Engaging the disengaged: Exploring the use of course-specific learning analytics and nudging to enhance online student engagement*

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Abstract

Universities increasingly implement online delivery to strengthen students' access and flexibility. However, they often do so with limited understanding of the impact of online pedagogy on student engagement. To explore these issues, a research project was conducted investigating the use of course-specific learning analytics to 'nudge' students into engaging more actively in their courses. Drawing on perspectives emanating from communication and critical theories, the research involved a staged intervention strategy conducted across three courses (n=892) focussing on a range of timely, strategic communication interventions. Research findings revealed benefits for students who felt supported by explicit expectation management and the strategic use of early nudging to enhance their prioritisation of key course-specific resources. Academics benefited by making use of nudging templates/principles to increase student engagement in their courses. The course-specific context meant that academics and students explicitly shared ways of working in the one place where learners ultimately succeed – the course.

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Introduction and background

The environments in which today's universities operate are what Barnett (2017) describes as "super complex" (p.viii) in that they are in a constant state of flux and messy with relentlessly changing value systems, concepts and perspectives. It is an environment characterised by fast changing and disruptive technologies, ubiquitous social and mobile media (the pressure and a perceived need to always be connected), the digitisation of everything, big data, corresponding changes to traditional professions, and new and continuously evolving professions (Kek & Huijser, 2017). Universities are also subject to the constant change evolving from globalisation, increasing managerialism in governance and progressively more constrained financial contexts. These changes have ushered in an age characterised by a rapidly increasing evolution of online learning with integration of online, hybrid, and collaborative learning, and phenomena such as Massive Open Online Courses (MOOCs), the rise of big data analytics driving learning, and personalised learning (Kek & Huijser, 2017).

This super complex higher education environment is accompanied by transforming student cohorts, with students now coming from diverse backgrounds perhaps unfamiliar with university requirements, practices and expectations. Within these contexts challenges are presented for institutional decision making on making and pedagogical design and delivery. For example, staff are asked to do more quality assurance with less resourcing, particularly in online spaces, while students seek more quality experiences (Baik, Naylor, Arkoudis, & Dabrowski, 2019). This encompasses just-in-time support, real world learning, targeted learning assistance, convenient access and value-for-money in their studies (Lawrence & Brodie, 2016). There are demands for a shift from traditional instruction where learning involves the transmission of set content using a 'one-size-fits-all' model via timetables operated at the institution's convenience (Kek & Huijser, 2017). Challenges emanate from how best to manage student expectations whilst also meeting optimal teaching and learning outcomes through quality student engagement.

Many institutions look to online learning as a panacea for increasing costs and growing student demands for convenient learning opportunities. Burton, Summers, Lawrence, Noble and Gibbings (2015) argue that, although perceived as digital natives, many students are inexperienced with online pedagogies and are unskilled and unprepared for navigating often inconsistent online learning management systems. There is also uncertainty about whether students who are technologically proficient and benefitting from state-of-the-art, ubiquitous technology know how to strategically employ technology-based tools to optimise their learning experiences (Burton et al., 2015). Bawa (2016) goes further to argue that online learning can impact negatively on student engagement, learning outcomes and attrition.

This landscape becomes more complex if the range of external difficulties facing contemporary students is related to students' capacities to engage in online learning (Brooker, Brooker, & Lawrence, 2017). These difficulties encompass financial strains; work and study workloads; mental, emotional and physical health issues; unfamiliar course expectations; discordant family expectations; problems navigating university systems and cultures; and issues related to self-directed learning and time management. Brooker et al. (2017) also argue that universities, constrained as they are economically, have limited resources (and the political will) to support all students and that it is neither practical nor feasible to address all student difficulties. How, then, can universities meet the challenges negatively impacting on student engagement, outcomes and retention,

particularly when these are exacerbated in an online learning mode?

Theoretical perspectives

Two theoretical perspectives are utilised to address these challenges. Critical discourse theory can assist in identifying the assumptions underlying institutional responses to student diversity and technological disruption. Involved is a shift from the traditional assumptions that students are perceived as being 'deficit', if they are unable to effectively negotiate university discourses and literacies, to one of 'unfamiliarity', which recognises that students bring with them beliefs, values, and experiences that may, or may not, be aligned with those of the university culture. Communication theory introduces the idea that, at its heart, learning and teaching is a process of communication which relies on academics being explicit about their requirements and expectations as a way of ensuring that they effectively share communication with students.

Critical discourse theory reconceptualises the university as a culture made up of a range of literacies, discourses and cultural practices. Students' transition is then recast as a process of gaining familiarity with, engaging and demonstrating these new literacies (Lawrence, 2005). Commencing students, for example, need to rapidly master discipline and subject discourses: academic, numeracy, research, information, administrative and digital literacies, as well as the more personal literacies also crucial for success, such as communication, interpersonal, stress and time management and financial literacies. These interact with new teaching and learning styles and a plethora of unfamiliar cultural practices. Yet students are expected to become familiar with, engage in, master and demonstrate these in their first piece of assessment (usually at weeks 3-6). For those unfamiliar with these literacies – first-in-family, low socio-economic, equity and international students – this transition may be daunting and may lead to non-engagement, anxiety and attrition. The difficulties inherent in these transitions may also be overlooked by academics embedded in their discipline and teaching in an online mode.

Kirtman (2009) suggests that in traditional on-campus learning there are more opportunities for shared understandings (unspoken assumptions) to be developed between academics and students. While some assumptions are shared, others may be unspoken, even unconscious, constituting a hidden curriculum and generating potential ambiguities or blocks in meaning and intention. These can be aggravated in online learning spaces where there are less shared understandings (Wanner, 2013). To resolve potential ambiguities in meanings and transform them into realistic expectations, it is necessary for unspoken assumptions to be articulated explicitly (Khan, Dieter, Berner & Valenta, 2013). This relies on expectation management to align academic and student expectations for mutual understanding and optimal learning to occur.

Expectation management relies on developing effective relationships based on effective communication. Communication was first conceptualised in a theoretical model, Shannon and Weaver's Linear Model (Fiske, 1982). This model involves a sender, message and receiver, with the meaning of the message seen to reside in the message with receivers receiving the message in the way that it was intended with 100% accuracy. That this model was considered to be simplistic necessitated revisions, though in fact many of us communicate as this were the case (for example, academics giving lectures without observing feedback).

The more recent transactional model appreciates the complexity of communication (Barnlund, 2008). It identifies that the meaning of a message (course content) lies in the perceptions (or fields of experience or ways of knowing) of both the senders (academics) and the receivers (students). The model recognises

that communication occurs in a context – the time, place or situation in which communication occurs which affects its meaning – an online versus an on-campus medium for example. The model also appreciates that there are barriers that can impede communication. Key barriers are semantic (verbal language, abbreviations, jargon), intrapersonal (perceptual barriers, including assumptions, expectations, stereotyping and prejudice), interpersonal (conflicts arising from culture and gender, etc.) and physical (technological barriers or accessibility issues – ones which intensify in an online environment). New students, unfamiliar with university and discipline discourses, or ways of behaving, may not understand the jargon and colloquial language endemic to the discipline and the university and may feel powerless in navigating learning management systems, enrolment processes and assessment requirements. Yet, equally and exponentially, students' capacities to communicate effectively can either help or hinder them in building the relationships they need to overcome these multiple barriers.

Critical discourse and communication perspectives combine then to reconceptualise students' engagement with the university's cultural practices and literacies as processes of communication, ones that are complex and often problematic. Pace (2017) refers to these processes as decoding of the disciplines where unfamiliar students may perceive they are not capable of communicating with academics who, immersed in the discipline, fail to identify bottlenecks to students' learning and neglect to systematically outline the steps needed to overcome these obstacles. By identifying and making these bottlenecks explicit and articulating their expectations, academics can then, more readily, model them for students. This, in turn, generates opportunities for practice and feedback, enhancing students' capacities to better manage any emotional obstacles, assess results, share what they learn with others and construct more realistic

expectations about their roles, tasks and responsibilities in learning.

The relationships between critical and communication perspectives and student success reveal that expectation management is crucial in assisting students to communicate meaningfully at university and to engage more effectively in learning (Colvin, Clark & Mayer, 2016). When there is a purposeful focus on expectations that explicitly set out the course's intent, its requirements and 'rules of engagement', then students can adjust their expectations to better deal with their learning experiences, both positive and negative, as well as to be better prepared to handle challenges and blocks that arise (Wanner, 2013). Alternatively, without this communication, students may begin their learning with a set of preconceived assumptions that may impact negatively on both their learning and satisfaction (Schwarz & Zhu, 2015). This can lead to students experiencing 'reality shock', or a mismatch between their expectations and experiences that can disrupt their learning engagement. Krause (2006) defines student engagement as "the time, energy, and resources students devote to activities designed to enhance learning at university" (p.3). Chen, Lambert, and Guidry (2010) however perceive that such definitions focus on individuals' engagement with learning and neglect the impact of students' interactions with staff or other students, even though these interactions can be key influencers of engagement. That interactions are more problematic online presents further difficulties. Academics may possess assumptions that technology is quick, easy to use, effortlessly accessible and appropriate for all learning activities. Further, that students' technological experiences are homogeneous, accompanied by sophisticated knowledge of information technologies (Burton et al., 2015). Assumptions like this can further disadvantage students, placing them at risk of lagging behind in their studies as they make their transitions to online study navigating

often unfamiliar and inconsistent learning management systems.

Experiences in relation to the use of massive open online courses (MOOCs) confirm that such assumptions are inaccurate. Although initially students are motivated, very few persist in their studies (de Barba, Kennedy, & Ainley, 2016). The reasons are varied. You (2016) argues that low online engagement is linked to poor academic achievement, procrastination and that withdrawal is connected to a failure to study systematically. Learners may not adapt to the demands of online learning as it requires more effort when deciding what, how, and how much to learn; how much time to invest; when to abandon or change learning strategies; and when to increase effort (Cerezo, Sánchez-Santillán, Paule-Ruiz, & Núñez, 2016). You (2016) notes that the autonomous nature of online learning means that students need to be more responsible. Thus, investigating the ways in which strategic institutional support and online learners' capacities for self-regulation can be correlated is important in sustaining students' motivation and engagement in online courses (You, 2016). Course Learning Analytics (CLA) can be useful as they reveal patterns in online students' access of course materials and resources.

Course learning analytics and nudges

CLAs are automatically recorded by Learning Management Systems (LMS) which track students' online learning behaviours. They expedite the measurement, collection, analysis and reporting of data about learners and their contexts for purposes of understanding and optimising learning and the environments in which learning occurs (West et al., 2016). By capturing these behaviours and operating on the data, stakeholders are provided with feedback which can be used to improve teaching and learning and educational decision-making (de Barba et al., 2016). Monitoring students'

participation thus assists academics to identify at-risk students, gain proactive feedback and adapt their instructional strategies (You, 2016). Learning analytics enables data-driven decision making while improving institutional productivity.

However, while learning analytics are increasingly used to track student engagement, uncertainty exists about ways to harness them effectively and efficiently to support student engagement (Stone, 2016). One tool for prompting students' online engagement is the use of nudges. A nudge is "any aspect of choice architecture that alters behaviour in a predictable way without forbidding any options or significantly changing their economic incentives" (Thaler & Sustein, 2008, p.576). The term is borrowed from marketing literature, underpinned by 'choice architecture' and behavioural science (individual psychology). For the purpose of this paper nudges are understood to be an intentional motivation activity and communication strategy focussed on motivating students to engage with critical resources and activities (Selinger & Whyte, 2011) including timely, strategic communication interventions to elicit online engagement targeted at non/low engaged students.

In higher education Nelson, Quinn, Marrington and Clarke (2012) and Nelson, Duncan and Clarke (2009), among others, implemented and evaluated faculty and institutional interventions designed to identify and support those students at risk of disengaging from their learning. Findings concluded that interventions can be successfully applied to a variety of learning contexts and student enrolment situations and that their impact on student persistence was sustained over time (for at least 12 months), positively influencing student retention. Much of this research has focused on interventions in faculty and institutional contexts. Research is more limited, but emerging, in pedagogical and course-specific contexts. This current research builds on that of

Buchs, Gilles, Antonietti and Butera (2016), who employed nudges in specific subjects to explain to students why and how to cooperate as part of a learning task. As well, Benarzi et al. (2017), found that 'strengths-based' and 'educative' nudges about the benefits others have already gained from a resource or activity were more persuasive than adopting a deficit approach that nags students about not having engaged with them. This paper reports on research that explored the use of nudges in three courses in a regional Australian university.

Research rationale and methodology

The problem addressed by the project team was the low levels of online engagement in course LMS and their impact on the quality of the student experience and student success in these courses. It was hypothesised that early online engagement with critical course resources/activities on course LMS, in combination with explicit communication of course expectations and critical literacy skills, would reduce the likelihood of students dropping out or failing the course. Success would be measured by increased online engagement resulting in benefits in learning outcomes and enhanced student satisfaction in these courses.

The project encompassed a mixed method case study and involved a staged course-intervention strategy focused, first, on the early encouragement of online engagement and, second, a range of timely, strategic and progressively encouraging communication interventions to elicit online engagement. Targeted at non/low-engaged students, the intervention modelled structured, strategic and theoretically informed communication approaches to encourage students' online participation to improve students' learning outcomes and satisfaction. Non/low engaged

students were defined as those students who had not accessed the course and/or key critical resources in the first five weeks of the semester or until the first census[1] date.

Participants included 892 students across three disciplines studying in three courses: EDE3103 *Perspectives of Early Years Curriculum, Play and Pedagogy*; NUR1102 *Literacies and Communication for Health Care*; and URP1001 *Introduction to Urban and Regional Planning*). The intervention took place in Semester 1, 2018. Key steps included:

1) The identification of five-six critical course LMS resources/activities in the first five weeks.

2) The use of CLA data to identify non/low engaged students and to determine a series of strategic 'nudging' communications to foster engagement. The team ensured nudges adopted an informal and a strengths-based communication approach, rather than one of deficit.

3) Weekly critical reflections by the team on how/when/what to nudge, develop nudging templates, monitor challenges and adopt continuous improvement strategies.

4) Analysis of data, including CLA, interviews and student surveys to determine the efficacy of the intervention in terms of 'change of engagement behaviour' with key resources.

Quantitative data comprised CLA (or clicks) representing students' engagement behaviour with critical course resources. In addition, students in the three courses were given the choice of participating in voluntary pre- and post-study online surveys to determine the perceived impact of the nudges. A five level Likert scale was used with the median value

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[1] In Australia, each subject of study offered at the university will have a census date. The census date is the last date you can withdraw from a subject without being financially liable i.e. having to pay for the subject

presented in the results. The surveys were distributed by the research assistant to enrolled students during the first five weeks (number of respondents: EDE =18, NUR =129 and URP =12). Data collected to measure success included CLA data to capture spikes in student engagement. Qualitative data included online interviews (via Zoom), Student Evaluations of Teaching (SETs) and email and forum communication related to the nudges.

Results and discussion

Overall, the results disclosed that the more structured, strategic and theoretically informed approach to communication encouraged non/low engaged students to engage with early course resources. Course data revealed increases in at-risk students engaging with their courses (for example URP1001). Figure 1 (where the x axis is the median values of the responses from the 5 level Likert scale) illustrates students' perceived helpfulness of nudging interventions in prompting them to access critical resources, such as assessment guides and module recordings.

EDE3103 and NUR1102 respondents were most positive about the usefulness of the nudges and URP1001 the least positive (prompting future investigation about why URP1001students felt this way). Qualitative evidence illustrated that students felt more supported and had clearer understandings of course expectations.

> I appreciated the reminder with so much going on across all my courses. It was good to keep focused. EDE3103

> I found this to be critically important, especially as the semester progressed, as did the workload. As I undertook three subjects, it was invaluable. EDE3103
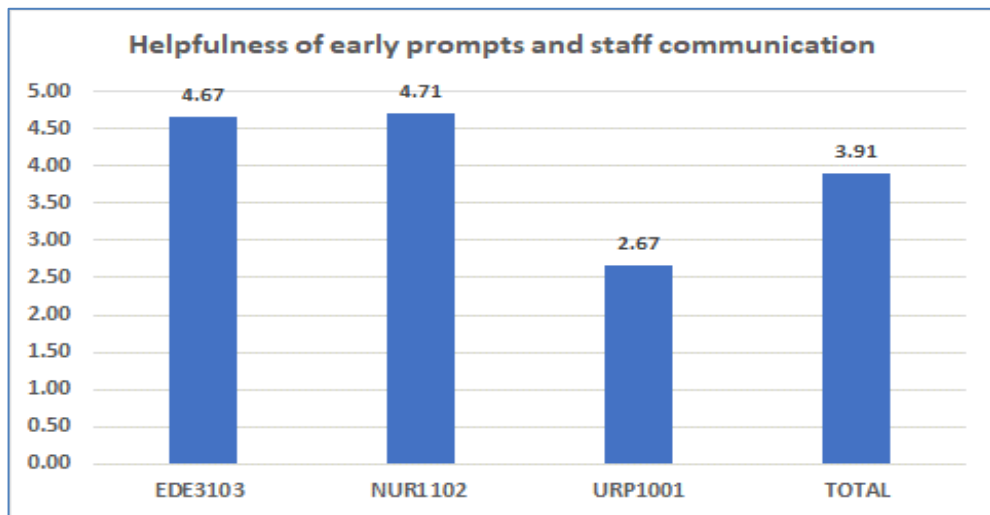

Figure 1. Levels of student approval of the value of early prompts and communication
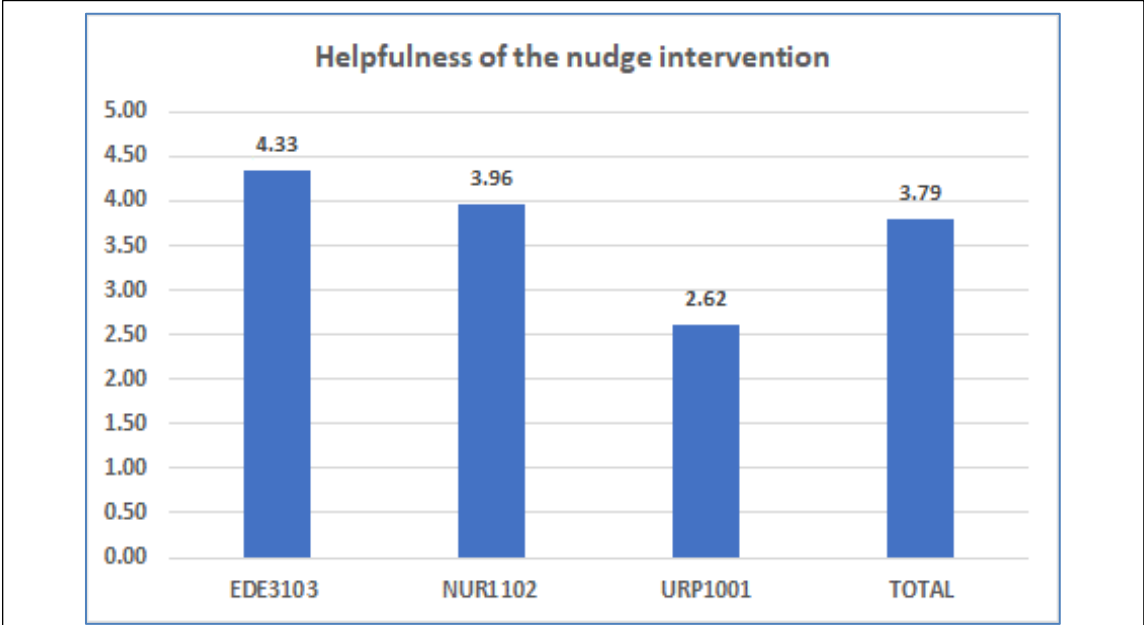
Figure 2. Nudges perceived as moderately to very helpful in EDE3103 and NUR1102 (4.3 to 3.96)

Figure 2, which illustrates that nudges were perceived as moderately to very helpful, was supported by qualitative post survey responses:

> Studying online via distance education can sometimes make it difficult to stay up to date, the sharing of the percentage of students' engagement was a great motivation to catch up to where I needed to be. NUR1102

> It helped me be more motivated knowing that someone was there reminding me what was expected. EDE3103

The nudges increased students' perceptions about levels of support provided by academics which also positively influenced their engagement. For example, Figure 3 illustrates students' views about anticipated/reported academic support.

Qualitative comments verified students' increased perceptions of academics' levels of support:

> The staff running this course were very on top of keeping us as up to date as we could be in our studies by using weekly tutorials and forum posts. NUR1102

Devlin and McKay (2017) contend that an intentional design of learning, teaching and assessment acknowledges the reality of the contemporary student context and seeks to mediate students' diversity. An intentional design supported by the use of CLA to initiate nudges is especially critical for students who, because of educational, cultural or financial disadvantage or because they are members of social groups currently under-represented in higher education, may require additional transitional support to "level the playing field" (Nelson et al., 2012, p. 5).
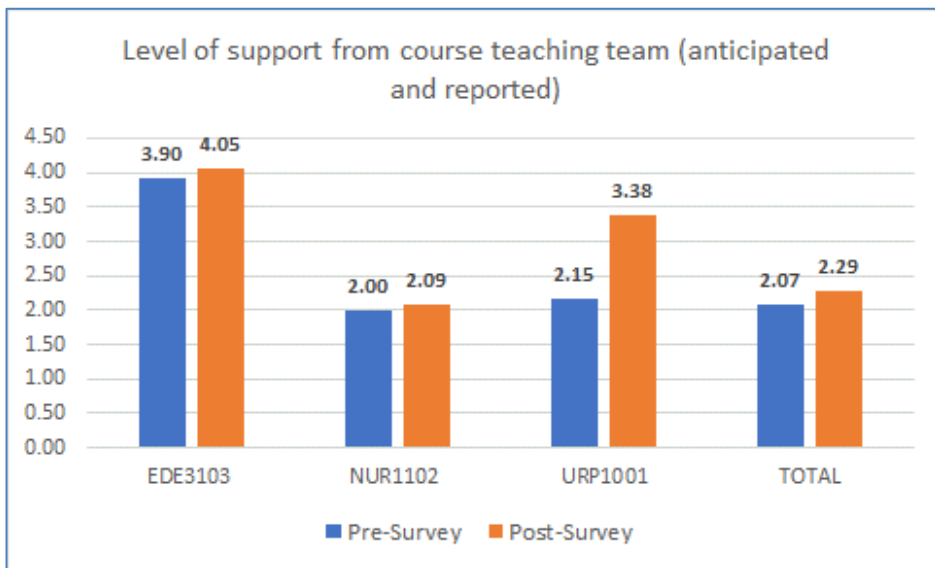
Figure 3. Level of student support was greater than anticipated in all courses

This is strengthened by academics' early promotion/communication of key resources and assessment information which assists students to align their expectations with those of the course, increasing their motivation.

> It's nice to get a clear understanding of the context we are given and really encourages me in getting into the work and being motivated at the same time. EDE3103

> I really appreciated the teaching team sending me the emails to engage and "check-up" with students to see that they were engaging with the course. Thank you. NUR1102

In this way nudges can reduce feelings of isolation, which Redmond, Heffernan, Abawi, Brown, and Henderson (2018) argue, has positive impacts on retention. Explicit information from academics about key resources and assessment requirements also supports students' familiarity with discipline requirements by more effectively decoding the discipline or discourse of the course.

> It was important as it directed my thinking and allowed for me to be wary of the online resources to use for assessment and for deeper understanding; NUR1102

Qualitative comments in the forums, personal emails and student surveys confirmed that students appreciated academics' efforts to design accessible and achievable assessment. Redmond et al. (2018) suggest that designing curriculum needs to be explicit in assisting students to deal with the tacit expectations inherent in assessment tasks and requirements.

> The "nudge" communications helped me to get back on track and complete assessments and course work. I also found the scaffolding to assessment extremely helpful in working towards completion of assessments; EDE3103

> The explicit scaffolding and instructions. We weren't left wondering about what should or needed to be done; EDE3103

The fact that (Education) students used language like 'scaffolding' underscores the usefulness of explicit knowledge and 'jargon' about the discipline. Students revealed how the nudges shaped their knowledge about what they needed to accomplish and how being explicit assisted them to feel less overwhelmed and more comfortable and align their studies with the course's design decisions. The nudges helped students to communicate more effectively with academics, overcoming physical barriers related to non-participation and non-engagement.

> I really liked the communications sent out. Coming from a face-to-face university previously, it felt more like that kind of lecturer interaction with Alice especially as getting to the lectures online was hard with prac, work and a baby. It was a good reminder of important areas and when the tutorials were released, etc. EDE3103

However the data were not always positive, demonstrating that there is a fine line between nudging and nagging. Nags adopt measures that are punitive, restrictive, and coercive or impose conditions, and unfortunately have an opposite effect to nudging (Benarzi et al. 2017). In this study the negative impacts of nudging were identified as an issue for a small number of students. These students felt that the nudges increased their anxiety levels by being communicated too frequently over multiple channels in a short period of time, or where a nudge adopted a discouraging tone.

> Sometimes has the opposite effect and causes stress like you are falling behind (NUR1102); It was great to have a reminder, but it caused me anxiety with how it was worded (EDE3103); I found there was too much information and a lot of emails, I didn't need all the information (URP1001); At times it almost created an unnecessary feeling of panic (NUR1102).

These comments reflect the need for academics to be aware that, although nudging assists student engagement, it can also demoralise or overwhelm students. The team's careful monitoring and ongoing reflection led to some key strategies for effective nudging. These included a clear identification of a selected number of resources (five over the first five weeks), the importance of nudging only one key/activity per week to avoid over-nudging and upselling the value of the resource to students' learning. Also critical was being cognisant of the tone of the nudge, for example, adopting an informal style and strengths-based communication approach. For example:

> Hi there, just a quick prompt to encourage you to take a few minutes to listen to the 'Winning Formula' presentation this week if you haven't had a chance. Students who have viewed the presentation have commented that they were much more aware of course expectations and the commitment required for the course. They also commented that after watching the presentation they felt much calmer in terms of knowing the type of support that would be provided to them and the fact that they weren't alone on this learning journey ☺ wishing you an awesome week.

Templates/samples were shared in these meetings to strengthen nudging efficacy, avoid nagging connotations and ensure continuous improvement processes were in place.

Conclusions and opportunities for future research and capacity/profile building

The findings extend the research related to CLA and nudges in higher education by harnessing learning analytics data and applying nudges to course-specific LMS to motivate early student engagement and to enhance the student experience and retention in these courses. The research revealed a number of benefits for both academics and students. The evidence illustrated the benefits for academics in terms of harnessing and integrating CLA to inform strategic and targeted approaches to course-

specific nudges. This could be achieved by creating a bank of easily accessible nudging samples supported by nudging principles and indicators related to who, where and when nudges should occur and by adopting informal, strengths-based approaches to directly communicate with low/non engaged students. The nudges supported students to access critical resources for assessment requirements, align their expectations more realistically with those of the course and more effectively accomplish their learning obligations and responsibilities. Overall, course-specific nudge interventions using course learning analytics represent a proactive (and relatively simple) approach that enables academics and students to share and fine tune their ways of working in courses – the critical spaces where teachers and learners need to meet and purposefully engage if students are to achieve their learning outcomes and succeed in their studies.

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