MONASH University

EDUCATION FUTURES

The role of learning analytics for evaluation in higher education

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January 14, 2019
Bluenotes APAC 2019 Conf.
Monash University

Data for teaching excellence

STUDENT EVALUATIONS OF TEACHING

Value proposition of SET

Inexpensive and efficient ways to evaluate teaching

Public accountability and public relationships

Students saying in evaluation of teaching

Validated evaluation instruments

E.g., Students' Evaluations of Educational Quality (SEEQ)

Marsh, H. W. (2007). Students' Evaluations of University Teaching: Dimensionality, Reliability, Validity, Potential Biases and Usefulness. In R. P. Perry & J. C. Smart (Eds.), *The Scholarship of Teaching and Learning in Higher Education: An Evidence-Based Perspective* (pp. 319–383). Dordrecht: Springer Netherlands. https://doi.org/10.1007/1-4020-5742-3_9

Self-selection bias is recognized

E.g., High achievers and females are most likely to submit

Macfadyen, L. P., Dawson, S., Prest, S., & Gašević, D. (2016). Whose feedback? A multilevel analysis of student completion of end-of-term teaching evaluations. *Assessment & Evaluation in Higher Education*, *41*(6), 821–839. https://doi.org/10.1080/02602938.2015.1044421

Evaluations of teaching have no associations with learning outcomes

Uttl, B., White, C. A., & Gonzalez, D. W. (2017). Meta-analysis of faculty's teaching effectiveness: Student evaluation of teaching ratings and student learning are not related. *Studies in Educational Evaluation, 54*, 22–42, https://doi.org/10.1016/j.stueduc.2016.08.007.

Self-reports may not be reflective of learning gains

Bjork, R. A., Dunlosky, J., & Kornell, N. (2013). Self-Regulated Learning: Beliefs, Techniques, and Illusions. *Annual Review of Psychology*, *64*(1), 417–444. https://doi.org/10.1146/annurev-psych-113011-143823.

Self-reports may not be reflective of actual experience

Winne, P. H., & Jamieson-Noel, D. (2002). Exploring students' calibration of self reports about study tactics and achievement. *Contemporary Educational Psychology*, *27*(4), 551–572. https://doi.org/10.1016/S0361-476X(02)00006-1

Self-reports reflect memories of experience, not actual experience

Zhou, M., & Winne, P. H. (2012). Modeling academic achievement by self-reported versus traced goal orientation. *Learning and Instruction, 22*(6), 413–419. doi:10.1016/j.learninstruc.2012.03.004

Static measures not informative for teaching action in real-time

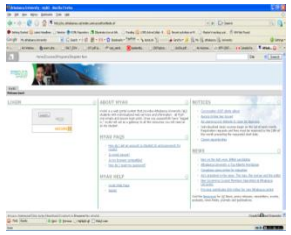
Jovanovic, J., Gasevic, D., Brooks, C., Devedzic, V., Hatala, M., Eap, T., & Richards, G. (2008). LOCO-Analyst: semantic web technologies in learning content usage analysis. *International Journal of Continuing Engineering Education and Life Long Learning*, *18*(1), 54–76.

Evaluations of teaching
do not measure learning progression

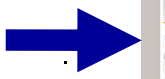
LEARNING ANALYTICS

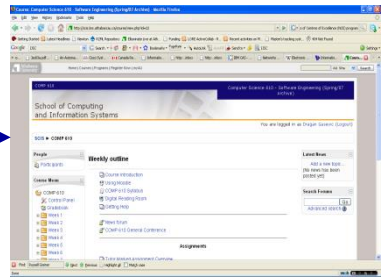
Learners

Student Information Systems



Educators

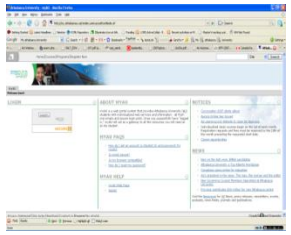




Learning environment

Learners

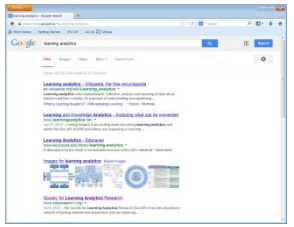
Student Information Systems



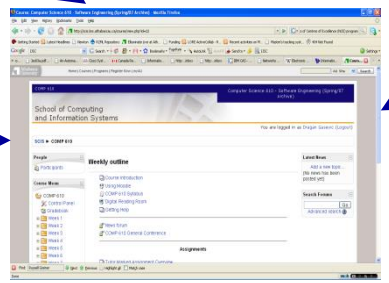
Mobile

Networks

Search

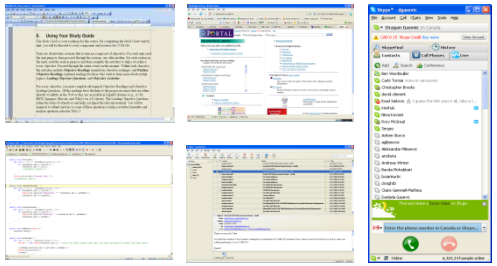


Educators



Learning environment

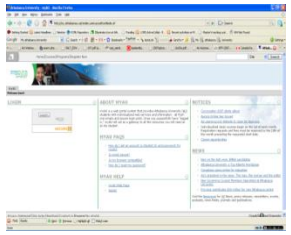
Blogs



Videos/slides

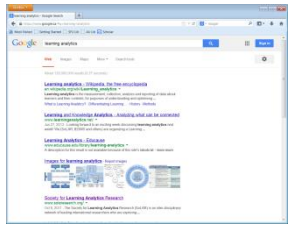
Learners

Student Information Systems



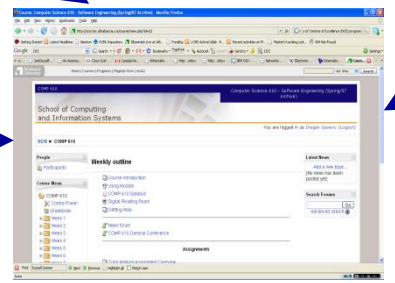
Networks

Mobile



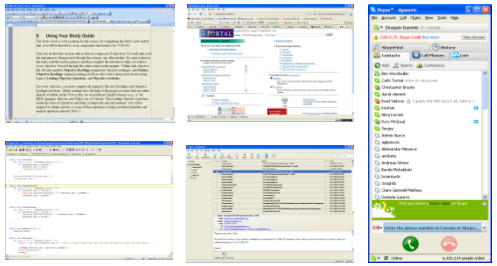
Search

Educators



Learning environment

Blogs



Videos/slides

Self-selection bias is reduced

Gašević, D., Dawson, S., & Siemens, G. (2015). Let's not forget: Learning analytics are about learning. *TechTrends*, *59*(1), 64–71. https://doi.org/10.1007/s11528-014-0822-x

Improved prediction of learning outcomes

Gašević, D., Dawson, S., Rogers, T., & Gasevic, D. (2016). Learning analytics should not promote one size fits all: The effects of instructional conditions in predicting learning success. *The Internet and Higher Education*, *28*, 68–84. https://doi.org/10.1016/j.iheduc.2015.10.002

Current state

Human learning strategies

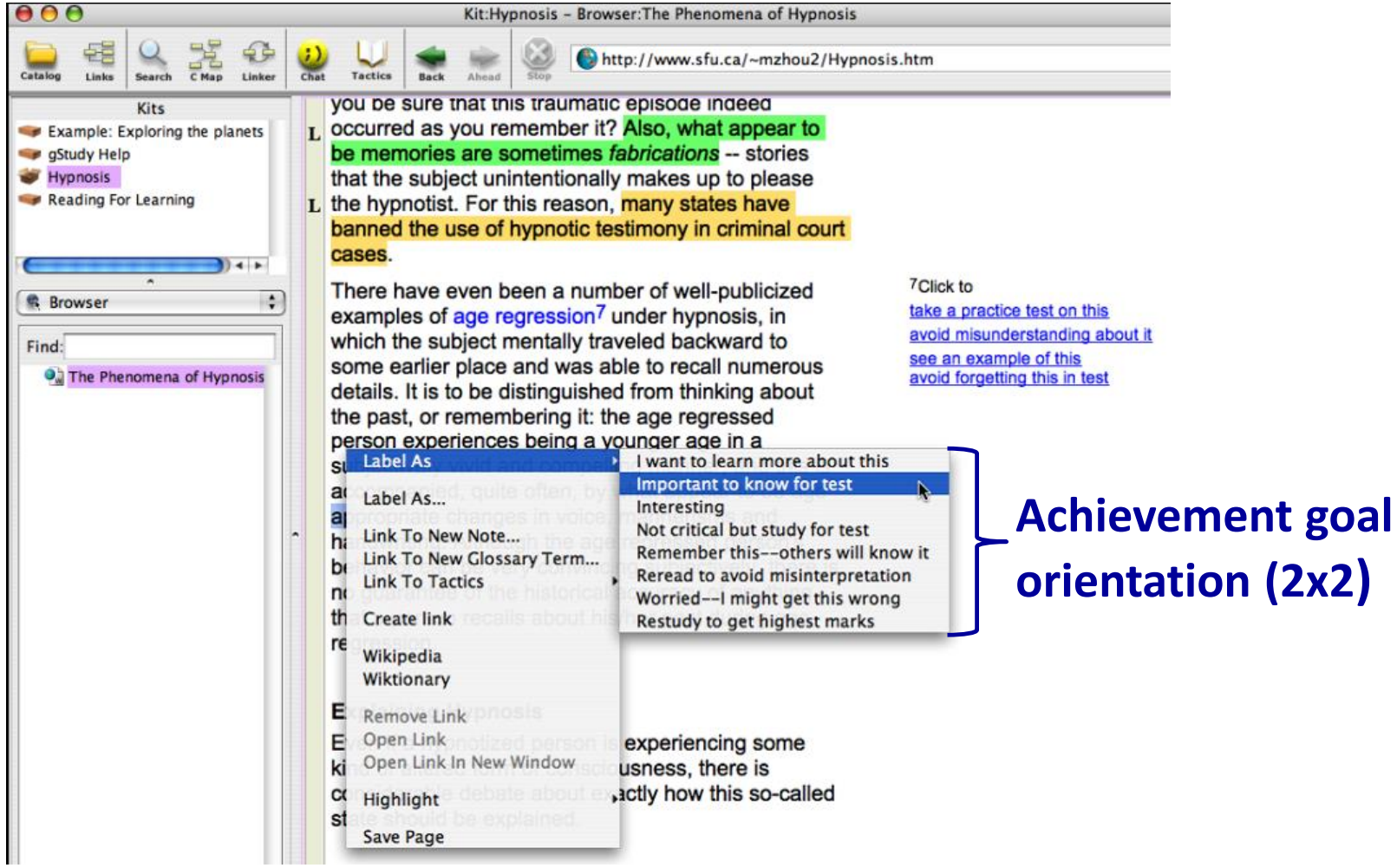
Approaches to learning, time management, and multimodality

Matcha, W., Gašević, D., Ahmad Uzir, N., Jovanović, J., Pardo, A. (2019). Analytics of Learning Strategies: Associations with Academic Performance and Feedback. In *Proceedings of the 8th International Conference on Learning Analytics and Knowledge* (in press), Tempe, AZ, USA.

Learning analytics can reveal realized intentions

Zhou, M., & Winne, P. H. (2012). Modeling academic achievement by self-reported versus traced goal orientation. *Learning and Instruction, 22*(6), 413–419. doi:10.1016/j.learninstruc.2012.03.004

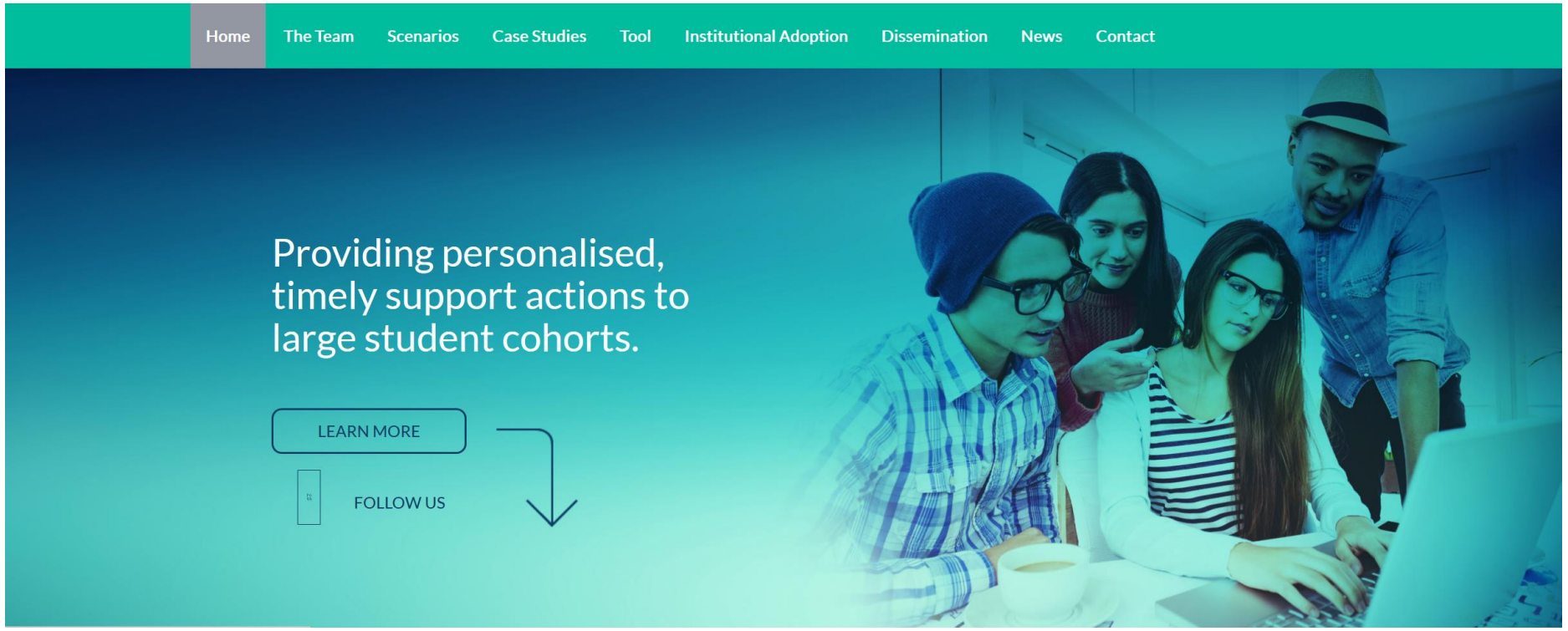
Traced self-reports



Zhou, M., & Winne, P. H. (2012). Modeling academic achievement by self-reported versus traced goal orientation. *Learning and Instruction, 22*(6), 413–419. doi:10.1016/j.learninstruc.2012.03.004

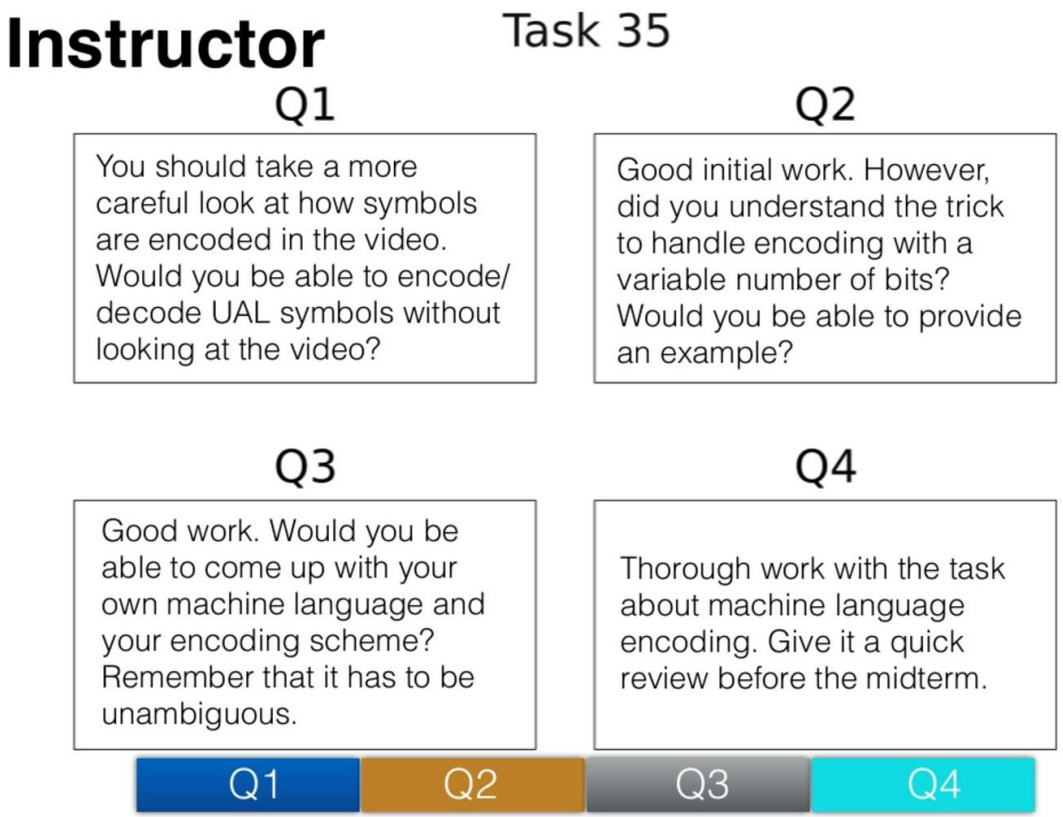
Analytics-based personalized feedback throughout and at scale

Pardo, A., Jovanović, J., Gašević, D., Dawson, S. (2019). Using Learning Analytics to Scale the Provision of Personalised Feedback. *British Journal of Educational Technology,* 50(1), 128-138.



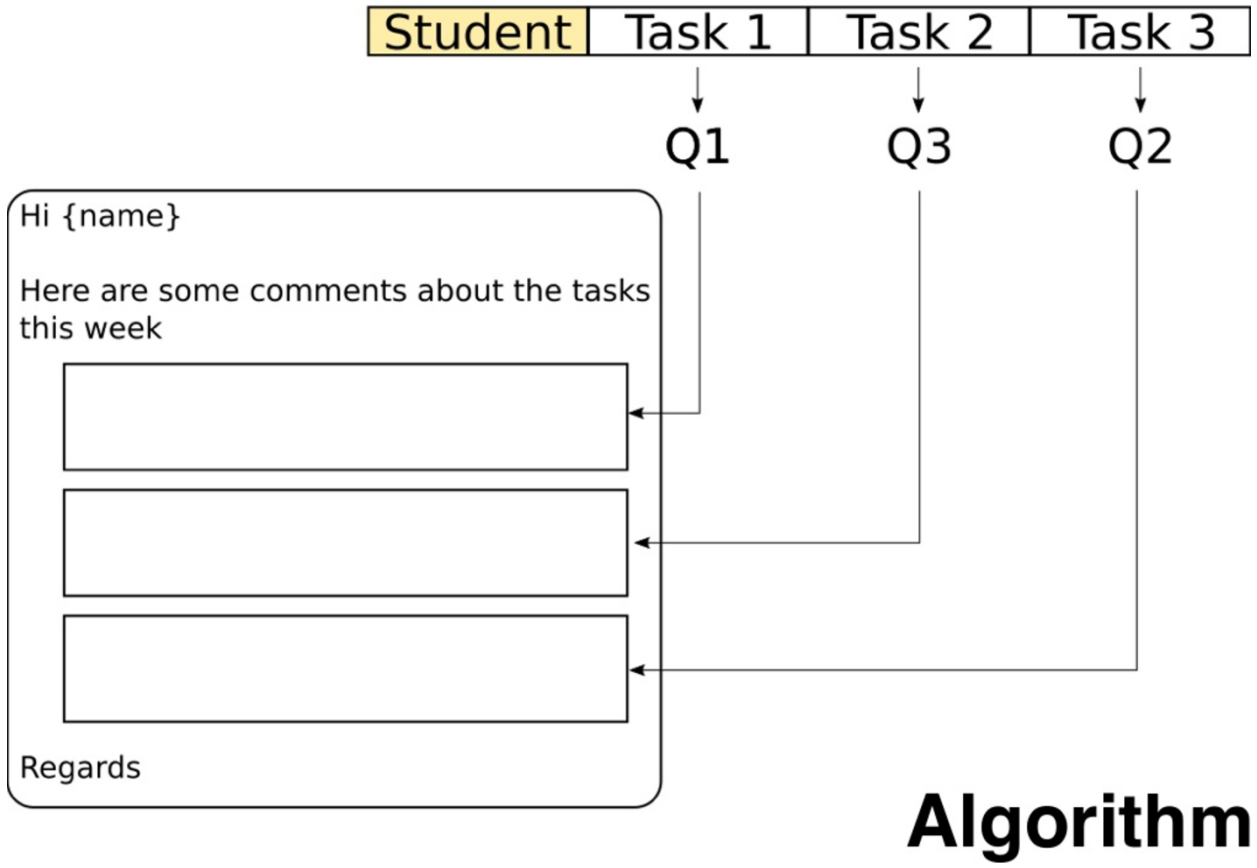
http://ontasklearning.org

Analytics-based feedback



Pardo, A., Jovanović, J., Gašević, D., Dawson, S. (2019). Using Learning Analytics to Scale the Provision of Personalised Feedback. *British Journal of Educational Technology,* 50(1), 128-138.

Analytics-based feedback



Pardo, A., Jovanović, J., Gašević, D., Dawson, S. (2019). Using Learning Analytics to Scale the Provision of Personalised Feedback. *British Journal of Educational Technology,* 50(1), 128-138.

Analytics-based feedback

Hi [redacted]

Here are some comments and feedback about your lecture preparation in ELEC1601 during Week 2.

Automatic Email

Activity VIDEO: Encoding in base 2, 8 and 16

- Make sure you review again the whole content explained in the video of the activity. You could use a piece of paper and try to replicate the developments that are explained in the video.
- Give another round to the questions next to the video in this activity until you answer all of them correctly at the first attempt and without looking at the solutions.

VIDEO: Review of natural and integer number encoding

- Make sure you review again the whole content explained in the video in the activity. Encoding naturals is a procedure that you will be using very frequently in the following weeks.

VIDEO: Encoding Integers

- Review again the 2s complement encoding explained in the video in the activity. Repeat the procedure until you are able to do it very fast.
- You should give it another try to the questions next to the video in this activity. Try to work in the encoding until you have no incorrect answers in a full round.

Read about the floating point representation

- Good work with the questions in the section. You may take some of them and create variations (change number of bits for example) to make sure you fully understand the concepts.
- You should give it another try to the questions about range, accuracy and precision in section 2.7.2.
- Good work with the questions in section 2.7.3.

Sequence of problems about information encoding

- Good work with the exercises in the sequence. You may want to review it in a few days, or perhaps before the midterm.

Regards

Pardo, A., Jovanović, J., Gašević, D., Dawson, S. (2019). Using Learning Analytics to Scale the Provision of Personalised Feedback. *British Journal of Educational Technology,* 50(1), 128-138.

Learning analytics can measure learning progression

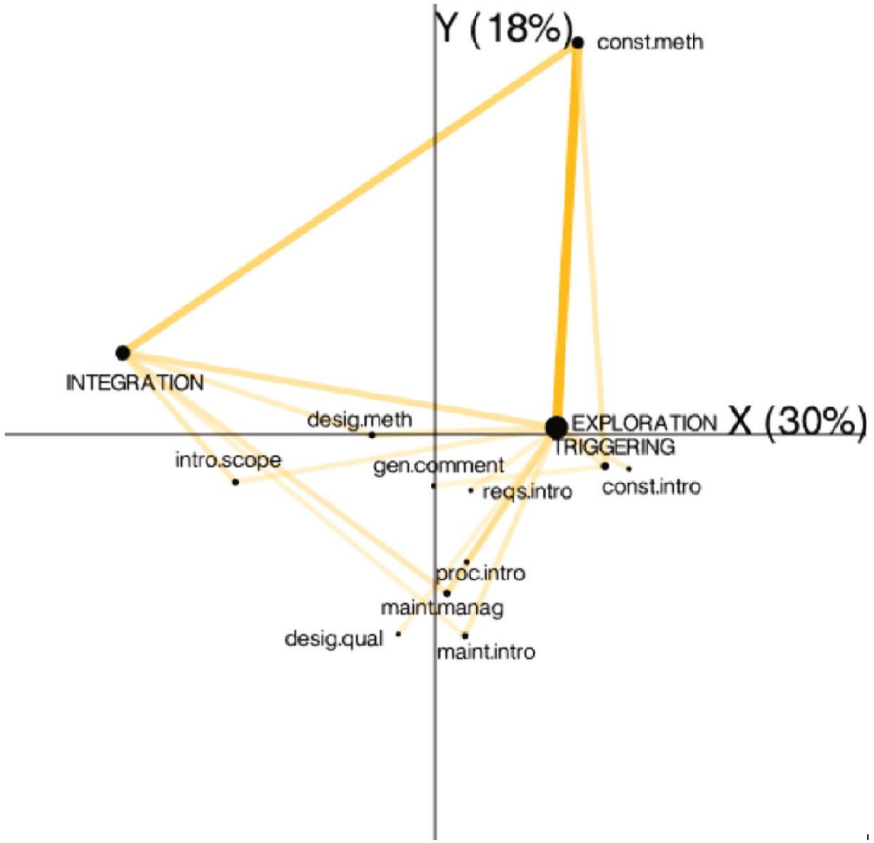
Critical thinking, second language dialogue, time management, and learning strategy

Pardo, A., Jovanović, J., Gašević, D., Dawson, S. (2019). Using Learning Analytics to Scale the Provision of Personalised Feedback. *British Journal of Educational Technology,* 50(1), 128-138.

Tracking progression

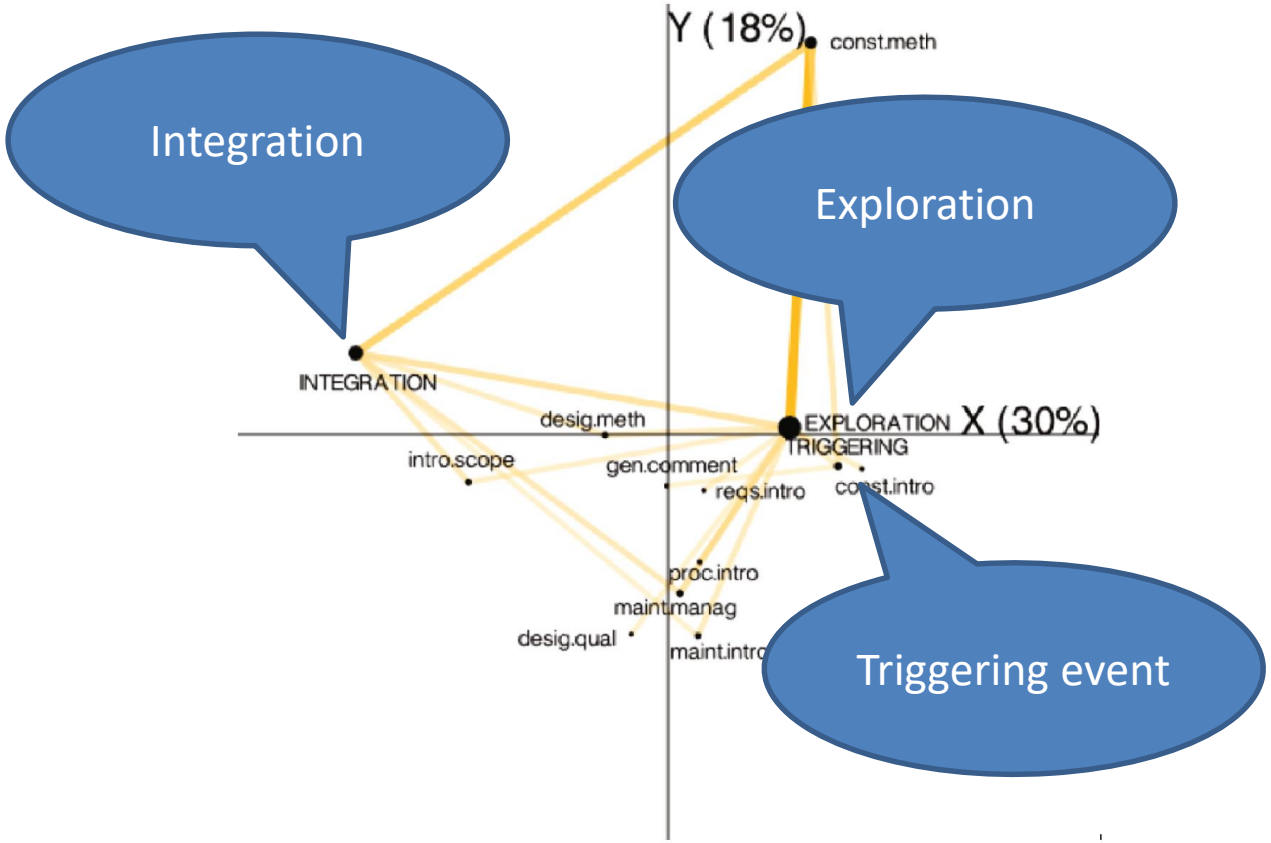
Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *The Internet and Higher Education*, *10*(3), 157–172. https://doi.org/10.1016/j.iheduc.2007.04.001

Tracking progression



Ferreira, R., Kovanović, V., Gašević, D., & Rolim, V. (2018). Towards Combined Network and Text Analytics of Student Discourse in Online Discussions. In *Proceeding of the 19th International Conference on Artificial Intelligence in Education* (pp. 111-126).

Tracking progression



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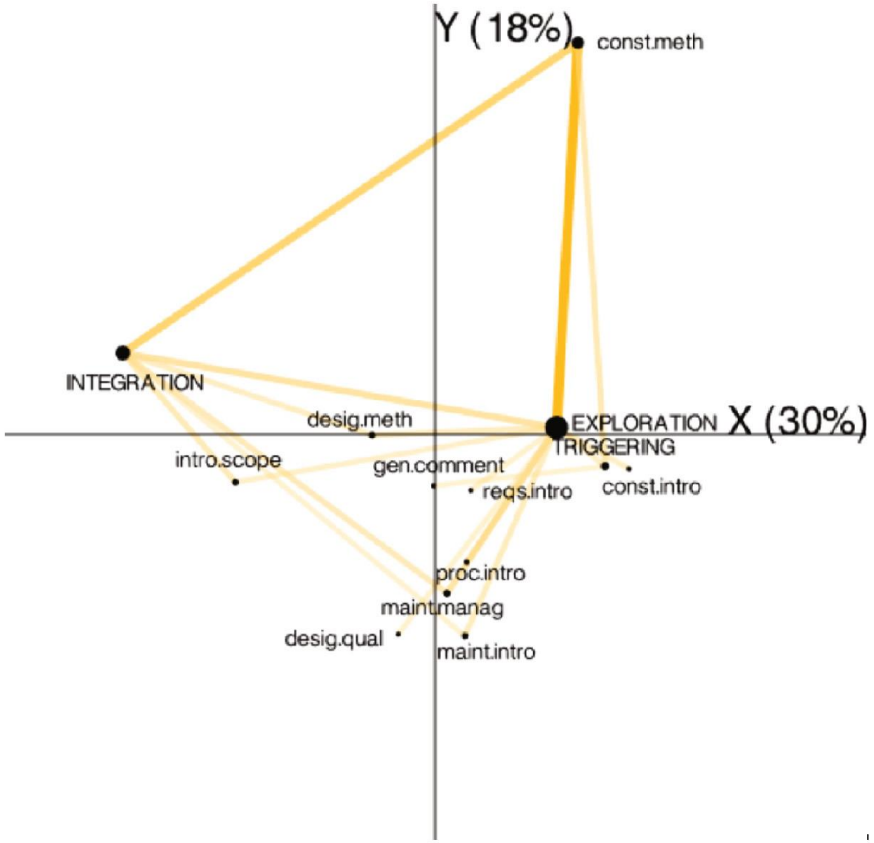
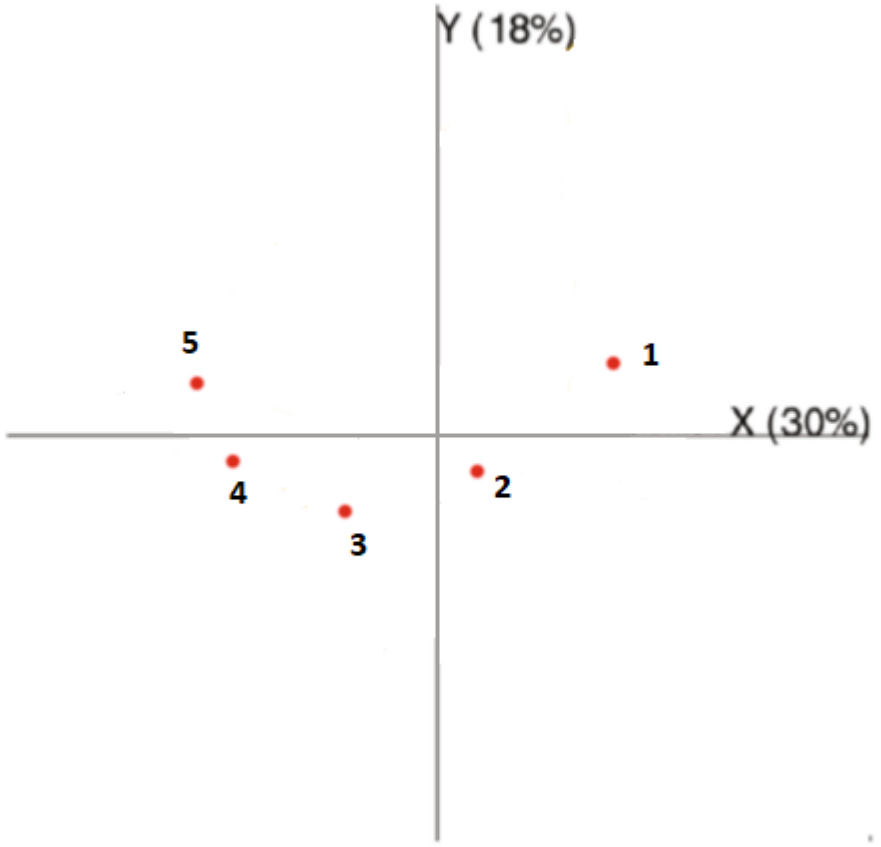
Tracking progression





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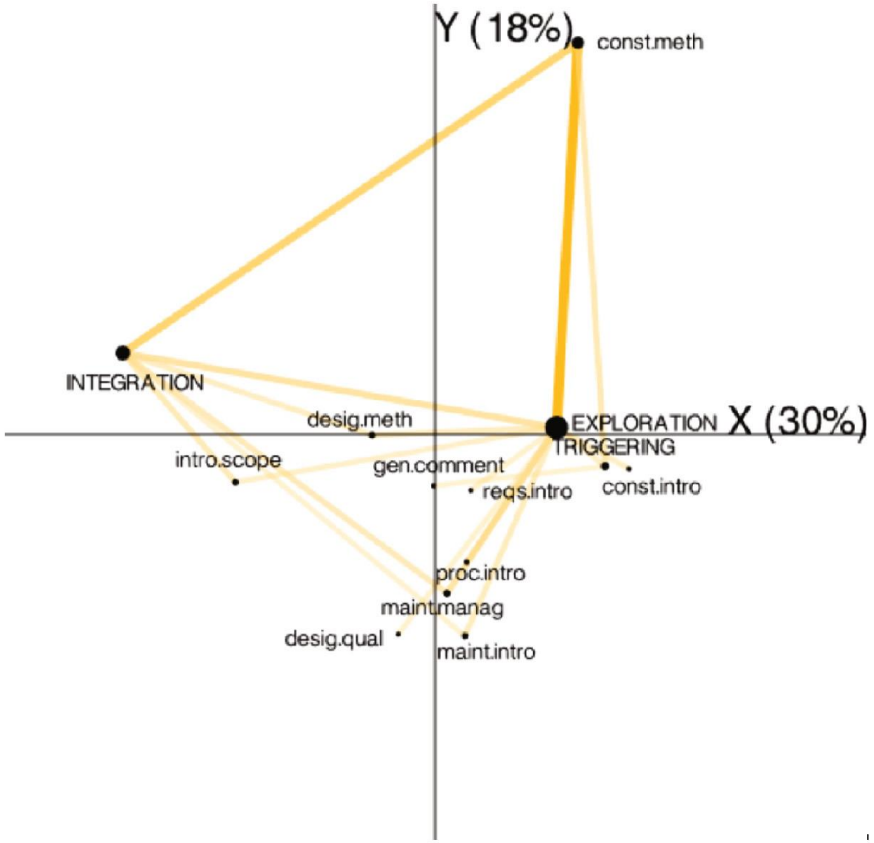
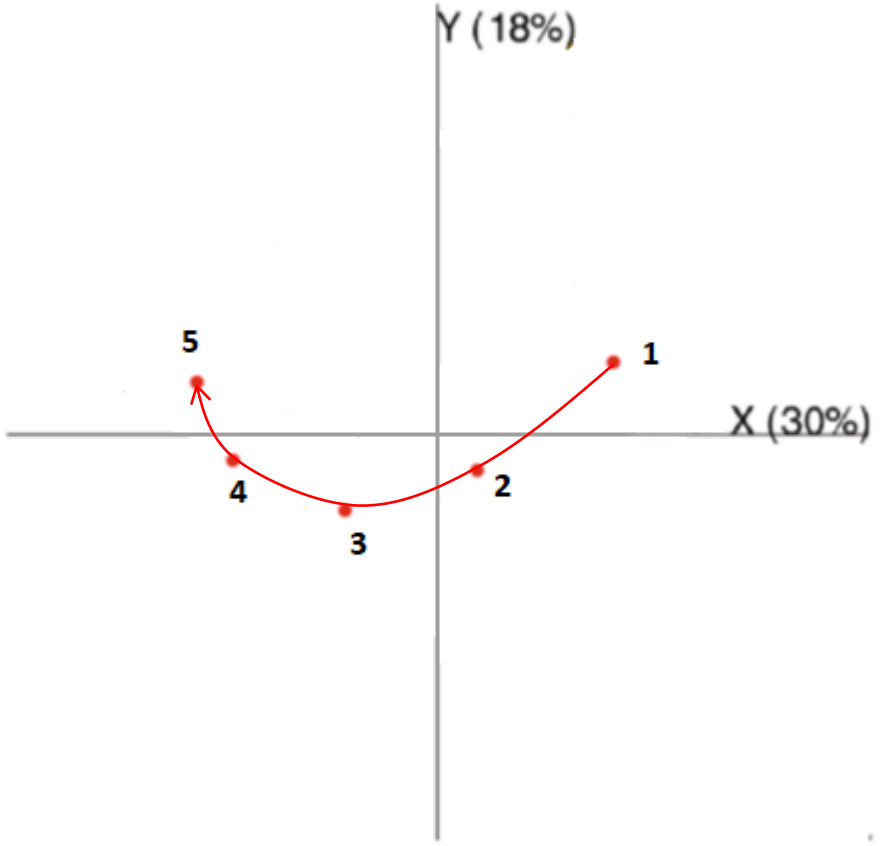
Tracking progression





Ferreira, R., Kovanović, V., Gašević, D., & Rolim, V. (2018). Towards Combined Network and Text Analytics of Student Discourse in Online Discussions. In *Proceeding of the 19th International Conference on Artificial Intelligence in Education* (pp. 111-126).

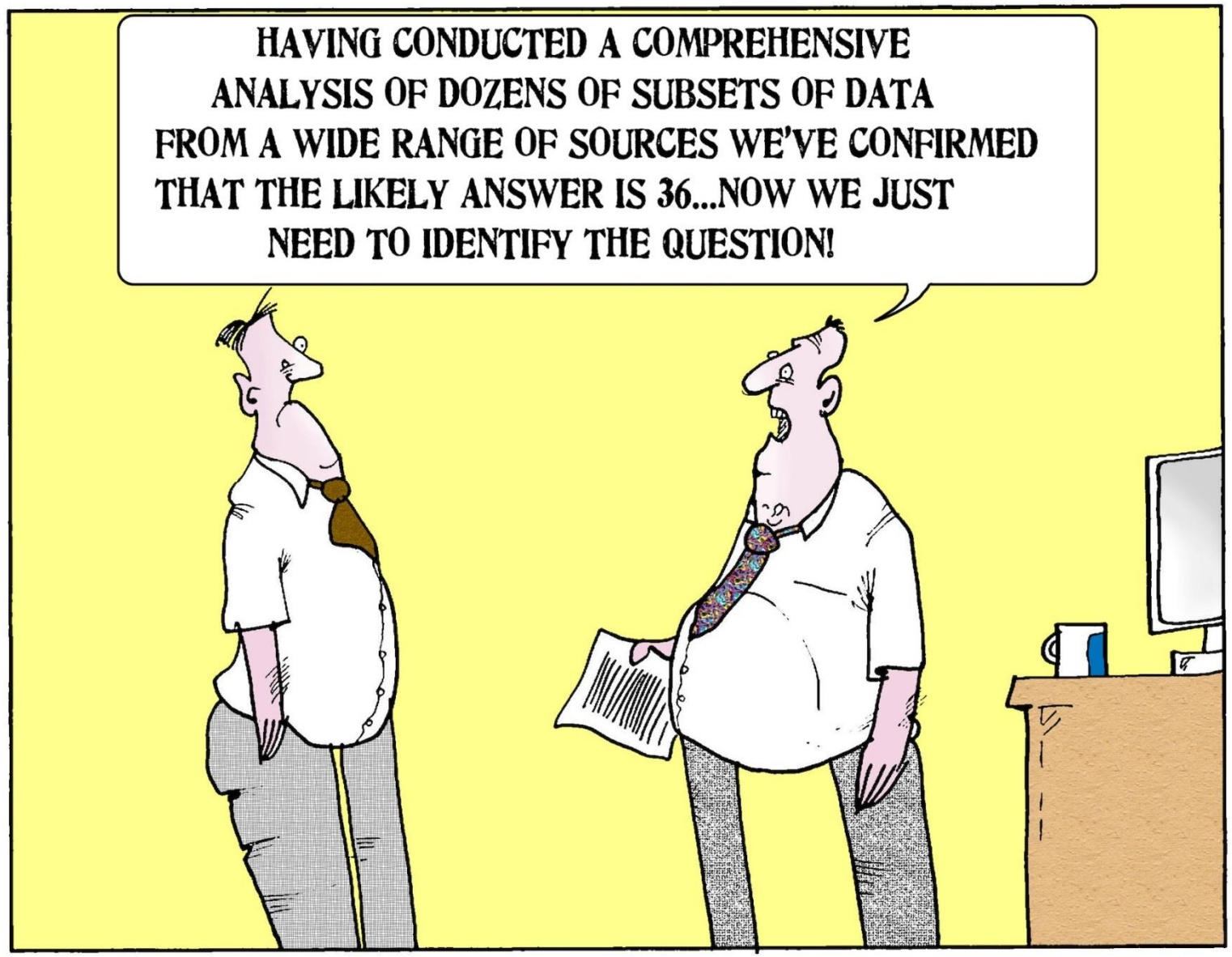
Learning analytics can offer insight in effectiveness of course design

LOCO-Analyst and Loop

Bakharia, A., Corrin, L., de Barba, P., Kennedy, G., Gašević, D., Mulder, R., … Lockyer, L. (2016). A Conceptual Framework Linking Learning Design with Learning Analytics. In *Proceedings of the Sixth International Conference on Learning Analytics & Knowledge* (pp. 329–338). New York: ACM.

DARK SIDE OF LEARNING ANALYTICS

Learning analytics can be misused in decision making


HAVING CONDUCTED A COMPREHENSIVE ANALYSIS OF DOZENS OF SUBSETS OF DATA FROM A WIDE RANGE OF SOURCES WE'VE CONFIRMED THAT THE LIKELY ANSWER IS 36...NOW WE JUST NEED TO IDENTIFY THE QUESTION!

Counting quantities of teacher activity is not a measure of quality

Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *The Internet and Higher Education*, *10*(3), 157–172. https://doi.org/10.1016/j.iheduc.2007.04.001

Teacher dominant role in online activities can be pedagogically unsound

Teacher dominant role in online activities can be pedagogically unsound

Social knowledge construction

Schrire, S. (2006). Knowledge building in asynchronous discussion groups: Going beyond quantitative analysis. *Computers & Education*, *46*(1), 49–70. https://doi.org/10.1016/j.compedu.2005.04.006

Teacher dominant role in online activities can be pedagogically unsound

Externally facilitated regulation and role assignment

Gašević, D., Adesope, O., Joksimović, S., & Kovanović, V. (2015). Externally-facilitated regulation scaffolding and role assignment to develop cognitive presence in asynchronous online discussions. *The Internet and Higher Education*, *24*, 53–65. https://doi.org/10.1016/j.iheduc.2014.09.006

Teacher dominant role in online activities can be pedagogically unsound

Central role of the teacher welcome at the start only

Lockyer, L., Heathcote, E., & Dawson, S. (2013). Informing Pedagogical Action Aligning Learning Analytics With Learning Design. *American Behavioral Scientist*, *57*(10), 1439–1459. https://doi.org/10.1177/0002764213479367

Interpretation of patterns in data must be done with care

Interpretation of patterns in data must be done with care

Counts of student-teacher interaction negative predictors

Joksimović, S., Gašević, D., Loughin, T. M., Kovanović, V., & Hatala, M. (2015). Learning at distance: Effects of interaction traces on academic achievement. *Computers & Education*, *87*, 204–217. https://doi.org/10.1016/j.compedu.2015.07.002

Learning analytics can have some issues with validity

How accurate is time on online measurement?

Kovanović, V., Gašević, D., Dawson, S., Joksimović, S., Baker, R. (2015). Does Time-on-task Estimation Matter? Implications on Validity of Learning Analytics Findings. *Journal of Learning Analytics, 2*(3), 81-110.

Analytics are mostly depended on (the quality of) online activities

Kovanović, V., Gašević, D., Dawson, S., Joksimović, S., Baker, R. (2015). Does Time-on-task Estimation Matter? Implications on Validity of Learning Analytics Findings. *Journal of Learning Analytics, 2*(3), 81-110.

Prediction of learning outcomes is not the same across all units/courses

Gašević, D., Dawson, S., Rogers, T., & Gasevic, D. (2016). Learning analytics should not promote one size fits all: The effects of instructional conditions in predicting learning success. *The Internet and Higher Education*, *28*, 68–84. https://doi.org/10.1016/j.iheduc.2015.10.002

FINAL REMARKS

Learning analytics and evaluations to be just components of teaching portfolios

Burdsal, C. A., & Harrison, P. D. (2008). Further evidence supporting the validity of both a multidimensional profile and an overall evaluation of teaching effectiveness. *Assessment & Evaluation in Higher Education, 33*, 567–576. doi:10.1080/02602930701699049

THE UNIVERSITY *of* EDINBURGH

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Learning analytics principles

Incomplete data and human involvement

Algorithms can perpetuate bias

Learning analytics not used to monitor staff performance

The University of Edinburgh (2017). Learning Analytics Policy, https://www.ed.ac.uk/academic-services/policies-regulations/learning-and-assessment/learning-analytics

Skills for data-informed decision making

Tsai, Y. S., & Gasevic, D. (2017). Learning analytics in higher education – challenges and policies: a review of eight learning analytics policies. In *Proceedings of the Seventh International Learning Analytics & Knowledge Conference* (pp. 233-242).

Embracing complexity of educational systems

Development of analytics culture

Manyika, J. et al. (2011). *Big Data: The Next Frontier for Innovation, Competition, and Productivity*. McKinsey Global Institute, http://goo.gl/Lue3qs

MONASH University

EDUCATION FUTURES

The role of learning analytics for evaluation in higher education

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