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LINCOLN HIGHER EDUCATION
RESEARCH INSTITUTE

An Initial Evaluation of the Enhanced Engagement Priority Marker Dashboard Pilot

Professor John G. Sharp
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Executive summary

This report presents case-study findings arising from a small-scale, largely qualitative and comparative evaluation of the value and positioning of Lincoln's enhanced Engagement Priority Marker Dashboard (EPMD) as an 'early warning' and ongoing alerting system for the purposes of identifying and supporting those students 'at risk' of falling behind and dropping out of university altogether, or failing to make progress in terms of their achievement potential. Undertaken between October, 2019, and January, 2020, findings draw mainly on the interview narratives of one colleague in Planning and Business Intelligence (PBI) involved in the extensive and prior development of the dashboard itself and for setting up the EPMD for use across the period of the evaluation as a whole, four Student Support Advisors externally monitoring the dashboards of seven personal tutors recruited from a number of Schools across all four Colleges (132 students in total, 73 in the first year of study), and six personal tutors also recruited from a number of Schools across the Colleges internally monitoring dashboards by themselves (198 students in total, 139 in the first year of study).

The enhanced EPMD, at the heart of the evaluation, functioned entirely in accordance with its intended purpose and proved a valuable asset for those interacting with it directly, including the student 'beneficiaries' contacted as a result of their behaviours. In terms of recommendations, the enhanced EPMD is considered best monitored externally for the purposes of student identification and effective 'intervention' and support, given the 'personal' nature of almost all of the matters arising, but in close contact and professional dialogue with personal tutors themselves who are better positioned and able to provide 'local' context and clarification as well as to respond to more academic concerns. Recommendations also extend to consider the potential training requirements for users scaling-up (including the resource implications involved), and the potential for future developments associated with the dashboard itself should this proceed to discussion for consideration (also including the resource implications involved).

The author of this report is grateful to everyone involved in the evaluation for their openness and honesty throughout and for freely giving up their time to share their knowledge and experiences of developing the enhanced EPMD, a credit to those involved in its development and production, the personal tutoring system at Lincoln and as users of the enhanced EPMD in practice. The author accepts full responsibility for any factual inaccuracies presented in association with the enhanced EPMD and the personal tutoring system.

Contents

	Page
Executive summary	1
Contents	2
1. Introduction	3
2. Review of literature	3
3. Operationalisation of the EPMD pilot	9
4. Presentation of findings	15
<i>The Lincoln dashboard</i>	15
<i>Training</i>	16
<i>Internal monitoring</i>	16
<i>External monitoring</i>	19
- <i>Student Support</i>	19
- <i>Personal tutors</i>	21
<i>Summary usage data</i>	22
5. Conclusions and recommendations	23
<i>Monitoring solutions</i>	23
<i>Training requirements</i>	25
<i>Lincoln dashboard developments</i>	25
6. Selected references	27
Figure 1 The potential value of student dashboard use	3
Figure 2 Basic design	10
Figure 3 Dashboard logic diagram (Simon Hearn and Jacqueline Mayer)	13
Figure 4 Dashboard logic diagram (College Directors of Education)	14
Table 1 Student participants by College and year group	11
Table 2 Summary of dashboard views	23
Appendix: Guide to the Engagement Priority Marker Dashboard for Pilot Project 2019-2020	

1. Introduction

In October 2019, the Lincoln Higher Education Research Institute (LHERI) was tasked by the university to evaluate a new and enhanced version of the Personal Tutor Dashboard. Full details of the enhanced dashboard, referred to here as the Engagement Priority Marker Dashboard (EPMD), are provided as shown (see Appendix). With the assistance of colleagues in Planning and Business Intelligence (PBI), Student Affairs, Student Support and all four College Directors of Education, work began on evaluating the EPMD the following month. While not the immediate focus of this work, the commitment of those colleagues in PBI who contributed to the two-year developmental cycle associated with the enhanced EPMD leading up to the evaluation should not be overlooked.

The primary objective of this evaluation was to determine where the enhanced EPMD is best placed for the purposes of monitoring and identifying those students potentially in need of support at the earliest possible opportunity, coordinating an appropriate level of ‘intervention’ or response, and thereby reducing the risk of individuals falling behind or, at worst, withdrawing from study and the university altogether. In terms of cost-benefit analysis alone, a crude estimate of historic non-completion within the Lincoln first year and failure to progress in later years is estimated to cost in excess of £5m/year. The report which follows provides summary details of findings, together with recommendations, located and contextualised within the recent field of dashboard literature such as it exists.

2. Review of literature

The focused review of literature presented here considers the use of student dashboards as an ‘early warning’ system for tracking and identifying ‘at risk’ students particularly in the first year of study where retention for progression is ‘universally’ acknowledged as most critical, for performance management where the longer-term improvement of overall attainment and success as a direct result of targeted ‘intervention’ is most effective, for addressing differential outcomes in attainment exist and persist, and for improving ‘customer satisfaction’ more broadly (Figure 1).

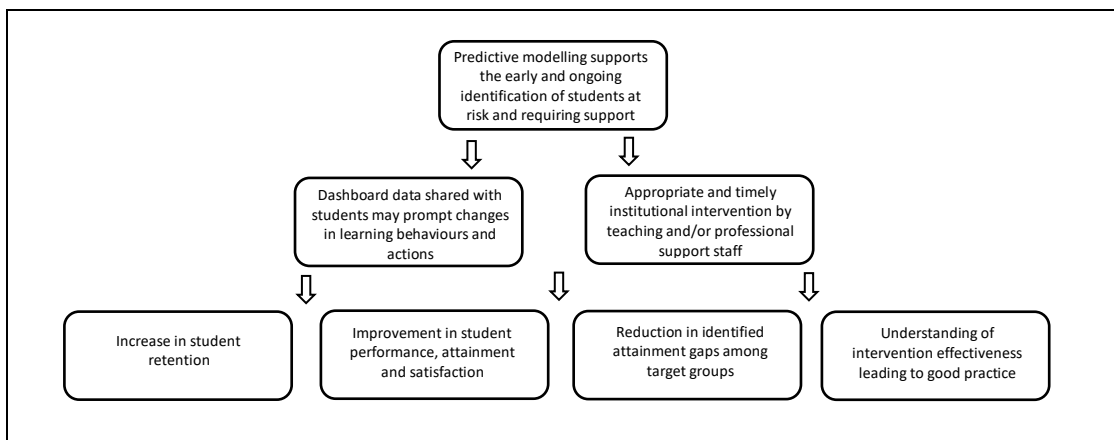


Figure 1 The potential value of student dashboard use (modified from Sclater and Mullan 2017)

2.1 International perspectives

The development and use of dashboard indicators in student affairs is of international and multi-disciplinary interest with contributions increasing in number particularly over recent years and from countries as diverse as the United States, Australia, Ireland, Belgium, the Netherlands, Switzerland, South Africa, Oman, Fiji and, of course, the United Kingdom (studies appear most frequently from the United States and Australia). From a longer history of use in business and industry as executive and data-driven information systems, dashboards made their first appearance in Higher Education in the 1990s. These continue to be designed and implemented in a bespoke and highly individualised manner, increasingly in response to the rise of learning analytics (defined most commonly as the measurement, collection, analysis and reporting of data about learners and their contexts for the purposes of understanding and optimising learning and the environments in which it occurs), hence the full term Learning Analytics Dashboards, including the centralised demand for accountability alongside the pressures attached to the deployment and use of ever-limited and diminishing resources.

As summarised by Mitchell and Ryder (2013), the best Higher Education dashboards available usually combine both form and function to synthesise, aggregate and display sometimes complex and usually readily quantifiable information on a single screen in such a simple way as to be meaningful at a glance. While these might be operational (sufficiently dynamic to track individual students and flag situations that require immediate action or a timely response), analytical (often with multiply-layered information for more longitudinal consideration) or strategic (comprising high-level metrics which document, review and help develop future plans), all are intimately linked in terms of institutional goals and objectives. Despite opportunities for dashboard systems to contribute to Higher Education transformation, student learning and student management, Mitchell and Ryder also considered an 'early' range of useful dashboard challenges:

- Technology, infrastructure and security: Including system requirements, increasingly distributed and varied learning platforms, access and availability, and data cataloguing, curation and governance (including ethics); drill-down capability alongside an understanding of data sources.
- Key measures and metrics: Including which indicators are the most meaningful and informative in terms of effectiveness and how they address priorities; indicator number limitations (e.g. between 5 to 9 are most optimal, but up to 15 or 20 may be acceptable).
- Data limitations and depth of understanding: Including the relationship between data availability, ease of data collection, data mining and decision-making potential; the relationship between correlation and causality.

Despite this, and while the algorithmic methods of predicting and modelling student outcomes and future directions can be statistically complex and can and do vary (Howard et al. 2018), situations whereby dashboards have been specifically employed as 'early warning' systems to prevent students actually failing their courses and dropping out (Ahmed and Al Hadhrami 2017; de Freitas et al. 2014; Jokhan et al. 2018; Krumm et al. 2014; Sclater et al. 2016), on academic grounds alone at least, have proved somewhat successful, with early 'intervention' even in the first few weeks of the first year of study in the form of tutorial classes reported to improve mean summative course grades by as much

as 8% (Cassells 2018). Sclater and Mullen (2017) also report the following (contextual details not available):

- Used as a proxy for effort, VLE variables were more than four times as strongly related to achievement than gender, race and income at California State University, Chico.
- Course completion rates increased from 81.1% to 86.8% in three years at Youngstown State University, Ohio.
- In one course at Marist College, New York, final grades improved by 6 percentage points among at risk students subject to 'intervention' compared to others who did not.
- At Strayer University, Virginia, contact with students identified as at risk in an 'intervention' pilot study improved their attendance by 5%, increased their pass rate by 12% and saw a decrease in attrition by 8% relative to a control group.
- At Purdue, Indiana, students made aware of their risk level in pilot groups sought help earlier than others and continued to seek out help more often after the 'intervention' period stopped.
- 730 students across a range of courses were identified as at risk at the University of South Australia. 66.0% of the 549 contacted passed with an average GPA of 4.29 while 52% of the 181 not contacted passed with an average GPA of 3.14.
- The drop-out rate at New England University in New South Wales was cut from 18% to 12%.

2.2 Student-facing dashboards and their use

Perhaps at their most advanced, dashboards appear to 'come into their own' when students are involved as 'primary stakeholders' or users with the ability to access and monitor their own information (the student-facing dashboard), which, in turn, provides the opportunity to support student-advisor dialogue and the overall learning process particularly with respect to goal setting, mastery orientation, the evaluation of learning activities, sense-making, reflection, self-diagnosis, self-awareness and self-regulation (McIntosh and Barden 2019; UWS 2017); notably so when helping support students, provide insights into their progress and help plan for the future thereby taking dashboards from the realm of 'transactional' to 'transformational'. Where studies employing a range of research methodologies offer critical insight within and beyond immediate implementation, the following points have also been well made and paraphrased for simplicity (Lonn et al. 2015; Charleer et al. 2018; Jivet et al. 2015; Lim et al. 2019):

- Role of a dashboard: Dashboard data can be 'basic', misleading and difficult to interpret (or to standardise interpretation); establishing the reliability of data is key in terms of reassurance, particularly when giving and receiving advice; demographic data including prior attainment before arriving at university can often help inform on context but needs to be handled sensitively and ethically.
- Role of 'visualisation' and 'visual salience': Dashboards are considered supportive tools with a use that can have potentially far reaching consequences; data should be presented for visualisation in as objective a way as possible in order to maintain 'neutrality' of ownership and make collaborative sense; visualised data could be 'nuanced' to reflect variation within outcomes rather than use black-and-white metric thresholds; students (as well as tutors) may

also need considerable help and support in making sense of dashboard feedback and interpreting the information presented.

- Role of the personal tutor: Dashboards facilitate insight and ‘intervention’ at many levels but may need to be moderated/mediated for students by personal tutors; overconfident students may interpret ‘low level’ negativity adversely and over-react unnecessarily or students may be portrayed negatively in ways easily overcome or resolved, both with unintended outcomes; dashboards may inadvertently promote shallow over deep or more organised approaches to studying and learning.
- Role of narrative: Dashboards might be usefully modified to store the qualitative data arising from discussion/tutorials and other sources improving ‘author-driven’ and ‘reader-driven’ interpretation.
- Transparency: Full dashboard information need not be seen by students at all times, only during tutorials; dashboards could be modified to hide and reveal information for tutorial purposes in stages, easing the flow of discussion; the use of dashboards beyond self-comparison, including peer-to-peer or peer-to-course social comparisons, may also have far reaching and unintended consequences (e.g. unproductive competition, gaming, intimidation, induce stress, disappointment and hopelessness, and demotivate otherwise fully engaged and enthusiastic students).

Interestingly, while Reimers and Neovesky (2015) also note a strong desire among students to see ‘statistics’ of their performance and attainment in dashboards, they remain very conscious about their privacy and do not, on the whole, wish other students to see their grades or, for that matter, to necessarily have their performance and attainment directly compared.

2.3 An element of critique

As reflected in the title of her short but highly informative overview, and in common with Mitchell and Ryder (2013), Teasley (2017) reminds us that a dashboard, student-facing or otherwise, *‘provides a visual display of the important information needed to achieve one or more goals, consolidated and arranged on a single screen so the information can be monitored at a glance’* (378). Teasley goes further, drawing on the contributions of others, warning readers that ‘one size’ does not necessarily ‘fit all’, and that despite their apparent technological maturity, many students do not in fact possess the data literacy or skill-set they require for unassisted dashboard decision-making or the other meta-cognitive applications and benefits they promote, including learning strategies and study behaviours, particularly if dashboard ‘leader-boards’ ranking students by name might be involved (lowering self-concept e.g. ‘that person is smarter than me’). Conspicuously absent from most other sources too, Teasley also considers the study of dashboards and dashboard use to be largely in its infancy, missing many key elements including appropriate conceptual and theoretical frameworks, relevant analytical frameworks and appropriate methodological considerations for empirical study with few published articles that evaluate effectiveness or impact. Teasley also noted that students find receiving consistent dashboard information (e.g. high performance feedback/high grade point average and low performance feedback/low grade point average) more helpful for decision making than conflicting feedback (e.g. high performance feedback/low grade point average and low performance feedback/high grade point average) and that dashboards which direct students to information about how to improve their work and their grades would be advantageous:

'... dashboards hold the potential for both promise and peril for motivating students. Given the rapid pace in which student-facing dashboards are being deployed in educational technology platforms, there is still a need to inform the design and application of these systems so they can fulfil the promise to support students' awareness, self-reflection and sense-making. Knowing who should see what information and when, how it might best be presented to individual students, and how to integrate dashboards into the larger pedagogical practices in Higher Education are important questions that call out for further research.' (382)

In the systematic reviews of dashboard research by Schwendimann et al. (2017), incorporating 55 articles selected from a total of 346, and Bodily and Verbert (2017), incorporating 93 articles from a total of 945, findings were broadly consistent with Teasley. In addition, and in terms of recommendations for practice and future research:

- The usage of different terms suggests no overall consensus on what constitutes a dashboard and, in particular, a learning analytics or student-facing dashboard across a range of Higher Education contexts (e.g. formal and full-time campus-based settings are more frequently reported than others).
- Despite their increasing popularity, what constitutes authentic data or the 'right' information or indicators to display and how to display them for the purposes of different user-literacy levels and decision-making and learning support remains problematic, with little analysis or evaluation of the design and development process.
- While theoretical, conceptual and analytical frameworks for the purposes of study are largely absent, Social-determination Theory (motivation-based) offers considerable potential (as might Control-Value Theory).
- Few studies actually explore dashboard 'early warning' and retention or learning gains or other learning-related constructs fully (e.g. retaining every student is not always 'a good' any more than a lost student 'bad').
- Most dashboards studies tend to focus on and track relatively simple 'click-level' data alone.

Bodily and Verbert (2017) do, however, present what they regard as nine key questions aimed at guiding the process of creating a student-facing learning analytics reporting system for consideration: What is the intended goal of the system? What visual techniques will best represent your data? What types of data support your goal? What do students need (does this align with your goal)? Is the system easy and intuitive to use? How do students perceive the reporting system? How are students using the system (frequency and why)? What is the effect on student behaviour? and What is the effect on student achievement?

As also cautioned by Gray and Perkins (2018), having reported students identified within three weeks with 97% accuracy using attendance/non-attendance, grades and performance descriptors (pass, fail, conditional fail, repeat semester/year):

'When dealing with achievement, welfare, and confidence of a student there are serious ethical considerations. Interventions, however well-intentioned, will affect a student's mindset. How large that effect, and whether it is positive or negative, will depend on the skill

and care of the educator involved. Practitioners will need to adopt a new approach when dealing with students identified by any analytics ... This is something educators may end up losing sight of when algorithms make the identifications instead of their own intuition. These effects can not only be triggered by an intervention, but also just from being identified as potentially benefiting from assistance. Some students could see this as an oblique method of assessing their performance and become withdrawn.' (30)

2.4 A UK case study: Nottingham Trent

Of all the UK university open-access dashboards available to view, the Nottingham Trent University Student Dashboard remains one of the most widely featured and discussed, appearing as part of a broader review of learning analytics in Higher Education by Sclater et al. (2016) on behalf of Jisc and showcasing on the AdvanceHE/HEA website (2019). The work at NTU also led to the Erasmus+ funded ABLE Project: Achieving Benefits from Learning Analytics (ABLE 2018), a joint venture between NTU, the University of Leiden and KU Leuven. Focused on the transition experiences of first year students alone, a number of ABLE Project reports are now available online including a summary of transition challenges and 'interventions', the strategies and tools to evaluate learning analytics 'interventions' and the three institutional case study outcomes (for a completely different case study of UK dashboard use linked to student support see also McIntosh and Barden 2019).

As far as can be established, the NTU dashboard, developed from a limited review of literature with little evidence of any or conceptual underpinning (not uncommon in the field), is described by Lawther and Edwards (2018) as originating from a pilot conducted in 2013 and introduced the following year. In common with most dashboard application, it presents basic student demographic information while initially monitoring door swipes, library use, VLE log-ins, assignment submissions, the use of electronic resources and attendance (other variables have also been considered over time). It then uses historical data to assign individual engagement ratings ranging from high (very good: in real time or over several days and reports maximising the chances of success without guaranteeing it) to low (poor: using university resources infrequently offering advice to seek out help). Both staff and students, who see exactly the same dashboard view, were involved in the pilot as well as in subsequent developments. Of particular interest, NTU established that low engagement as recorded by the dashboard helped identify students most at risk of withdrawing from study, failing academically or likely to achieve lower degree outcomes (twice as many highly engaged final year students are now known to get a 'good degree' than those receiving low engagement ratings). Students in the low engagement category were also found to be disproportionately male, BAME, WP and BTEC entrants. NTU felt that with their dashboard they could 'target' student behaviours rather than student characteristics while acknowledging the need for much further research to understand the scale and depth of change and what 'interventions' work for which students. Overall, 27% of students reported that they had changed their behaviour in response to data provided by the dashboard and 80% of staff felt that the data provided by the dashboard changed how they worked with students. In addition, as reported by Sclater et al. (2016):

- NTU found levels of engagement to be a stronger predictor of success than background characteristics.

- Personal tutors were prompted to contact students when their engagement drops off, finding the dashboard a valuable resource.
- The provision of the dashboard helped to build better relations between students and personal tutors.
- Some students found that seeing their own engagement as a positive, helping them to stay engaged.
- Transparency and a close partnership approach was critical to the success of the initiative reducing ethical concerns about the use of student data (the dashboard operation is reported to be overseen by the PVC Academic and a dashboard Governance Group which reports directly to their Academic Standards and Quality Committee).
- The provision of the dashboard is now expected by staff and students and the project has helped to extend the culture of data-driven decision-making across the university.

Work at NTU, focusing on ‘no-engagement alerts’, has been reported most recently by Foster and Siddle (2019) who conclude appropriately:

‘We would argue that the implementation of technology alone cannot create a more inclusive environment, but metrics output from learning analytics systems have the potential to provide institutions with the necessary data to do so.’ (9)

3. Operationalisation of the EPMD pilot

3.1 Overall design and timeline

The overall design employed for the evaluation, adhering to the broad principles outlined in the Lincoln Impact Evaluation Framework (LIEF), is best described as a comparative and largely qualitative and embedded case study (Figure 1). A small group of personal tutors, invited to participate by College Directors, self-selected into those monitoring the EPMD for themselves (internally) and those to have their dashboards monitored for them by a small team of Student Support Advisors (externally). Personal tutors monitoring internally had full access to the EPMD and continued to offer tutorial support as they would do normally with the additional requirement that they monitor the EPMD on a weekly basis. Externally monitored dashboards were also viewed regularly and on a weekly basis by the Student Support Advisors, on Wednesdays, with personal tutors contacted by email should anything flagged require attention (from studentsupport@lincoln.ac.uk, titled ‘EPM Dashboard – weekly report’). Personal tutors contacted by Student Support were asked to respond as soon as possible in order for students requiring an ‘intervention’ to be contacted within the same week or as soon as possible thereafter.

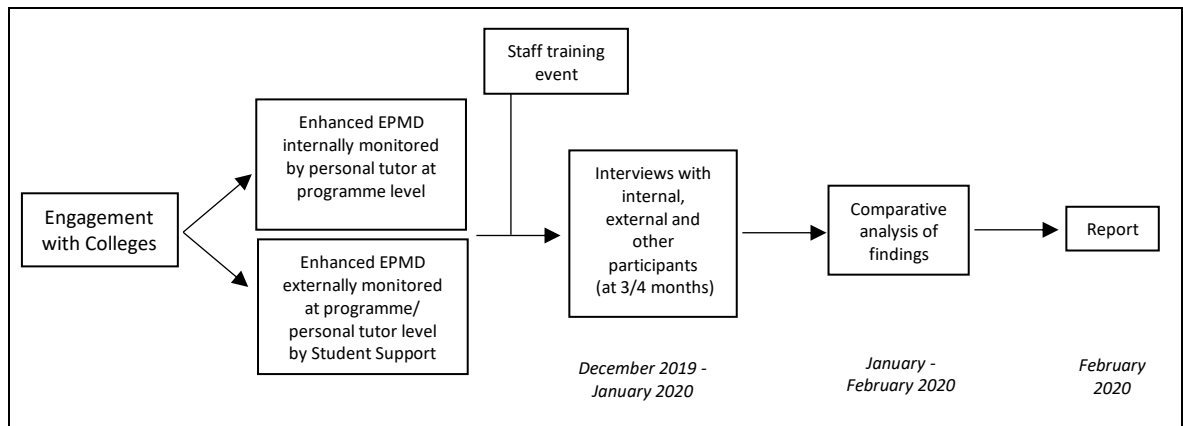


Figure 2 Basic design

3.2 Participants

All colleagues taking part in the evaluation, together with their role in the pilot, are listed as follows.

Organisation and management

- John Sharp Lincoln Higher Education Research Institute (Evaluator)
- Simon Hearn Planning and Business Intelligence (Dashboard design and development)
- Judith Carey Director of Student Affairs and Jacqueline Mayer Head of Student Services (Training)
- Farhan Ahmed/Debbie Lock College Director of Education (LIBS)
- Mark Smith College Director of Education (Social Science)
- Gyles Lingwood College Director of Education (Arts)
- Andy Evenden College Director of Education (Science)

In the spirit of adopting a ‘theory of change’ approach as promoted in LIEF, two separate logic diagrams outlining the thoughts of the organisers in terms of the EPMG’s longer term value are as shown (Figures 3 and 4).

Student Support Advisors: External dashboard monitors from the Student Support Centre

- Jakki Roberts, Rebecca Courteaux, James Ball and Libby Arnold

Personal tutors LIBS

- Internal – Judith John, Dept. of Accountancy, Finance and Economics, BA (Hons) Accounting and Finance
- External – Farhan Ahmed, Dept. of Marketing and Tourism, CertHE International Tourism Management, Events Management and Sports Business Management
Nick Taylor, Dept. of Marketing and Tourism, BA (Hons) Marketing Management
An additional member of the LIBS external contributors (not listed) subsequently withdrew for personal reasons.

Personal tutors Social Science

- Internal – Xanthe Prior, School of Health and Social Care, BSc (Hons) Nursing (Adult)
Sean Morton, School of Health and Social Care, BSc (Hons) Nursing (Adult)
- External - Mary Willis, School of Health and Social Care, BSc (Hons) Nursing (Adult)
John McKinnon, School of Health and Social Care, BSc (Hons) Nursing (Adult)

Personal tutors Arts

- Internal – Teo Ghil, School of Fine and Performing Arts, BA (Hons) Drama
Jamie Wood, School of History and Heritage, BA (Hons) History
- External – Anna Scheer, School of Fine and Performing Arts, BA (Hons) Drama
Katherine Fennelly, School of History and Heritage, BA (Hons) History

Personal tutors Science

- Internal – Matthew Simmonds, School of Life Sciences, BSc (Hons) Biomedical Science
- External – Nicole Murdock, School of Pharmacy, BSc (Hons) Pharmaceutical Science

Student participants

Listed by College and year group as shown (Table 1):

College	Internal monitoring	Year group (1, 2, 3)	External monitoring	Year group (1, 2, 3, 4*)	Total
LIBS	89	89, 0, 0	49	30, 12, 7	138
Social Science	47	20, 27, 0	48	23, 25, 0, 0	95
Arts	32	19, 6, 7	28	17, 3, 8, 0	60
Science	30	10, 7, 13	7	3, 0, 2, 2	37
Total	198	139, 39, 20	132	73, 40, 17, 2	330

Table 1 Student participants by College and year group (4*denotes MPharm)

3.3 Interview protocol

Semi-structured to open interviews with Student Support Advisors and personal tutors having their dashboards monitored for them externally were mainly conducted between late December, 2019, and early January, 2020. Those tutors monitoring dashboards internally took place throughout January, 2020. The interviews themselves, conducted individually or in pairs, lasted 30-45 minutes in duration and made use of the same opening prompts on each occasion (slightly modified as required):

- How do you feel about having been involved in the EPMD pilot?
- In what ways has it impacted on your work as a personal tutor/Student Support Advisor?
- How many calls have you received from Student Support in relation to 'flags'/'interventions' have you made by yourself to date?
- How many of these turned out to be of an academic/personal nature?

- Without breaching any confidences, can you provide any details of any specific 'interventions' which serve to illustrate/exemplify any critical incidents?
- How did you find working on the EPMD pilot affected your relationship with Student Support/the personal tutors/the students and their responses to being contacted?
- Given the choice, and within the stated aims of the pilot, which method of monitoring the dashboard do you think most effective?
- In terms of future developments, what do you think is the way forward for dashboard use (advantages/disadvantages/resource requirements/demands/dashboard developments)?
- Is there anything else you'd like to relay/tell me about concerning your involvement in the pilot at this point in time?

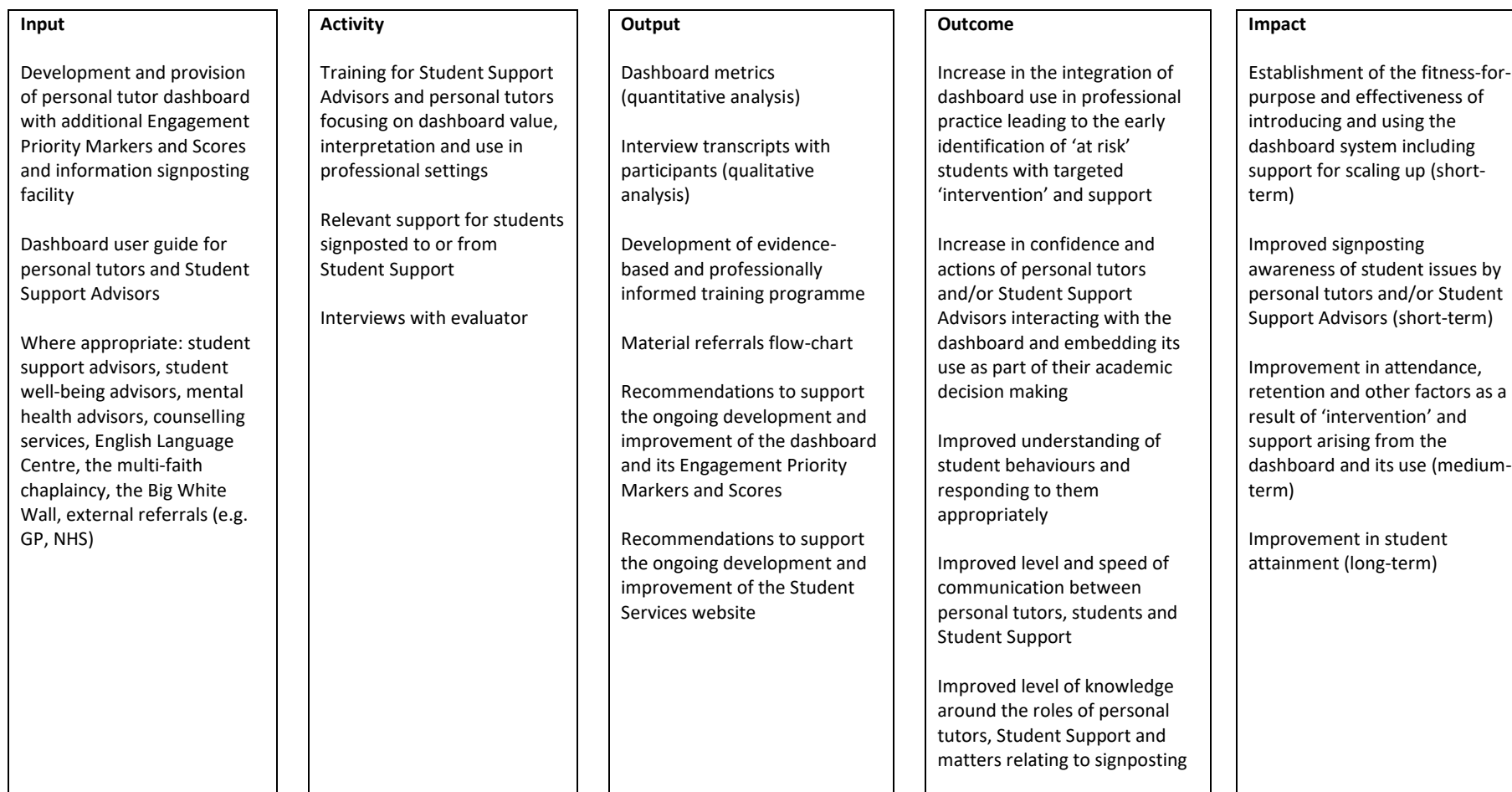


Figure 3 Dashboard logic diagram (Simon Hearn and Jacqueline Mayer)

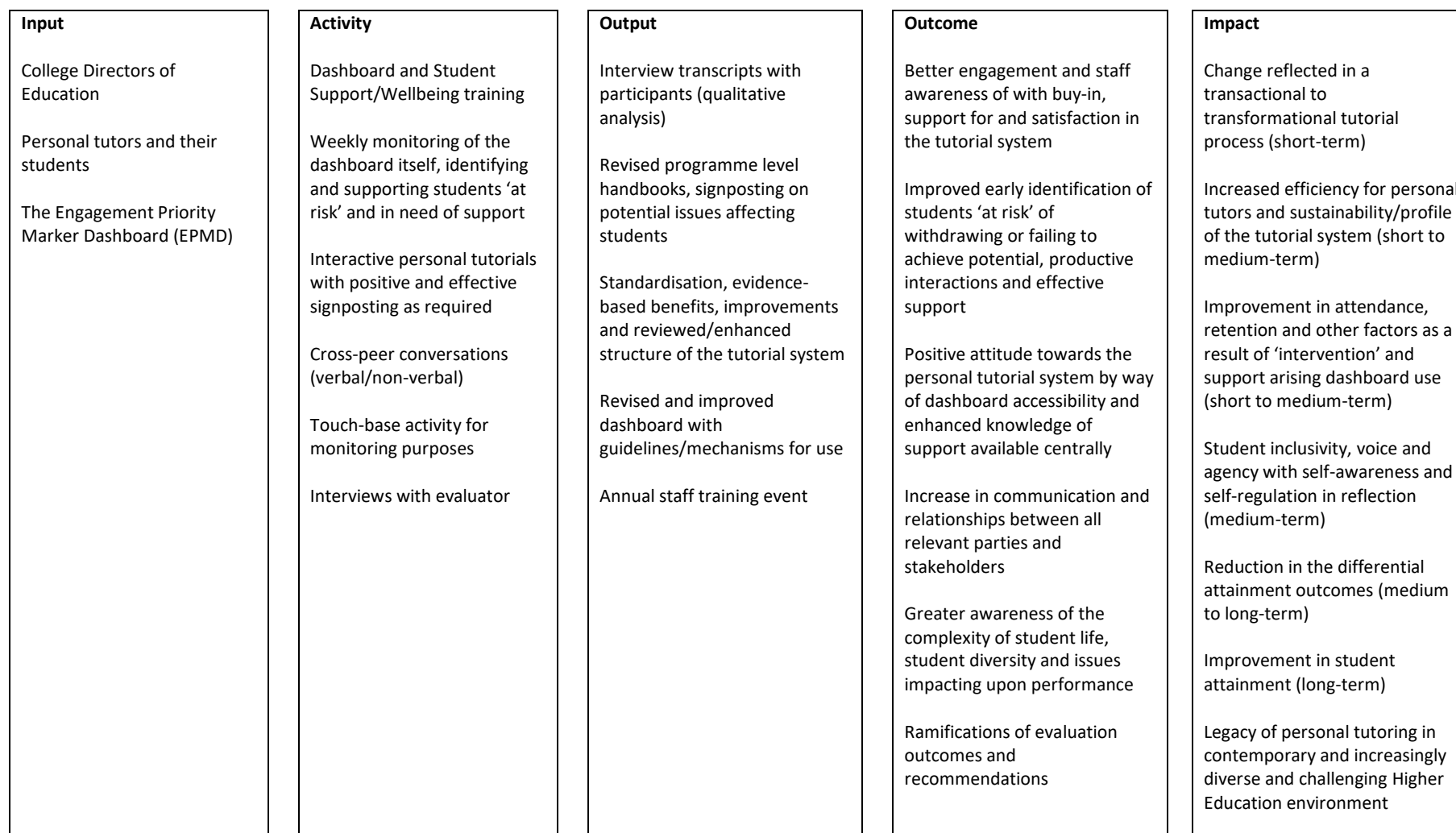


Figure 4 Dashboard logic diagram (College Directors of Education)

4. Presentation of findings

Evaluation findings are presented here in terms of a continuous narrative paraphrasing the original responses, thoughts and ideas of participants as far as possible at interview in an effort to maintain authenticity and accuracy while maintaining a degree of anonymity. The four main categories, chosen to reflect the main components of the EPMD pilot, include the dashboard itself, the training package offered, the monitoring of dashboards internally by personal tutors, and the monitoring of dashboards externally by Student Support Advisors on behalf of those personal tutors who elected to participate in this way. The report as a whole was circulated to all participants ahead of final submission in order to correct points of accuracy or to add additional detail as required.

4.1 The Lincoln dashboard

The introduction and use of a student dashboard monitoring system at Lincoln University is reported to have originally emerged from earlier discussions surrounding recognition of the need to use student data more effectively for the purposes of monitoring progress as well as how to improve the personal tutoring system which was itself under review at that time. The Nottingham Trent model, such as it was, was a relatively recent innovation then and the use of learning analytics for such purposes was only just under review by JISC (work ongoing e.g. Carmen Tomas at Nottingham University). The initial student dashboard 'prototype' subsequently introduced, from which the enhanced EPMD used in this pilot represents the most recent iteration, was therefore developed by colleagues in Planning and Business Intelligence (PBI) working with locally held data and utilising existing software and staff resource. The dashboard provided the means by which academic colleagues (senior staff and tutors and personal tutors at College, School or programme level) could monitor, intervene and support students wherever and whenever appropriate in the light of more 'local' knowledge and contextualised information in order to predict and mitigate anticipated 'risk'. Anecdotal evidence from its original introduction suggested that where the dashboard was being used regularly, it did appear to lead to improved outcomes (retention, grades, and so on). At the same time, the nature of any 'interventions' made remained a 'Black Box' (e.g. how do we have those conversations, what forms do they take, how are students encouraged to turn things around or to seek advice, how, when, on what basis and to whom do we signpost them to?). Some pockets within the institution were known to do this consistently well, some less so and some hardly ever at all.

Building on existing functionality and content (e.g. Student ID, name, programme, entry type and tariff, personal tutor, attendance, library visits, Blackboard usage and marks), and a further investment in expertise and resource over time, but with the facility to drill down further at the level of the individual, the enhanced EPMD piloted here also includes Withdrawal Potential (an algorithm generates a low, medium or high rating based upon protected characteristics e.g. gender, qualifications, ethnicity, disability, POLAR) and programme/level of study (both equally weighted), and the Engagement Priority Marker (an aggregated RAG rating system derived from scored module marks, attendance and Blackboard use with module marks and attendance scores each uplifted using a 50% weighting to reflect their considered importance). As a result of extensive 'in-house' research and development in PBI, a credit to those charged with developing the dashboard itself, details of the scoring procedures and thresholds involved are outlined separately (see Appendix). While suggestions

for the further development of the enhanced EPMD arising from the user groups during evaluation are presented later (see Section 5), the associated resource implications for further dashboard developments and 'scaling up' are not inconsiderable and should form part of all ongoing discussions at a strategic level. Limitations of the existing software used to construct the current EPM Dashboard should also be considered.

4.2 Training

As part of the EPMD evaluation, Student Services and Student Affairs were asked to provide introductory briefing and training sessions for all Student Support Advisors and personal tutors involved in the project (working both internally and externally). This was delivered with support in most sessions from the Head of LHERI to help ensure that any queries about the evaluation could be answered during the session and further explored if required. In total, eight training events were run between 29 October and 11 November, 2019. The purpose of the training was to introduce all involved to the concept of the dashboard and its function, their roles and commitments within the evaluation, to consider possible situations and scenarios and to reinforce lines of communication, as well as to ensure that personal tutors were fully aware of the signposting options available for non-academic 'interventions' (each receiving a copy of the 'Student Guide' to the personal tutoring system). At the heart of each training event was a PowerPoint presentation which included a basic overview of and background to the dashboard which was used as a starting point to consider the University's Access and Participation plan, as well as sector developments in the area of learning analytics. Later slides in the presentation covered the use of the dashboard itself with live links to demonstrate its functionality. The use of the live aspect of the EPMD was used for all of the sessions to allow the personal tutors to explore 'case studies' in real time using students from within their own cohorts. In general, most of the personal tutors seemed very aware of their own cohorts and the sessions also provided a useful opportunity to consider current EPMD developments. All staff attended, but attendance varied from 1 to 4 colleagues at any one time (one colleague was 'trained' by phone). JGS attended all but three sessions. The events were also useful in terms of discussing existing practices in dashboard use, the personal tutoring system as a whole, including selection and training, and induction and mentoring at School level (revealing sometimes striking inconsistencies between Colleges, Schools, programmes and individuals).

4.3 The internal monitoring of dashboards by personal tutors themselves

Overall, interviewing the personal tutors monitoring internally revealed a palpable sense of commitment and sense of responsibility towards their students (with one personal tutor carrying 'information/help cards' around with them in case required), with the EPMD and engagement in the pilot considered valuable in terms of monitoring student progress at a programme and module level (those personal tutors who were also Programme Leaders and/or Senior Tutors saw the importance at a higher level where access was available also). The EPMD was considered easy to use with the RAG system flagging up concerns which they knew had to be addressed and quickly. In comparison with the 'old' dashboard, the EPMD was generally considered less time consuming to use and required less 'drilling down' to identify their own students and reach a level of operational usefulness which had previously led to a lack of enthusiasm for regular use and a view that it may not have been entirely fit-for-purpose:

'The 'new' dashboard is more proactive, these are your students, your groups, gives a birds-eye view of the issues.'

Almost all held to the spirit of the pilot to monitor weekly (around mid-week was common), but monitoring at up to 10 day intervals was not uncommon (timetable 'pressure points' contributed mostly to a drop in frequently). Programme Leaders with access to the EPMD and the 'old' dashboard were often able to contact their own flagged students or the students of others where appropriate. In one instance, the personal tutor, also a Programme Leader, kept their team apprised of the pilot and its nature as it progressed. Some tutors considered red flags only, some also incorporated amber into their monitoring and 'interventions'. Across the period of the pilot, the number of red flags varied from 0 for some tutors to 6 (following up amber flags was highly variable but could sometimes be prompted by other tutors raising concerns). 'Intervention' was most productive when the personal tutors were actually teaching their own student groups (not always the case). One personal tutor actually taught all first year students within their programme and so knew them all reasonably well. Other personal tutors only had groups of between 12 to 18 students and may not have seen them other than at designated times. In such instances, the students often only became really known to them along with any recurring issues when in the second or even third years of study. Interestingly, and at interview, the frequency of formal meetings with students varied considerably from the prescribed minimum of two per semester (often starting in Week 5) to more and across the university calendar (in one instance, in Weeks 1, 2 and 5 as a result of a particularly proactive Senior Tutor). In addition, and for some, dashboard information was also prioritised in different ways and at different levels (e.g. benchmarking progress with first and third years in particular with less emphasis on second years).

Actual 'interventions' took many forms as anticipated, either by email or in person if being taught at the time, often resulting in a meetings with the personal tutor with or without a Programme Leader as required. In almost all 'instances' students presented with mainly personal or 'transitional' problems in Year 1 in the main, all of which were referred to Student Support or Wellbeing in line with recommendations. Most students seemed grateful or thankful for the initial contact and some were surprised and asked for clarification of their tutor's interest. One student on a course in which attendance was compulsory and included placements was found to have broken an ankle and was panicking until 'intervention' helped resolve the situation through appropriate adjustments. One student was reported as not wishing to disclose anything but eventually took the offer of help and self-presented to Wellbeing. One general feature to emerge at interview was a clear sense of students, particularly in the first year, feeling 'overwhelmed', with 18 to 19 years olds leaving home for the first time, trying to look after themselves, becoming independent adults, learning to cook, make friends, feeling homesick and managing all that while attempting to seek out the right help:

'Deer in headlights ... how does that help me to achieve my [academic] objectives.'

Some issues were also specifically related to mature students who were also known to be juggling sometimes more complex lives. On more academic matters, and continuing on the theme of 'intervention', extension requests often emerged as a common feature but in the case of at least one international student, referral to the English Language Centre was the solution. In only one reported

instance, a 'flagged' student eventually did withdraw but the EPMD did give the opportunity for the personal tutor and student to meet and discuss this through. It was noted that if the pilot had started at a different point in the academic year, it is highly likely that more students that went on to withdraw would have been flagged. The dashboard was also found to be valuable for providing evidence of 'problematic engagement' which would otherwise have been easily contested or refuted by some students.

While easy to use, and not particularly onerous, occasional concerns about additional workload were raised in connection with the regularity of monitoring required and the commitment to follow-up (the personal tutors differed in opinion over this). In one reported instance, a single student who ignored all attempts to respond to emails generated 'loads of work' (as did another situation arising from an incorrect email address). One personal tutor also indicated that the dashboard helped contribute in other unanticipated ways:

'The third year I knew quite well, knew of their problems. For the first year it was perfect. As Programme Lead I often pick up staff/student clashes, some students just migrate towards some staff members. Tutor groups may be moved around if the tutor isn't doing their job. Engaged tutors might look more, those less engaged less.'

Views surrounding the 'positioning' of the dashboard varied slightly but maintained an overall consistency:

'From my point of view, it's good, but then there's the workload ... I think it better maintained by a Programme Leader ... could be a Year Group leader ... someone who works with them or knows them well ... as a Programme Leader I know what they come with, their strengths, why they're not turning up ... but that's only possible because I have a relationship with them ... I gear my support to their attainment ... you have to have a relationship with them particularly at Level 1 ... or if someone else is doing it and you're not teaching them.'

'Super if they [Student Support] want to monitor it for me but I wouldn't want to lose contact ... need the contact, need to be the point of contact in the first instance ... I'd like to know what's going on in a call.'

'Could be a combination of the two [external and internal monitoring] ... a hybrid ... a combination would bring consistency to the School and ensure everyone took their role seriously ... I'm happy to monitor it on my own if the group is about 12 students, if I had 40 students across Years 1, 2 and 3 the workload would be higher ... but having it monitored [externally] would help. You wouldn't want to be harassed constantly by Student Support or Wellbeing all the time though, we'd need to make sure the communication was sensitive, maybe weekly.'

Some comments were also received concerning the dashboard markers themselves. Library usage was often thought of more as a 'social hub', improving community, connectivity and preventing isolation. Blackboard usage was considered important in some disciplinary areas over others depending on how it was used and promoted. The attendance monitoring system, operating

independently of the dashboard, was often reported as particularly problematic depending on course requirements and operationalisation which was usually outside of any academic control. Personal tutors would certainly benefit from the enhanced EPMD as 'retrieval issues' could be spotted on the dashboard and addressed more quickly than the attendance monitoring system allows for currently.

4.4 The external monitoring of dashboards by Student Support Advisors

Student Support Advisors (monitoring dashboards externally)

Following initial apprehension over the short notice period and workload implications, colleagues in Student Support involved directly in the weekly monitoring of dashboards externally on behalf of personal tutors conveyed a very real and welcomed sense of empowerment and ownership over their engagement in the pilot, with the dashboard considered relatively easy to access and use. The team were, in fact, delighted to be involved, indicating that if properly resourced they could easily 'make it their own'. They considered their direct involvement particularly beneficial as Student Support could operate proactively to intervene and reach out to students themselves quickly and consistently without having to wait for 'drop ins' or only deal with 'referrals', 'catching' students who might have 'ducked below the radar' or had issues which might have been easier to resolve if picked up earlier, thereby benefiting and impacting positively upon the student experience. The Student Support advisors, who deal with this day in day out, felt that they could take any associated administration off personal tutors leaving the academics to concentrate on other things.

The team involved established an efficient system of weekly administration, with one colleague monitoring all dashboards usually on Tuesdays, 'triaging' the students requiring 'intervention' on the basis of the colour of flag (the team actively contacted students flagging amber and white in addition to red, checking by phone call, an email or inviting them in accordingly). They were also able to consider prior service access and attendance and select an appropriate course of action for follow up (e.g. a 'front desk' response or a response requiring more specialized and experienced input). The Student Support Advisors were also keen to point out that they did not target students from any one demographic, but offered help and support universally. In all instances where an 'intervention' was required, tutors were consulted in advance with any prior information available also collated in order to help understand or anticipate the likely direction of conversation and what the initial contact might be about. Tutors were given 24 hours to respond which they considered a reasonable time in order to 'catch' the problem quickly (worked well). The team reported that the response from tutors was fantastic and supportive. The students were never 'cold called'. The Student Support Advisors did report that, while probably cheaper and more effective to do by themselves, a lot of time and effort was sometimes inevitably involved, particularly with respect to searches (e.g. using QLS), making the calls themselves, record keeping using a specially constructed spreadsheet and 'Maximiser' (the institutional system used to hold prior records and to log the use of services and phone calls) and monitoring and follow up with specialist advice and support where required (e.g. ensuring an application for financial assistance has been made or ensuring the 'intervention' had impact):

'If we had someone dedicated to doing this we could make it a success ... if we had the time and resources ... you have to be on the front-line to do it, use our knowledge and expertise to

capture the problems that have solutions while the solutions are available, for the benefit of the students.'

The Student Support Advisors also noted that engagement was often observed to dip quickly and that a speedy response was definitely required once a student 'red flags' and gets noticed. The team certainly noticed a sharp increase in 'business' over the period of the pilot, often among WP students (e.g. mature, BAME), and in some disciplines more than others where recruitment might be higher than normal. All of their work on the pilot ran alongside the 'day job' and 'drop-ins'. Interestingly, and in accordance with the internal monitors, almost all 'flags' turned out to be of a personal or pastoral nature (e.g. family issues, childcare or other caring responsibilities, mental health issues including anxiety or depression, debt, illness, social or emotional issues, bereavement, police matters and bullying), with few academic (e.g. struggling with academic workload and tasks, placement issues, completing interruption logs). They team also reported that when a crisis suddenly cropped up, students didn't always know what to do, where to go or who to turn to for immediate support. In their view, students would not normally raise personal or pastoral issues with tutors so many issues could easily get overlooked and missed (e.g. students may not want to raise it with tutors or consider it inappropriate in more formal academic settings). Even academically, students were known to often 'fear being wrong' or didn't understand the work but were too afraid to ask, so may come out of a lecture, for example, 'lost' and lacking in confidence to seek out help. Students were also frequently noted to lack the language skills to help report things at an emotional level. The Student Support Advisors also noted that many lecturers were not always aware of the difference between Student Support and Wellbeing Services and that some tutors were perhaps sometimes 'too engaged', creating its own set of problems, while others were perhaps not engaged enough. The team reported all students contacted were indeed 'grateful', with only a very small number questioning the 'approach', often because they thought the matter was in hand (e.g. absence requests which had, in fact, not been properly requested and logged). Interestingly, the most productive time to call students and have personal discussions turned out to be between 3.30 to 5.00pm on any given week day (when their timetable was less busy) and 5.00 to 7.00pm on Thursdays (late opening, 'teatime', when most likely to be at home), outside what many might regard as the normal working hours of academics (contact earlier than 3.30pm was almost impossible as the students were invariably busy). Student Support was also well placed being in the '*front-line*' to redirect where required (e.g. Wellbeing, English Language Centre, the library, and so on).

At its peak, up to 20 calls were being made per week, each requiring up to two hours to administer and complete the 'intervention' process in full. While some interventions led directly to retention, two students were also supported to leave. In one instance, a student, already known to the team because of financial issues, was disengaged, struggling on placement, and playing one tutor off against the other. 'Intervention' resulted in a desire to get the matter resolved on all sides resulting in a clearer picture of what was going on with the offer of better and more targeted support. Another student whose attendance had plummeted turned out to be '*bed ridden*' due to mental health issues but was encouraged to attend Wellbeing which they did. In another situation, a student contacted revealed that they had '*big issues*' but would not elaborate further and declined all offers of help.

Personal tutors (having their dashboards monitored for them 'externally')

Personal tutors having their dashboards monitored for them all reported positively about their experiences on the pilot despite being 'hands-off', their commitment to their students reflected in discussion about the diversity of participants in today's Higher Education system, the range of issues they present and the different and competing priorities they face almost daily (e.g. separation, isolation, estrangement, health-related events, domestic responsibilities and working to support study). Interactions with Student Support and the number of students requiring 'intervention' varied according to the dashboard flags raised, with some tutors having little to no contact at all (overseeing relatively 'unproblematic' tutor groups over the duration). Despite being involved in the pilot, most also continued to monitor their 'old' dashboards but as a lower priority and at a lower frequency than normal:

'I quite liked it ... an extra layer of reassurance that I've not missed anything ... you get an email from Student Support enquiring ... a safety net.'

'For time and time management reasons, an external monitor would be better, students can be helped and signposted ... absolutely fine about it ... better eye on retention ... I'd feel good about that.'

Communication with Student Support not only drew 'interventions' to the attention of the personal tutors consistently and reliably but ensured that these were promptly followed up where necessary:

'Student Support flagged up issues about my students ... I knew where to refer them to but I wasn't fully familiar with all the services on offer ... the qualitative connection is quite important to interpret patterns of behaviour alongside the statistics ... I felt really supported, the students were 'serviced' much faster ... I've been able to follow through an agreed plan ... I also valued the second pair of eyes ... Student Support could step back and look at the problem ... I was also able to approach them to raise issues for students that hadn't yet flagged ... when flags are raised the situation is often more complex than thought.'

In one School, the Senior Tutor was described as completely 'on the ball', monitoring their 'old' dashboard on a regular basis and flagging up issues with particular students requiring 'intervention' as they arose (sometimes ahead of the EPMD monitoring). In this particular instance, the student cohorts were small and the students themselves were usually well known to their tutors as a result. Attendance was a mandatory requirement on the courses involved as these were of a professional and regulated nature requiring the frequent monitoring of actual percentages rather than trends. Tutorials were held twice a semester, as was common, with the first in Week 3 and the second in Weeks 10 or 11 (in other Schools and Colleges, first meetings were said to take place earlier in Week 2 or later in Week 5 – with potential consequences in the first year of study). In addition to minimum requirements, an additional three timetabled classroom sessions were also provided in order to help get to know the students and for students to help get to know staff. Not all students took advantage of these meetings but this was always followed up (not always the case elsewhere). Two additional

students were also picked up by the Senior Tutor that didn't register on the EPMD for 'local' reasons. Despite this, the personal tutor also considered the EPMD highly valuable:

'A lot to gain from an external team looking at it ... achieves consistency between tutors ... prompting, reminding to check, considering context and if an 'intervention' is necessary or 'no worries.'

'From the point of time management and workload, I have office hours, sometimes no one turns up, sometimes all the slots are filled, I have to manage the time. From a student perspective, it would be better if they went to Student Support or Wellbeing. ... I can't help them ... if they were more hands on, available, for personal issues ... I'd be afraid that in the gap between seeing them a less confident student may not go along ... an independent link would be best.'

As was indicated elsewhere, Senior Tutor engagement varied (a 'label' rather than a role with responsibility) and that while the automated email attendance system alert did work (albeit independently of the EPMD), this was dealt with 'elsewhere' and not always with the knowledge of the tutor, at least initially. On at least one occasion, an unnecessary complication arose due to poor attendance coinciding with the anniversary of the death of a student's parent resulting in action from the 'Office' which wasn't aware of the circumstances resulting in distress which the tutor had to resolve. Similarly, Learning Support Plans were not always thought to be shared as promptly with tutors as they could be holding up sometimes important adjustment (e.g. mental health, hearing loss, and so on – delays often extending well into a term).

Interestingly, and for the most part, the personal tutors also relayed that almost all of the students contacted during 'interventions' prior to the EPMD pilot involved personal rather than academic problems. As indicated earlier, most students seemed unaware of the services available to them or that the university would be interested in their personal issues at all. In discussion, most students seemed relieved and grateful to have been 'picked up'.

One problematic issue arising with the 'old' dashboard system included a lack of knowledge of the dashboard and its purpose at all, a problem thought easily resolved by incorporating training at induction for new members of staff. One personal tutor only knew of its existence in passing conversation with another colleague some time after they arrived (the same tutor also commented that the dashboard was not always easy to access or to interpret, and that even when accessible that didn't mean it was being used – there was no monitoring of that). Other tutors noted that some tutor group sizes were so large that regular and frequent contact was not always possible at all. Similarly, personal tutors not teaching the students within their own groups did not always know which students had authorised absences.

4.5 Summary usage data (dashboard 'views' and actions)

Summary data concerning dashboard views obtained from PBI for the period October, 2019 (during initial training), to early January, 2020, is listed below by College (for personal tutors monitoring internally) and the Student Support Advisors (monitoring dashboards externally):

College	2019			2020	Total views	Total students
	Oct	Nov	Dec	Jan		
LIBS (internal)	0	23	2	1	26	89
Social Science (internal)	0	8	2	0	10	47
Arts (internal)	0	7	2	1	10	32
Science (internal)*	1	1	0	0	2	30
Student Support (external)**	48	185	45	15	293	132
Total	49	224	51	17	341	330

Table 2 Summary of dashboard views (*the science tutors continued to monitor their 'old' dashboards alongside the EPMD due to their roles as Programme Leaders; ** Trained first)

Table 2 should be interpreted with some care, of course, as the exact nature and purpose of the 'views' presented numerically is not known with any certainty (e.g. within Student Support, for team discussion rather than student monitoring). What can be reported with more certainty, and from Student Support alone, is summarised as follows:

- Of the 132 students being monitored, 65 (49.2% in total) were either not contacted or, if 'flagging' with a minor concern, the personal tutors had requested 'no contact' because they were already aware and supporting the students themselves.
- Of the 67 students who were contacted (50.8% in total), 24 had an Engagement Priority Marker Score warranting a reach out email informing them that Student Services were working with their personal tutors and detailed the support available. A further 10 contacted indicated that they did not need any support at all, while 9 ignored all attempts to get in touch. Importantly, 23 students were invited in for a meeting or referred directly to another service of whom 2 went on to suspend. Only 1 student is known to have actually withdrawn completely, and this took place as the pilot began.

5. Conclusions and recommendations

The use of student dashboards in Higher Education is clearly on the increase, both nationally and internationally. Recognised for their potential value as 'early warning' systems for identifying students at risk of falling behind or dropping out of university altogether, for monitoring student attainment and progress and evaluating the effectiveness of 'interventions' directed towards supporting students leading to the development and for sharing of good practice, dashboard design and implementation remains entirely idiosyncratic and localised at institutional level. As far as can be reasonably determined from the research literature consulted, together with a basic search of institutional websites across the UK, Lincoln's EPMD certainly presents an opportunity for commercial exploitation subject to further research and development and marketing should such an option prove desirable. The resource implications associated with such a venture are, however, not inconsiderable. In terms of research and development, and by way of suggestion only, some of this could be reasonably carried out via doctoral study, including staff candidature, focusing on the technical aspects of the dashboard

itself together with its pedagogical application and effectiveness across the institution. Central to the evaluation itself, the enhanced EPMD as it currently exists, functioned perfectly as anticipated, the research and development bringing it this far a credit to all of those involved and to Simon Hearn (PBI). The following recommendations focus draw on the available evidence-base surrounding where the enhanced EPMD might best be positioned.

5.1 Monitoring solutions

As a direct result of the pilot undertaken here, key information extracted from the available research literature and taking into consideration all of the information presented at interview, two main recommendations emerge:

- Recommendation 1: If the principal purpose of the enhanced EPMD at Lincoln is solely to provide an 'early warning' system for identifying students at risk of falling behind or dropping out of university altogether, particularly but not exclusively in the first year of study, thereby enhancing the retention of those students who, but for personal reasons, would continue to benefit from Higher Education, there is little doubt that the dashboard should be monitored centrally and by a dedicated team of, for example, external Student Support Advisors. Such a move would, however, require an additional resource in terms of staffing and staff training for this solution to work most effectively. The Student Support Advisors involved in this project, who also developed a highly efficient dashboard monitoring management system at the point of implementation (ensuring a regular, consistent and reliable approach to 'intervention' and dealing with the overwhelmingly personal nature of student issues which emerged), also indicated that such a move might be introduced differentially, starting with the next cohort of first years themselves and following them, and those starting university behind them, through subsequent years. This approach would certainly incur additional technical work from PBI to ensure the correct student cohorts were accessible for the correct Student Support Advisors. All colleagues in the pilot were in agreement, however, that the professional dialogue between Student Support and personal tutors was also instrumental in its success and that establishing clear roles, responsibilities and channels of communication between areas was essential for the benefits of such a system to be maximised for all concerned. A 'hybrid' solution is therefore proposed. The personal tutoring system, as it currently exists, would remain unaffected and continue without interruption, with tutors able to access the enhanced EPMG as they access the 'old' dashboard now but relieved of the workload pressure and responsibility associated with the frequency and consistency of monitoring that 'early warning' requires.
- Recommendation 2: If, however, the enhanced EPMD at Lincoln is to be introduced as an 'early warning' system alongside a function more attuned to improving the longer term engagement and attainment of Lincoln students then a wider 'hybrid' solution should be considered, with the responsibility of 'early (and continued) warning' falling to Student Support Advisors working alongside Senior Tutors and Programme Leaders monitoring the same dashboard for more academic purposes. As in Recommendation 1, the personal tutoring system, as it currently exists, would remain unaffected and continue without interruption, with personal tutors able to access the enhanced EPMG as they access the 'old' dashboard now but able to focus their attention almost exclusively on academic matters while

liaising with colleagues in Student Support where personal issues impact adversely affect progress. It should be noted that specific views of the dashboard, based on individual requirements such as programme, year group, and so on, would not be possible due to the manual intervention required. However, College and School overview access could be provided in a similar manner to how the Personal Tutor Dashboards are now.

5.2 Training requirements

Despite the professional usefulness and value of the high-level training provision for all involved in the pilot (organised by Jacqueline Mayer and Judith Carey), 8 individual sessions were required to work with the Student Support Advisors and personal tutors involved alone (one by phone). However:

- Training should be considered an essential and mandatory requirement for all parties involved in 'core' dashboard use in order for the dashboard to be monitored read and interpreted consistently and appropriately, for decision-making, and for the services available from Student Support, Wellbeing, ELC, the Library (including MASH) and all other areas to be widely disseminated (this should also extend to finding a mechanism for training/informing students if a student-facing dashboard system is developed). As for the pilot, this could be provided centrally (resource implication).
- Beyond Student Support Advisors and Senior Tutors/Programme Leaders, training at a more 'local' level should be accommodated at the level of individual Schools. As indicated above, scaling-up dashboard literacy training at an institutional level, should this be required, presents its own resource issues, which, like dashboard development, are not inconsiderable. At interview, it was also suggested that a basic level of dashboard training might form part of the induction pack for all new staff (resource implication).
- The training element of dashboard use should be extended to include materials on both the positive and negative effects of dashboard monitoring, decision-making and intervention on students themselves, as reflected in the research literature (and self-monitoring and interpretation by students if applicable – e.g. stress, anxiety, competition, gaming, demotivation, and so on).
- Training should also emphasise the limitations of dashboard monitoring (learning analytics, 'click-level' data, and so on) in the context of the personal tutoring system which is an inherently human endeavour, the success of which is based entirely upon the inter-personal relationships between staff and students and the quality of one-to-one and group interactions.

5.3 Lincoln dashboard developments

It should be emphasised here, to be clear, that the enhanced EPMD 'worked' well across the pilot study, largely because of the considerable investment already devoted to its development and introduction as well as the level of technical support available from PBI. At interview, however, 'users' of the dashboard in practice raised a small number of valuable operational and design suggestions worthy of consideration and detailed discussion at a higher and more strategic level. Each of these carries a considerable resource implication should the university choose to develop the dashboard further. In particular, future developmental work might consider carefully the ease and readiness with

which it can be accessed, which key indicators and other information it chooses to present and how this is presented visually in terms of interpretability. All of this extends to students if future developments and access is to be shared in the form of a more student-facing dashboard thereby ensuring a clear and transparent sense of ownership (student dashboards need not contain all of the information available to staff presenting potential ethical challenges). If possible, the dashboard might also benefit from alignment with one or more theoretical or conceptual frameworks (e.g. Self-determination Theory or Control-Value Theory). In more detail (as raised at training or during interview):

- The EPMD would benefit from a reduction in technical language on screen, thereby providing a means for common understanding and interpretation by all users. This extends to some of the dashboard 'labels' which, for some, inadvertently conveyed a sense of student 'deficiency'.
- The notion of 'deficiency' extends to the EPMD itself which could be renamed (e.g. the Lincoln Student Engagement Dashboard or L-SED). This would depend on the ultimate 'users' (e.g. staff and/or students).
- In addition to considering the value of its existing variables, others considered potentially useful might include 'offer status' (e.g. conditional/unconditional – high sector-wide drop-out rates have been noted in students with unconditionals arriving with very low entry tariffs) or, as at Monash in Australia, 'First in Family' status additionally reflecting a student's cultural and social capital at the point of entry.
- Almost everyone involved in the pilot commented on the need for an embedded and shared 'notebook' as a means of recording 'contacts' and 'interventions' in order for all parties with access to understand history, context, background and ongoing events (ethically and sensitively of course).
- Over the course of training and use it became clear that the existing dashboard measures may not be sufficiently sensitive potentially missing vulnerable and 'at risk' students who might benefit from support. In addition, the Withdrawal Potential Index is a combination of two independent variables. These might best be considered separately. Threshold levels associated with the RAG ratings may need to be adjusted downwards accordingly. It might also be particularly helpful if all numerical variables might also, like attendance, be calibrated and standardised to a percentage scale which is perhaps easier to interpret. Finally, it was also suggested that individual variables might be RAG rated individually to offer more discriminatory information at a finer level of detail (which might allow a better sense of which combinations of variable are the most accurate predictors of vulnerability).
- If possible, the attendance alert monitoring system should be linked directly to the dashboard rather than sit alongside it.
- If possible, the dashboard should be developed to accommodate 'local' variation in course requirements (e.g. regulated courses which demand 100% attendance or where attendance monitoring is influenced by placements).
- The dashboard as it currently exists is dynamic, changing daily. Student could conceivably be red flagged one day and not the next. The presentation of weekly or monthly averages might also be useful.

- In one meeting (outside of the pilot) it was also suggested that dashboard developments could also make provision to monitor events at a module level.

It is important to note that whilst all of the potential developments listed above can be considered, not all may be technically possible due to factors associated with the availability of data and the current platform on which the EPMD has been built.

In a final but important comment, and in one documented example of a student-facing dashboard reported by McIntosh and Barden (2019) at the University of Bolton (the Learning Excellence Achievement Pathway or LEAP: available at bolton.ac.uk/leaponline), it is possible to integrate dashboard use with learning development in order to help students monitor their own academic and personal engagement through self-regulation also with the aim of achieving higher levels of attainment and digital literacy. In an earlier email exchange with the author (pers. comm.), who was in the process of moving institutions, Dr McIntosh offered to discuss this further if required.

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