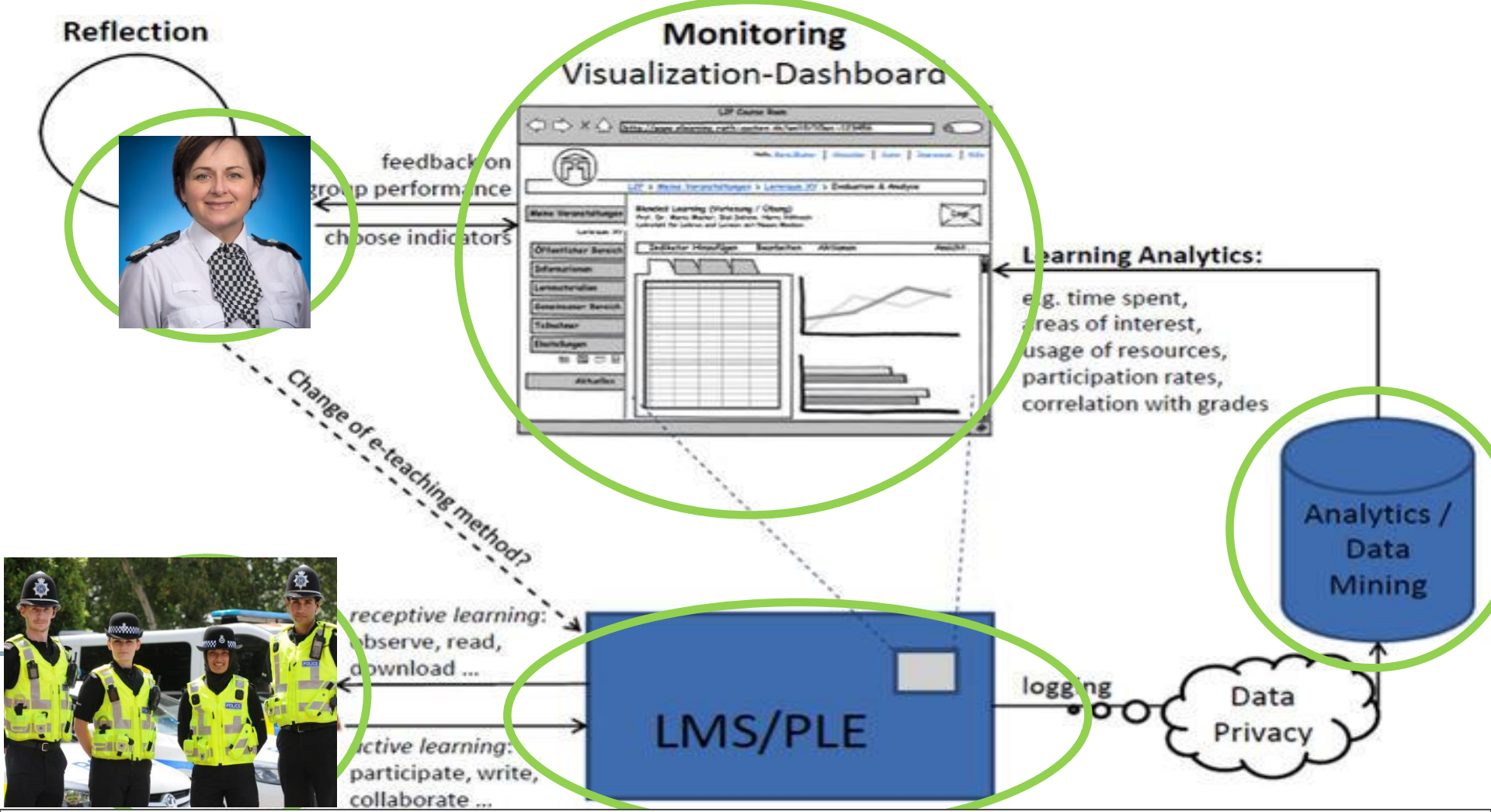
Adeniji, B. (2019). A Bibliometric Study on Learning Analytics. Long Island University. Retrieved from https://digitalcommons.liu.edu/post_fultext_dis/16/

Agenda

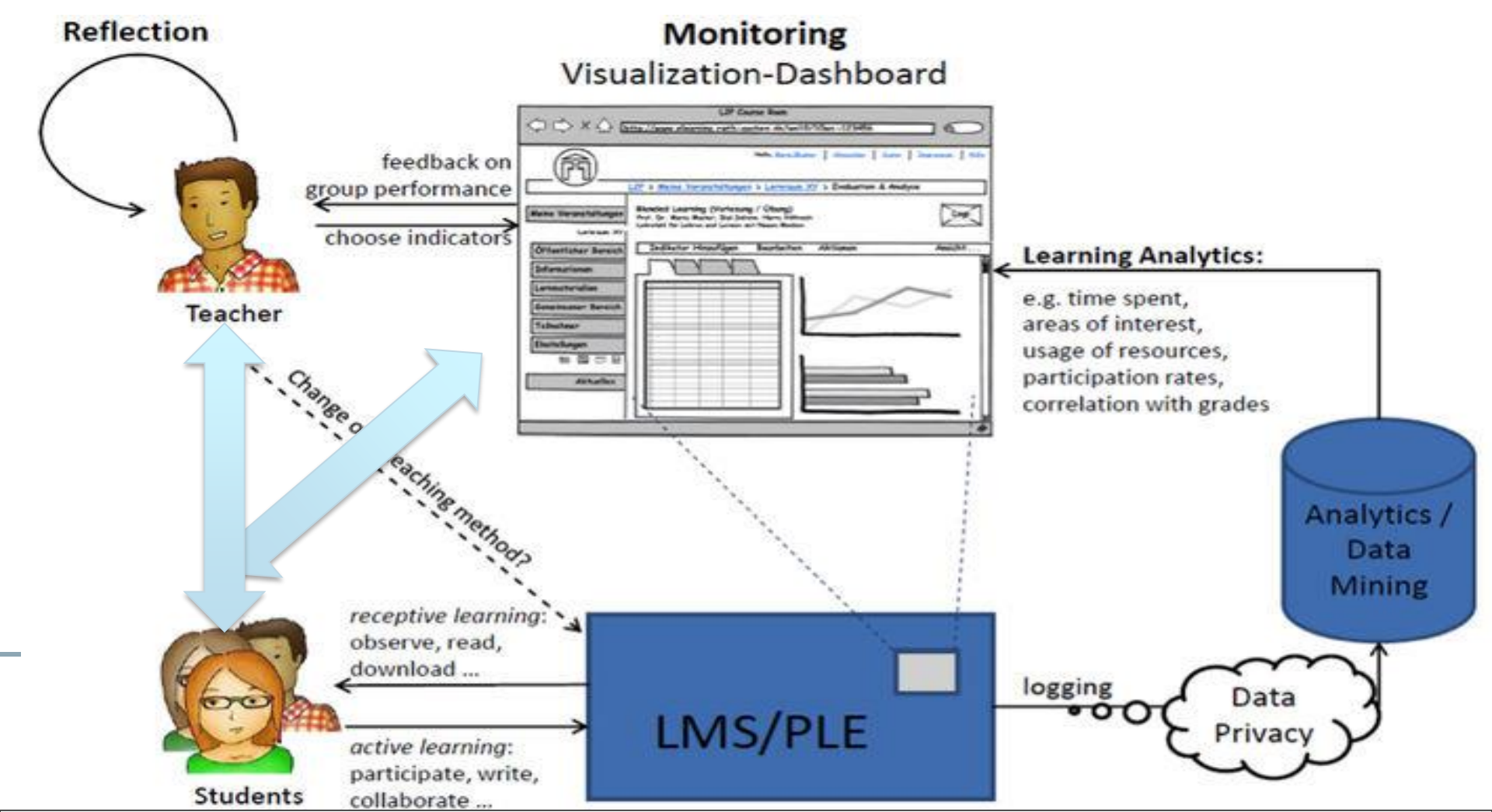
1. What is learning analytics?
2. Exemplar 1: How do we know that people have learned from Learning From Incidents?
3. Exemplar 2: Can we track how good learners are in search-skills?
4. Exemplar 3: Can we predict what is a good learning design?
5. What are the main affordances and limitations of Ed Tech in terms of data?





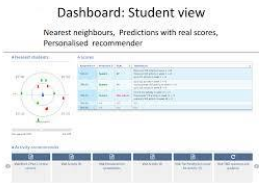


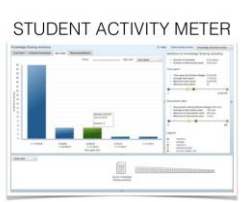
Dyckhoff, A. L., Zielke, D., Bültmann, M., Chatti, M. A., & Schroeder, U. (2012). Design and Implementation of a Learning Analytics Toolkit for Teachers. *Journal of Educational Technology & Society, 15*(3), 58-76.

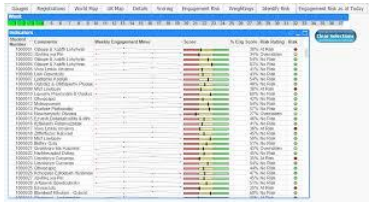


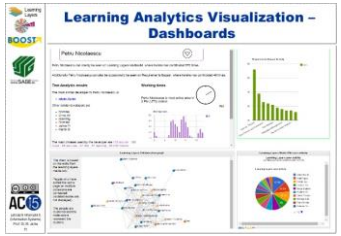
Dyckhoff, A. L., Zielke, D., Bültmann, M., Chatti, M. A., & Schroeder, U. (2012). Design and Implementation of a Learning Analytics Toolkit for Teachers. *Journal of Educational Technology & Society, 15*(3), 58-76.

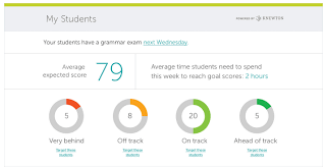
It’s everywhere

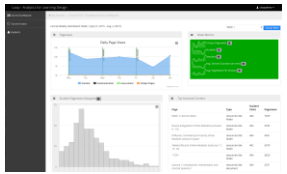




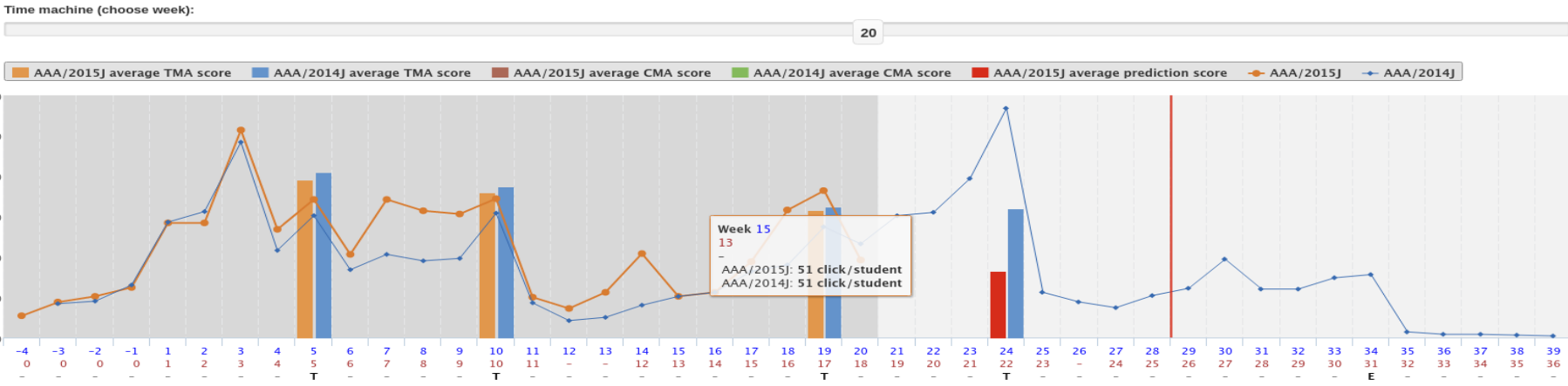








AAA 2015J - Week 20



Registered students	VLE active students	Students predicted not to submit	Last TMA result (average)	TMA submissions
910	635	307	63	0
↓9 WRT Previous week	↓121 WRT Previous week	↑116 WRT Previous week	↓2.4 WRT Previous presentation	↓586 WRT Previous week

25 Export Select columns

Student PI	Name	TMA	Risk of non-submission	Next TMA prediction	Next TMA grade prediction	Risk of Failure	Final result prediction	Final result
A0000194	Flores Joseph	71 NS NS		Not submit	Not Submit		Fail	Fail: no resit
A0000251	Taylor Raymond	76 84 72		Submit	Fail		At risk	Pass
A0000305	Thomas George	98 98 90		Not submit	Not Submit		At risk	Pass
A0000511	Allen Patrick	97 97 95		Submit	Fail		Pass	Distinction
A0000653	Jones Robert	95 94 89		Submit	Fail		Pass	Pass
A0000658	James Catherine	98 94 97		Submit	Fail		Pass	Distinction
A0000742	Turner Timothy	91 76 74		Submit	Fail		At risk	Pass

Hlosta, M., Herrmannova, D., Zdrahal, Z., & Wolff, A. (2015). OU Analyse: analysing at-risk students at The Open University. *Learning Analytics Review*, 1-16.

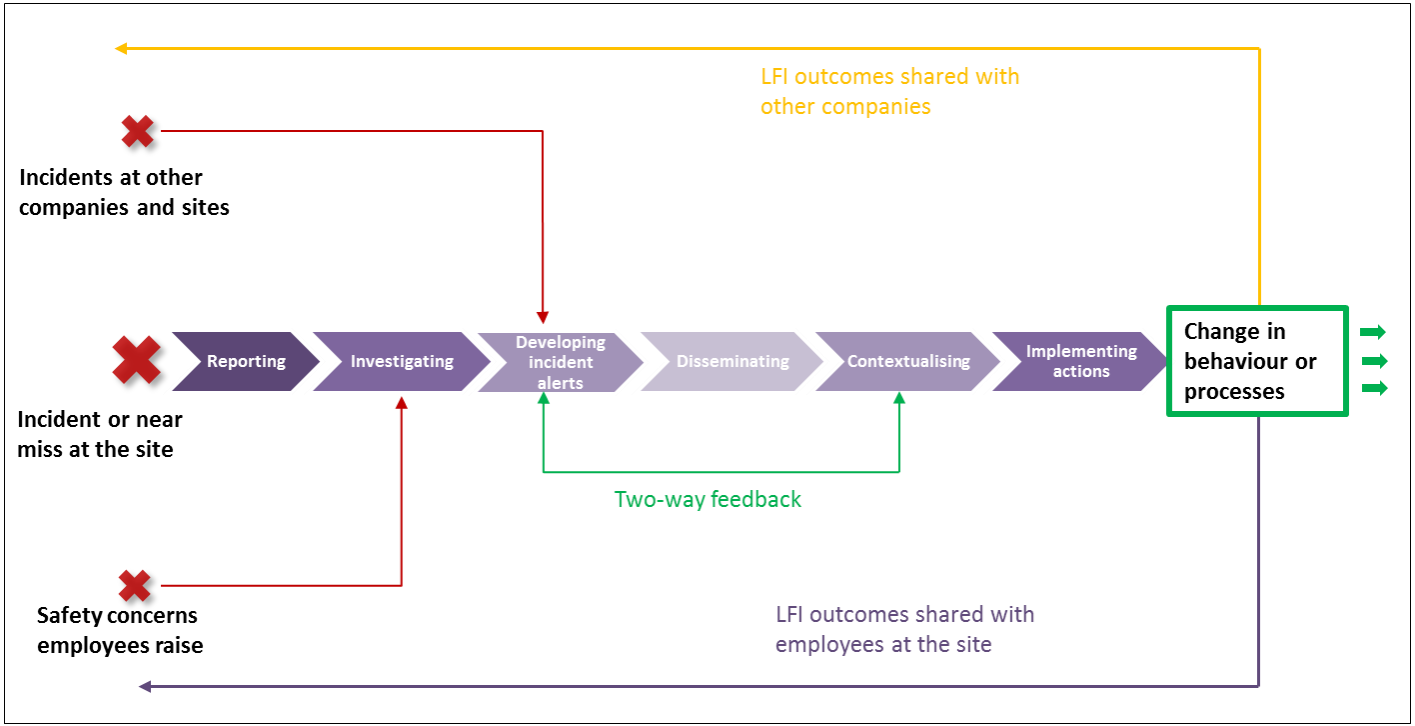
Prof Paul Kirschner (OU NL)

“Learning analytics: Utopia or dystopia”, LAK 2016 conference

1. Increased availability of learning data
2. Increased availability of learner data
3. Increased ubiquitous presence of technology
4. Formal and informal learning increasingly blurred
5. Increased interest of non-educationalists to understand learning (Educational Data Mining, 4profit companies)
6. Personalisation and flexibility as standard

Exemplar 1: How do we know that people have learned from Learning From Incidents?

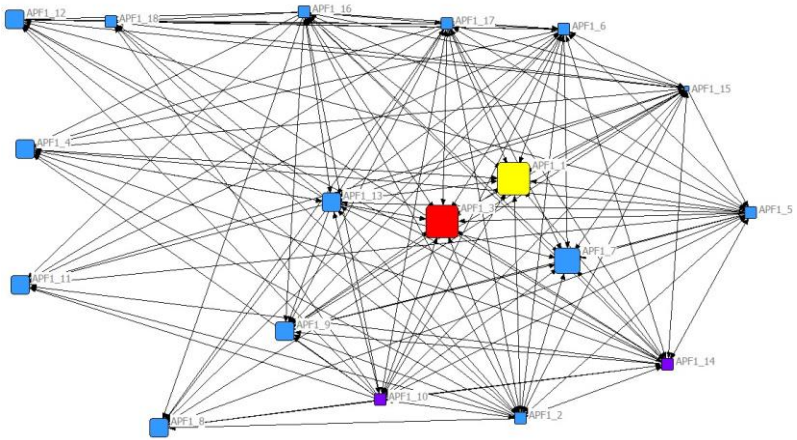
The Learning from Incidents (LFI) Process



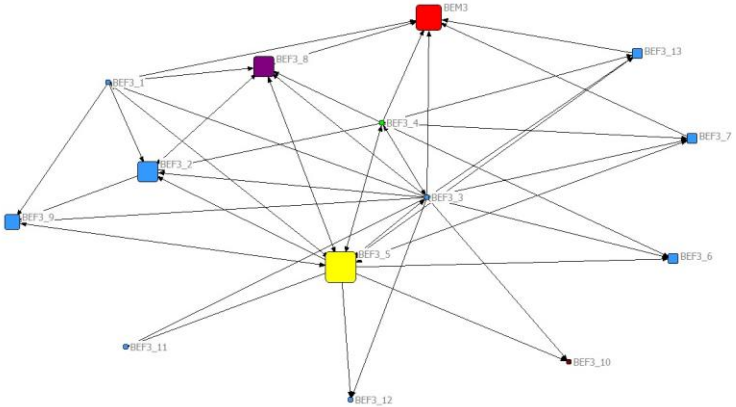
Littlejohn, A., Margaryan, A., Vojt, G., & Lukic, D. (2017). Learning from Incidents Questionnaire (LFIQ): The validation of an instrument designed to measure the quality of learning from incidents in organisations. *Safety science*, *99*, 80-93.

Networks in LFI: Disseminating and contextualising information

Company A

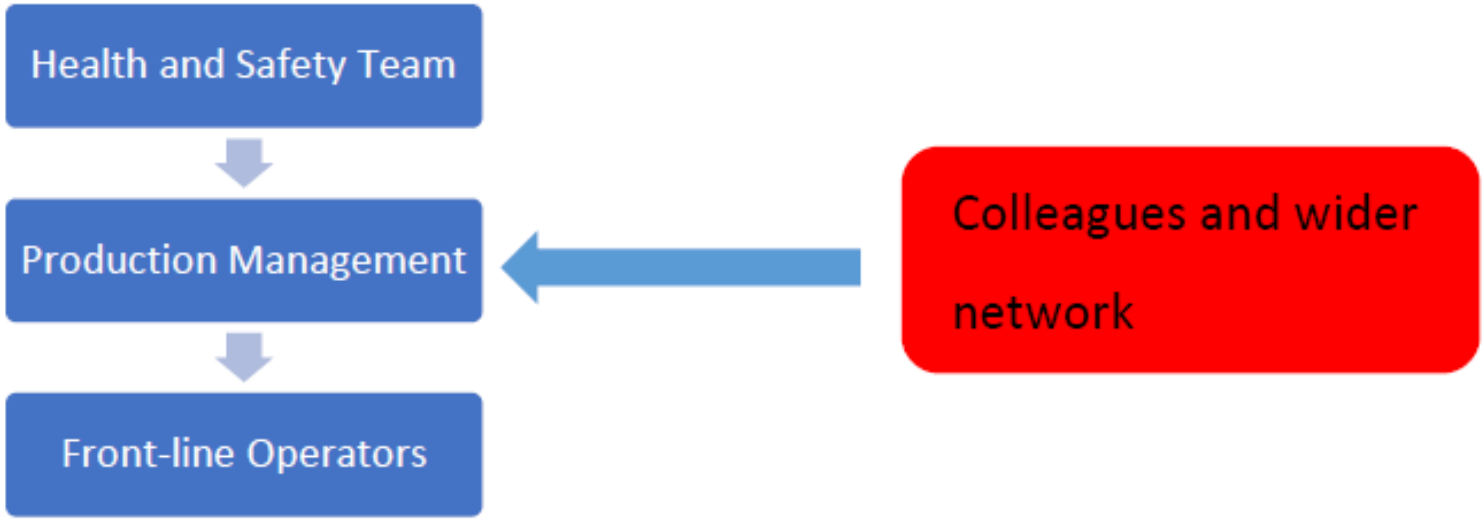


Company B



Murphy, V. L., Littlejohn, A., Rienties, B., King, S., & Bryden, R. (2018). Where does information on incidents come from? In: SPE International Conference and Exhibition on Health, Safety, Security, Environment, and Social Responsibility, 16-18 Apr 2018, Abu Dhabi, UAE. https://doi.org/10.2118/190526-MS

Barriers to Learning: Receiving irrelevant information



Murphy, V. L., Littlejohn, A., Rienties, B., King, S., & Bryden, R. (2018). Where does information on incidents come from? In: SPE International Conference and Exhibition on Health, Safety, Security, Environment, and Social Responsibility, 16-18 Apr 2018, Abu Dhabi, UAE. https://doi.org/10.2118/190526-MS

Barriers to Learning: Team supervisor as a facilitator

“Well the general format is the manager will stand there and I'd say read directly off a slide on a screen and then say right I just gave you that brief... Not that there is any understanding there.”

Exemplar 2: Are students well skilled in searching the internet?

- Across the globe people are assumed to have good internet searching skills
- However, recently there is a debate whether this is actually the case?
- In particular, some have raised concerns about a widely used self-report instrument called Internet-Specific Epistemic Questionnaire (ISEQ)?

- Are students well skilled in searching the internet?
- (How would you set up a design to test this?)

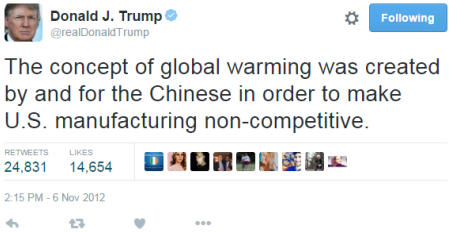


Figure 8.1:

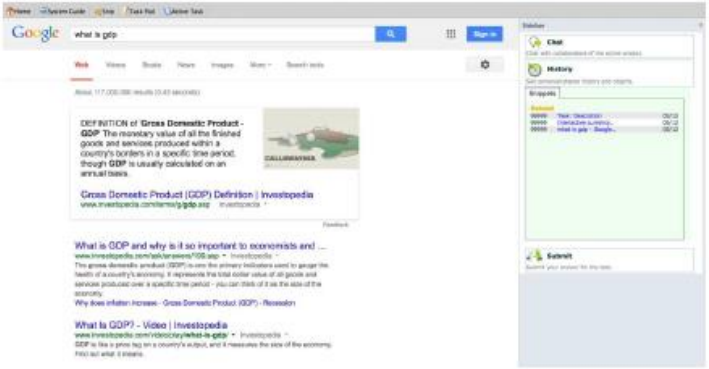
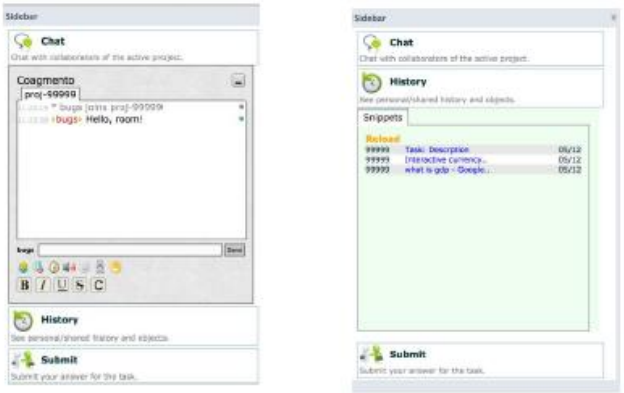


Figure 8.2:

Figures 8.3 (left):

Figure 8.4 (right):



- Lab study whereby 269 students worked in dyads on complex red yeast rice case
- We monitored which websites they visited (and which they did not)
- We analysed chat data and final dyad answer to government advice

Knight, S., Rienties, B., Littleton, K., Mitsui, M., Tempelaar, D. T., Shah, C. (2017). The relationship of (perceived) epistemic cognition to interaction with resources on the internet. *Computers in Human Behavior, 73,* August 2017, 507–518

Table 4
Illustrative examples of pages used and visited.

rank	url	project count	% visited	% used	used rank	Website type
1	http://www.medicinenet.com/red_yeast_rice_and_cholesterol/article.htm	138	89.61	62.99	1	Lay health advice
2	http://www.webmd.com/cholesterol-management/red-yeast-rice	99	64.29	43.51	4	
3	http://umm.edu/health/medical/altmed/supplement/red-yeast-rice	90	58.44	56.49	2	
4	http://www.webmd.com/vitamins-supplements/ingredientmono-925-red%20yeast%20rice%20(red%20yeast.aspx?activeingredientid=925&activeingredientname=red%20yeast%20rice%20(red%20yeast	85	55.19	33.12	6	
5	http://articles.mercola.com/sites/artides/archive/2009/09/10/why-you-should-avoid-red-rice-yeast.aspx	79	51.30	29.22	8	Alternative medicine
6	http://en.wikipedia.org/wiki/Red_yeast_rice	79	51.30	22.08	12	Encyclopedia
7	http://www.medicinenet.com/red_yeast_rice_and_cholesterol/page4.htm	64	41.56	43.51[a]	3	Lay health advice
8	http://nccam.nih.gov/health/redyeastrice	63	40.91	36.36	5	Alternative medicine
9	http://www.mayoclinic.org/drugs-supplements/red-yeast-rice/safety/hrb-20059910	59	38.31	24.03	10	Lay health advice
10	http://www.emedicinehealth.com/drug-red_yeast_rice/article_em.htm	57	37.01	18.83	13	
11	http://www.medicinenet.com/red_yeast_rice_and_cholesterol/page4.htm#how_safe_are_red_yeast_rice_products	57	37.01	25.97	9	
12	http://www.reuters.com/article/2008/07/09/us-contamination-common-idUSCOL97022820080709	54	35.06	31.17	7	News
13	http://www.drugs.com/mtm/red-yeast-rice.html	46	29.87	16.88	14	Lay health advice
14	http://altmedicine.about.com/od/herbsupplementguide/a/redyeastside.htm	41	26.62	16.23	15	Alternative medicine
15	http://www.medicinenet.com/red_yeast_rice_and_cholesterol/page2.htm	39	25.32	3.90	36	Lay health advice
16	http://www.nlm.nih.gov/medlineplus/druginfo/natural/925.html	35	22.73	23.38[a]	11	Government advice
17	http://www.medicinenet.com/red_yeast_rice_and_cholesterol/article.htm#what_is_red_yeast_rice	33	21.43	11.69	17	Lay health advice
18	http://www.webmd.boots.com/cholesterol-management/guide/red-yeast-rice	31	20.13	11.69	18	
19	http://www.medicinenet.com/red_yeast_rice_and_cholesterol/page5.htm	30	19.48	6.49	25	
20	http://www.nutraingredients-usa.com/Suppliers2/Red-rice-yeast-supplements-raise-contamination-issues	29	18.83	11.04	19	Nutrition news

[a] Note, the higher level of 'use' than 'viewing' may be as a result of strings matching in the use case without having been viewed (for example, by manually typing 'page4' on the end of a url that has not, in fact been visited). This discrepancy may also be a result of errors in the log data. The 'website type' column provides the researcher's assessment of the kind of information and authorship of each given resource.

Knight, S., Rienties, B., Littleton, K., Mitsui, M., Tempelaar, D. T., Shah, C. (2017). The relationship of (perceived) epistemic cognition to interaction with resources on the internet. *Computers in Human Behavior, 73,* August 2017, 507–518

Table 6
Correlation of trace and survey data.

	Unique Pages Viewed	Unique Pages Used	Unique queries	Messages exchanged	Query Vocabulary Richness	IISEQJust	ISEQGen	Search Experience
Unique Pages Viewed		0.45***	0.48***	−0.05	−0.18**	0.01	−0.01	0.08
Unique Pages Used			0.16*	−0.04	−0.10^	−0.01	0.00	0.03
Unique queries				0.02	−0.14*	0.03	−0.02	−0.03
Messages exchanged					0.03	−0.05	−0.01	0.03
Query Vocabulary Richness						0.09	−0.02	0.03
ISEQJust							0.22***	−0.19**
ISEQGen								0.22***
Search Experience								

<0.001 = ***; <0.01 = **; <0.05 = *; <0.1 = ^.

- No relation between ISEQ and what students actually do online ☹

Knight, S., Rienties, B., Littleton, K., Mitsui, M., Tempelaar, D. T., Shah, C. (2017). The relationship of (perceived) epistemic cognition to interaction with resources on the internet. *Computers in Human Behavior, 73,* August 2017, 507–518

Exemplar 3: linking existing datasets

- Learning design data (>300 modules mapped)
- VLE data
  - >140 modules aggregated individual data weekly
  - >37 modules individual fine-grained data daily
- Student feedback data (>140)
- Academic Performance (>140)
- Predictive analytics data (>40)
- Data sets merged and cleaned
- 111,256 students undertook these modules

Hours spent undertaking each type of activity

Design stages

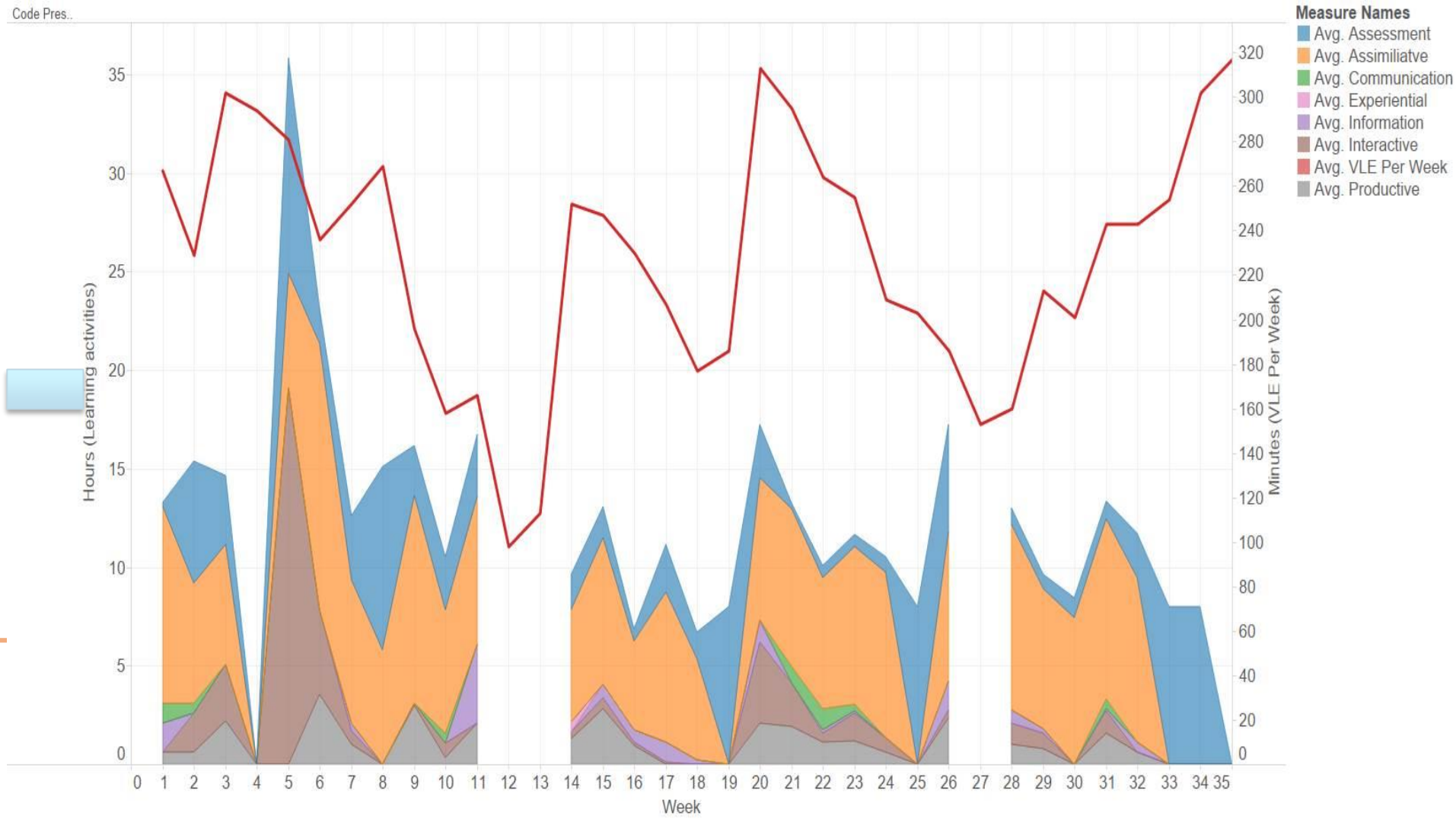
Initial | Specification (REP03) | Draft (D2) | Final

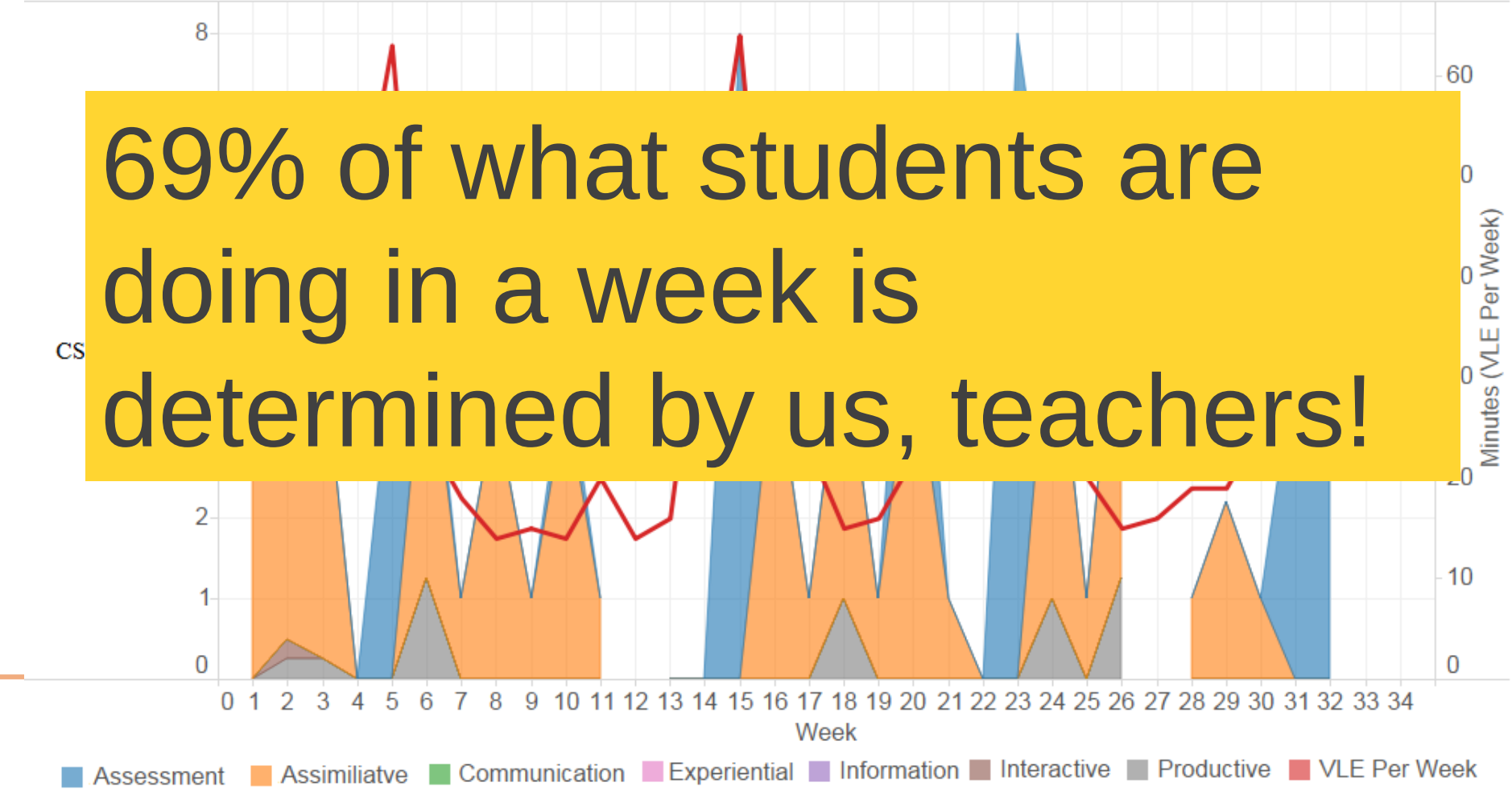
Copy and replace:

Initial → Specification | Specification → Draft | Draft → Final

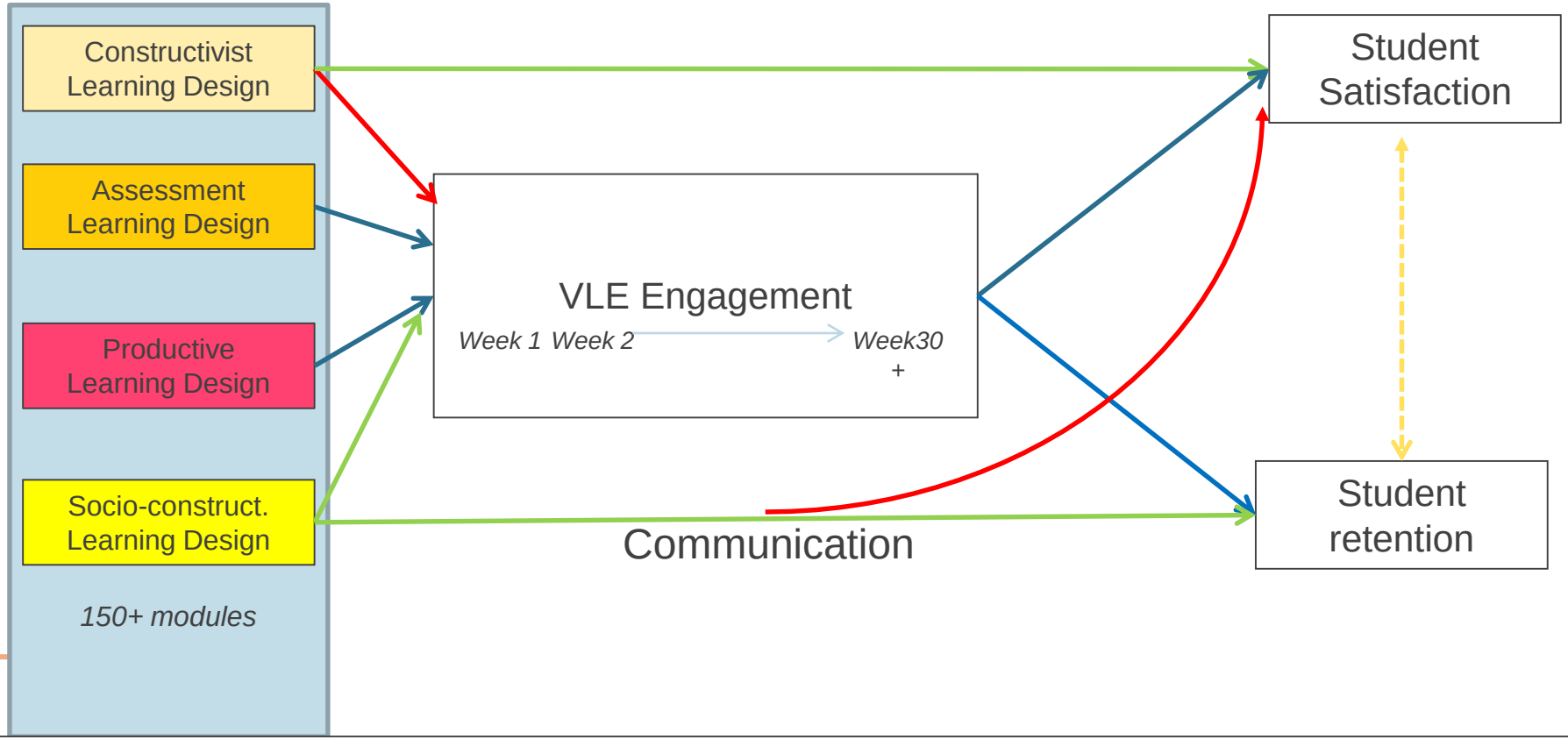
Workload tool → Initial | Workload tool → Specification | Workload tool → Draft | Workload tool → Final

Week	Assimilative	Finding and handling information	Communication	Productive	Experiential	Interactive / Adaptive	Assessment	Total hours
								Avg: 12.16, StDv: 6.28 Hide guides
Week 1	10	1.5	1	0.6	0	0	0.2	13.30
Week 2	6.1	0	0.5	0.6	2	0	6.2	15.40
Week 3	6.1	0	0	2.2	2.85	0	3.5	14.65
Week 4	0	0	0	0	0	0	0	0
Week 5	5.8	0	0	0	19.1	0	10.9	35.85
Week 6	13.5	0	0	3.55	4.3	0	1.8	23.15
Week 7	7.25	0.4	0	1	0.7	0	3.3	12.65
Week 8	5.79	0	0	0	0	0	9.3	15.09
Week 9	10.5	0	0	3	0.1	0	2.5	16.16
Week 10	6.31	0	0.5	0.35	0.7	0	2.65	10.51
Week 11	7.46	4	0	2.1	0	0	3.2	16.76
Week 12	5.69	0	0	1.3	0.35	0.5	1.8	9.64
Week 13	7.43	0.65	0	2.8	0.6	0	1.6	13.08


Code Pres..
Measure Names
Avg. Assessment
Avg. Assimiliatve
Avg. Communication
Avg. Experiential
Avg. Information
Avg. Interactive
Avg. VLE Per Week
Avg. Productive
Hours (Learning activities)
Minutes (VLE Per Week)
Week
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
0 5 10 15 20 25 30 35
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320



Nguyen, Q., Rienties, B., Toetenel, L., Ferguson, R., Whitelock, D. (2017). Examining the designs of computer-based assessment and its impact on student engagement, satisfaction, and pass rates. *Computers in Human Behavior*. DOI: 10.1016/j.chb.2017.03.028.



Rienties, B., Toetenel, L., (2016). The impact of learning design on student behaviour, satisfaction and performance: a cross-institutional comparison across 151 modules. *Computers in Human Behavior*, 60 (2016), 333-341

Nguyen, Q., Rienties, B., Toetenel, L., Ferguson, R., Whitelock, D. (2017). Examining the designs of computer-based assessment and its impact on student engagement, satisfaction, and pass rates. *Computers in Human Behavior*. DOI: 10.1016/j.chb.2017.03.028.

Conclusions I

1. A lot of data is coming into (and out of) education: LFI???
2. A lot of “semi-standardised” data is gathered within and across institutions
3. Great opportunities to harvest fine-grained and longitudinal data

Conclusions II

1. What about the ethics?
2. What can be standardised (and what not)?
3. Are we optimising the record player?

Yes I donate
ORGAN DONATION

The power of learning analytics to visualise evidence of learning

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W: https://www.sportentransplantatie.nl/

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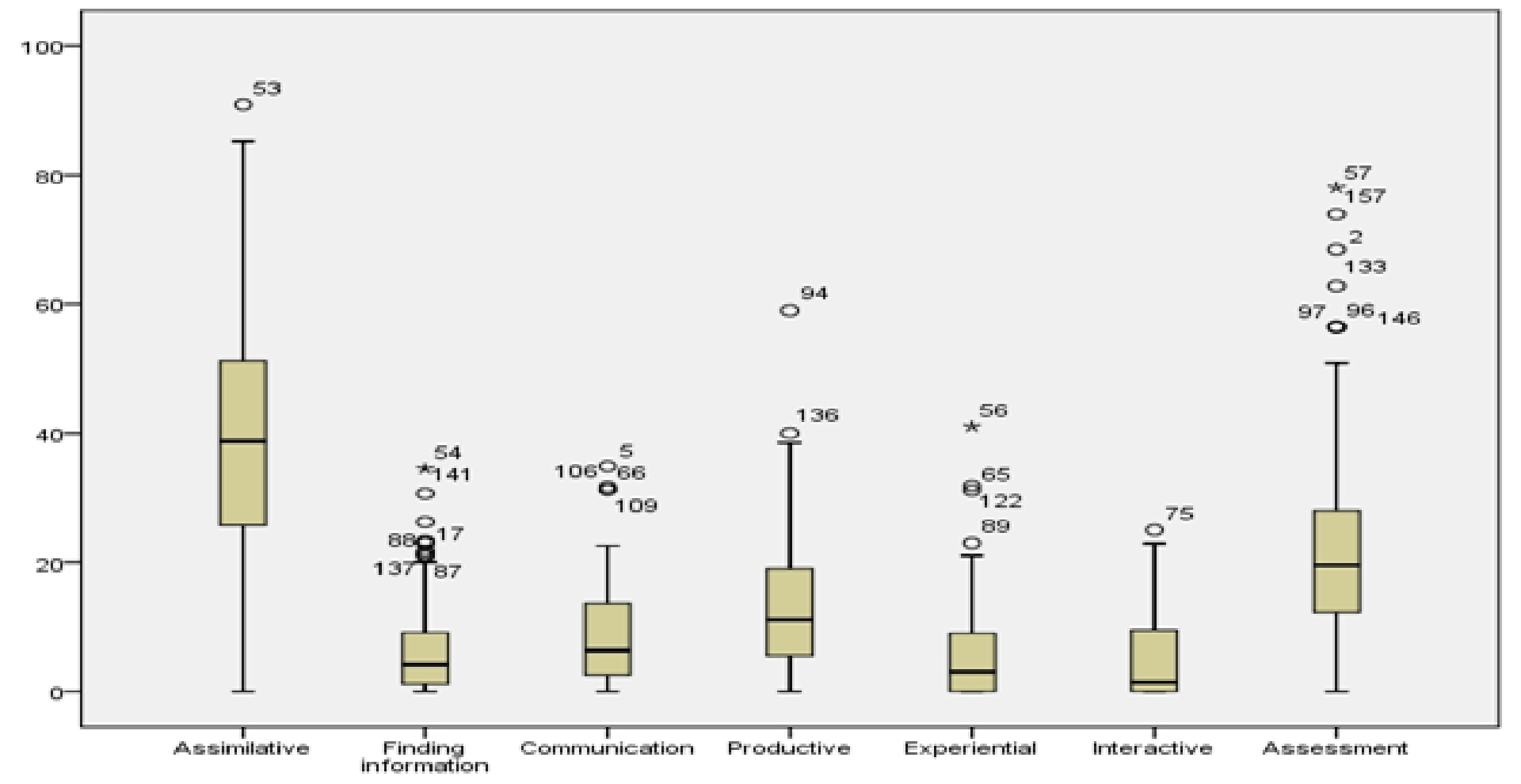
Centre for Policing Research and Learning

The Open University



Toetenel, L., Rienties, B. (2016). Analysing 157 Learning Designs using Learning Analytic approaches as a means to evaluate the impact of pedagogical decision-making. *British Journal of Educational Technology, 47*(5), 981–992.