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Students' learning responses to receiving dashboard data

Research report

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Contents

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Acknowledgement

Executive summary

This scoping study aimed to explore the under researched areas of undergraduate students' responses to the use of learning dashboards. Learner dashboards are a graphical interface that manipulate and present to the student data about their learning behaviours (attendance, visits to the library, attainment etc.). The study involved twenty-four final year undergraduate students in a single faculty in a UK university and focussed on the ways they interpreted and responded to seeing data about their learning presented via a learner dashboard. Due to the small scale nature of the study, and the way that the data was gathered through (human mediated) interviews, caution is needed to generalising from the study's findings.

Key findings

The study suggests that, similar to feedback literacy (Sutton 2012), there is a type of literacy associated with dashboards that has components of knowing, becoming and acting and that employing these concepts helps us to understand how students' respond to dashboards. By identifying students' engagement with dashboards as a literacy practice rather than a technical skill or understanding, the study argues that we need to focus on students' growing identity that is embedded into a sense of being and is individually experienced and constructed. The notion of 'dashboard literacy' suggests that institutions, as they develop their use of learner dashboards, should find mechanisms to ensure that students engage with all three dimensions of dashboard literacy (knowing, becoming and acting).

The study provides evidence that most students, even those with lower marks, are motivated by seeing their data presented in a dashboard format and this can lead to changes in behaviour which are likely to lead to improved student outcomes and attainment.

It illustrates how students' engagement with dashboards is highly individual and dependent on their personal disposition and orientation to learning. Hence their use needs to be treated cautiously recognising the power that these tools have to impact on students' well-being.

The study suggests some practical approaches to adoption of learner dashboards that flow from the findings.

Main report

Context and rationale

Dashboards are the graphical interface that manipulate and present data about students' learning behaviours (attendance, visits to the library, which books they take out, their attainment etc.). Although only a few UK HEIs have developed a dashboard for students, most other UK HEIs have an aspiration to develop their use (Sclater 2014).

Learning analytics take students' behaviours as "proxies for learning" and in doing so they simplify and codify learning in terms of what they are able to measure. There have been critical views of other uses of such top down technologies including Land and Bayne's (2002) analysis of the VLEs that applied Foucault's (1977) metaphor of the panoptican, a prison designed for easy surveillance which brings about compliant behaviours even when prisoners are not being watched. Similarly, MacFarlane has critiqued the way that the UK higher education audit culture uses measures of student performance as proxies for their development (cognition) (2017, p.47). Gourlay (2017) has problematised the notion of student engagement which is complex and often not visible and notes that the term student engagement as defined by Trowler (2010) and Coates (2007 in Trowler 2010), misses out on the invisible, the intangible and the process aspects of learning (interlocution). She argues that the notion of time on task is problematic and leads to a 'tyranny of participation' (2015, p.405). These critiques of top down approaches to defining and measuring learning provide a critical lens to understand the limitations of dashboards.

Research into use of dashboards is in its early stages with some evidence of their positive impact on student engagement leading to improvements in student motivation, retention, satisfaction and attainment (Duval, Verbert, Klerkx, Govaerts, & Santos 2013; HEA 2014; Sclater 2014; UCISA 2015). However, much of the focus of the research is on the technical aspects of collecting and analysing data (Papamitsiou & Economides 2014; Jivet, Scheffel, Drachsler, & Specht 2017) with little understood about how students respond to seeing data presented in this form (Duval et al. 2013). One particularly significant study examined which educational concepts underpin the design of student facing dashboards underpinning (Jivet et al. 2017) based on a literature review of 26 papers. They found that the majority of papers employ self-regulated learning, but do so in a limited way with attention to only the metacognitive processes associated with self-regulated learning. Instead they argue that the use of self-regulation principles need to incorporate changes that are cognitive, emotional and behavioural for instance through helping students to engage with activities such as goal setting.

This scoping study aimed to understand the way that students respond to learner dashboards as areas that is under researched (Jivet et al. 2017; Lester, Klein, Rangwala, & Johri 2017).

The aims were to investigate:

- undergraduate students' response to receiving feedback on progress;
- the impact that different ways of presenting data (for example qualitative, quantitative, benchmarked, signposting further action, mediated by personal tutors) has on students' learning response.

Research questions

1. Can certain aspects of design of feedback on progress (e.g. use of language and the way that interventions are signposted to students) support positive student engagement in their learning?

2. What are students' response to information about their progress from a learner dashboard?

3. How does the data collected in this study open up new ways of theorising institutional use of data?

Methods

The study was small scale, using two methods of data gathering: focus groups and semi-structured interviews.

Focus groups

Initially two focus groups were undertaken to establish which types of data presentation would support students' positive engagement (the study's second research question). Students were asked to evaluate ten dashboard elements see Appendix A (figure 1a to 1f). The elements were derived from researching dashboards used at other HEIs both in the UK and internationally. Mock up designs in paper format were created, and students, working in pairs, discussed their response and noted their views of these elements by annotating each element.

Interviews

Following the focus group, individual interviews were held with twenty-four students. Each student was given a dashboard containing their own data. The design of the dashboard was based on the evaluation of the dashboard elements obtained during the focus groups. An example dashboard is shown in Appendix B. The interviews were semi-structured around three open interview questions:

- What is your response to seeing the dashboard elements containing your data?

- What action would you take as a result of seeing your dashboard?

- Whose responsibility do you think it is to act on the results of your dashboard?

Sample

The sample was final year undergraduate students within the School of Education at a single case study UK higher education institution. The sample for the focus group and first round of interviews consisted a self-selecting group of 10 students. The second round of interviews involved a 14 final year students from a cohort of 16 students.

The academic range of the sample was varied, with students in the first round of interviews ranging from 1st to 168th (out of 178) in their cohort and for the second round ranged from 1st to 16th (last) in their cohort. Their on-track score, which showed the predicted class of degree, ranged from 51% to 74% for the first round, and 58% to 76% for the second round. The dashboard also presented each student with their performance in a recent assignment: some (12) were doing better in this assignment mark was better than their overall average, some (17) worse, and some (5) the same. This suggests that the study had the potential to uncover a range of emotional responses to the assignment data, not just being pleased that this assignment was raising their average mark up or disappointment that it was lowering their average mark. For round 2 the sample had significant variation in the academic range of the students including 14 out of 16 students from a whole course group thus ensuring that the sample contained more than the most eager ones.

Ethics

The study was sensitive in nature, given its focus on students' academic performance. Ethical concerns related to providing data about progress to students which might negatively impact on their well-being. These students were all in their final year, a time of increased anxiety and pressure as they come towards their final pieces of assessed work that will determine their degree classification.

BERA principles informed the study (2011). Participation was voluntary, so students made informed choice about what they would get out of participation. The value to the students was that they would get some first-hand experience of data gathering which might benefit them in terms of being able to apply this understanding to their own research. In addition, providing students with data about their progress has been found to support positive student engagement and retention (see the rationale for the study). In the design of the study we, the researchers, were aware of the responsibility that we had for supporting students' positive experience of receiving data about their progress. We did this by preparing carefully to ensure that all the data presented was valid, and by helping students to interpret their data in a way that would encourage positive outcomes. For instance, explaining how the on-track score was calculated and how it will change as

future results are entered (we explained how the details of the final degree classification is arrived at by explaining that the lowest mark is dropped from the calculation of the final degree classification and talked in particular how the student's current on-track score could be improved). Students all appeared to value this discussion and find it motivating. Students' identity has been anonymised through the use of pseudonyms.

Findings

Table 1 identifies the dashboard elements (found in Appendix A) and how they were scored during the focus group.

Dashboard element		Type of element	Score
Figure 1a	Attendance Data	Pie chart	19
Figure 1e	On track for chart	Slider	18
Figure 1j	Course Summary	Table	14
Figure 1f	Library Data	Pictoral	13.5
Figure 1b	Assignment Details	Text	12
Figure 1d	Distribution of grades	Bar chart	12
Figure 1c	Personal Tutor Data	Text	9
Figure 1a	Emoticon/word input	Pictoral	5
Figure 1h	Word cloud	Pictoral	3.5
Figure 1i	VLE Activity	Line graph	1

Table 1 Scoring for the elements of dashboard shown in Appendix A (maximum score 20 using Likert Scale on 0 Dislike very much; 1 Dislike; 3 Like; 4 Like very much)

The elements that evaluated most highly were those that had a simple, clear presentation of data, for instance the pie chart showing a student's attendance. The uncluttered slider showing predicted degree classification was also valued by students:

> *But it does show it (the on track score) quite simply (India)*

> *It makes (the on track score) easier to understand (Asmah)*

This simple display helped students to understand their predicted degree classification and is contrary to Lester et al. (2017 p.72) who found that students privilege their own assessment of current performance over the predictive dashboard data. The reason for this difference is likely to be the complexity of the degree classification algorithm (which takes an average of the best 210 out of 240 intermediate and honour credits, and which none of the students appeared to be familiar with) and the importance that students attach to their degree classification.

The lower scoring elements were those that required more complex interpretation such as graphs or bar charts. This may be related to the subject specialism of the participants (education students) but concurs with Demmans, Epp & Bull (2015) who found that visualisation needs to minimise uncertainty and boost impact. Hence many students preferred the narrative description of their performance in the cohort to the graphical one.

> *when you just read it, you just think, oh it's only four per cent, whereas when you look at the chart it makes it more real sort of thing, because you're comparing yourself to others. (Nadia 13th out of 16)*

Although some students preferred the graphical presentation which they felt enabled them to see more clearly their position and thus had greater potential to motivate them to take action:

> *I think the graph's easier to understand because text you have to read but when there's a graph mine is highlighted in orange, so automatically my eye will go there. (Hamza 7th out of 16)*

This range of responses suggests that students will value being able to customise the displays to the format that they find most helpful (narrative or graphical presentation) and supports the findings of Lester et al. (2017, p.71) who found that students want tools that could be both personalised and tailored to their needs but also that allow them to remain somewhat anonymous.

Analysis

The analysis used Sutton's (2012) notion of feedback literacy to understand the data. Sutton (2012) draws on understandings of academic literacies to make the case for the notion of feedback literacy. The work of Lea and Street into the nature of students' academic practices identified the notion of Academic Literacies, which are embedded practices that exist within discipline values and norms, and have epistemological roots (1998). They suggest that academic literacy is not simply a set of discrete technical and instrumental skills which learners must master, rather academic literacies are entwined with "issues of identity and the institutional relationships of power and authority that surround, and are embedded within, diverse student writing practices across the university" (Lea and Street 1998, p.157).

Drawing on this understanding of Academic Literacies, Sutton (2012) has developed a model of feedback literacy around three interrelated dimensions: knowing, being and doing, and suggests that acquiring feedback literacy is mediated by the students' perceptions of their university teachers' identities.

In the following analysis I provide a description of each of Sutton's (2012) dimensions, knowing, being and acting, supported by quotes from the data to exemplify each dimension. I then extend this to argue that there is a particular type of literacy associated with understanding dashboards.

Knowing

Sutton (2012) describes the knowing dimension of feedback literacy as engaging with the epistemological dimension of feedback in which academics comment upon the quality and quantity of knowledge that learners have presented, and also feedback for learning which offers guidance on how academic performance can be improved. In relation to dashboards, the knowing dimension has a number of features including checking for accuracy (especially the attendance data), understanding their individual marks and their significance to their personal goals (ipsative feedback). It also involved understanding where their performance sits in the cohort (norm referenced performance) and understanding their performance relative to benchmarking criteria (criteria referenced performance).

The ipsative dimension is illustrated in the following examples where students are making sense of the dashboard and the way that it presents their data:

> *There is no point in seeing an average of everybody's marks, only because it doesn't really matter what other people get because it's only your marks that matter. (Ingrid 168th out of 178)*

> *I still got a 2.1, but it's just when it's [compared to the rest of] the group [that it looks worse].(Sazia 13th out of 16)*

One of the more challenging aspects of the dashboard is seeing how one's performance compares to the rest of the cohort - norm referenced data. Students' responses to norm referenced data were highly personal depending on their individual disposition: some students liked knowing this information as it helped them to better understand their position in the cohort. It was surprising that even those in the middle or towards the bottom of the group valued knowing their position in the cohort despite

> *Interviewer: you scored 63% but the average for the whole cohort was 64.5%. So you were ninth, so just below the average and just below half mark.*

> *Asmah: I honestly didn't think I'd done very well on the essay. So seeing it like that it does make me feel a bit better to be honest. (Asmah 9th out of 16)*

In contrast some high performing students did not like to compared themselves to others:

> *I'm happy with that [mark of 75%] but I don't think I still need to know what position I'm in. Because I know that I've done better than the majority, so that's fine… I was happy with the grade and I've done better than the majority I still think that [positional data] kind of makes me feel I still could've done better. (Justine 15th out of 178)*

Other students were more ambivalent about seeing their mark being compared to the rest of the cohort:

> *I mean I would like it to be higher but, because I know it's not one of my best. I do like it because you can see kind of where you are, but then it kind of makes me think eighty-two people are better than me. (Jasmin 83rd out of 178)*

> *Not really that bothered because if you already know your grade and you know that you didn't do that well you know, you've kind of already guessed that you're not going to be at the highest point with everybody else. (Ingrid 168th out of 178)*

> *I never expect to be top anyway… I don't feel like I did terrible (Sareena 13th out of 16)*

Although some students at the bottom of the cohort appeared to be knocked by seeing their position:

> *When you look at the position thing, like thirteenth out of sixteen. It's a bit crap. (Nadia 13th out of 16)*

Clearly the way that students interpret their learner dashboard is highly individualised and appears to relate to their self-belief. Sutton talks about grades being polysemic, in that they signify different meanings to different students (2012, p.34). Similarly, the impact of dashboards is that they lead to students' responses that are highly varied and personal with a strong ontological dimension: there is no 'one size fits all' approach to the way that dashboards are interpreted by students. The notion of the variation in student

dispositions (Barnett 2012) helps to understand students' response to dashboards and to avoid simplistic over generalisations about how dashboards impact on students as if they are a homogenous body. Indeed, understanding this personal (ideographic) response is important because institutions need to avoid losing sight of the individual when scaling up use of data.

The final aspect of 'knowing' (understanding) dashboard feedback relates to ways that students responded to data presented in criteria referenced form. On the dashboard students were able to see their score relative to thresholds which we determined: red, amber and green flags were used to RAG rate the score that each student received see Figure 1.

Course Summary

Year	Module Code	Module Title	Credits	Mark	Grade	Status	Action Needed
16/17	DIM1130	Safeguarding Children and Young People	30	55		🚩	
16/17	DIM1330	Social Policy and Inclusion	30	68		🚩	
16/17	DIM1130	People in Action: Work with individuals and Groups	30	64		🚩	
16/17	DIU6130	Reflection and Practice	30	40		🚩	Discuss the feedback at a tutorial with the PAT

Figure 1 A student's profile with RAG rating flags

I like the flags because it's another visual aid to see, okay well if I'm green I'm good (Rebecca 1st out of 178)

if you're going through it in your first year you don't really know what you're doing and if you see [the flag saying] "need to make an appointment" you are more likely to make an appointment because you know you haven't done that well. (Ingrid 168th out of 178)

RAG rating is a technique used to benchmark: it indicates where a student's performance is acceptable (green), at risk (amber) and below the desired performance (red) and thus it makes criteria referenced judgements about what is considered to be 'good' (green) and 'bad' (red). We coding firsts and 2:1 scores (i.e. over 60%) as green whilst scores in the 2:2 range were flagged as amber (i.e. 50 to 59%), and scores below this red (i.e. below 50%). This is problematic as it imposes a set of values on the student and does not allow them agency to determine their own personal goals. Many of the participants wanted to change the way that we had RAG rated their profile to reflect their personal aspirations, see the quote from Jasmin, whilst others were happy for the institution to set the flags, see the quote from Marcia:

The thing about the green flag is some people will be getting a 2:2 and actually that will be an incredible grade for them. For me, I obviously want a first, and it is possibly still doable as long as I work my socks off. (Jasmin 83rd out of 178)

I'm happy for it [the flag colour] to be decided for me because I think it motivates me more to work harder, whereas if I set it myself I'd just [set it] too low. (Marcia 53rd out of 178).

Across all the forms of data, ipsative, norm and criteria referenced data, and all the formats of data (pictoral, narrative, graphical) it was clear that students needed help and reassurance in understanding their learning dashboard and that there was an important role of the interviewer in mediating the students' interpretations:

Interviewer: you're a bit below the average, but you probably, did you know that or is it a bit of a shock?
Sazia Yeah I sort of knew that anyway.
Interviewer   And it's only one part of the module.
Sazia It's only one part of the module.(Sazia 13th out of 16)

Becoming

Sutton's (2012) second pillar of feedback literacy is about becoming which he explains as the student's investment of their identity in their academic work. Sutton (2012) illustrates the power that feedback has to shape a student's identity which involves feelings of being worthy. For instance, that they have the ability to achieve the degree. Feedback affects students by helping to develop their self-confidence or conversely it can have a negative impact on individuals. Sutton (2012) argues that students need to recognise that accepting feedback is a process of self-development and for some learners developing their mode of educational being constitutes a challenging and anxiety-provoking experience.

When exploring the data, it was clear that similar processes occurred as students interpreted the data in their dashboard. Marcia talks about seeing herself as a 2:1 student and feeling concerned at the way the dashboard appears to show her as doing less well:

oh am I really going to graduate with a 2:2? […] Because I've always seen it as hoping to aim for a 2:1 or a first (Marcia 53rd out of 178)

The criteria referenced data presented a significant emotional challenge for many learners both those at the top and the bottom of the group. Jasmin, who was on track for a first, but who scored around the middle of the cohort in the particular assignment presented on the dashboard, conveys her disappointment: she needs to process this emotion to make sense of it and looking at the dashboard display that shows where stands in the cohort is a way to do that:

Because I was really disappointed with it [seeing her position in the group], but then seeing that maybe that is average, it's not as bad I suppose (Jasmin 83rd out of 178)

Seeing her score of 75% compared to the cohort, Justine expresses how this has a negative impact on her:

> 14 other people have still done better than me...I had thought I'd really, really topped it, I've maxed out here. And it's taken away a bit from that feeling of elation (Justine 15th out of 178)

For some students seeing their dashboard data appears to boost their self-confidence as a learner:

> So that's a bit of an ego boost isn't it? It tells you how well you're doing (Rebecca 1st out of 178)

> it's quite nice to see that I'm using it [VLE] enough but I'm definitely using it more than the others and it seems to be reflecting in my grades…. I've done better as the years have gone on and it's really shown how much university has helped me progress with my academic writing skills (Rebecca 1st out of 178)

Acting

The final dimension of feedback literacy is that of acting on feedback. It involves reading, thinking about and taking action as a result of feedback (Sutton 2012). Similarly, students needed to read and interpret their dashboard and in doing so it invoked a range of ways that they would act in response. The following quotes illustrate these action-orientated responses and demonstrate that many students felt more motivated, determined to do better and to prioritise their academic study:

> I think as soon as I saw it I decided I'm taking a month off [paid] work to just get on with my dissertation (Marcia 53rd out of 178)

> I'd work even harder to get my last module to be like, so hopefully I would get a first type of thing. (Sarah 65th out of 178)

> I think it kind of gives me motivation to try harder (India 16th out of 16)

> Nadia: On my average I'd want to get that up a bit, because I don't really like being where I am.
> Interviewer: So what would you do?
> Nadia: Stop doing work last minute. (Nadia 13th out of 16)

However, alongside the positive impact on motivation there was also evidence that providing data could be unsettling and destabilising:

> The saddest one is the core summary overall because looking back on grades that you've previously had - you can't really change them any more so you can't really do anything. (Ingrid 168th out of 178)

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> *I'd definitely just do more reading and work a little bit harder than I already do. It's a bit of a kick up the backside. But then on the other side it's a little bit demotivating at the same time (Esme 9th out of 16)*

Thus in relation to the 'acting' dimension of dashboard literacy, for most students, dashboards appeared to help them reflect on learning and to motivate learning. Much of the literature on use of dashboards has focussed on their potential to support self-regulation learning behaviours (Jivet et al. 2017) and our data supports this potential of dashboards, however they also highlight a range of ways that students engage with their dashboards that raises deeper questions of their learner identity (discussed in the being section above).

Whilst there were examples of positive learning behaviours in the data, there were ways that dashboards encouraged action that might be of questionable value. Many of the sample of students focussed on the accuracy of their attendance data and wanted to correct inaccuracies in the records of their attendance. This investment in time to correct attendance data could be seen as effort that could be better spent on other learning related activities. It also appeared to raise anxiety levels. The first thing that the last thing that Sannah comments on is the inaccuracies in the attendance pie chart:

> *The absences are because I've lost my card. I've not officially missed any …It just shows that I'm always losing things and that I need to go and get them [the absences authorised] (Sannah 1st out of 16).*

Further it illustrates MacFarlane's (2017) notions of student presentism, whereby students feel compelled to attend lectures because they are being monitored rather than because they believe that they will be a valuable learning opportunity and demonstrates how an institution's policies and practices shape students' behaviours in ways that may not be the best use of their time and effort.

Conclusions and recommendations

This scoping study has analysed some of the complexity in the ways that dashboards are understood by individual students using Sutton's (2012) dimensions of feedback literacy, knowing, becoming and acting. The findings have illustrated how these dimensions apply to students' understanding of dashboards and suggested the term 'dashboard literacy' to explain the ways that students make sense of them. By identifying students' engagement with dashboards as a literacy practice, I suggest that it involves a growing student identity and is embedded into their identity work in that it is individually experienced and constructed and not simply a technical skill or simply a matter of a cognitive understanding. Thus I suggest that institutions, as they develop use of learner dashboards, should find mechanisms to ensure that students engage with all three dimensions of dashboard literacy (knowing, becoming and acting).

The study provides evidence that the majority of students, even those with lower marks, appear to be motivated by seeing their data presented in a dashboard format and this can lead to changes in behaviour which are likely to lead to improved student outcomes and attainment. Although it also illustrates that students' engagement with dashboards is highly individual and dependent on their personal disposition and orientation to learning, and thus it suggests that it is important to provide students with choice about the way that their data is displayed and to scaffold the ways that dashboards are introduced to students to support them in their interpretation process.

The use of learner dashboards offers potential to engender positive learning behaviours, such as goal setting, and a sense of agency, however these outcomes need to be designed into a dashboard including the way that it is implemented, for instance by enabling students to customise their Learner Dashboard. As Knox (2016) has argued, the student is generally positioned as the passive recipient of the analytical process. Care is needed in relation the way that values such as trust and student agency are enacted when the driver for development of a dashboard is often linked to neo-liberal pressures such as 'improving retention and graduation rates' (Newland & Trueman 2017; Sclater 2017, p.28) and when students are subjective to other performative pressures which undermine trust between the student and the institution (Macfalane 2017, p.43).

I have illustrated how institutions need to be cautious in relation to their implementation of dashboards because of their power to valorise the sorts of behaviours and the levels of attainment that are seen to be important, valid and worthy of measurement or recognition. This is particularly evident in relation to use of criteria referenced presentations of the data. Techniques such as RAG (red, amber and green) ratings can impose values onto students and thus reduce student agency as they embed institutional goals. The values that underpin adoption of dashboards which needs to be consciously considered by institutions to ensure that learner dashboards are tools that foster and develop students as active agents in their own learning.

Institutions will need to be aware that learner dashboards are not simply technical tools, but rather need to be conceived as tools that require embedding and supporting through other mechanisms, such as personal academic tutorials or personal development planning, for their potential to be assured. As has been discussed, learner dashboards have significant potential to enhance students' self-regulatory behaviours such as motivation and engagement but beyond the learners, as their salience increases, they are likely to have an impact on a range of roles and practices within the institution.

There is a danger that students faced with their learning dashboard can become more docile and compliant. They appeared to spend a disproportionate amount of time focussing on data about their attendance reinforcing MacFarlane's (2017) notions of student performativity and presentism. The Dearing report (1997, p.8) described one of the key imperatives for higher education as "to develop a culture which demands disciplined thinking, encourages curiosity, challenges existing ideas and generates new ones". Hence design and implementation of learner dashboards need to be driven by an explicit intention of developing students' critical autonomous behaviour alongside their potential to support the institutional agendas.

Dashboards are often associated with interventions offering extra support which are targeted at particular, usually low-attaining students (Sclater & Mullan 2017, p.5). The findings have suggested that the impact of seeing interventions presented via a dashboard is likely to be emotionally charged for some students, and has the potential to have a negative impact on a student's well-being and to reinforce feelings of negativity and 'otherness' (Thomas 2017). Thus within a context of increased incidence of students' mental health, illustrated in the recent Higher Education Policy report (Brown 2017), institutions have a duty to take care how they implement dashboards.

To conclude, there is a growing expectation that data gathered about students' learning behaviours and attainment will be shared with students in the form of a dashboard and higher education institutions are investing considerable effort in their development (Sclater 2014; Newland & Trueman 2017). This study has illuminated the ways that students respond to their learner dashboard and these understandings may be of significance to the sector as these tools become more widely adopted.

The findings suggest some practical recommendations for institutions as they develop and implementation of learner dashboards:

- focus on a student's personal trajectory (ipstative data) that draws attention to their past and present scores to illuminate their learning gain;

- allow students to personalise their learner dashboard. In particular, allow students control over the way that comparisons are made with other student's performance (norm referenced data), for example by allowing students to choose whether they see their data compared to others in the cohort and, if they do, to choose who their scores are compared against. This could be the average mark for the module or cohort or to the highest performers on the module or cohort;

- embed the use of dashboards into personal development planning and or personal academic tutorial processes to ensure that each student is individually and collectively supported to interpret and plan how to act on their data;

- focus on the way that interventions are signposted with an awareness of the emotional component of dashboard feedback;

- interrogate the institutional values that underpin the adoption of learner dashboards with a particular focus on how trust and student agency are engendered and how these are translated into the principles that are driving the adoption of dashboards.

Limitations and further study

The study was based on final year students in one academic school in a single post 92 university. The extent to which the findings apply to other learners needs further. research. It is well established that the first year at university has the highest drop-out rate and involves significant transition from school or college into a higher education setting (Turner and Tobbell 2017) which will affect how students' response to learner dashboards. Further research is needed to examine how first year students respond to use of a learner dashboard with a focus on how students developing identity within higher education is mediated through these tools.

The data was gathered through one to one interviews which enabled students' interpretation of their dashboard to be mediated by the interviewee. Whereas if used at scale, students might be expected to access their dashboards unmediated by a professional. Indeed, misinterpretations of data have been reported to lead to students making erroneous judgements (Lester et al. 2017, p.68). Further research is needed into how unmediated access to dashboards affects students' interpretations and behaviours.

The design and implementation of learner dashboards are underpinned by institutional values. The Open University's *Policy on Ethical Use of Student Data for Learning Analytics* illuminates how its values of openness, student agency inform the implementation of their learner dashboards. Further investigation is suggested into the way that institutional values are reflected in the implementation of dashboards and how these values shape students' response and the ways that learner dashboards affect other parts of the institutional (such as relationships with academics, learning support staff). The work on institutional learning and assessment cultures (James 2014) might be usefully employed.

Dissemination and Planned Outputs

Conference presentations:

Students' perspectives on learning analytic dashboards Association for Learning Technology Conference, Liverpool, September 2017.

Students' learning responses to learning analytic dashboards Society for Research in Higher Education, Newport, December 2017.

Students' responses to learning analytics dashboards, Using data to increase learning gains and teaching excellence conference, Milton Keynes, January 2018.

Students' responses on learning analytic dashboards, Jisc Digifest, Birmingham, March 2018.

How do students respond to seeing data about themselves presented via a Learning Analytics Dashboard? Invited Speaker Elesig Webinar July 2018

Dashboard literacy: understanding students' response to learning analytic dashboards, Networked Learning, Zagreb, Croatia, May 2018

Planned publications:

Planned Paper *Learner dashboards in Higher Education* to Higher Education Policy (intended submission March 2018)

References

Barnett, R. (2012). Learning for an unknown future. *Higher Education Research & Development, 31*(1), 65-77. doi:10.1080/07294360.2012.642841

British Educational Research Association. (2011). Ethical Guidelines for Educational Research. Nottingham: Bera.

Brown, P. (2017). *The invisible problem? Improving students' mental health* Retrieved from http://www.hepi.ac.uk/wp-content/uploads/2016/09/STRICTLY-EMBARGOED-UNTIL-22-SEPT-Hepi-Report-88-FINAL.pdf

Coates, H. (2007). A model of online and general campus-based student engagement. *Assessment & Evaluation in Higher Education, 32*(2), 121-141. doi:10.1080/02602930600801878

Demmans Epp, C., & Bull, S. (2015). Uncertainty Representation in Visualizations of Learning Analytics for Learners: Current Approaches and Opportunities. *IEEE Transactions on Learning Technologies, 8*(3), 242-260. doi:10.1109/tlt.2015.2411604

Duval, E. E., Verbert, K. K., Klerkx, J. J., Govaerts, S. S., & Santos, J. L. J. L. (2013). Learning analytics dashboard applications. *American Behavioral Scientist, 57*(10), 1500-1509.

Foucault, M. (1977). Discipline and Punish, Panopticism. In Alan Sheridan (Ed.), *Discipline & Punish: The Birth of the Prison* (pp. 195-228). New York: : Vintage Books, 1977.

Gourlay, L. (2015). 'Student engagement' and the tyranny of participation. *Teaching in Higher Education, 20*(4), 402-411. doi:10.1080/13562517.2015.1020784

Gourlay, L. (2017). Student Engagement, 'Learnification' and the Sociomaterial: Critical Perspectives on Higher Education Policy. *Higher Education Policy, 30*(1), 23-34. doi:10.1057/s41307-016-0037-1

HEA. (2014). design4learning: from blended learning to learning analytics in HE.   Retrieved from https://www.heacademy.ac.uk/events-conferences/event9900

James, D. (2014). Investigating the curriculum through assessment practice in higher education: the value of a 'learning cultures' approach. *Higher Education, 67*(2), 155-169. doi:10.1007/s10734-013-9652-6

Jivet, I., Scheffel, M., Drachsler, H., & Specht, M. (2017). Awareness is not enough. Pitfalls of learning analytics dashboards in the educational practice. In E. Lavoué, H. Drachsler, K. Verbert, J. Broisin, & M. Pérez-Sanagustín (Eds.), Data Driven Approaches in Digital Education. EC-TEL 2017. Lecture Notes in Computer Science (Vol. 10474). Cham: Springer. Retrieved from http://dspace.ou.nl/bitstream/1820/7985/1/115_ECTEL_preprint.pdf. doi:10.1007/978-3-319-66610-5_7

Knox, J. (2016). Data power in education: Exploring critical awareness with the 'Learning Analytics Report Card' (LARC). *Television and New Media.* doi: 10.1177/1527476417690029

Land, R., & Bayne, S. (2002). Screen or Monitor? Surveillance and disciplinary power in online learning environments In C. Rust (Ed.), *Improving Student Learning using Learning Technology* (pp. 123-138). Oxford: OCSLD.

Lea, M., & Street, V. B. (1998). Student Writing in Higher Education: An Academic Literacies Approach. *Studies in Higher Education, 23*(2), 157–172. doi:10.1080/03075079812331380364.

Lester, J., Klein, C., Rangwala, H., & Johri, A. (2017). Learning Analytics in Higher Education. *ASHE Higher Education Report, 43*(5), 9-133. doi:10.1002/aehe.20121

MacFarlane, B. (2017). *Freedom to Learn*. London: Routledge.

National Committee of Inquiry into Higher Education (NCIHE). (1997). *Higher Education in the Learning Society (The Dearing Report)*

Newland, B., & Trueman, P. (2017). *Learning Analytics in UK HE 2017: A HeLF Survey Report*. Retrieved from https://helfuk.blogspot.co.uk/p/research.html

Open University. (2014). *Policy on Ethical Use of Student Data for Learning Analytics*. Retrieved from http://www.open.ac.uk/students/charter/sites/www.open.ac.uk.students.charter/files/files/ecms/web-content/ethical-use-of-student-data-policy.pdf

Papamitsiou, Z., & Economides, A. A. (2014). Learning analytics and educational data mining in practice: A systemic literature review of empirical evidence. *Educational Technology and Society, 17*(4), 49-64.

Sclater, N. (2014). *Learning analytics The current state of play in UK higher and further education*. Retrieved from https://www.jisc.ac.uk/rd/projects/effective-learning-analytics

Sutton, P. (2012). Conceptualizing feedback literacy: knowing, being, and acting. *Innovations in Education and Teaching International, 49*(1), 31-40. doi:10.1080/14703297.2012.647781

Trowler, V. (2010). *Student Engagement Literature Review*. Retrieved from https://www.heacademy.ac.uk/system/files/studentengagementliteraturereview_1.pdf

UCISA. (2015). *2014 Digital Capabilities Survey Report*. Retrieved from UCISA: http://www.ucisa.ac.uk/~/media/Files/publications/surveys/Digital_Capabilities_survey_report_2014.ashx
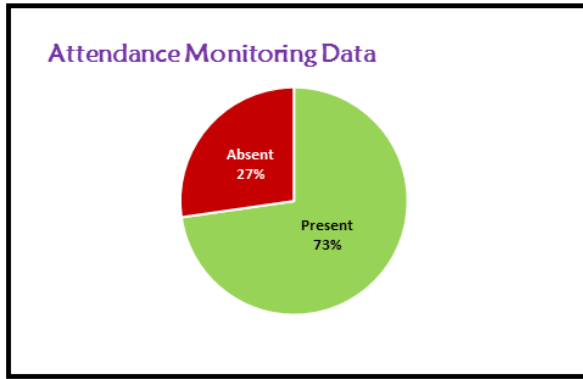
Appendix A Dashboard elements

Figure 1 a

Attendance Monitoring Data

Absent
27%

Present
73%

Figure 1 b

Latest Assignment Details:

Module: Research Methodology

Assignment: Assignment 1 – The Research Proposal

Percentage: 65%

Grade: B

Average percent for the whole cohort: 64%

Position in Cohort: 78th = out of 180

Figure 1 c

Personal Tutor Meeting Log

6/5/16 – Discussed poor draft assignment result, reasons and possible course of action.

5/3/16 – Progressing reasonably well [ASJ]

10/1/16 – Referred to Academic Support Tutor for help with correct referencing

12/9/15 – Initial meeting – all fine.

Figure 1 d

Distribution of Grades Assignment 1

First	2:1	2:2	3rd	Fail
53	69	44	14	0

you

Figure 1 e

You are currently on track for:

| Fail | Third | 2:2 | 2:1 | First |

Figure 1 f

Library Data:

Number of books currently on loan — **4**

Number of visits to the library in the last month — **8**

Number of electronic resources accessed in the last week — **15**

Figure 1 g

How are you feeling today about your course?

Click on the icon above to indicate how you are feeling about your course today and then enter a word to describe how you feel in the box here:

Figure 1 h

This word cloud is based on all the words from your cohort entered in the last 24 hours and is updated once every hour

deadline nearly hurray going feeling done struggling stress stressed handed-in easy good misunderstanding submitted completed finish enough hard hard-work difficult finished work yippee happy handed

Figure 1 i

VLE ACTIVITY - PER MONTH

VLE Activity

	Oct-16	Nov-16	Dec-16	Jan-17
Cohort Av	15.9	33.4	24.5	34.4
Student	0	3	37	5

Axis Title

— Cohort Av — Student

Figure 1 j

Course Summary

Module Code	Module Title	Credits	Mark	Grade	Status	Action Needed
DFM1030	Theories and Strategies for Learning	30	47	D	🚩	Make an appointment with your personal tutor
DFM1130	Perspectives in Learning and Development	30	55	C	🚩	None
DFM1230	Self Society and Welfare	30	65	B	🚩	None
DFM2310	Children and Young People in Context	30	45	D	🚩	Make an appointment with your personal tutor
DIM1330	Advanced Professional Practice	30	48	D	🚩	Make an appointment with your personal tutor

Figure 1a-j Dashboard elements evaluated during the focus groups

Appendix B Example Learner dashboard used in the Interview

Course Summary

Year	Module Code	Module Title	Credits	Mark	Grade	Status	Action Needed
14/15	DFM1030	Theories and Strategies for Learning	30	52	C	🚩	Discuss the feedback at a tutorial with the PAT
14/15	DFM1130	Perspectives in Learning and Development	30	67	B	🚩	
14/15	DFM1230	Self Society and Welfare	30	58	C	🚩	Discuss the feedback at a tutorial with the PAT
14/15	DFM2310	Children and Young People in Context	30	75	A	🚩	
15/16	DIM1130	Safeguarding Children and Young People	30	58	C	🚩	Discuss the feedback at a tutorial with the PAT
15/16	DIM1330	Advanced Professional Practice	30	78	A	🚩	
15/16	DIM1130	People in Action	30	77	A	🚩	
15/16	DIM2430	Languages and Communication for Effectiveness and Inclusion	30	78	A	🚩	
16/17	DHM1020	Research Methodologies	20	67	B	🚩	
16/17	DHM2630	Finding a Voice					
16/17	DHM1130	Helping in Context	30				
16/17	DHF2940	Major Study	40				

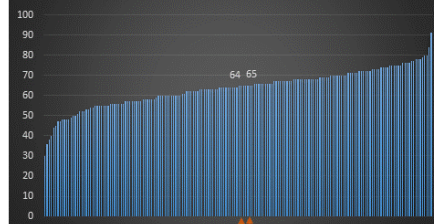## Attendance Monitoring Data:

- Self Authorised Absence 7%
- Absent 24%
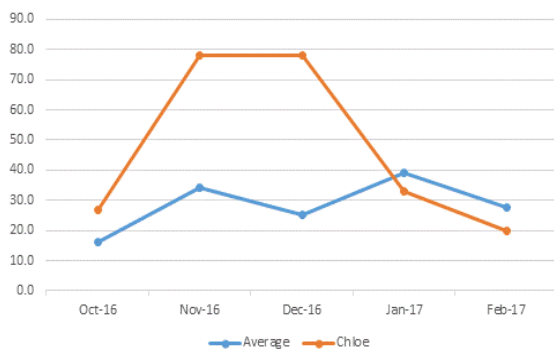- Present 69%
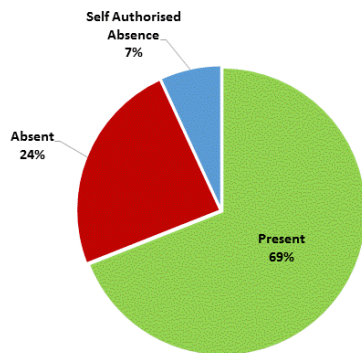
Latest Assignment Details:

Module: Research Methodologies

Assignment: Assignment 2 – The Evaluative Report

Percentage: 65%

Grade: B

Average percent for the whole cohort: 64%

Position in Cohort: 83rd = out of 178

Distribution of Marks - Assignment 2

64 65

Average | you

UniLearn Activity – per Month

Average — Chloe

You are currently on track for:

Fail — Third — 2:2 — 2:1 — First ⬆

Contact log

Date	Logged by	Initiated by	Method	Reason type	Note
18/Oct/2016 18:14:08	Alison Ryan (GORFA01)	Staff	In Person	PTM	Tutorial on 18/10/16 to discuss major study topic.

Appendix C Participants' academic profile

Round 1

	On track %	Latest assignment %	Position in the cohort (n=178)
Rebecca	74	91	1st
Pavan	73	76	11th=
Justine	71	75	15th=
Claire	71	71	25th=
Marcia	64	68	53rd=
Sarah	70	67	65th=
Jayne	70	66	74th=
Jasmin	72	65	83rd=
Kirsten	62	60	116th=
Ingrid	51	48	168th=

Round 2

	On track %	Latest assignment %	Position in the cohort (n=16)
Sannah	73	73	1st=
Lydia	68	73	1st=
Nulla	68	68	3rd=
Sidra	63	68	3rd=
Malcom	76	67	6th
Hamza	69	66	7th
Naomi	61	64	8th
Jenny	64	63	9th=
Asmah	59	63	9th=
Esme	66	63	9th=
Nadia	63	60	13th=
Sazia	62	60	13th=
Sareena	60	60	13th=
India	61	58	16th