

Chapter 13

Empowering Teachers to Personalize Learning Support



Case Studies of Teachers' Experiences Adopting a Student- and Teacher-Centered Learning Analytics Platform at Three Australian Universities

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1 Introduction

1.1 Students' Success and Teachers' Roles

Ensuring student success is a multifaceted challenge facing higher education institutions worldwide, particularly in light of pressures such as the massification, commodification, and diversification of higher education. We adopt Kuh and colleagues' definition of student success as "academic achievement, engagement in educationally purposeful activities, satisfaction, acquisition of desired knowledge, skills and competencies, persistence, attainment of educational objectives, and postcollege performance" (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006, p. 7). Student engagement is viewed as a key indicator of student success as the extent to which students engage in educational activities is likely to determine whether they will succeed in their studies (Kuh et al., 2006). Key mechanisms that support student engagement include improving the quality of student-staff relationships,

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encouraging timely help-seeking behavior, and clarifying expectations (e.g., Kahu & Nelson, 2018; Krause & Coates, 2008; Zepke & Leach, 2010). A sense of success in the early stages of students' university careers is also critical in building persistence and downstream academic achievement (Tinto, 2006). Lizzio (2006) has characterized five 'senses of success', including students' needs to feel capable, connected, purposeful, resourceful, and competent in terms of navigating academic culture. While 'engagement' and 'success' are necessarily broad, what is abundantly clear from the literature is the key role that teachers¹ play in fostering the abovementioned factors.

Krause and Coates (2008) point out that “[s]tudent perceptions of the learning environment and the commitment of academic staff to supporting student learning have a profound influence on student satisfaction and sense of belonging” (p. 501). A teacher's role in developing relationships and trust with students can powerfully impact on their engagement and academic achievement (Bryson & Hand, 2007; Reason, Terenzini, & Domingo, 2006). This has been encapsulated in the idea of 'relational pedagogy', which espouses that the “positive messages that are implicit when academics give time and support to students are significant in helping students feel that they are both worthy of their place and able to succeed in the university” (Pearce & Down, 2011, p. 492). Despite the commodification of higher education, the human relationships that exist at the core of learning and teaching are still critical but increasingly forgotten.

The unfortunate side effect of burgeoning class sizes and the concomitant sense of anonymity in today's higher education contexts undermines this central tenet of student success (Bryson & Hand, 2007). How students perceive these exchanges with their teachers has a positive impact on academic achievement, engagement, satisfaction, and retention (Farr-Wharton, Charles, Keast, Woolcott, & Chamberlain, 2018). Importantly, this conceptualization emphasizes the need for individualized communications: “Keeping the channels of communication open between the instructor and student is essential to enhancing the quality of exchanges. Students need to perceive that there is ready access to the instructor” (Jacques, Garger, Thomas, & Vracheva, 2012, p. 9). An example of these exchanges is feedback, known in the assessment literature to be another critical touchpoint between students and teachers (Hattie & Timperley, 2007). Timely, specific, goal-oriented feedback that clarifies standards and develops positive motivation and self-assessment strategies help to foster students' self-regulation and improve learning (Nicol & Macfarlane-Dick, 2006). The challenge in the context of higher education today is, of course, to scale these exchanges that provide learning support without losing the timeliness and personalization aspects. Proposed methods for such scaling increasingly include software (e.g., Pardo, 2017) that allow for teachers to measure student achievement in greater numbers and inform future teaching designs and approaches.

¹We use “teachers” in this chapter to refer to educators who design and deliver learning experiences for students. This includes coordinators who have additional responsibilities such as broader curriculum design and ownership, as well as tutors (or teaching assistants) who work under coordinators.

Ostensibly, this is one of the promises of the field of learning analytics (LA), which purports to have a “[f]ocus on informing and empowering instructors and learners” (Siemens & Baker, 2012, p. 253). This field typically focuses on big data available from digital learning systems, algorithmically analyzing behavioral “user events” in the form of logs of interactions and being concerned with combining logs from different data sources (Pardo & Dawson, 2016). An important issue here is that LA can be characterized as taking a computational view of learning, missing out on its relational and humanistic aspects. Some authors have rightly warned that the ‘learning’ in LA is being forgotten in favor of the ‘analytics’ and that a return to the root of learning and teaching including considering pedagogical intent and context, and involving students and teachers as the key stakeholders, is essential (Gašević, Dawson, & Siemens, 2015).

1.2 The Contexts of Teaching and the Learning Analytics Needs of Teachers

Perhaps symptomatically, reports from around the world suggest laggard adoption and implementation of LA by teachers. Recent reports on Australasian LA adoption and implementation have highlighted that, as the primary implementers of any LA tool, teachers need to be involved in designing LA approaches that “are sensitive to their environments, meeting and extending their pedagogical requirements, and ensuring flexibility” (Colvin et al., 2016, p. 19). In this context, and in keeping with the relational pedagogy outlined above, a key need seems to revolve around actions that involve personal connections with students, which balances the automation of computers with the humanistic approach of teaching (West et al., 2015). Notably, this report highlighted that teachers “still have to make sure that it [communication and feedback] is personalized and meaningful for students” and that teachers need LA tools with “some ability to modify it to their own requirements because each course and each cohort of students may differ” (p. 20).

The learning and teaching landscape in any institution, faculty, and indeed course² is unique and influences the uptake of any innovation, especially LA (Ferguson et al., 2014). Several factors can impact adoption, but some are particularly relevant to teacher- and student-centered LA:

1. Faculty resistance to change and workload issues are examples of social and cultural context that need to be understood and addressed (Macfadyen & Dawson, 2012), including concerns around needing to adapt to new tools and approaches, and change existing practices.

²“Course” is defined in this chapter as an individual component of an academic program that a student takes, usually lasting a semester. For example, it is referred to as a “unit of study” at the University of Sydney, a “subject” at the University of Melbourne, and a “course” at the University of New South Wales.

2. A large proportion of learning and teaching activities typically occurs outside the online space (not just outside the confines of a learning management system [LMS]) and often involves human interaction (West et al., 2015), presenting challenges for capturing and using the right data in the right place.
3. The lack of available tools that properly address the needs of teachers and students (Colvin et al., 2016) and a lack of bottom-up support and sharing that is driven by LA users (teachers and students) who have personally experienced tangible benefits, potentially causing stalling or retraction of interest (Liu, Rogers, & Pardo, 2015).

From these challenges, it may be surmised that a potential solution for teacher adoption is LA software that (simultaneously, in one place) assists them in capturing and working efficiently anywhere and in real time with a wide and flexible range of meaningful data, addresses their felt needs while reducing workload, and can yield immediate, shareable benefits. Existing LA tools are predominantly based on dashboards or mail merge (Lawson, Beer, Rossi, Moore, & Fleming, 2016; Tanes, Arnold, King, & Remnet, 2011; Verbert, Duval, Klerkx, Govaerts, & Santos, 2013). However, these single-purpose LA tools that just present a dashboard or just allow databasing and creation of mail merge emails may be effective in addressing parts of the whole ‘data lifecycle’ that teachers must manage through the course of a semester or year but fail to address its entirety nor the three challenges noted above. For example, dashboard tools are typically view-only, do not afford direct-to-student or two-way communications, and even sophisticated reporting outputs may be seen as a workload imposition with little or no benefit (Macfadyen & Dawson, 2012). Additionally, mail merge tools typically do not afford data collection processes or predictive analytics.

In an example of a consolidated LA workflow, Pardo and Dawson (2016) outlined a multistep lifecycle for LA which was geared toward improving learning practice; their process involved (1) data capture and combination from logs and other sources such as demographics, (2) data visualization and analysis through reporting interfaces, (3) algorithmic generation of models for prediction of learning outcomes, and (4) interventions at various levels of the university enterprise ranging from students and teachers to directors and administrators. Here, we contend that this conceptualization is still too computational and does not sufficiently involve teachers throughout the cycle nor address their barriers to adoption identified above. We therefore propose a reconsideration of this lifecycle that is more humanistic and meaningfully addresses teachers’ and students’ immediate needs in a wide range of contexts, in order to shift the conversation from single-purpose LA *tools* to multi-functional LA *platforms* that may address these needs in an integrated way:

1. Data collection—the *right* data needs to be gathered from both online *and* face-to-face learning and teaching environments. This does not necessarily need to include system logs, nor demographics.
2. Data curation—all relevant data need to be accessible in one place. The teacher, with their understanding of the pedagogical and pastoral contexts of their course,

should be the one making the informed decisions about what data to curate and when.

3. Data manipulation and analysis—the ‘raw’ data may need to be transformed or otherwise manipulated before it can yield a useful representation of information or be used to inform subsequent action. This does not necessarily need to, but could, involve any automated or algorithmic processing.
4. Actions enabled by the presence of data—providing learning support to students needs to occur in a timely way, account for individual student needs, and consider the classroom climate (Hattie & Timperley, 2007). Personalized support delivered by an electronic system (e.g., via email or a web page) helps to address this, but empowering the entire teaching team with relevant data when interacting with students face-to-face and online is also important.
5. Closing the loop and evaluation—feeding students’ engagement with, and perception of, personalized support back into the system so that teachers can use it to improve their approach.
6. Reflection—prompt and guide reflection on teaching and support practices by providing easy access to relevant representations of data.

Taken together, these needs and challenges speak to the importance of personalizing the learning environment. The term “personalized learning” encompasses a wide range of approaches that, broadly speaking, seek to tailor the content, support, and pathways that students receive based on some information known about each student (Alli, Rajan, & Ratliff, 2016). By amplifying the intelligence of human teachers with the agility of software (Baker, 2016), LA can help teachers leverage student data to provide timely, pedagogically meaningful, and tailored support. In completing the above LA lifecycle, teachers also change their practices based on data about students and the impact of support they are provided. We contend here that this personalized learning is therefore not just about *personalization* (tailoring) but also *person-alization* (humanizing) students’ learning experience by teachers.

We next introduce an LA platform that was developed to address these issues, followed by the experiences of three Australian institutions—the University of Sydney, the University of Melbourne, and the University of New South Wales (UNSW) Sydney—which are at different maturity levels of its adoption and implementation. As part of this, we discuss the context in which each institution is using the platform and the rationale behind its adoption. Finally, we synthesize the impact of the platform on teachers and their students, discuss a series of implications for practice, and conclude with future research directions.

2 The Student Relationship Engagement System (SRES)

Teachers lack the requisite combination of tools to fully control the personalization process for their students through the “data lifecycle” outlined above. To this end, the Student Relationship Engagement System (SRES; www.sres.io) is a unique LA

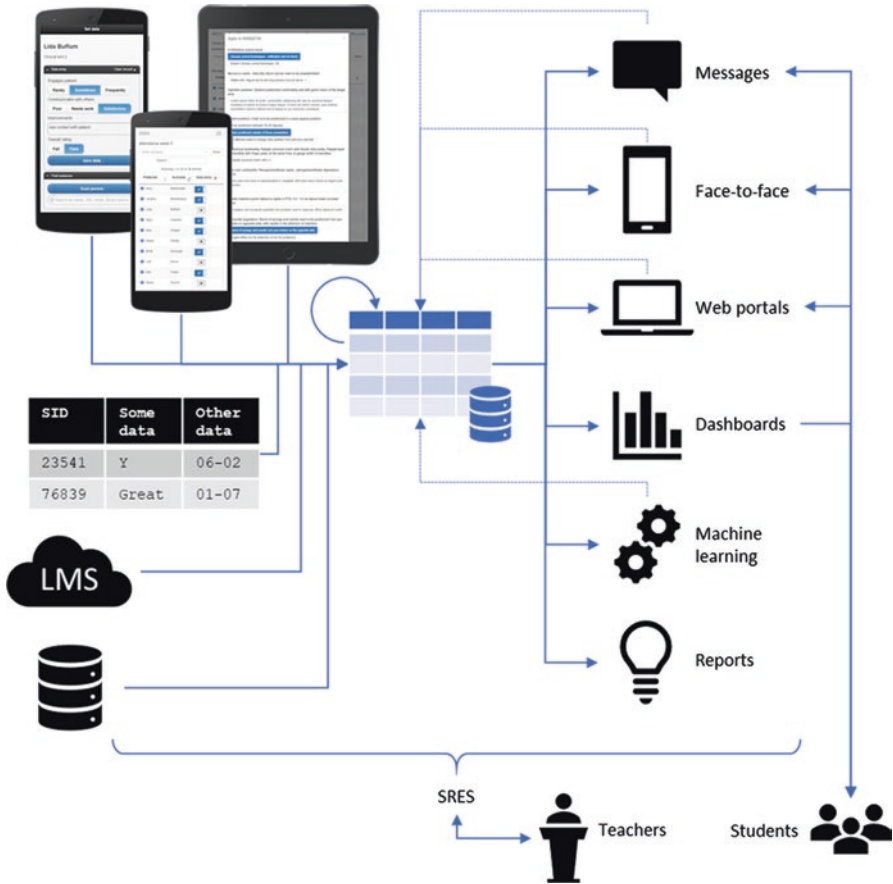


Fig. 13.1 Schematic of the Student Relationship Engagement System (SRES) as a multifunctional learning analytics platform. Data are collected and curated (left half) into a database that is unique for each course (center). Data can be manipulated, analyzed, and used in many ways (right half), some of which feed more data back into the system (thin dashed lines). Students interact with the SRES through a number of modalities and can also feed data back directly into the system (double-ended arrows). Teachers are in full control of all these stages of the learning analytics data lifecycle, accessing the SRES through a web interface

platform, housing a wide range of flexible and highly customizable tools, which has been developed to give teachers full control over the data lifecycle and to empower them to use data in ways that suit their specific teaching contexts (Fig. 13.1). The SRES addresses our proposed LA data lifecycle by providing a platform where teachers have ownership and control over each stage.

1. Data collection—teachers can import most kinds of electronic data into the SRES (keyed by a unique student identifier) or set up data synchronizations with databases or LMSs. Importantly, they can also build simple mobile web app interfaces within the SRES to collect data from face-to-face learning and teaching

environments (e.g., in-class attendance, participation, or assessment data). Similar web interfaces (“portals”) can also be presented to students so that they can enter relevant information directly into the system.

2. Data curation—all collected data can be curated into “lists” (essentially a database, usually one such list per course) within the SRES and made accessible online to other teaching staff within the course in real time. A key factor here is that teachers are in full control of the columns (attributes, fields) in their lists.
3. Data manipulation and analysis—spreadsheet-like data manipulations can be performed directly within the platform, including using rules that can range from simple to complex depending on teachers’ needs. They can also visualize data by creating custom dashboards and apply machine learning algorithms (clustering, decision trees, and association rule mining) to uncover hidden patterns in large datasets to better understand how students are engaging and succeeding (Liu, Taylor, Bridgeman, Bartimote-Aufflick, & Pardo, 2016). Predictive models can also be built and applied using teacher-selected attributes. All of these manipulations and analyses can be performed by teachers without any coding, simply by selecting relevant columns and operations via a graphical user interface.
4. Actions enabled by the presence of data—teachers can provide personalized online support to students by sending customized emails or pushing personalized web page content (“portals”) to a student’s LMS. They can also use data to inform face-to-face actions, such as presenting relevant data to teaching assistants at the point of contact to contextualize teaching activities to address identified learning needs. Custom dashboards can be shared with other teachers and even students. Customizable reports can also be designed to automatically inform members of the teaching team about students who meet teacher-defined criteria.
5. Closing the loop and evaluation—teachers can see who has opened emails sent from the SRES, how many times, and whether links have been clicked. This can inform the need for further action, such as follow-up communications either online or face-to-face. Teachers can also capture feedback about whether their message has been helpful to students by enabling a function that allows students to vote and provide qualitative feedback explaining how and why.
6. Reflection—by variably combining the custom visualizations, closing-the-loop information, machine learning insights, and by virtue of having all relevant data in one place, teachers can evaluate the impact of their actions and better understand the characteristics of their student cohorts. Based on this, they may, for example, adjust future approaches to student learning support in terms of recipient pool and messaging.

In stark contrast to other LA approaches and tools, the SRES gives precedence to teacher intelligence and small (but meaningful) data over predictive algorithms and big data. It enables teachers to design an LA approach that is contextualized to their unique learning and teaching situation. This may include collecting and curating traditional student engagement and performance data such as attendance, LMS use, tutor feedback, and grades but may also include nontraditional information such as



Fig. 13.2 Key functionality of the SRES mapped to the six stages of the proposed LA data lifecycle

those that students proffer about themselves, such as their preferred name, photo, and details such as their background and interests. The flexibility of the SRES affords teachers the ability to leverage a wide range of data to suit the needs of their teaching practices and student cohort. Together with the functionality built into the platform, teachers are given control of the whole data lifecycle (Fig. 13.2), enabling them to obtain and use contextually meaningful academic engagement and success data to foster relationships with, and provide support to, their students.

3 Institutional Case Studies

3.1 Methodology

To conduct a cross-institutional study, three Australian universities who currently have access to the SRES platform were selected: the University of Sydney, the University of Melbourne, and UNSW Sydney. Between these institutions, the

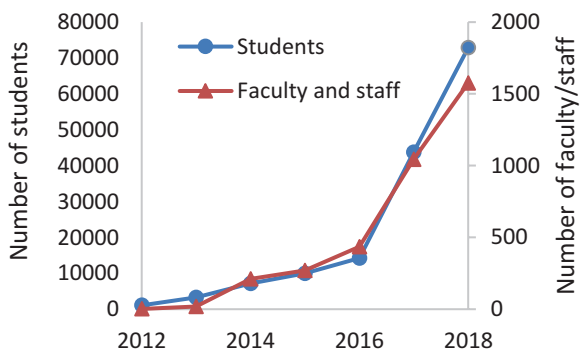
maturity of adoption of the SRES varied, with the University of Sydney being the first developers and adopters, giving teachers more time to adjust to and implement the platform (Vigentini et al., 2017). Across all three cases, however, the research sought to investigate the following broad questions which applied regardless of the maturity of adoption:

1. Why did teachers choose to adopt the SRES?
2. How did teachers use the SRES to support student success? (That is, what data did they select, how did they use these data, and why?)
3. What are teachers' perspectives and experiences of the impacts and effectiveness of the SRES on them and their students? (For instance, on students' engagement, satisfaction, and success?)
4. What are students' perspectives of the personalized support messages received from teachers via the SRES?

The mixed-methods methodology for the investigation focused primarily on semi-structured interviews and informal feedback with teachers (including coordinators, lecturers, and tutors), supplemented with qualitative and quantitative data from the SRES platform including percentage of emails opened and responses from students regarding the helpfulness of communications received through the SRES. This approach was taken because it is often difficult to establish the impact of a *platform* which can be applied in many different ways for different purposes; in the context of LMSs, Coates, James, and Baldwin described this issue as being “not the provision of features but their uptake and use that really determines [a platform’s] educational value” (2005, p. 26). The diversity of uses (and indeed teachers and students and their individual characteristics) also precluded predominantly quantitative measures of impact, even though they may be possible for more focused programs (Dawson, Jovanovic, Gašević, & Pardo, 2017).

While these research questions were used across all three institutions, the highly customizable nature of the platform meant that it was not possible to compare courses within institutions, nor across institutions. Currently across the three universities in this study (Fig. 13.3), the SRES houses teacher-selected data for over 43,000 students (2017 count, over 72,000 projected for the entirety of 2018). These

Fig. 13.3 Combined adoption measures of the SRES at three Australian institutions. Figures for 2018 are projected based on half-yearly data



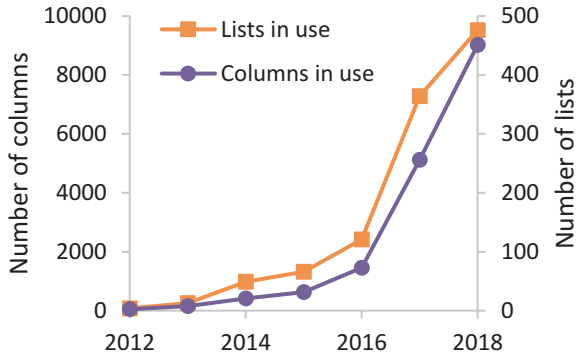


Fig. 13.4 Combined use measures of the SRES at three Australian institutions. Figures for 2018 are projected based on half-yearly data. The database structure of the SRES allows teachers to create “lists” (typically one per course) with students and create relevant “columns” in these lists to house data of their choosing

data relate to students across 360 lists (2017 count, 470 projected for 2018), each list typically representing a single course (Fig. 13.4). Across these lists, 5100 columns (2017 count, 9000 projected for 2018) contain data about students, each of which has been selected by teachers for use. While a large sample size usually lends itself to more impressive statistical outcomes, in the context of the SRES, this primarily resulted in an overwhelming diversity of variable uses and users. Therefore, this study sought a more holistic understanding of how teachers were using the platform and the reported impacts of this on students. The case studies start with a wide-ranging snapshot of its use at the University of Sydney, the original developers of the platform where it has been used by an increasing number of teachers since 2012. More focused perspectives are then presented for the University of Melbourne and particular courses at UNSW Sydney.

3.2 Case Study 1: The University of Sydney

The SRES was developed in 2012 by two teachers in the Faculty of Science responsible for coordinating large first-year units with up to 2000 students per semester. After being used primarily within the Faculty of Science for the first two years, it spread organically across other areas including Arts and Social Sciences, Business, Engineering, Health Sciences, and Medicine. It now reaches over 50% (in 2017, over 32,000 unique students) of the entire university’s student cohort, almost 5,000 weekly users (students, teachers, and support staff), and over 1,500 registered faculty and staff users. In these diverse settings, teachers’ adoption of the SRES has extended from enhancing teaching and learning to streamlining administration and course coordination.

A recurring theme from interviews was the use of the SRES to capture student attendance and participation grades. Many reported collecting attendance at face-to-face sessions such as tutorials and laboratory classes. Compared to traditional practices of using paper-based rolls that were often lost or sometimes entered at the end of the semester, the SRES allowed teaching teams to record data and act upon it throughout the semester. Many teachers viewed attendance as an important indicator with both their personal experiences and empirical studies indicating a correlation between student attendance, participation, and performance (Credé, Roch, & Kieszczyńska, 2010; Newman-Ford, Fitzgibbon, Lloyd, & Thomas, 2008). As one coordinator explained, “it tends to be the case that if you don’t turn up you just don’t have the opportunity to ask as many questions and really sort of nut out those ideas. Earlier in the degree attendance is a lot more important because they’re picking up the basic concepts that they need for the rest of their degree, and possibly for the rest of their lives.” Having access to attendance data in the SRES allowed teachers to identify students who were not engaging, with many using this information to generate personalized emails, reminding students of attendance requirements and offering support where required.

Interestingly, others provided additional reasons for collecting attendance data, noting that the process of collecting this data was in itself an opportunity to engage with students. The change in tools and process meant that instead of calling names from a paper-based roll, teachers would move from student to student scanning their student ID using the SRES mobile web app. Some teachers reported that this process allowed them to learn the names and faces of their students more quickly, while some reported this as an opportunity to provide feedback to students about their progress. In these situations, the technology caused a change in practice which helped to strengthen teacher-student relationships.

To achieve a similar goal, some teachers reported directly collecting information from their students through the SRES at the beginning of semester. They noted the positive effects of having this information, such as work experience, interests, career trajectory, and even student photos, with one coordinator reporting, “that really helped with our tutors because they felt like they had this photo there that they could immediately see who their students were, and then they also had something interesting about them that they could use to memorize who they were as well. They found that really useful.” Some used this information to inform their teaching practices as it allowed them to contextualize these based on the cohort of students. One tutor with students from a range of majors used this information to structure class discussions based on the different background knowledge and unique perspectives of individual students present. They found this to be a more positive experience, stating, “because I could go directly to a person who I already knew had background—whether it be through their major or through their work experience—I was able to generate a much smoother discussion in class.” Reflecting on students’ perspective of this experience, they reported, “their perception was here’s a teacher who actually knows all about me already. They’ve taken the time and the effort to understand me as an individual.”

Coordinators reported using face-to-face data in conjunction with data from a variety of online platforms, including the LMS and external discussion boards such as Piazza. For example, having access to last log-in date and discussion board usage allowed coordinators to identify whether students were actively contributing, passively viewing, or not engaging at all. Combining multiple data sources in the SRES allowed coordinators to identify students who were at risk of lower performance. The focus on this combined dataset was primarily in the early weeks of the semester, including the weeks leading up to the census date (when students can unenroll without financial penalty). One teacher reported using this information prior to census to send personalized emails to students who were at risk, advising them and offering support. Interestingly, they reported a reduction in the number of students who dropped out, stating “we used to have maybe 30, 40 people drop out minimum. Now we can have a handful” (cohort size 800–1300). Another teacher using the SRES in a similar way reported a halving of the year-on-year withdrawal rate in a first-year cohort of 270, without any other changes made to the course except the introduction of the SRES.

In addition to capturing and acting on face-to-face and online participation data, the SRES was used heavily for providing personalized assessment feedback. As with attendance, many teachers increasingly used the SRES to mark and provide feedback for in-class assessments such as presentations. To do this, course coordinators or learning designers built forms within the SRES, which were then used by markers on a mobile-friendly SRES web app that enabled live data collection. Teachers then used these data to build personalized feedback via email, text message, or through a web page embedded into the LMS. This involved creating conditional text and piping entered data into templates, as with mail merge approaches. Some teachers reported grouping students based on performance (such as low, medium, and high) and sending feedback that was customized to each of these groups. Others reported much more complex processes in which students were assessed against a detailed set of criteria and would receive highly personalized emails with feedback comments tailored to their performance against each criterion. In addition to receiving feedback, they would also receive suggestions for improvement.

The use of the SRES for assessment feedback not only allowed for more efficient marking processes but also resulted in more timely and detailed feedback to students. Providing more immediate feedback was seen as important, particularly where assessments built upon each other or required the application of similar skills. As one coordinator reflected, “We’ve moved from, I’d have to say, not the best feedback mechanisms up to now very prompt feedback on any submitted work. So that the students, before they have to complete their next submission task, have an opportunity to improve.” The personalized nature of the feedback was also well-received by students, with one coordinator noting, “I routinely get emails back from students who believe I have personally sent them that email. Who believe that I have taken the trouble to individually engage with them and give them that feedback. I get thank you emails, and I get questions about the email that I sent, from time to time. Not a huge number, but enough to give me a good indication that that’s the

way that they seem to be received.” Some coordinators also emphasized the benefit of having timely access to assessment grades for their course as this allowed them to quickly identify trends, including areas where further instruction was required for all students to address learning gaps. From here they were able to communicate this to tutors and ensure that subsequent classes focused on bridging these gaps.

In addition to using the SRES to provide personalized feedback to students’ assessment tasks, some teachers also utilized the SRES to contact students who were not performing well and may have needed support. For students who had not submitted, some coordinators used personalized emails to remind them of the requirement to submit, to negotiate deadlines, and to remind students of the process to make arrangements for missed assessments. For students who had submitted but were not performing to the level required, coordinators often sent emails recommending they attend additional workshops or engage with support services. While many wanted to provide support and encouragement to other students, time constraints were a major challenge which impeded their ability to do so. As one teacher reflected, “we’re very good at sending complaint emails when things go wrong, but when things go well we don’t tell people and people need those spontaneous good emails,” Another teacher noted, “reinforcing the good ones—there’s immense value in that and we forget that group, often. We don’t give them enough praise and recognition.” Interestingly, one coordinator did report using it to identify high performers in order to email them about opportunities for further study.

While many see the value in adopting the SRES, for tutors, the support of the coordinator was an important factor in being able to implement and use the SRES within a course. One tutor reported, “I had a whole lot of fights with the [course] coordinator to get SRES into the [course].” To overcome this resistance, they initially trialed it with one class of students on a limited basis and then rolled it out across all classes. The workload generated by sending emails was also a point of reflection for staff. Some teachers mentioned challenges engaging with students despite the personalized nature of their emails, reporting that they perceived that often students did not even open them. In contrast, others reported an increase in the responses received from students as a result of sending emails through SRES. Despite the increase in workload, many teachers actually commented on this positively. As one noted, “[f]rom a workload perspective, yes, it is generating a whole lot more [email responses from students] that you wouldn’t otherwise have. It’s actually really quite productive [at engaging students] that way.” Another reflected, “Care [for students] overrides the [additional] time.”

This sentiment was echoed in student comments, which were volunteered directly to the platform in response to personalized messages. These allowed the platform to accurately capture students’ perspectives and therefore allowed teachers to close the loop and start reflecting on their support approaches:

- “Thank you for the feedback! Understanding the breakdown of marks and feedback in such detail really helps prepare for other [assessments] and next year placement. Thanks for the semester!”
- “Just let me know teachers do concern [sic] about my study and my learning outcome, and helpful advice to do better.”

- “It is really helpful, thanks for encouraging me onto the rest of the semester, I was losing it and I thought I might just give up. But thank you very much and I will keep up the good work!!!!!!!!!!!!!!”
- “This message shows me which part I can do better in final exam and makes me feel the professor is kindness.”

At the University of Sydney, the SRES has provided teachers with a practical platform to work with student data on attendance, assessment, participation, and engagement in face-to-face and online environments. This has led to tangible benefits including improved student feedback and engagement as well as administrative efficiencies, which together has gradually helped to overcome faculty resistance. Additionally, small communities of practice have formed within and between departments, where learning designers and faculty worked together to share success stories and help provide on-demand support. Despite the challenges some teachers have experienced, the involvement of teaching staff in the design and development of the SRES over the years has also improved the extent to which it has been adopted and used across the university. As one participant noted, “the selling point is that it was made by a teacher. Because teachers know what teachers need.”

3.3 Case Study 2: The University of Melbourne

The second case study involves teachers from the Faculty of Science at The University of Melbourne, a large research-intensive university, who piloted the use of the SRES from early 2017 (Vigentini et al., 2017) and as such are still relatively new adopters of the platform. Melbourne’s adoption began with a conference presentation piquing interest, leading to the joint initiative between the platform’s Sydney developers and the academic faculty leadership team at Melbourne. Melbourne was further supported in the implementation of the platform by an information technology specialist, who had her role shifted to help support the SRES. Participants in the SRES pilot were coordinators from five courses ranging from Mathematics, Biology, and Chemistry, and all courses had over 300 students enrolled. The structure of the courses often included multiple lectures each week as well as additional tutorials and workshops. Assessment typically included a large examination component (e.g., 70–80%) with the remaining assessment linked to assignments and laboratory work. Within all the courses that participated in the study, coordinators noted that they believed student engagement could be improved. Yet despite these ongoing concerns, coordinators felt they had few routes to improve engagement or understand what other measures, apart from attendance, could be designed and implemented to better track student engagement.

Participants were drawn to trial the SRES for a multitude of reasons. One recurring reason stated by participants to use the SRES in their course was dissatisfaction with the existing LMS’ functionality. While the SRES was originally designed to supplement the LMS rather than to replace it, participants noted that

using the SRES decreased the amount of time they spent using the LMS. One coordinator noted, “[t]he systems we’ve got at the moment are a bit old, a bit clunky... we needed a better system for recording data, [the SRES] seems to be an improvement over what we’ve got at the moment.”

However, the SRES’ appeal was not only a sleeker interface. Participants also mentioned that they were motivated to participate in a system that could improve student support. The ability to send personalized emails to students, a function not available on the current LMS, intrigued participants. One noted, “I wanted the students to feel like we were really interested in their progress, so to be able to personalize an email to them and point out what support was available to them if they were struggling, I really like that idea...” Another participant voiced similar motivations for using the SRES, “It just sounded like a way we could interact with the students on a more personal level, we’ve heard comments, and we try to reach out to as many as we could, and [with the SRES] now if there are at risk students we could sort of go, ‘Hey, you are at risk’.”

Yet despite the appeal of personalized emails, many participants in the pilot did not fulfil their hope of using the email function available through the platform. When asked about how they used the platform, many coordinators only used it for rudimentary functions, such as recording attendance or marks. However, this finding not only did not match participants’ original motivations for using the platform, which were often far loftier, but also was subsequently modified by many participants who still wished to use the personalized email function in future semesters. One participant explained, “[w]hen I started using the SRES the semester was already underway, and you got to brief tutors about how to use the system and so on, so by that point it felt a bit too late... also partly because you know I’ve got a hundred other things going on in a semester, and partly because it’s also with so many tutors it is a bit of an effort to hunt down tutors to get them to input their data.”

Further complicating the research was the ad hoc way that many coordinators piloted the email function within their teaching design and course delivery. One teacher noted, “I sent an email to basically the bottom quartile of the class... picked a point where I thought anything above that seemed reasonable.” He emailed those students regarding their current mark and reminded them to do their assignments and attend tutorials and offered consultation times. In response, some students emailed thanking him for letting them know or for noticing, although he also received some emails saying that students’ assignment marks were missing from tutors who had yet to input them.

In fact, a common issue that arose in interviews about the SRES was the lack of engagement from tutors, rather than students. As the courses had such large student enrolments, some coordinators had close to 40 tutors during the semester. For the data to stay up to date, all the tutors needed to take attendance using the SRES web app (and if by hand, they would later input it into the system) and enter all student grades in a timely manner. However, this goal was difficult to achieve and cumbersome to enforce. As one participant said, “When you have 40 tutors in a [course], there’s always going to be some that haven’t entered their data on time, no matter how many times you drum it into them.”

Implementation challenges related to tutor responsibilities and ad hoc emailing were further compounded by the lack of available time for coordinators to familiarize themselves with the system. Despite these challenges, students who did receive messages were generally positive about the extra support and care. Students who were asked to comment on whether the email was helpful or not wrote comments such as:

- “It was personal and gives me faith in the care our lecturers and coordinators have in us. It also included additional helpful information just in case.”
- “Great appreciation to that, like a hopeless person just found a guiding star! Thanks.”
- “It was highly encouraging and sends a positive message to the student about the staff’s commitment to their success.”

Additionally, the use of the SRES may have contributed to changing teachers’ perspectives on student engagement, teaching design, and possibly motivate teachers’ attitudes and future behaviors about student engagement and LA. For example, in one course, the tracking of marks and attendance made the coordinator realize that students were unconcerned about marks and attendance as long as the minimum requirement was achieved so they could sit for the exam. This revelation led the teacher to rethink his approach and use the email function in the future to help understand why students may not come to lectures and/or tutorials.

The use of the SRES also motivated some coordinators to more deeply consider how student engagement could be measured to improve their teaching design in the future. For example, one participant, when asked about how the SRES impacted them, noted that “[t]he SRES has made me think ‘wouldn’t it be good if we knew this?’” while another participant mentioned, “[y]ou know, you need to do some analysis to have evidence for making a change... and you need data for that.” One participant, who noted that they did not really utilize the platform to its fullest potential, further mentioned, “I’d like to know more about the platform, I think we can improve, I think we can do more.”

Teachers at the University of Melbourne adopted the platform to provide more personal support for students and to ease the process of data collection and curation primarily from face-to-face environments. These two purposes were interlinked, with data availability affording targeted support; an unforeseen but encouraging effect was that this also triggered further reflection on selecting and applying relevant data to enhance learning and teaching. Despite only having used the SRES for a short period of time, teachers started to see positive impacts in terms of workload efficiencies and improved student feedback, although there were issues around compliance by more diverse teaching teams.

3.4 Case Study 3: The University of New South Wales Sydney

UNSW Sydney also started piloting the SRES in early 2017. There were three elements that catalyzed its implementation here: (1) a fertile landscape incentivizing the personalization of student experience, supported by an ambitious strategic plan

(the “2025 Strategy,” grounded on four key domains: “Communities,” “Feedback and Dialogue,” “Inspired Learning through Inspiring Teaching,” and “Being Digital”); (2) a certain flexibility to support innovations in learning and teaching afforded by a strategic and systematic review of over 800 courses over 5 years; and (3) a forward-looking team in the portfolio of the Pro-Vice-Chancellor Education, with the expertise to support early adopters of educational technologies.

Yet, a cautious and thorough approach was developed in order to provide effective support for teachers involved in the project. The starting point of the implementation was the invitation of several coordinators to participate in the project, focusing on large first-year courses. In the initial round, four large courses expressed interest, but only two decided to continue; these two were characterized by a higher level of resilience to uncertainty and innovation (with a potential to accept and learn from failure and suboptimal processes): a first-year Marketing course (800+ students) and a first-year Biology course (250+ students), both repeated over the two semesters in the year).

An important element behind the choice of courses is the belief at this university that the focus on the first-year experience departs from the traditional transactional model of education delivery, instead of offering a multicomponent model with multiple value creators that focus on student experience. In this sense, it is envisaged that *personalized* learning pathways and communications are customized using LA and iteratively inform learning design. This is intended to address critical concerns that are particularly salient for first-year students, including interaction in group work, ambiguity in communications, and assessment anxiety. By scaffolding students in personalized ways, the strategic aim is to enhance students’ educational experience and improve performance.

With this backdrop, the two courses adopted very different approaches: the Biology course took a simplistic path, adding the SRES as the tool to enable more detailed feedback after the mid-semester exams. In a sense, this established a baseline for the implementation without disrupting the normal running of the course but gave an opportunity for the teachers to identify data to offer students a more detailed account of their performance which they would not normally get for exams. In this case, only the two course coordinators were involved in the process: they negotiated the scope of the implementation and selected the metrics of interest, keeping in focus only the provision of better feedback to students.

The personalized report received in students’ inboxes after the mid-semester exams gave specific details about the areas requiring improvement and additional targeted resources, enabling them to adjust their modes of learning. The student response (in semester one 2017, emails were sent to 1005 students; 81.4% opened the emails with some up to 30 times) was overwhelmingly positive with 99.8% of the students indicating via a survey link at the bottom of the email that it was helpful. Similar results were obtained in the second mailing. The following comments exemplify their views:

- “This email was helpful in highlighting specific areas of weakness and will allow me to fill in gaps in my knowledge!”
- “It told me exactly where I went wrong, now I can improve in that area, thanks [teacher name]!”

- “The feedback was detailed and constructive- advised on what areas could be improved on instead of a generic feedback relating to the entire cohort.”
- “Thank you for providing me feedback on the areas that I am weak on, please continue to do this. I will use this to revise and improve in these areas.”

The coordinators were surprised by the response from students and were quickly convinced about the effectiveness of the approach: “I could not believe that students would open and go back to the email 30 times! ...even if the amount of feedback provided is limited, the students are appreciating the fact that the message is directed to them.”

The Marketing course adopted a more holistic and systematic approach, integrating several tools in the course including the use of an external resource from the textbook publisher (McGraw-Hill Connect and LearnSmart), a unique approach focusing on individual characteristics for personal development and team formation, and the SRES as an essential component to provide logistic support in the collection and curation of key behavioral and performance attributes during the course (including attendance, class participation, and team presentation outcomes). Although the main focus of the integration and adoption of the SRES was an administrative one, because of the nature of the discipline (marketing), the coordinator was convinced about the potential benefits of the SRES for the running of the course and for the use of data. In this case, all the tutors as well as the course coordinator contributed by using the SRES in their daily activities. For example, all teachers logged attendance and class participation in the same place via the SRES web app, saving much time from manually aggregating separate spreadsheets.

In the first run of the course using the SRES, the coordinator praised the simplicity of being able to visualize a snapshot of what happened in the course by the end of each week. Using the SRES visualization tools, the coordinator could easily generate a real-time report. Further, the fact that information about engagement with the external tool was brought back into the SRES meant that she could also appreciate how students valued the resource. The ability to see what students and tutors were doing in near real time also meant that she started to question the importance of attendance at lectures and of engagement with the ecosystem in the course. This sort of reasoning, partly prompted by the disciplinary context, reflects the effectiveness of marketing channels in the consumer journey to purchase and draws a parallel to the student journey (Bucic, Vigentini, & King, 2018). This thinking drew the course team to experiment with the modes and level of “nudging” (i.e., the frequency and timing of messages) in order to test whether there was a perceived difference in “teacher’s presence.” Comparing the way in which messages were sent (high frequency, about once per week in semester one vs low frequency, at the start and around key assessment points in semester two) showed that students receiving more frequent and consistent relevant messages rated their satisfaction with the course to be much higher than when they were just prompted occasionally.

Both cases provided strong evidence that students appreciated the teacher’s presence or simply the fact that their teachers cared about them. This was associated with higher satisfaction with the courses and, at least in the Marketing course,

was also associated with an improvement in performance compared with the previous instances of the course without the SRES. Combined with the ability to collect and curate face-to-face and electronic data (e.g., assessment outcomes, attendance, participation, and online tool use) as well as visualize and act on this data, all in a single platform, this helped teachers overcome resistance to change. As seen in the other case studies, teacher engagement with the SRES also enabled some reflective practice.

4 Discussion

4.1 *Empowering Teachers to Personalize Support for Student Success*

The work presented here sought to investigate one LA solution to a sector-wide issue: maintaining the personalization of higher education in the face of massification, commodification, and diversification. As student numbers grow, along with tuition prices, and emerging new cohorts of students, higher education is pressured to find new ways to support student engagement and success. The platform discussed in this chapter, the SRES, seeks to enable teachers to provide personalized and timely support and feedback to students which would not be feasible at scale using traditional approaches.

The case studies coordinated across three very different institutions provided systematic data on the adoption, implementation, and use of the SRES, showing how the platform offered teachers the ability to collect, curate, analyze, and act upon data that was meaningful to their specific teaching context, as well as close the loop for reflection on changes to practice. To teachers, the two most important differences between the SRES platform and other extant LA tools have been (1) the ability to precisely select and use data that is relevant to them and (2) being able to efficiently perform operations at scale on the data from a single software platform. Many teachers at the three universities placed strong emphasis on collecting attendance and assessment data, and many also used the SRES to curate data from other sources including online systems and richer metrics from face-to-face classroom interactions. The unique web interface also afforded both students and teachers the ability to input information directly into the SRES, such as allowing students to enter information about themselves and teachers to efficiently enter attendance, participation, grades, and feedback.

In contrast to existing (often manual) practices, the SRES has empowered teachers to engage in more systematic and targeted support actions throughout the semester. The most common actions from the platform have been to personalize messages to students for a wide range of purposes including offering support to students considered “at risk,” reminding students of attendance and assessment requirements, providing tailored feedback, and alerting high achievers to the possibility of advanced study. Other actions have included customizing face-to-face teaching and

learning activities to the backgrounds and interests of learners by leveraging data curated in the SRES. Interestingly, many teachers commented that their workload when using the platform was not necessarily reduced (at least not at first), although their time was more “productive”; this has helped to alleviate a key barrier to adoption (Macfadyen & Dawson, 2012).

Another contributing factor to overcoming change resistance has been the positive outcomes for both teachers and students from the personalized, *person-alized*, and timely nature of actions taken by teachers empowered by the SRES. These outcomes included more open channels of communication, increased help-seeking behaviors from students, feedback that allowed students to improve performance on subsequent assessments, and increased retention rates. The impact on student satisfaction has been reflected in the positive feedback teachers have received from their students. Although the diversity of ways in which this LA platform was used across the three institutions precluded a typical quantitative impact study, the mixed-methods data including teacher interview responses and student perception data together suggested that the SRES positively impacted students’ outlook on the level of personal support provided for them, and perhaps even their engagement with the material and eventual academic performance. The SRES has therefore helped to enhance teachers’ “relational pedagogy” (Pearce & Down, 2011) to promote student success. Of course, effect is hard to generalize as the use of the platform was sometimes part of a range of changes made to courses by teachers, and the cohorts were different. At the same time, the case studies started to show that the platform not only provided an opportunity to enhance the student experience, but given interest, time, and effort from teachers, there is great opportunity to delve into action research of how students learn and engage with support.

4.2 *Implications for Practice*

This chapter set out to investigate the experiences of teachers at three Australian universities implementing a humanistic LA platform. A number of ideas from the LMS implementation and adoption literature are instructive here to help frame implications for LA practice.

First, it is important to keep in mind that learning technologies (including LA) are not neutral technologies but rather can impact teacher’s expectations, desires, behaviors, and, thus, their teaching design (Coates et al., 2005). The technology itself has a powerful role in influencing and shaping teaching practices. Second, even though an LMS may provide various functions for enhancing online learning and teaching beyond the transmission of textual content, the way teachers use the technology may be mismatched with students’ expectations or needs (Lonn & Teasley, 2009). Third, these varied functions open the possibility for teachers to reconsider their practices as their use of (and comfort with) the technology progressively evolves (West, Waddoups, & Graham, 2007). Using these three perspectives in the context of the case studies, we highlight three general implications for LA practice.

4.2.1 Learning Analytics Needs to Address Actual Needs

Adoption of the SRES has spread throughout the University of Sydney where it was developed, to the University of Melbourne, UNSW Sydney, and to teachers in other Australian institutions. In contrast to many top-down implementations of LA, the bottom-up nature of the SRES has assisted with its widespread adoption primarily due to being designed by teachers for teachers. By helping teachers to collect and use meaningful data relevant to their context to provide timely learning support to students, the SRES addresses pedagogical and pastoral needs of personalization and relationship building (Kahu & Nelson, 2018; Zepke & Leach, 2010) and removes some of the usual barriers to LA adoption such as one-size-fits-all approaches, opaque predictive algorithms, and a disconnect between analysis and action (Liu, Bartimote-Aufflick, Pardo, & Bridgeman, 2017). Other barriers removed have led to greater veracity and workload efficiency (Macfadyen & Dawson, 2012) in data entry, analysis, and communication with students. It has not only empowered teachers with the capability to increase the number and quality of exchanges with their students (West et al., 2015), but more importantly it has allowed them to humanize these exchanges and also support nonelectronic interactions. This has helped to mitigate the sense of anonymity (Bryson & Hand, 2007) that is associated with large cohorts of students. At the same time, the SRES has streamlined some of the most burdensome administrative aspects of unit coordination, allowing teachers to focus more attention on pedagogical and pastoral care for students.

Together, these contribute to the critical “usefulness” factor highlighted in the literature on LA (Ali, Asadi, Gašević, Jovanović, & Hatala, 2013) and LMS (West et al., 2007) adoption and address the need for innovations to present a “relative advantage” to existing approaches as argued by Rogers (2003). In the face of institutional culture and workload pressures contributing to the lack of LA adoption by teachers, being able to demonstrate the relative advantage of LA and its compatibility with their needs is crucial (Macfadyen & Dawson, 2012). Bringing data and a range of tools together into one platform for academics who are interested in their students empowers them to reflect on how their practice affects students but also enables them to reflect on the effectiveness of their practice.

4.2.2 Start Small but Provide for Growth

Addressing elements of teachers’ immediate perceived needs helps to underpin strong teacher buy-in. However, it is also important to negotiate the implementation space to ensure that the technology does not get in their way but rather blends in with their practice facilitating the running of courses. The case studies suggested that teachers’ contexts and approaches were nuanced, needing an LA system that was customizable and flexible and could support multiple learning designs and teacher perspectives. For example, while the SRES platform is capable of quite complex data collection and analysis, many teachers included within the study found its most simple functions to be the most meaningful for them: collecting

attendance and sending personalized messages. This is not to say that these are purely perfunctory; indeed, many studies have suggested a close association between these and student success (Credé et al., 2010; Newman-Ford et al., 2008; Pearce & Down, 2011). Also, this does not indicate that the other functions of the platform are not useful or meaningful, although it does affirm that the system design needed to include both simple and advanced functionality to allow teachers to apply functions as they chose and felt comfortable with. This concords with LMS adoption literature where instructors would start to use simple features that addressed their immediate goals, and then experiment with other functionality as they grew more comfortable with, and confident in, the platform (West et al., 2007).

A risk here is that teachers will not progress from rudimentary applications of the technology, and the technology becomes a shackle rather than an enabler. In the LMS space, this may present as teachers continuing to use the largely textual platform to didactically transmit written content to students and codify learning in terms of achievement in preprogrammed positivist quizzes (Coates et al., 2005). This potential shackling was clear in some interviews where, although teachers had every intention to explore richer functionality beyond attendance tracking, they did not have the workload capacity or the knowledge to be able to experiment in this way. Part of this involves teachers overcoming the initial learning curve with all technology such that this investment can pay time dividends and permit further experimentation. Another part is gaining an understanding of how the technology may be better applied. When combined with initial rudimentary applications, this may be sufficient to drive teachers to richer uses; as one interviewee noted, this is a "...foot in the door. Because once you realize that you can efficiently keep track of people and just use it almost as an administrative tool, then you start to see what else can be done with it... Once I see that it can do that, then oh, I can also – and then you start to get into the more sophisticated functions. There's that classic thing about any piece of software and the user interface – you want it to be accessible to your new user, to your basic level." The same interviewee emphasized that "sharing success stories" as part of his community of colleagues was an integral part of this, as discussed in the next section.

4.2.3 Foster Communities

Combining top-down support with bottom-up adoption may assist to expand the uptake of LA throughout higher education institutions. In our case studies, teachers were empowered by having the customizable platform, although there was scope to further empower them by fostering communities of practice through which they could share different ways in which the SRES might helpfully personalize support and feedback. Learning by members of an organization is often informal, relying on colleagues who are geographically close or in similar roles (Boud & Middleton, 2003). This is particularly true for university teachers, who primarily rely on informal conversations with peers to grumble about teaching issues and share solutions for improving teaching practices (Thomson, 2015). As there is a strong tendency for

teachers to interact and share ideas just with others who are similar to them, top-down support may provide the opportunity to foster a more heterogeneous community of users. As the type of user expands from innovators to early adopters and the use of the SRES moves from ad hoc trials to more strategic and systematic use, the need for support is also likely to expand. Communities of practice that form around interested teachers and support staff can then aid the sharing of information and the spread of innovation (Wenger, 1998). At the University of Sydney, these communities are starting to form within faculties where early adopter teachers and learning designers are promoting the platform, training their peers, and self-organizing support from the central learning and teaching unit. At UNSW Sydney, both course coordinators were awarded teaching excellence awards from their respective faculties for the ability to lead teaching in their disciplines and experimenting with digital tools capable of improving the student learning experience; this serves to raise the profile of such innovations and pique colleagues' interest.

The importance of a learning and teaching support unit (either within a faculty or centrally) was an understated feature in all three case studies. In the three institutions, this unit variably comprised staff with learning design, educational technology, and/or software development expertise, which was crucial in supporting academics in using the platform (Vigentini et al., 2017). In some cases, these units were also instrumental in connecting various data sources to the SRES so that relevant student data was available. Because these institutions shared a common open-source codebase for the platform, the designers and developers in these units formed an informal cross-institutional community of practice. This allowed not only the sharing of practice but also the development of new approaches and software functionality, which in turn benefited all involved.

4.3 Conclusion and Future Directions

Traditional LA, with its focus on single-purpose tools such as dashboards, visualizations, or mail merge, may not only stifle the richness and depth of support and relationship building that is integral to effective teaching but may also inadvertently suppress the development of teachers' collection and application of student data. Although the SRES is a more holistic platform, it is not immune: a fixation on capturing and tracking attendance (even though it may be pedagogically and contextually meaningful) may limit teachers' conceptualization and the use of student data. However, at least at the University of Sydney where SRES adoption is more widespread, we are observing a subtle progression from rudimentary to richer applications, which has been afforded by the flexibility of the platform and communities of teachers sharing success stories. In future work, we seek to analyze this progression of sophistication, consider how teachers' aspirations compare with their actual usage, and determine the factors that lead to evolving uses of student data by teachers to continue to personalize the learning experience.

Personalized messages were one of the intermediary steps in this progression of complexity, requiring teachers to apply data to tailor this form of support and feedback, which itself required teachers to collect and curate the right data. Previous research has suggested that there may be some discrepancies between how teachers compose message-based support and what is impactful for students in terms of content (e.g., motivational vs informational, summative vs formative) and nature (e.g., tone and orientation toward performance or outcomes) (Tanes et al., 2011). With the SRES allowing teachers to be more nuanced and granular in the triggers and content for each personalized message, it will be interesting to explore these in terms of their nature and content, and the extent to which they are being personalized. Some future analyses will also explore the interaction between students' personal characteristics (e.g., personality, emotional intelligence, and learning approaches) and behavioral observations (from both engagement and performance) with the messages received.

Beyond direct student-facing impacts such as personalized electronic communication and data-augmented face-to-face interactions, our interviews also revealed how using the SRES to enhance student engagement and success could prompt teachers to reconsider their broader teaching approaches and learning design. This seemed to be related to their use of the platform indirectly increasing their awareness of the measures of student engagement and success, and the implications for their existing practices. At the micro level, the affordances of the technology have led to changes in how teachers interact with students during face-to-face classes, nurturing positive teacher-student relationships. These impacts warrant further investigation, such as identifying archetypes of users and uses, investigating how teachers' own learning may be associated with each of these, and examining appropriate ways to measure impact that are specific to the type of use. Further studies are also planned at the course level to identify the impact of specific SRES affordances, such as the impact on student belonging of using the SRES web app to capture student attendance. After all, LA as a human activity is intensely contextualized, and its ultimate goal is to optimize learning and the environments in which it occurs, through empowering teachers' human judgment (Siemens & Baker, 2012).

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