Supporting and humanizing behavioral change without the behaviorism: digital footprints, learning analytics and nudges

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Keywords: human-computer interaction, digital footprints, learning analytics, nudge theory, disabled students, agency, equity, students as partners, online education

Abstract

This chapter incorporates and expands on published conversations started by Professor Richard Thaler and Cass Sunstein, Professor Sarah Hayes (and colleagues), Dr. Sian Bayne (and colleagues), Professor Paul Prinsloo and Dr. Sharon Slade, and others whose work addresses learning analytics, nudge theory, and behavioral change. We have applied these concepts and movements as they may serve to empower students in understanding their digital footprints and making explicit the hidden curriculum in online higher education (HE). We also discuss the potential pitfalls of such data-driven pedagogy. It is through dialogue and co-authorship that Kennedy and Payne, in particular, found intersectionality in their identities and place within the academy - Kennedy: a disabled undergraduate student - an under-served cohort in HE and Payne: under-served in the academy not only given her identity as a Black woman but also as an early career educator and researcher. It is through our collaboration with senior academic, Compton, and through our positionalities and solidarity that we advocate for a further tenet to be included within the Human-Data Interaction (HDI) framework, linked to disability, race, or any form of marginalization of the experiences of individuals through data-driven systems and analytics. We propose the addition of 'equity' as an HDI principle. We hope to forge further alliances that allow for the mutual articulation of how HDI can be deployed in ways that empower both students and instructors and drive equity-minded and responsive pedagogy.

Introduction

When students engage in online learning, they leave behind digital footprints: artifacts that trace their activities such as contributions, page views and communications. Digital learning management systems (LMS) and other electronic interactions generate data from these footprints that can provide insight into student progress and engagement as it relates to student success (Zhang et al. 2020). These data are one aspect of the wider field of learning analytics (LAs). LAs encompass the broad data mining, collection, analysis, and sharing/reporting/disseminating of students' digital footprints. The intention is to anticipate and investigate numerous aspects of educational performance geared toward 'actionable intelligence' (Bayne et al. 2020: 71) and 'actionable insights of immediate and demonstrable instructional effectiveness' (Tsai et al. 2020: 556). LAs are shaping the role of online instruction and student self-regulated learning by allowing instructors to orient students through actionable feedback (Lim et al. 2021; Tsai et al. 2020) and empowering students to orient themselves (see Appendix 1). Three tenets are the core of Human-Data Interaction (HDI): legibility, agency, and negotiability; the theme of resistance has been introduced for further investigation (Hayes et al. 2021). Thus, the current HDI framework is expressed through the following areas of exploration (Hayes et al. 2021: 10):

• Legibility: enhancing the comprehensibility of data about people or data-driven systems
• Agency: empowering the individual to act in response to actions made on their personal data
• Negotiability: influencing others' use of one's data, thereby enhancing one's control over it
• Resistance: studies where resistance is being developed in any area of data interactions

These tenets are the ways in which students have control over their digital footprints and the ways in which students and instructors interact with LAs 'in meaningful way[s], going beyond legibility towards agency and negotiability' (HDI Network 2021). There is a tangible shift by education decision-makers towards more focus and exploitation of digital footprints as evidenced by the increasing use of evaluative metrics and data-driven policy in education which are often rooted in fear of being "left behind" (Holloway 2021). Our diverse experiences suggest a similar conclusion: processes to *meaningfully* embrace LAs have been slower than predicted (see Reyes 2015), and there remains discord in terms of the how far LMS engagement markers can be construed as predictors of success. You (2016), for example, identifies a strong correlation whilst Strang (2016) found little evidence to support correlation between outcomes and LMS interactions. The digital footprints and data generated by students (or, indeed, absence of data) are largely useless unless approaches and mechanisms for interpretation are established and this intelligence is acted upon. It is beyond our scope here to discuss the many digital systems that generate data or the tools with which that data could be analyzed or interpreted. Rather, our goal is to challenge narratives that adopt and promote LA data for surveillance and standardization as well as to challenge the view that the data are best marshaled and utilized by administrators and academic staff alone.

In our varied roles and experiences we have too often seen data used as a blunt instrument resonant of classic conditioning: alarms or warnings when work is overdue or a library has not been visited for a certain time, for example. Our perspective, broadly guided by conceptions of a pedagogy of kindness (Denial 2020), seeks sharing and collaboration where previously there has been surveillance and judgment. It confronts issues of data ownership and eschews simplistic behaviouristic outcomes. Instead, we are keen to connect LAs with dialogic and compassionate responses and in particular with acknowledgement of nudge theory. Nudge theory, coined by behavior scientists Richard Thaler and Cass Sustein, connects persuasion with design principles (Thaler 2015). Behavior science explores human behavior such as how people are motivated and how they make decisions. A nudge is an approach to 'tuning' (Zuboff 2019: 294) that 'changes the context in which decisions are presented in order to encourage a particular choice' or action (Einfeld & Blomkamp 2021: 1). Nudge theory is increasingly influential in many domains from healthy eating initiatives (Vecchio & Cavallo 2019) to local government 'social good' interventions (Local Government Association 2020), but its utilization in education is limited despite many potentials (Weijers et al. 2021). It is possible this is a consequence of common critique of nudges as being capitalistic and manipulative (Zuboff 2019). The theory offers potential for nudges that prompt automatic or reflective responses and are also somewhere on a transparent and non-transparent continuum (Hansen & Jespersen 2013). As such, the use of nudge has not always been so benign. Our emphasis is towards nudges that focus not on punishment and reward (behaviorism) but encourage positive choices and decisions. Therefore, our conceptions and deployments of nudges are not only designed to not deceive but shift towards fostering critical engagement with students, prompting internal dialogue, actual dialogue or both.

The growing adoption and interest in LAs and nudging has supported a strategic commitment to transparency regarding key drivers for improved student engagement, retention and success. At the same time, concerns are increasingly being voiced around the extent to which students are informed about and supported (or hindered by) the use of their digital footprints. Other concerns are with regards to the ways in which students are tracked and surveilled as they engage online (Prinsloo & Slade 2016); constant 'surveillance disciplines [students] to perform in specific ways' (Holloway 2021: 51) resulting in 'panoptic performativity' (Holloway 2021); the notion of the panopticon (Foucault 1979) has allowed HEIs to exert behavioristic approaches to teaching and learning (Holloway 2021). Thus, we seek to reimagine the deployment of LAs and nudges as a means to reconstruct students and instructors from passive "data subjects" into active participants in the processing of personal data for academic decision-making.

A HDI perspective views the tenet of agency as deliberate design that helps us meaningfully change how data is collected and used; intentionally designing negotiability into the LMS means to work in harmony with those who receive our digital data with an eye toward changing how they capture and deploy our digital footprints (HDI Network 2021). It is important to

acknowledge that making pedagogical conclusions based on delimited dimensions creates a context for stereotyping and discrimination (Prinsloo 2016); this kind of profiling can result in deficit narratives, may result in narrow-minded views of teaching and learning (Payne et al. forthcoming), hinder students' potential and may hurt self-efficacy. Marginalization can occur through multiple and intersecting factors; however, this chapter focuses specifically on disabled students[1] - in particular, students with 'specific learning difficulties' (Bolton & Hubble, 2021: 3) who often have worse outcomes from higher education than their non-disabled peers (Bolton & Hubble 2021). As such, we would like to share a few assumptions before you delve further into this chapter:

- Academic staff have a responsibility to support our increasingly diverse body of students and need to be open to new tools, techniques and opportunities (Ferguson 2019).
- Behaviouristic approaches (rewards and sanctions) are at the heart of much of what we still do in education but there are movements and trends challenging this (Gershoff 2017).
- Achievement and progress differentials in HE often exist for marginalized students (Bolton & Hubble 2021; Payne 2021a; Payne et al. 2022).
- LMS data are not indicators of students' potential and merit (Prinsloo 2016), and LAs are not impartial (Mortier et al. 2020).

We hold that technology and access to information, that enables and privileges agency, provides an awareness of what and where students are in order to empower them to work toward their own personal goals; it also 'optimizes [their] behavior' (Arnold et al. 2017: 526) and 'is an approach to combating potential deficits of self-directed learning that many students face' (Arnold et al. 2017: 526). We exemplify our argument through the social lens of impairment (Bones & Ellison 2022), specifically learning disabilities and the set of experiences associated with executive dysfunction. Whereas the aim of the medical model of disability is to "fix" the disabled person, the social model aims for agency and liberation from the barriers in HE that privilege non-disabled students (Bones & Ellison 2022). Nudging, prompted by LAs, may be one way to approach improving achievement and offering connection and support for not just disabled students but all students. Our suggestions are underpinned by Universal Design for Learning (UDL) guidelines (CAST 2018).

Making our positionality explicit

Positionality can be thought of as 'the intimate and ever-changing social, technological and political contexts that intermingle with, create and continue to influence a person's values, identity and opportunities (Hayes 2021: 10). To transform the students as partners movement (Cliff et al., 2017) into a genuine allyship, our chapter explores LAs, nudging and access to

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[1] In this article, we use identity-first language, as opposed to person-first language. Co-author Kennedy identifies as disabled and uses identity-first language for themselves.

information through, not only published literature, but through the experiences and observations of the authors of this chapter - a disabled undergraduate student (Kennedy), an early career educator and doctoral student (Payne) and a senior educator (Compton). Often, such equity- and student-centered research and literature endeavors to discuss and learn *about* disabled students, but not necessarily *from* them. In a bid to embrace reflexivity, we chose to self-disclose aspects of our identities, insider status and how we position ourselves with regards to the topic (Tshuma 2021).

Our positionalities are aligned to 'a worldview that opens up space for individuals to adapt […] to new perspectives, approaches, and techniques…' (Dent 1999 as cited in Watkins & Marsick 2020: 89). In the creation of this work, we sought to privilege marginalized voices and authentic collaborations toward 'educational legitimacy' (Alhadad et al. 2021: 39) and, specifically for those under-served within the academy, to 'move out of our "place" as manipulatable objects to empowered subjects' (hooks 2015: xxxii) by exploring the positive ways in which we might engage with and be empowered by the affordances of LAs, nudging and access to and control over information captured by the LMS. The term under-served is a deliberate choice as it identifies 'individuals not through their personal characteristics but through their relationship with schooling and allows recognition that marginalization is a product of the institutions and systems we create and sustain' (Te Riele, 2004: 3 as cited in Payne et al. 2022).

Examining this topic through our individual yet intersecting identities is a way for us (and others) to become more aware of notions of 'data colonialism' (Bayne et al. 2020: 70) - the ways in which entities privatize students' digital footprints. Our collaboration also served as a way to reflect upon our scholarly motivations. Our positionalities encourage us to 'transgress hegemonic power' (Payne 2021b) and to reimagine the ways in which students' digital footprints are captured and deployed. This reimagining requires an acknowledgement of status and privilege and an engagement with ethical reflexivity, praxis and social justice (Payne 2021b).

Connecting behavioral science with universal design and support

Higher education institutions (HEIs) have a responsibility to support an increasingly diverse body of students (Payne et al. 2022). Therefore, HEIs and practitioners need to be open to new tools and techniques, such as data generated by students' digital footprints and opportunities offered by behavioral psychology (Ferguson 2019). UDL (CAST 2018) is a proactive approach to curriculum design that is grounded in accessibility (Bones & Ellison 2022).

It is widely understood that self-management is key to success in online learning (Arnold et al., 2017; Barron & Kaye 2020). As such, the nudge can be a personalized dialogic coaching method that enables self-regulation and may help students overcome learned helplessness (Barron & Kaye, 2020). However, nudges have potential for less benevolent applications such as 'herding' which often relies on 'foreclosing action alternatives' (Zuboff 2019: 295). Additionally, rather

than create panic or stress, nudges should act as a compassionate call to action – e.g. a reminder of students' options to submit their work, request an extension, or suggestions to review key learning materials (that, based on LAs, student(s) may not have viewed or sufficiently engaged with) to enable progress and success. There is a danger that nudges designed to assist students reach a defined end goal (e.g., complete assignment or an entire programme) are considered not in terms of impacts on cognitive processes, critical reflection and decision-making (which may or may not be measurable) but rather via common proxies for behavioral changes such as grades (Weijers et al. 2021). Contrary to the deployment of nudges that convey instrumentarian rationality toward others' means (Deflem 1994; Zuboff 2019), the data, nudges, and options will, ideally, be transparent and accessible and afford students genuine agency. The greatest benefit of nudging is the shift towards good decision-making and effective strategies for independent learning.

With an aim to 'heighten the salience of goals and objectives' (CAST 2018), we deploy nudges. By employing the insights provided by LAs, nudge messages can serve as a scaffold for meta-cognitive processes and provide choices. Although this chapter focuses on the use of nudges to improve the learning environment for under-served students, specifically disabled students, our aim is to consider the possibilities of LAs and nudges in order to provide better opportunities to meet the needs of all students to find success in the online learning environment and 'through the demystification of the implicit university curriculum' (Devlin & McKay 2018: 158). Nudge messages should be written with empathy (see Appendix 2) and contain relevant links to direct students to the relevant resource(s) (see Appendix 3). What often surfaces is positive instructor-student interactions such as support conversations (Onwards from Learning Analytics (OfLA) 2020) (see Appendix 4).

Humanizing behavioral change

The rewards and sanctions that are emblematic of behavioristic approaches are at the heart of much of what we still do in education, but there are trends towards challenging manifestations of this - from the tendency towards banning of physical punishments in schools*[2] to rapid growth in interest in ungrading; ungrading is a unifying term for assessment and feedback processes that seek to de-emphasize conventional dominance and centrality of grades and re-focus feedback away from judgment and towards development (Blum 2020; Compton 2021). We stand against the deployment of LAs and response to nudges as indicators of students' potential and merit (Prinsloo 2016). We advocate for the employment of choice, empathy, human connection, and understanding (in contrast with carrot and stick approaches of education) to help effect small changes through supportive nudges. In the context of LAs, the nudges will form part of the structural 'choice architecture' which evolves iteratively as new data emerge or are triggered by a student's emergent data. By recognising human preferences and tendencies when making

[2] Corporal punishment was banned in the UK in 1986 and across Australian states over the last four decades but is still legal in some US states as it is in more than 150 countries in the world.

decisions we can become 'choice architects' by deliberately tapping into these preferences. Choice architecture is the opportunity for choice within a wider design (Thaler & Sunstein 2009). The choice architect, cognizant of human decision-making tendencies, seeks to offer a framework that will help challenge what we might consider to be poor decisions. As an instructor we have varying degrees of responsibility for the conceptual, physical and digital structures that reflect design intentions. The choice architecture therein is the ways we offer decisions that will stimulate reflection, open channels of communication and/ or nudge students towards positive decisions (for them). As such, issues of accountability, user empowerment and trust are key (Mortier et al 2020); these aspects can be thought of as issues that can enable 'growth, recognition, empowerment, community and possibility' (Payne et al 2022: 9).

Empowering students with executive dysfunction

According to the UK Parliament, nearly 20% of university undergraduates in England identify as disabled with the most commonly reported disability being learning difficulties - including dyslexia, dyspraxia and Attention Deficit (Hyperactivity) Disorder AD(H)D (Bolton & Hubble 2021). These students are likely to possess many or all of the indicators of executive dysfunction. Students with executive dysfunction may struggle with skills vital to independent study and content learning e.g., initiation, planning, organization, etc. (Dunn et. al 2018). Executive functions are a set of top-down cognitive skills - inhibition, working memory, and cognitive flexibility; these skills may be impacted by developmental conditions or injuries to the frontal lobe in later life, leading to the aforementioned difficulties with skills that are often crucial to academic success (Diamond 2013); they are not to be confused with intelligence.

A product of being under-served by HEIs is that disabled students often demonstrate lower levels of engagement which leads to achievement differentials and, subsequently, employment rates and other outcomes when compared to their non-disabled peers (Commissioner for Fair Access 2019; Department of Education, Skills and Employment (DESE) 2020; Martin 2020; Prevatt et al. 2017; Stone 2017). Achievement differentials exist for disabled students, and 'even in the best of times, disability impacts student success, as the traditional model of higher education assumes neurotypicality' (Bones & Ellison 2022). As executive functions are linked to planning and organization, for students with executive dysfunction, it is valuable to build in periodic or persistent nudges of and toward 'both the goal and its value in order for them to sustain effort' (CAST 2018).

Nudges can serve as a UDL mechanism that encourages all students in a semi-structured manner to elicit these types of changes that can serve them well throughout their course (Marino & Vasquez 2019); proactive nudges and data-driven 'intervention' nudges can enable deepened learning (Prevatt 2017) aided by coherent and empathetic choice architectures in learning and assessment resources, growth mindset (Marino & Vasquez 2019; Dweck 2015) and effective self-regulatory behaviors of students (Arnold et al. 2017; Barron & Kaye 2020; Saint et al.

2021). We believe these approaches are significant as students with a declared disability are enrolling into online HE at increasing rates each year (Commissioner for Fair Access 2019; DESE 2020).

Commencing undergraduate students, in general, may be anxious to or unaware of how to get started, unfamiliar with the student supports available, unsure how to navigate the LMS, and/or due to competing demands (Biney 2021; Stone & O'Shea 2019), may need to further develop their time management skills to accommodate their academic endeavor (Barron & Kaye 2021). With an aim to enable the curriculum (Dinmore & Stokes 2015), we advocate the implementation of nudges as something that can be useful for everyone using an LMS, as compared to a tool aimed directly at disabled (or other marginalized) students, who may feel singled out. LAs and nudges should enable progress through access to information. An example is the My Learning Analytics (MyLA) student-facing dashboard developed by the University of Michigan with collaboration from the University of British Columbia (see Teasley 2017; Haynes-Magyar et al. 2018).

Empowering educators in an era of datafication

For early career educators, neoliberal discourses and 'panoptic performativity' have diminished possibilities for pluralistic thinking (Holloway 2021). Data-driven 'algorithmic thinking' (Holloway 2021: 38) undermines teacher expertise, and we caution against unchecked dependence on evaluative analytical and numerical data - especially as a 'means to others' commercial ends' (Zuboff 2019: 9). Rather, we advocate for LAs to be used to complement instructors' professional knowledge and experiences.

'Learnification' (Bayne et al. 2020: 21) and 'datafication' (Holloway 2021: 14) discourses in HE have served to downgrade 'academics as proletarians' (Arthur 2009 as cited in Payne et al. 2022: 3). We believe the deployment of LAs and nudges are not for instructors to merely 'respond to analytic outputs' (Bayne et al. 2020: 71) nor succumb to measurement mania (Prinsloo, 2015). It worthwhile to consider that 'positivist, quantitative ways of knowing' (Holloway 2021: 11) offered by LAs can lead to limited intervention approaches in which instructors (and, therefore, students) are 'channeled along predefined trajectories of educational performance that, paradoxically, leave little room for agency', experimentation, or expertise (Tsai et al. 2020: 557).

Educators can also be under-served in HEIs (MacKenzie 2021). This is particularly true for HE instructors who are early career - and Black (Mukandi & Bond 2019). This nexus of early career status and race identity frequently translates to perceived expertise and value being deemed as lesser than tenured and, more often than not, white colleagues. Further, Black educators are often regarded as 'out of our hood when in the academy' (Mukandi & Bond 2019: 259). Yet, in the first author's teaching scholarship, she has dared to interrogate which means are no longer "fit

for purpose" and which influences and ideologies she accepts or resists (FitzGibbon 2021). Taking a relationally-oriented approaches (Payne et al. 2022) and use of compassionate nudges were said to be anecdotal and even unorthodox by more conservative colleagues. Thus, the authors write this chapter while still being 'constrained by the discursive and prescriptive boundaries that shape and uphold' the conservative traditions of HE (Payne et al., forthcoming). However, through praxis, the first author, in particular, is reclaiming her 'position as knowledge producer' (Alexander-Floyd 2012: 1) and 'as author [and] as knower' (Watego 2021: 55).

We support the view that LAs should work to complement instructors as knowers (and retain their pedagogical agency); such approaches 'are the [critical and] reciprocal rebellion that stands to empower both student and instructor' (MacKenzie et al. 2021: 39). In online spaces, LAs can provide opportunity to action personalized approaches to an ever more diverse and larger student enrollment. However, 'emphasizing the human in the machine is critical in the pursuit of engaged pedagogy... in teaching online' (MacKenzie et al. 2021: 39). This humanizing approach is in direct contrast with the 'teacherless model of student self-direction' (Bayne et al. 2021: 71).

Understanding the challenges and risks of learning analytics

HE has been, traditionally, 'rooted in insidious forms of inequity and deficit narratives' (Payne 2021b) as demonstrated in racist, ableist and other forms of 'systemic oppression experienced by multiply-marginalized' students and instructors (Boveda & McCray 2020: 496). Further, instructors' roles are rife with high-stakes accountability, performativity (Holloway, 2021) and authoritarian trappings; students' positions have also been bound in assumptions about deferential status and behaviors (hooks, 1994). Thus, HEIs cannot assume that the adoption of LAs leads to student empowerment or trust (Tsai et al. 2020; Payne et al., 2022). Students' (lack of) involvement in the use of their data often ends with the extraction of their data resulting in 'limited understanding of the benefits' of such collection of their digital footprints (Tsai et al. 2020: 563). The challenges and risks of LAs have been broadly categorized by Ferguson (2019) under six headings: duty to act, informed consent, safeguarding, equality and justice, data ownership and protection and privacy and integrity of self.

While institutions have a duty to use the data, information and resources made available to support students, it is vital to recognise that such LAs are not impartial. LAs are creations of human design and can 'absorb all of the biases and judgements of the designers' (Holloway 2021: 38). HEIs, and those who work on their behalf, do not exist in a vacuum; that is, 'we are all the product of the society we live in' (Charles 2019: 4). By giving a voice to the data, practitioners define meaning through interpretations of students' actions and behaviors within the LMS (Mortier et al. 2020). Thus, the collection, analysis and communication of students' data 'has to account for addressing structural inequalities of the past' (Prinsloo 2016) such as the ways in which data has been used to 'predict potential and/or to exclude individuals' from HE

(Prinsloo 2016) and the ways in which data has been used academically and commercially (Schumacher & Ifenthaler 2018; Zuboff 2019) rather than for learning - e.g., for the sole benefit of funders, HE administrators, institutional marketing and governments rather than to benefit students and instructors (Ferguson 2019; Holloway 2021; Teasley 2017).

Previously, students may have either been unaware that their digital footprints were being mined, collected, analyzed, and shared and/or reported - or perhaps they did not care (Prinsloo & Slade 2016; Roberts et al. 2016). However, personal data management have become points of elevated interest and concern. The rise in use of sites like Amazon, Facebook and Google (Zuboff 2019) have contributed to increased attention to data leaks and privacy violations in our personal and academic lives (Dawson 2020; Cadwalladr & Graham-Harrison 2018; Mansfield-Devine 2015; Mortier 2020; Zuboff 2019). Conversely, digital footprints can be poor and/or incomplete indicators of student activity and progression; one aspect to consider is the impact of students' viewing materials offline and working outside of the confines of the LMS (Schumacher & Ifenthaler 2018a). 'Rurality, for example, can be prohibitive to full and equitable online participation' (Payne et al. 2022: 5) and can skew LAs. Even in developed nations, students in rural and remote areas experience issues of poor connectivity, limited internet quotas and high internet costs (Payne et al. 2022). The necessity for emergency remote teaching has highlighted these issues, and research has found that one in five Australian households access the internet only through mobile-phone technology (Payne et al. 2022). Therefore, it may be a necessity for students to view learning materials offline. Yet, previously, Canvas, a commonly used LMS in HE, did not capture digital footprints on mobile devices, and the reporting of mobile page views within analytics was only recently implemented (Instructure Community 2022).

Disabled students are less likely than their non-disabled peers to complete modules within the LMS; online environments may not be fully accessible to them - e.g., a lack of subtitling on videos and poor image descriptions, etc. (Cooper et al. 2016). LMS data often presents students' activity to them as a means of comparison across other students within a course (Instructure Community 2022; Teasley 2017). For disabled students in particular, comparative performance information may do more harm than good (Jivet et al. 2020). Receiving analyses of peer activity and performance risks 'reducing autonomy and so [is] related to a decrease of intrinsic motivation… this information may impair their academic self-concept' (Schumacher & Ifenthaler 2018b: 606). Further, for disabled students, it is particularly important to safeguard data related to their disability status and to make explicit the 'mechanisms for complaint and correction of errors' (Ferguson 2019: 26). The rise of LAs in online HE discourse has not created these challenges and risks, but, rather, has catalyzed them (Ferguson 2019; Schumacher & Ifenthaler 2018a).

Taking a decolonizing, deliberate and democratic approach to learning analytics

Thinking critically about the intersection of data and disability, it is crucial that we recognise that data are not raw, that the framing, categorisation, collection and comparison are not neutral acts, and the ways in which data are used flow from, normalize, and perpetuate specific understandings of identity, agency and potential. As such, the collection and use of individuals' data can also create new forms of inequalities and exclusions. Thus, we must contemplate how those who handle students' LMS data recognise that they are not indicators of students' potential and merit but the results of the skewed allocation of value and resources (Prinsloo, 2016).

The movement toward decolonization in HEIs challenges systems and dares practitioners to challenge the practices that have not equitably served students at the margins. In order to decolonize the approach (Charles 2019; Prinsloo 2016) toward deliberative, democratic and ethical deployments of LAs (Buckingham Shum 2022), we believe that it is vital for educators to genuine value and bring an understanding of the circumstances and experiences of under-served students (Cook-Sather & Des-Ogugua 2019; Devlin & McKay 2018; Payne, 2021a Prinsloo 2016) whilst simultaneously making learning proactively inclusive for everyone.

We advocate for a further tenet to be included within the HDI framework, linked to disability, race, or any form of marginalization of the experiences of individuals through data-driven systems and analytics. We propose the addition of 'equity' as a specific HDI principle. Although it could be understood as implicit within the other HDI principles, we believe an explicit tenet is required. One that focuses on the importance of recognising systemic iniquities and striving to use data impartially, without prejudice and affirmatively to better support students' academic and learning needs in a way that also recognises their socio-emotional needs.

The key to enacting a digital pedagogy of the under-served is to provide ample resources to support emotional responses to cognitive challenges (MacKenzie et al., 2021). We regard an inclusive, proactive and responsive learning environment for disabled students as an improved environment for all students (CAST 2018); alignment with UDL is part of HEIs' enduring responsibilities of inclusive teaching practices (Dinmore & Stokes 2015). Nudges can serve as an egalitarian adjustment designed to remove barriers to learning by making the hidden curriculum explicit (Dinmore & Stokes 2015). In alignment with Thaler (2015), we endorse the below three principles in guiding the use of data-driven nudges:

1. All nudging should be transparent.
2. It should be as easy as possible to opt out of the nudge.
3. There should be good reason to believe that the behavior being encouraged will improve the welfare of those being nudged.

We assert that the use of LAs should privilege the learner (Schumacher & Ifenthaler 2018b). To encourage disabled students to view themselves 'via possibilities rather than risk; to theorize rather than be pathologized' (Watego 2021: 39) we, too, advocate the need for students to be repositioned by putting them 'into the flow of personal data; to make the parties about whom personal data is generated into active rather than passive participants in its distribution and use' (Mortier 2020).

Student-facing LA dashboards can nurture self-regulated learning through accessible visualizations, feedback, and nudges (Haynes-Magyar et al. 2018; Lim et al. 2021; Teasley 2017). However, merely presenting students with 'dangling data' (Winstone & Carless 2019: 7), e.g., outcomes of their digital footprints, does not empower them to make assured academic decisions for themselves. Students also do not consider access to LAs to be a substitute for instructor-student dialogue (Schumacher & Ifenthaler 2018b), and, in implementing a student-facing dashboard, practitioners must consider fostering dialogue (Charles 2019) as well as 'specific actions a student can take to improve their learning approach and progress' (Lim et al. 2021: 2). The nexus of access, control and understanding of data is key to facilitating the HDI tenets of agency and negotiability - as well as 'supporting learning motivation' (Schumacher & Ifenthaler 2018b: 398). In an exploratory study conducted by Schumacher & Ifenthaler (2018a) students were presented with 15 different learning analytics features. In Schumacher & Ifenthaler's second study, students were requested to rate their options for undertaking forms of data creation that they themselves endorse based on 'learning, acceptance, and privacy aspects' (2018a: 401) (see Table 1).

Table 1 - Description of LA features

Description of learning analytics features in this study.

Feature	Function
F1: time spent online	overview about time spent in the online learning management system offering different visualizations and comparisons (time spent online today, the day before, this week, last week, last month, term), analysis about activity in the system
F2: suggestion of learning partners	the learning analytics system suggests learning partners on the basis of learning material worked on, competencies of the learners, current knowledge, learning goals, self-assessment results, etc., to create synergies for both learners
F3: learning recommendations for successful course completion	recommendations on which subjects need to be learned for successful course completion based on self-assessment results, content the learner has already worked on, and curricular information
F4: rating scales for learning material	learners can rate learning material (e.g., texts, videos, presentations, self-assessments) on a 5-point scale regarding the overall evaluation, difficulty, fit of the material to subject, helpfulness, etc.; furthermore, they can see other students' ratings
F5: timeline showing current status and goal	progress towards (self-set) goals is illustrated (e.g., as a bar chart); learners can get information about remaining learning subjects, texts they need to read, pending assignments, etc., to be able to reach the goal by the set point of time
F6: time expected to complete a task or read a text	next to learning material (texts, videos, presentations, self-assessments, etc.) learners can click an icon symbolizing a watch, to be informed about their expected reading or working time on the basis of their average processing time in relation to the average working time of the other participants
F7: prompts for self-assessment	with distance of time after learning matching self-assessments are offered to the students
F8: further learning recommendations	when learners have recurrent problems with subject areas, the system offers additional learning material or explanations to the learners based upon their results of self-assessments or forum discussion
F9: comparison with fellow students	allows comparisons with the course average regarding tasks processed or texts read, time spent on learning, learning outcomes, etc.
F10: considering the student's personal calendar for appropriate learning recommendations	learning analytics considers personal schedule and preferences of the student as well as the term schedule to offer appropriate learning possibilities for the remaining time
F11: newsfeed	shows relevant news related to the learning content
F12: revision of previous learning content	in courses which build upon content from previous courses, the system makes cross-references to previous learning material, self-made learning material (mind maps, summaries, etc.) to refresh students' knowledge and facilitate assimilation
F13: feedback for assignments	seminar papers can be created in the learning management system for semantic analysis, to receive feedback on structure, content, plagiarism, and improvement
F14: reminder for deadlines	provides reminders for examination dates, submission, enrollment, and re-registration deadlines and announces upcoming events; students can set preferences regarding time and content of the alerts
F15: term scheduler	recommends relevant courses that fit the learners' prior knowledge, curricular requirements, individual scheduling, and preferences and shows alternative courses and study paths

The outcomes of the study indicated that students are 'more willing' to share their data for LAs when they perceive the information as relevant for their learning (Schumacher & Ifenthaler 2018b: 402). Student-facing dashboards are intended to enhance performance through supporting 'awareness, self-reflection, and sense-making' (Teasley 2017: 379). Students indicated five features of LA dashboards they would use for their study: (1) reminders of deadlines, (2) revisions of 'corresponding content of former semesters', (3) self-assessment prompts with just-in-time feedback, (4) receiving feedback for assignments created in the LMS, and (5) learning recommendations that scaffold toward course completion (Schumacher & Ifenthaler 2018a: 403). These features are aligned with time management, meta-cognition, monitoring, and self-regulation and are beneficial to both disabled and non-disabled students.

Summary

LAs and data use more widely are often viewed with suspicion, not least by those already systematically and systemically marginalized. A predictable - perhaps inevitable - consequence can be resistance to data gathering and resultant behavioristic interventions if they are perceived as tools of managerialist, audit cultures that perpetuate and strengthen inequities. We see a need to shape our increasingly data-driven futures in HE. We are arguing for concurrent acknowledgement of both the potentials and pitfalls, open dialogue amongst all key stakeholders, and approaches that empower and enable students and instructors to develop appropriate data literacies to better understand themselves and their roles: 'Students need the tools that will help

them to understand what they are consenting to, and researchers/developers need to have a clear understanding of the pedagogic value that they are offering' (Ferguson 2019: 26). Only from this position will we be equipped to meaningfully embed and apply the HDI principles and confront the potentially profound impacts of mass data collection otherwise only seen, controlled and used by the few.

At a collective level, open data and improved data literacy (e.g., legibility) can mirror co-creation and collaboration in HE and the increasing prominence of the student voice. At an individual level, data can offer opportunities for academic staff to draw on UDL and some basic principles of behavioral psychology to design learning and its supportive interfaces iteratively and compassionately, informed by emergent data. It also offers scope for nudge interventions that respect student agency, genuine choice and difference. For the students, developing a literacy around human tendencies and their own behaviors, illuminated by data, can offer insights of genuine value. At all times we should endeavor to enable 'relevant [and equal access to] support instead of overloading students with superfluous information' (Tsai et al. 2020: 560).

Building on the current four tenets of the HDI framework (legibility, agency, negotiability, and resistance), we propose the addition of 'equity' as a specific HDI principle. Predictive models of student success have rarely considered disability (Cooper et al. 2016). Data are valuable, but if it is interpreted by someone whose drivers are audit-driven then we are only adding ingredients to a recipe for disempowerment: consequences that are opposite a democratic, liberal ideology of education (Dewey 1997; Gutek 2004).

At the heart of learning, teaching and decolonisation is communication - a process that relies on both educators' and students' involvement (Lawrence et al. 2019; Charles 2019) to 'bridge the gap between research and practice' (Michos et al. 2020: 94). Our chapter and collaboration aim to promote the conscious and deliberate idea of genuine allyship. Our intent is to welcome and position marginalized students and academics (at all career stages) as powerful producers of new academic futures (Alhadad et al. 2021). We hope that such allyships are 'dynamic, ongoing and participatory' (Prinsloo 2015). Through our collaboration, the intent was to create, learn and envision the emancipatory possibilities of learner analytics, personalized nudges and shift away from coercion toward agency, empowerment, and equity for both students and instructors alike.

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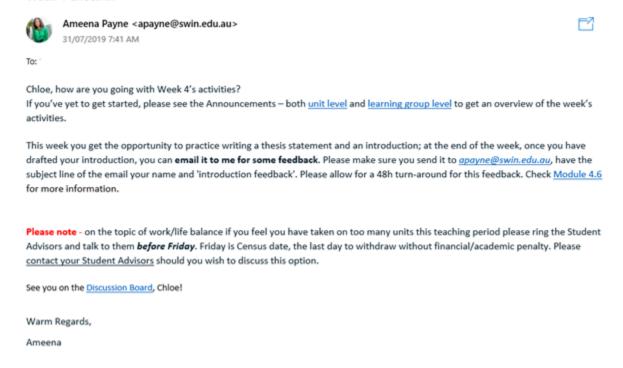Thaler, R., & Sunstein, C. (2009). Nudge: Improving decisions about health, wealth, and happiness. London: Penguin.

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Appendix

Appendix 1. Personalised orienting nudge presenting choice to withdraw from unit

Week 4 Check-In

Ameena Payne <apayne@swin.edu.au>
31/07/2019 7:41 AM

To:

Chloe, how are you going with Week 4's activities?
If you've yet to get started, please see the Announcements – both unit level and learning group level to get an overview of the week's activities.

This week you get the opportunity to practice writing a thesis statement and an introduction; at the end of the week, once you have drafted your introduction, you can **email it to me for some feedback**. Please make sure you send it to *apayne@swin.edu.au*, have the subject line of the email your name and 'introduction feedback'. Please allow for a 48h turn-around for this feedback. Check Module 4.6 for more information.

Please note - on the topic of work/life balance if you feel you have taken on too many units this teaching period please ring the Student Advisors and talk to them **before Friday**. Friday is Census date, the last day to withdraw without financial/academic penalty. Please contact your Student Advisors should you wish to discuss this option.

See you on the Discussion Board, Chloe!

Warm Regards,

Ameena

Appendix 2. Nudge email for non-engaged students

"The secret of getting ahead is getting started." – Mark Twain

Ameena, It looks like you haven't yet had the opportunity to **log in** in Learning Group 02 of EDU10024 Academic Skills for Success I understand there could be various reasons for this – from technical issues to a busy schedule. Regardless of the reason, I am touching base to help you get on track in your unit. The first couple of weeks tend to take off quickly as we build social networks, conceptual understanding, and knowledge of academic skills for success.

My recommendation is to access **Canvas** and the skill building exercises as early as possible as it's always harder to play catch-up than it is to do a little each day. Don't hesitate to get in touch if you have any queries.

"You don't have to be great to start, but **you have to start to be great**."
– Zig Ziglar

Ameena Payne
Pronouns: she/her/hers

eLearning Advisor (eLA)
COM10011 Learning and Communicating Innovative Business Practice
EDU10024 Academic Skills for Success

Appendix 3. Nudge for not yet submitted assignment

I noticed you've not yet submitted Assignment 3, 'Brand You'. Not to worry! You still have time to submit! It is due by 5p tomorrow - Friday 5 February.

This message is a reminder that if you would like to request an extension, it's not too late. I am approving all 48-hour extension requests. So, if you feel you may need one, please request one now via the Assignment Tab under 'Request for Assignment Extension':

https://swinburneonline.instructure.com/courses/2312/assignments/23575

If you have questions, please post up on the Q&A discussion forum - between myself and your peers, we will be available to answer questions!

All the best,

Ameena
apayne@swin.edu.au

Appendix 4. Positive impact of supportive nudges

Ameena,

I wanted to say a big thank you to you.
You may not have realized how much of an impact you have had but if it was not for you and your continued support during this teaching period I don't think I would have continued.
On top of the COVID-19 drama, I have had so many things happen in the last 2 months that have really hit me for 6, none more so than this last week.
But because you went the extra mile over these last 8 weeks, I wanted to make sure that I got everything completed, even if I needed a little extra time.

I don't know how else I can show my appreciation apart from an email but you deserve so much more.
I am so glad that I was lucky enough to be in your group and had you there to support me when I didn't know where to start.

It's a shame that I won't have you for my future units (Maybe?) but I just wanted to let you know that you are amazing and I am forever grateful.

Regards,

Laura

Bachelor Of Business
Major in Business Administration
Swinburne

About the authors

Ameena L. Payne is a Doctor of Philosophy (Education) student at Deakin University and works as an educator within the disciplines of social science (education) and business at Swinburne Online. She is a Fellow of Advance Higher Education Academy (HEA) and the Higher Education Research and Development Society of Australasia (HERDSA). Her research interests are at the nexus of technology-enhanced learning, relational pedagogy and critical theory. www.AmeenaPayne.com

Dr. Martin Compton is an Associate Professor working in the Arena Center for Research-Based Education at University College London. For the last 20 years he has worked primarily in teacher and academic development including 5 years running an online PGCert HE. His research interests and publications include overt consideration of the affordances of and impediments to successful digital education as well as tangential investigations in the contexts of transnational education and the observation of teaching and learning.

Sophie Kennedy is a Scottish student working towards a BSc (Hons) in Psychology & Counseling. She also works as a student consultant for Abertay University's Learning Enhancement Academy and was elected the Abertay Student Association's Disability Officer from 2020-2022. Her research interests include improving the accessibility of education for disabled and neurodivergent students and researching alternative definitions of student success.