Evidence for Enhancement:
Improving the Student Experience

Learning Analytics Hot Topic: Dashboard design

Heather Gibson and Alan Clarke
The Open University

It is particularly important that institutional staff understand the data that is being presented to them, as they will use it to design interventions that will directly impact on the student learning experience. It is also important that they have the right data to help do this. Students need to understand what is being presented to them via dashboards so that they can monitor their performance and understand what they need to do to improve (student-facing dashboards in this context tend to focus on providing feedback on learning to students as their purpose). Much of the work carried out in learning analytics around dashboard design has focused on student-facing dashboards. This might suggest an assumption that institutional staff understand what dashboards are telling them, this is an assumption that could perhaps be investigated in more detail.

However, there have been some insights from learning analytics about dashboard design for institutional staff. Sclater, Peasgood and Mullan (2016) reported that the New York Institute of Technology has developed a staff dashboard to assist staff to decide on what to do to support learners who were predicted to be at risk. The prediction identified correctly three-quarters of the students who would drop out. The dashboard allowed staff to be informed of the prediction in a timely manner so that they could take immediate action to help the individual learners. In this case, the dashboard was presented as a table with one line for each student and designed to be intuitive as possible. In addition, Webb and Bailey (2018) emphasise the importance of presenting information using terms with which tutors and students are familiar. Dashboard design therefore needs to take into account the needs of the user (what the user will use the data for), and the data capability of the user (the ability of the user to understand the data presented to them).

The current design of dashboards *for students* is probably best described as 'one-size fits all' (Jivet, 2018), with little consideration given to differences between learners, such as motivational factors. In a systematic literature review of papers looking at dashboard design for learners, Jivet et al (2017) identified that only approximately half the papers reviewed 'explicitly mentioned' some kind of pedagogical theory underpinning the design. These were categorised into six distinct types: cognitivism, constructivism, humanism, descriptive

models, instructional design and psychological.

The paper argues for careful consideration for dashboard design for learners: what information is presented may communicate particular messages, which may or may not be helpful. 'Social framing' - learners being able to compare their performance against their peers - might promote the message that success is about 'being better than others' rather than about 'mastering knowledge, acquiring skills and developing competencies' (Jivet, Scheffel, Drachsler, & Specht, 2017). Comparing performance with others can be motivating for some learners, but not for others.

Bennett, presenting the results of a Society for Research into Higher Education (SRHE) study on learners' responses to dashboard design, offered a range of conclusions including that learner dashboards should:

1   recognise that learners are motivated by different factors
2   show individual learning routes and trajectories
3   allow learners to customise what information they can use and in what format
4   make it easy or explicit about how learners act on the information presented to them
         in the dashboard

(Bennett, 2018).

Knight et al (2015) address issues around stakeholders being involved in design by using participatory design (PD) to develop a learning dashboard for engineering students. This is best illustrated through Figure 1 below, which compares a 'traditional' dashboard design process (they describe this as 'for stakeholders' with the PD process (design with stakeholders)). Note the emphasis at all stages on interaction and discussion with relevant stakeholders.
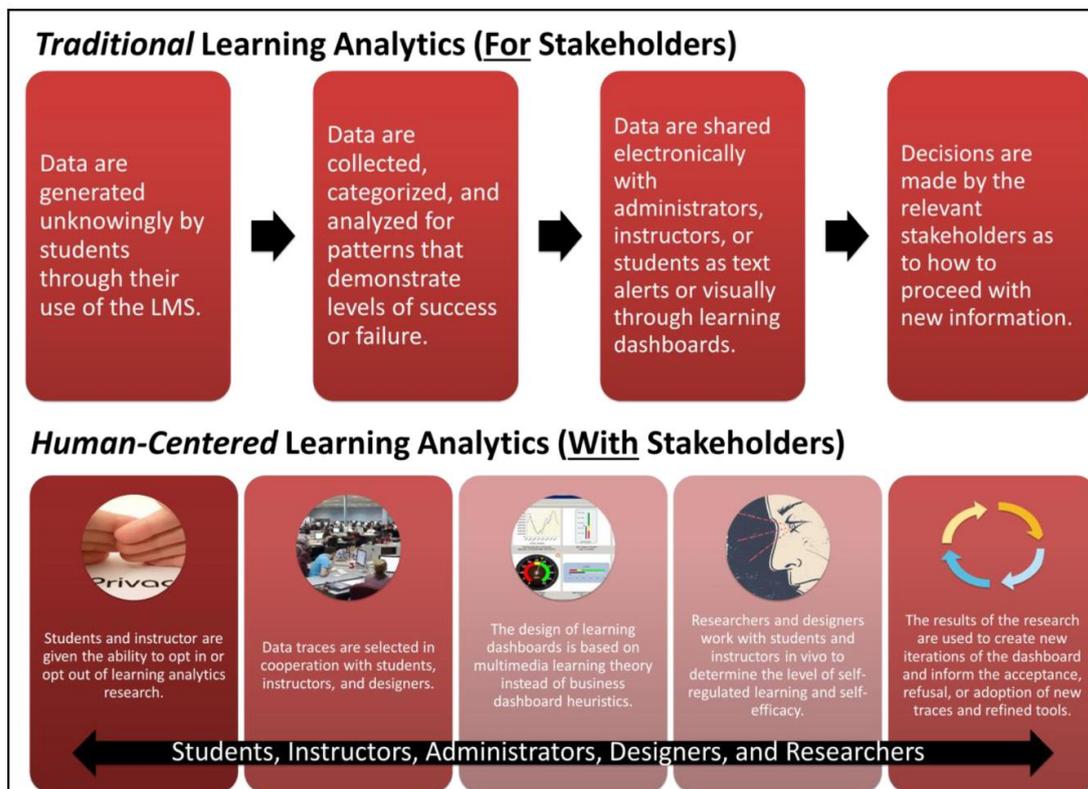

Figure 1: a participatory design framework (from Knight et al, 2015)

Participatory design is also identified by Gunn et al (2017) as being a 'powerful strategy to ensure that the sophisticated learning analytics tools that are the result of generous investment in research and development are actually fit for the users and purposes they are intended'.

Discussion about dashboard design must address accessibility for disabled students. Jisc highlights the need for all information presented on a dashboard to be offered in an accessible format so that a disabled student can use the data.[1] The design of visualisations needs to consider the use of assistive aids such as screen reader as well as the needs of other groups of students and tutors (for example, dyslexia).

These pieces of work emphasise the need to consider the needs of stakeholders and anticipate the potential effects (positive and negative) that presenting data in particular formats will have. Although these refer to students as the primary stakeholders, these comments are equally relevant to dashboards used by institutional staff for the reasons noted at the beginning of this paper. Knight et al's (2015) work which uses a participatory design involving stakeholders at all stages of the process, might be one way in which to address these issues. Like the other aspects of learning analytics discussed in this paper, the key message here is that for a dashboard to be fit for purpose, the design process needs to be opened up beyond learning analytic units to include the wider institution and student population.

References

Bennett, L. (2018). *Challenges to the Design of Learning Dashboards.* Jisc.

Gunn, C., McDonald, J., Donald, C., Milne, J., & Blumenstein, M. (2017). *Building an evidence base for teaching and learning design using learning analytics.* Wellington: Ako Aotearoa - The National Centre for Tertiary Teaching Excellence.

Jivet, I. (2018). Adaptive learning analytics dashboard for self-regulated learning. *8th Conference of Learning Analytics and Knowledge (LAK18).*

Jivet, I., Scheffel, M., Drachsler, H., & Specht, M. (2017). Awareness Is Not Enough: Pitfalls of Learning Analytics Dashboards in the Educational Practice. *Data Driven Approaches in Digital Education*, (pp. 82-96).

Knight, D. B., Brozina, C., Stauffer, E., Frisina, C., & Abel, T. (2015). Developing a learning analytics dashboard for undergraduate engineering using participatory design. *ASEE Annual Conference and Exposition.* Seattle, WA: American Society for Engineering Education.

Sclater, N., Peasgood, A., & Mullan, J. (2016). *Learning analytics in higher education: a review of UK and international practice.* Jisc.

Webb, M., & Bailey, P. (2018). Scaling Nationally: Seven Lesson Learned from Jisc's National Learning Analytics service. *Eighth International Learning Analytics and Knowledge Conference.*

---

[1] accessibility.jiscinvolve.org/wp/2017/01/09/an-inclusive-approach-to-learner-analytics.