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New Anthropology for Higher Education

Background research report

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1 Introduction

Overview

This project advances institutional capacity by building new perspectives and approaches for enhancing the student experience. Effectively managing the student experience is essential to retention, support and education. Yet, fundamentally, the prevailing means for conceptualising and assessing the student experience are out of date. Most of the entrenched conceptualisations of students were formed many years ago in far-away places. Only around 20 per cent of students respond to surveys and only around 15 per cent of variability in the resulting data can be explained. By blending earlier work on students with more contemporary perspectives, the project validates new psychographic constructs and profiles for understanding today's students. We validate a suite of new constructs relating to student identity, expectations, wellbeing, engagement, values, opinions, attitudes, interests, commitments and lifestyles. We explore new information sources available to institutions for procuring the kinds of empirical insight likely to change practice. By looking beyond current constructs and information, the project exposes new options for institutions.

There are myriad compelling reasons for changing tack and looking more broadly:

- While escalated via paper then online over the last three decades, the 'student survey' is an increasingly outdated means of capturing useful information on today's students. Response rates are in decline (typically around 20 per cent (Radloff et al., 2013)), with evidence suggesting surveys are increasingly being ignored. More effective electronic footprints are available that students create through their interactions with courseware, social networking and other systems.
- Institutions and other stakeholders seem increasingly unresponsive to results from student experience surveys. There are various reasons for this, including that over the decades strategies have been developed for influencing and rationalising survey responses, that the phenomena measured have themselves become more standardised, that people get habituated to the results and that, almost invariably, it is hard to explain statistically more than 15 per cent of variation in data (Coates & Ainley, 2007). Explanatory power is low, as is generalisability.
- There is substantial evidence that the student experience is highly individual in nature, yet prevailing analytical approaches emphasise crude group-level statistical generalisations. As the ubiquitous use of mobile technologies implies, there is a need to deploy much more nuanced approaches, including through the use of business, academic and people analytics.
- Australia has substantial data on certain facets of student learning and development, yet is seriously lacking data on other important areas. There is a plethora of data on satisfaction and perceptions of teaching, for instance, yet little if any data on who students are, how people approach higher education, the ways in which they learn and how people change as they progress. Such limitation is stifling innovation and is in need of major and urgent improvement.
- Most work on this front is framed within the context of institutions and fields, but higher education is increasingly trans-disciplinary and trans-institutional in nature. The future learner is more likely to engage in episodic interactions with multiple institutions in the course of their completion of an undergraduate degree ('student swirl' (Sturtz, 2008)).

Hence, to make any progress it is imperative to take the individual as the primary unit of analysis.

Contexts

Fundamentally, we seek to develop different means for enhancing the student experience because higher education is getting a lot more complicated. The system is undergoing radical change, with disruptive innovation at its core (Christensen & Eyring, 2011). New regulatory and funding arrangements are spurring new institutional forms, new qualifications and a larger and more diverse system than ever. Institutions are positioning in increasingly competitive markets, sub-degree programs are expanding and private payments are increasing. Seeking excellence, in all its diverse forms, requires innovative ways of doing business.

In most countries, university education is in unprecedented demand (OECD, 2014; UNESCO, 2014). A range of factors contribute to this growing demand. The bachelor and, increasingly, the master degrees are now passports to professional work, though in many economies additional years of workplace experience are also required (Coates & Edwards, 2010). Professional work grows in complexity, requiring more expansive knowledge and skills, and people are moving through more jobs, necessitating new and enhanced training across their careers. Of course, there are broader reasons why people seek higher education, such as increased civic participation, building networks, and forming personal and intercultural skills.

Supplying quality and efficient higher education to meet this increased demand is proving challenging. Many collegial approaches to higher education are not scaling well. The governance, leadership and management arrangements of many traditionally structured institutions were not intended for environments characterised by universal levels of provision and increased student contribution. As explored below, scaling higher education to this extent can create discontinuities across disciplines and academic functions, pressure conventional forms of academic work, require new forms of governance and require the need to more explicitly engineer and manage previously tacit forms of community. Soon, supply is also likely to be choked by academic work and workforce constraints, given shifts in demography, work roles and research training (Coates & Goedegebuure, 2012).

Focus

So we initiate this new line of enhancement work because system and institution changes make understanding students' higher education experience more important than ever before. In light of contemporary policy developments, understanding how individuals choose among institutions and courses of study is increasingly complex. At the same time, it seems that 'going to uni' is no longer what it once was— a seminal life event or stage, a coming of age almost. Students today source identity-building experiences from a broad range of study, lifestyle and employment opportunities. Such change drives a need to revisit basic assumptions about who students are, what they seek from higher education, the expectations that shape their experience and how institutions can best help students reach their potential. Yet, surprisingly, there has been no major cross-institutional study in Australia in recent years into how individuals approach higher education. The concepts that drive many student experience and 'lifecycle' models are similarly dated. Major data collections are progressed without any overarching conceptualisation of today's student.

The way in which we have studied students' experience also needs to change. We contend that, rather than rest further weight on approaches designed for a previous era, a more productive way to study the experience of today's students is to shift from general statements about the broad experience of groups to a more individual focus. The now well-institutionalised focus on groups is largely an historical artefact of the methodological, analytical and processing limitations of the traditional student survey. With mobile technologies, people analytics and other techniques made possible by rapid advances in technology, we now have the tools and data required to overcome these limitations. Hence, we propose a sustainable shift in focus using the powerful fields of business, behavioural and academic analytics, referenced as 'education analytics' in this project.

As higher education changes, so too do the means by which institutions seek to lead students' experience. Effectively understanding and managing students' experience is vital. It is imperative that institutional recruitment and management systems target relevant facets of the student experience, are deployed in appropriate ways and return robust data able to impel progress. In doing this, they must make appropriate assumptions about the discourse between students and institutions.

Australian higher education has shown substantial leadership in understanding and enhancing the student experience over the last three decades. Myriad studies have been conducted (see: Coates, Tilbrook, Guthrie & Bryant, 2006; Radloff et al., 2013), building on specific Anglo-American assumptions about 'the student' (e.g. Marton & Saljo, 1976; Pace, 1986). However, as we outline below, particularly given contemporary changes, further investment in prevailing approaches now a generation old is yielding increasingly diminishing returns to practice and policy. There is a need to study different concepts and methods to understand contemporary higher education and build productive and quality futures.

Hence, this project advances a major new line of work into the experience of our undergraduate students. Who are the individuals entering Australian higher education, and how can institutions better manage their experiences as they progress through study? How can we move beyond the suite of popular but limiting constructs on teaching, retention, experience and engagement to look instead at student profiles, types and segments? How can we get information on each and every student, not just the one-fifth who respond to surveys, and how can we explain more than a fraction of the variation in students' experience? These are deep and broad yet basic questions that require us to better understand how an increasing number and range of individuals approach higher education, students' identities and expectations, and how institutions can manage and enhance students. This fresh work will help sustain Australia's leadership in this area, with benefits for the sector, institutions and individuals.

The study steps ahead in substantive, technical and practical ways.

- Substantively, we will investigate who students are and what they expect from higher education—inquiry that goes beyond stereotypes, generalities and dated assumptions about demography and contexts.
- Technically, we will develop sustainable new approaches for Australia to measure and report on these new constructs and profiles. We will develop the field of education analytics and help institutions leverage under-utilised existing data for quality enhancement.
- Practically, we shed new light on how institutional leaders and managers could use new insights and data sources to monitor and improve the student experience.

But why complicate matters with this integrated analysis? The need, in summary, stems from the increasingly pressing need for joined-up leadership and management, education, and institutional research: the management and leadership of higher education needs to become more evidence-based; work on the student experience needs to move beyond reliance on survey rituals that reify mythical sociodemographic groups; and institutional research (including various emerging forms of ‘big data analytics’) needs to become less atheoretical. Figure 1 depicts the design space in which the study is positioned. Finding a ‘sweet spot’ that unites practical, theoretical and technical angles carries valuable potential for maturing the evidence-based leadership of higher education. Making this step requires creation and adoption of a ‘new anthropology’ for higher education. This involves new frames for understanding motivations, new perspectives on student identity that jump beyond dated myths, and evidence-based management to replace rituals ingrained in an earlier age. This paper attempts a modest shift in this direction.

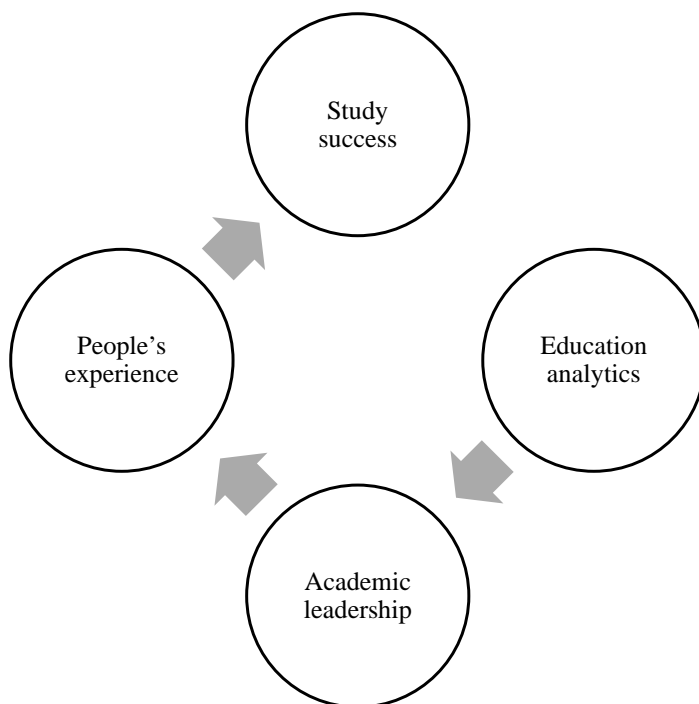


Figure 1: Study design

We have deliberately positioned this project to build squarely on Australia’s excellent research, policy and practice in this field, to launch invigorating and expansive conversations about students’ experience, and to help institutions monitor and improve the quality of education. This work advances rather than replaces current work. Student surveys and the concepts they purport to measure have grown to play an important role in Australia. Yet increasingly they have been shaped to furnish information required for monitoring and quality assurance rather than the far more textured information required to more fully understand and continuously improve students’ experience. The current work assumes that surveys will continue to play an important role, but that there is an enormous need to look into new concepts and data sources.

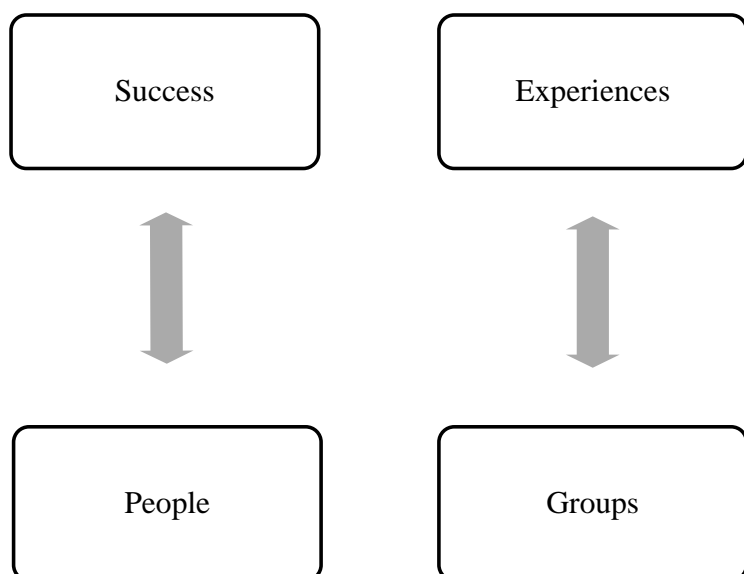


Figure 2: Design logic

This report

This report tackles these matters head-on, investigating conceptual, analytical and managerial perspectives on how institutions can help students succeed. Each of the following chapters presents a considered response to these driving questions:

- what does higher education want for its students?
- who are today's students?
- what can be known about today's students?
- what can be done to make things better?

The next chapter articulates a model of study success. To help students succeed, it is argued in the following sections that we must build better perspectives for understanding students and effective strategies for analysing and interpreting huge volumes of data on activity and performance. Building new approaches to study success both facilitates and requires more evidence-based approaches to academic work and leadership. The report investigates each of these areas and considers by way of conclusion what institutions could seek to achieve.

2 Framing student success

Introduction

As higher education has become larger and more diverse, so too has the challenge of helping each learner succeed. The reasons for participation have proliferated, as have the programs, environments and post-graduate pathways. This changed context makes it more important than ever to develop practice-relevant conceptualisations about what higher education is seeking to achieve. While clearly not a task that can be approached or accomplished in any easy or conclusive way, it is likely that a basic frame—even one that is highly contestable—carries genuine potential to inform future progress.

A key question guiding this task would appear to be: ‘What does higher education want for students?’ If the answer is ‘success’, then what is a useful way of conceptualising this phenomenon? In the remainder of this section, we advance a normative model of success, articulated as a basis for subsequent investigation of student identity and institutional research to inform leadership.

Figure 3 provides an overview of the model. Though not deterministically sequential, the model outlines several non-exclusive thresholds of increasing success. While it focuses primarily on academic matters, it does so in a contemporary way that recognises the broad nature of a person’s higher education engagement. The model integrates prior research into the student lifecycle, access and participation. The following description sets out the normative architecture of the model. Subsequent analysis explores how these ideas may play out in context and be underpinned by data.

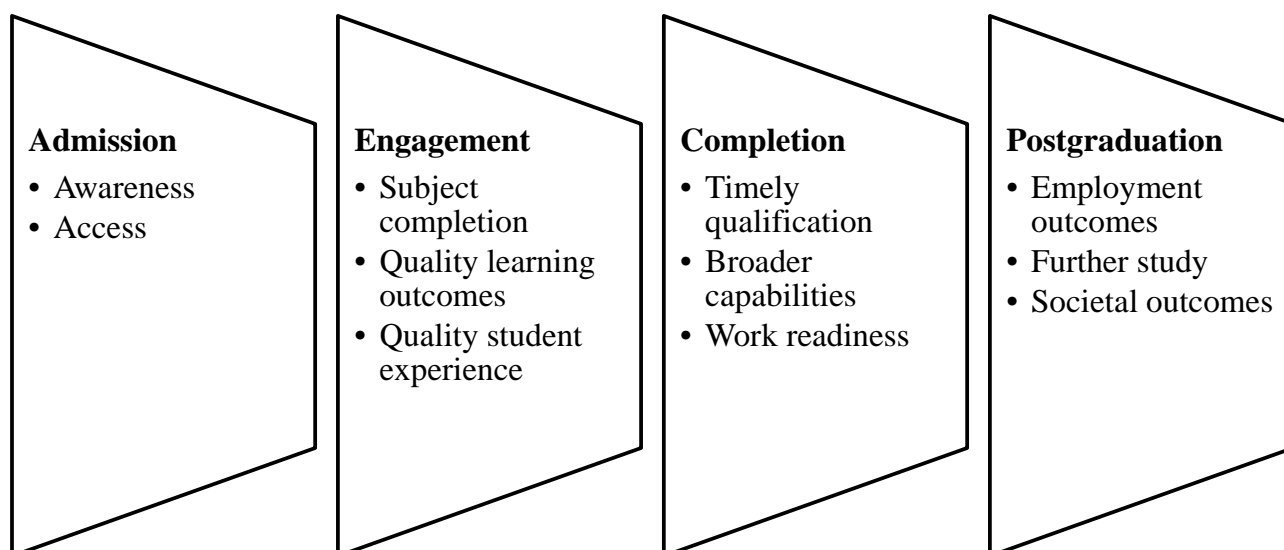


Figure 3: Study success model

Admission

Awareness

Simply becoming aware of higher education is an important form of success, regardless of a person’s ultimate attendance. While substantial work is unfolding to better link higher education with precursor opportunities—not least, or only, through better alignments between

qualifications, more generalisable credit structures and more transparent and granular learning outcomes—still the fraught nature of life, career and cross-sectoral transitions often renders incomprehensible even to industry experts entry into the foreign world of higher education. Large-scale survey results have affirmed that current students often hear about higher education during childhood, making clear the importance of a host of powerful and often tacit socio-cultural cues regarding the value of higher education. Such cues may be particularly powerful for school-leaver entrants, but are also likely to inflect the attitudes and aspirations of adults considering further education. It is reasonable to assume that not having such cues makes less likely the chances of participating in higher education, and reaping all the rewards this may convey. Hence, simply becoming aware of higher education is doubtless an initial albeit insufficient form of success.

Access

For many potential students, the first measure of success in higher education is gaining access to an institution or course. A number of factors, including academic preparation, aspirations for further study and ability to actually enrol and attend higher education, contribute to whether students are successful in terms of their access. To date, most research into access has focused on particular segments of the student population, such as people from structurally defined disadvantaged groups (whose access rates fall below expected demographic shares) or people entering selective courses (like medicine or engineering). Combined, such groups reflect a relatively small and shrinking subset of the student population. But it is important to recognise that most students would feel a sense of achievement in gaining access to higher education. In subsequent analyses, therefore, it is important to keep in mind the need to move beyond specific demographic or contextual groups—often reified in policies that are decades old—in efforts at building a more sophisticated understanding of higher education.

Engagement

Subject completion

Getting involved in higher education is, of course, just the first of many possible successes in higher education. Once engaged in study, a further basic sense of success involves simply passing the units in which a person enrolls. Building on definitions established in the late 1980s, for instance, national statistics in Australia calculate ‘success rates’ as the proportion of actual student load for units of study that are passed divided by all units of study attempted, including failed units or those where students withdraw after the census date (Department of Education, 2015). This, of course, implies a lowest common denominator conceptualisation of success (at least 50 per cent), which may be especially problematic in situations involving professional degrees where a particular standard of performance is expected and yet a student has achieved a bare minimum pass (noting that Australia has few professional licensing exams). It also begs the question of whether ‘50 per cent’ at one institution is the same as ‘50 per cent’ at another—almost certainly not the case given the almost complete lack of cross-institutional calibration mechanisms. Increasingly, these are policy rather than technical complexities, and hint at the complexities surrounding even this basic threshold of success.

Quality learning outcomes

Given that defining success as simply passing subjects sets a very low standard for success, what other markers can be prescribed? Ideally, appropriate curriculum design implies that passing a

subject involves developing particular academic outcomes. That subjects are graded at more than just a pass/fail basis suggests that we recognise that there are different levels of quality. Similarly, concerns about falling academic standards and 'easy passes' suggest that there are particular thresholds of what we consider successful study, and what is simply adequate. In this view of success, while students who pass their subjects may be successful in certain ways, a 'real' success is a student who achieves a particular, higher, quality of academic outcomes. Recently, major efforts have been made to advance more encompassing and scientific notions of such success.

Even if attention focuses on academic achievement as success, a further definition might be achieving or exceeding academic expectations for students (whether those expectations are personal, familial, or broader). While this concept is clearly related to the idea of success as broader than a binary fail/pass outcome, it is a more student-centred definition that emphasises the oft-quoted transformative nature of higher education. Here, success is defined as students living up to their personal potential. A gifted student who coasts through study with pass grades has not really been successful, according to this definition. This notion is strongly embedded in the liberal arts tradition (Boyer, 1987). This broader notion of personal success also goes to the prospect that a student may appear to prosper but may be performing below expectations.

Quality student experience

Study success may also be defined as relating to particular attributes of the student experience. Here, a successful student is one who is engaged in an appropriate way with her or his higher education experience, either with academic experiences or broader life outside the classroom (Zepke & Leach, 2010). This type of success could apply to individual subjects or semesters, or as a reflection on a broader experience overall. For that reason, it seems appropriate to separate it from the conceptions of success that apply clearly during study, or at completion.

Completion

Timely qualification

Several different types of success could apply at completion of a student's studies. We refer to 'completion' rather than 'graduation' because only one of these definitions implies that graduating from a course is required to be successful. A student may be successful according to the other conceptions without obtaining a formal qualification.

Closely related to the idea of success as completing subjects, albeit on a larger scale, is defining success as completing a qualification. Much current popular debate about higher education outcomes in Australia, discussing student debt and future employment, appears to rest on degree completion as success (e.g. Kemp & Norton, 2014). Measures of attrition and retention are also based on this conception of success. Yorke and Longden (2004), however, critique this definition, saying that lower levels of government funding, the increased emphasis on lifelong learning, and the move away from traditional, full-time engagement in higher education weakens the rationale for such a definition. Australia does not currently define a fixed period for completion of degrees, although such a limit may be imposed in various institutional or international contexts.

Broader capabilities

This type of success is demonstrated by the graduate attributes agenda. Here, a successful student is one who graduates having developed generic capabilities to a particular level. Individual institutions define differently which graduate capabilities are appropriate, and what level of capacity. Within Australia, institutions typically seek to develop traditional liberal arts abilities such as leadership or global citizenship, alongside other skills including communication, a high level of discipline knowledge and critical thinking. The sector's ability to measure success in terms of graduate capacities is currently very limited, though a matter of considerable debate if not yet investment.

Work readiness

As well as developing generic skills, a vocational view of higher education might define success as developing the skills required to practice the role or career in which a student has trained. The tension, particularly in professional degrees, between teaching discipline content as opposed to work-related skills, demonstrates that this is not quite the same as simply completing a qualification. Similarly, the previous definition focused on graduate capabilities as a whole and is, to some extent, an ideal; this definition focuses on a graduate's ability to pursue a career.

Postgraduation

Employment outcomes

Clearly, a host of outcomes flow from completion of a qualification. Gaining employment is particularly important (Coates, 2014). But is being employed enough, or is being employed in a career that substantively uses the skills developed in higher education enough? Has someone with an engineering degree who doesn't work as an engineer been successful? And does the extent of employment matter? Over what period of months or years should employment outcomes be judged (Coates & Edwards, 2010). Unlike emerging practice in the United States, Australia does not currently have a measure for return on investment in study, except perhaps crude graduate earnings, making it difficult to venture beyond presumption in establishing the net value of participating in higher education.

Further study

As well as vocational and broader social outcomes, study success in higher education often flows into further higher education. Someone completing an associate degree may move into a bachelor, or shift from bachelor to masters, or progress from masters to doctoral, then research or teaching roles at varying points along the way. In this way, academic success carries potential to spur further academic success.

Societal outcomes

A broad societal view of success goes to the contribution made by higher education participants towards a more productive, well-informed, aware or just society. The emphasis on public engagement, as well as community access programs and the like, affirms this role for universities particularly. Whether or not students pass their subjects, or are satisfied with their experiences, or complete their degrees, is not as important through this lens as whether they are able to

contribute more fully to society because of their study. Again, this is the goal of traditional liberal arts education at a broad level.

Taking stock

A key consideration in any such model of success is that different stakeholders may meaningfully (but often unselfconsciously) promote different conceptions of what it is to be successful, and this profoundly affects how services are delivered and the student experience in higher education.

Private providers, for example, may quite reasonably define student success in terms of graduate outcomes—getting a specific job, a promotion, or entrance into a degree due to an acquired qualification. A university with a strong liberal arts or religious tradition, by contrast, may see graduate career outcomes as only a part of a larger mission that includes more focus on the transformative nature of university study. More specifically, what counts as success may differ depending on field of study, particularly when comparing generalist degrees to professional degrees, or change, depending on the level of study.

Traditional measures of educational disadvantage and inequity, which are typically based on broad demographic factors, interact with only some of these facets of success, and do so in complex ways. For example, students from low socio-economic backgrounds are under-represented in the university population compared to their relative share of the Australian population. They are, therefore, less successful as a group at accessing university study. Once in university, however, they are not significantly less likely to complete subjects or degrees than students from other backgrounds, and are more likely to report high levels of satisfaction with their student experience and exceed their expectations for academic success (Baik, Naylor & Arkoudis, 2015; Naylor, Baik & James, 2013). On these measures, then, they are as likely to be successful as other students. Indigenous students as a group, however, are less likely to be successful than non-Indigenous students in terms of their access, subject completion and qualification completion. Individual students from either group, of course, may vary from these trends.

Other individual factors may also have a profound impact on a student's success. Personality, motivation and cognitive competencies have all been shown to interact with retention and subject completion. Robbins et al. (2004) and Richardson, Abraham and Bond (2012) performed meta-analyses of 109 and 241 datasets to examine the relationship between these factors and grade-point average (GPA) and retention. Both groups found that traditional demographic and psychosocial indicators of educational disadvantage correlated weakly at best with these types of success. Instead, commitment to completing the degree, self-efficacy, and academic preparedness correlated strongly with retention, while self-efficacy, motivation, self-assigned grade goals and persistence correlated with GPA. Both measures of success were, therefore, strongly influenced by self-regulatory, and particularly motivational, factors.

It should also be noted that, as well as moderating two types of success, motivation should also affect what a student considers to be success. Students who go to university to improve their career outcomes are likely to base their assessments of success primarily on that measure, although other aspects, including quality of the student experience and GPA, might also be important. Conversely, students who are primarily interested in their subject material but have no clear career goals are likely to emphasise different aspects as success. Investigating student motivation may, therefore, provide valuable insights into what students consider success, as well

as indicating how students may perform on particular measures of success such as GPA or retention.

3 Hyper-intersectional identities

Introduction

Succeeding in higher education means different things to different people. Obviously, while the preceding conceptualisation of success is deliberately decontextualised to the point of theoretical generality, to be of any use it needs to be made real in the context of particular student and institutional contexts. Building a useful understanding of the student experience requires looking beyond a single success dimension to embrace a host of other characteristics. Hence, an essential second question to ask is: Who are our students?

This broad question can, of course, be approached in many different ways. This project seeks to advance thinking about the student experience by embracing substantially more complexity than has hitherto been the case. In essence, we assert the need to shift from viewing the student experience through the structure of crude sociological groups to instead looking through prisms that give life to the experience of people. As the following discussion brings out, this is not just a linguistic slip but a fundamentally different way of conceptualising the identity of those people who study in higher education. We believe that this shift—broadly, from treating each student as a group member to treating each student as a person—will likely require much work, particularly in developing sensitive educational analytics, but will ultimately be productive.

This section unpacks the theoretical perspectives that underpin this new perspective. We first discuss what we refer to above as ‘sociological groups’. Next, we progress analysis by delving into the substantially more sophisticated but under-studied world of student typologies. We then shift even further to theorise what we refer to as even more sophisticated ‘hyper-intersectionalities’. The section concludes by weaving these further dimensions back into the earlier analysis of success.

Sociological groups

Driven partly by the availability of data, and what is measureable, students in higher education have conventionally been bundled into broad groups defined by often static demographic and contextual variables. Such labelling runs from casual conversations to more formal policy treatments and generally targets groups that deviate from traditional elite-era university students (which might be stereotyped as white, urban, medium or high socio-economic status (SES), English-speaking school-leavers). An obvious example is the ‘equity groups’ defined a few decades ago, which include students who are Indigenous, low SES, from regional or remote backgrounds, from non-English speaking backgrounds, have defined disabilities, women in areas where they have typically been under-represented, including engineering, information technology, and postgraduate study. Several other disadvantaged groups can be identified, including first-in-family, refugees and Pasifika, among others. Other common groupings pertain to study contexts (e.g. online, part-time, discipline) or individual characteristics (e.g. gifted, mature age). Of course, many—and perhaps most—students are not grouped at all.

The popularity of such research is fuelled not just by tradition, but also by the convention and the expertise of the people performing the analyses. Yet such groupings have been criticised for being incomplete, for being too blunt to capture the diversity within, and for reinforcing approaches convenient to institutions rather than serving students (Ladd, Reynolds & Selingo, 2014). Despite such criticism, the analysis of such groupings against various criterion variables generates a wealth

of research and there appears to be little appetite for change in the sector as a whole. This is surprising, for often very little variation in measures of the student experience can be explained by such groups. We believe that these categories are insufficient to meaningfully provide insight into a successful experience in higher education.

Student typologies

Overview

An alternative approach is to look beyond aggregate groupings for an approach that more deeply unpacks the extent and nuances of the student experience. The field of marketing offers clues to fruitful prospects, as it operates often with broadly similar data and analytical contexts. A key step here is to shift from dissolving people's identity into broad static classifications, to exploiting the particularity and dynamism that patterns each person's experience. A first move in this direction involves the analysis of typologies based on needs, behaviours, cognitive or motivational factors.

A typology is a system of classification according to a general type. Typologies are defined by a cluster of factors considered jointly (as opposed to a taxonomy, where each factor is considered in succession through a series of classifications, forming a hierarchical tree, whereas typologies are flatter structures (Marradi, 1990)). In essence, group membership is identified by how closely individuals adhere to the type definition. If they are sufficiently different, they belong to a different type. Both taxonomies and typologies can be systematic and underpinned by considerable theoretical framing; the difference is in how members are identified.

Many student typologies in higher education have been developed in the United States, where there is more of a tradition of this type of research. They may, therefore, need some refinement before being generalised to other contexts. However, most are based on analyses of many thousands of students and similar categories have been identified over time and by multiple researchers, which may indicate the categories identified are both relatively robust and stable over time.

Motivation-based typologies

One of the most cited student typologies, and perhaps one of the earliest, is Clark and Trow's 1966 study. This typology was based on two dimensions, identification with the college and involvement with ideas. This led to four groups, based on binary combinations of the two dimensions:

- 'academics', who are high on both scales;
- 'collegiates', who identify with the college but are more interested in its social aspects;
- 'vocationals', who are interested in ideas but not in the social aspect of college, and see college as a stepping stone to a good job; and
- 'nonconformists', who identify more with off-campus groups and issues related to art, literature and politics than academic or collegiate life.

This typology has been very influential, and many subsequent typologies have used similar names or divisions. For example, Horowitz (2013) took a historical analysis of student groups and also identified four groups broadly similar to Clark and Trow's, including:

- 'outsiders' (academics);

- 'collegemen/women' (collegiates);
- 'new outsiders' (vocationals); and
- 'rebels' (nonconformists).

Several student typologies developed in the 1960s and 1970s also shared similar groups or made subdivisions of Clark and Trow's categories (Newcomb et al., 1967, Keniston, 1965, Hackman & Tabor, 1976). Some of these subgroups, particularly those related to the 'nonconformists' group, may represent specific cultural and political movements of the post-war US and may, therefore, not be applicable to modern students.

A more recent typology is Astin's 1993 factor analysis of 2600 student responses to 60 items from a Cooperative Institutional Research Program (CIRP) survey between 1971 and 1980 (Astin, 1993). Although this typology is also based at least partially on Clark and Trow's, Astin identified seven groups, including:

- 'scholars': students with high academic drive and self-confidence;
- 'status-strivers': students who want to improve their career opportunities;
- 'leaders': students with high confidence in their leadership and popularity but with low academic drive;
- 'hedonists': students who are more interested in the social aspects of college;
- 'social activists' students who rate social and political concerns highly;
- 'artists': students with high self-assessment of their artistic ability and self-confidence; and
- 'uncommitted': students who were lower than average on all scales.

The primary limitation of Astin's study was that the students surveyed were freshmen in the first stages of their degrees. Thus, their responses were primarily about their expectations of college and activities prior to enrolling, from which their behaviour at university was inferred. However, Astin and Horowitz both concluded that there was considerable stability in the student groups identified over time (Horowitz, 2013; Astin, 1993).

Cheong and Ong (2014) attempted to demonstrate that Astin's model also applied cross-culturally, by performing an analysis of 315 freshmen responses to the CIRP Freshmen Survey in Malaysia in 2010–2011. The researchers removed all questions relating to alcohol and abortion, making it impossible to identify the 'hedonist' group, but otherwise used k-means cluster analysis to identify all of Astin's groups plus another group, which they labelled 'undecided', who were below average on all scales but with a small positive rating in the career success scale that differentiated them from 'uncommitted' students (Cheong & Ong, 2014).

The Parthenon Group provides marketing and strategic advice to US universities. In 2014, they also published a student typology derived from a Parthenon Group survey of 3200 students who were in college or considering enrolling. Although no methodological details were provided, they appear to have created a typology based on both sociodemographic and motivational factors (Ladd, Reynolds & Selingo 2014). This typology identified six groups:

- 'aspiring academics', who comprised 24 per cent of the sample;
- 'coming of age', 11 per cent of the sample, who favour social rather than academic experiences;
- 'career starters', who comprised 18 per cent of the sample;

- ‘career accelerators’, who comprised 21 per cent of the sample, and were older students with already established careers who wanted to upskill;
- ‘industry switchers’, which included older students and comprised 18 per cent of the sample; and
- ‘academic wanderers’, who comprised eight per cent of the sample and were typically older and with less clear aspirations for college.

Despite the limitations of the Parthenon Group study as a research-based taxonomy, it is notable for explicitly identifying differences between the motivations of school leavers and mature aged students and considering the implications of those differences in terms of the student experience and success.

Behaviour-based typologies

Behaviour-based typologies are sometimes favoured because, unlike attitude- or motivation-based analyses, they can be developed based on concrete, observable data rather than inferred behaviour. In reality, though, most are based on self-reported survey data, which potentially undermines this strength.

Bahr (2010) describes a typology of two-year community college students in the US based on an extraordinarily large dataset. Bahr’s typology used the enrolment and completion data of nearly 166,000 students from a diverse range of types of community colleges in 2001. Based on the types of subjects taken and credits obtained, Bahr identified six types of student based on a k-means cluster analysis. He drew tentative conclusions about common motivational themes for each cluster based on enrolment and completion data.

The clusters in Bahr’s typology were:

- ‘Vocational students’, who comprised three per cent of the sample. These students also attempted a high number of units, but primarily in areas that did not provide transferrable credits. These students (perhaps similarly to many vocational students in Australia) may have therefore enrolled in college to obtain specific qualifications that didn’t require further study.
- ‘Non-credit students’, who comprised three per cent of the sample and attempted a high number of non-credit subjects. They may be primarily interested in the non-academic life of community colleges, or building skills in non-academic areas.
- ‘Transfer students’, who comprised 13 per cent of the sample. These students attempted the most units, primarily in areas that provided transferrable credits. They were believed to intend to transfer into a four-year college as a result of their studies.
- ‘Exploratory students’, who comprised 19 per cent of the sample. They typically pursued broad, undirected study, with a low completion rate. Their enrolment pattern was most similar to transfer students, although the two groups differed in their completion rates.
- ‘Experimental students’, who comprised 30 per cent of the sample and typically had a light study load and a short duration of enrolment. These students may have entered college to see what it was like and then found that it didn’t suit their needs or interests.
- ‘Drop in students’, who comprised 32 per cent of the sample. These students attempted few units, typically of non-transferrable credit, and had high attrition rates (Bahr 2010).

Key strengths of this typology are the extremely large sample size and its utility for college leaders in providing support for students. Better availability of course advisory services, for example, may help exploratory students complete their degrees in a timely and better focused manner (effectively reducing the number of exploratory students and increasing the number of transfer students). Also interesting are the potential differences in motivations for enrolling, and therefore for what counts as study success, for each group of students. Clearly, a transfer student who doesn't succeed in completing their qualifications and transferring to a four-year college is likely to consider themselves to have failed in their goal. Likewise, a vocational student may count success in terms of their career outcomes. However, how do exploratory and experimental students see their enrolment? Are they successful because they entered college, decided they didn't like it and left with a bearable amount of student debt? Or are they failures because they didn't complete their qualifications? As Kemp and Norton (2014) suggest, not all attrition is bad attrition, unless qualification completion is your only marker of successful study.

Saenz et al. (2011) also developed a more complex, 15-group typology based on self-reported activities in 320,000 community college students using the Center for Community College Engagement survey (Saenz et al., 2011).

Kuh, Hu and Vesper (2000) describe another behavioural typology, based on 51,000 student responses to the College Student Experiences Questionnaire (CSEQ) collected between 1990 and 1997. Unlike Bahr's study, this typology is based on self-reported behavioural information and may, therefore, be less objective than the more concrete enrolment data. This typology is also based on full-time undergraduate students at four-year colleges only, but did sample students from all four year levels. Ten groups were identified using factor analysis followed by cluster analysis, and included:

- 'Disengaged students', who comprised 18 per cent of the sample. These students were below average on all of the measured activity scales.
- 'Recreators', who comprised 10 per cent of the sample. They were distinguished by spending more time on sport and exercise than average, and below average time on most other scales, as well as achieving lower than average marks.
- 'Socialisers', who comprised 10 per cent of the sample and were distinguished by spending above average amounts of time in social interaction and substantive interaction with their peers.
- 'Collegiates', who also comprised 10 per cent of the sample and were distinguished primarily by their heavy investment in co-curricular activities and interaction with both faculty and peers.
- 'Scientists', who comprised nine per cent of the sample. They were distinguished by above-average time spent on science and quantitative activities and interaction with faculty.
- 'Conventionals', who comprised eight per cent of the sample and engaged in above-average amounts of sports activities, academic effort and social interaction with peers. They had below-average activity in substantive interactions with peers and participation in cultural and performing arts.
- 'Individualists', who comprised seven per cent of the sample. They were distinguished by a high amount of participation in arts activities, overall effort and interaction with peers, but lower than average interactions with faculty.
- 'Artists', who also comprised seven per cent of the sample. Like Individualists, they spent more time participating in arts activities than average, but had average interactions with

faculty. They were typically below average on other scales.

- ‘Grinds’, who comprised five per cent of the sample and displayed high academic effort but didn’t demonstrate involvement in most other activities.
- ‘Intellectuals’, who also comprised 5 per cent of the sample and displayed above average activity on all scales.

This typology found differences between group frequencies based on demographic factors such as gender (but independent of ethnicity), study major, year of study and type of institution (Kuh, Hu, & Vesper, 2000). Interestingly, the paper explicitly takes the view that a rounded education, where a range of generic, social and academic skills are developed, constitutes success at college. Groups that place ‘too much’ emphasis on single activities—including socialisers, recreators, artists and grinds—are not considered to have achieved as much as those undertaking broader activities and are penalised by the authors’ ‘Sum of Effort’ and ‘Sum of Gain’ calculations. Within the US liberal arts tradition this attitude may be understandable, but one may question whether artists and grinds, for example, are less satisfied with their student experience because of their narrower interests than ‘individualists’, ‘intellectuals’ or ‘conventionals’.

The Kuh, Hu and Vesper typology has been expanded in further work by Kuh and Hu. Zhao, Gonyea and Kuh (2003) identify ‘unconventionals’ (students who show a high interaction with diversity), ‘collegiates’, ‘vocationals’, ‘conventionals’, ‘maximisers’, ‘grinds’, ‘academics’ and ‘disengaged’ students. Hu and McCormick (2012) identify ‘unconventionals’, ‘collegiates’, ‘conventionals’, ‘maximisers’, ‘grinds’, ‘academics’ and ‘disengaged’ students.

Dugan (2013) used latent class analysis to develop a typology based on 11,200 responses to the Multi-Institutional Study of Leadership. This typology was based exclusively on students’ extracurricular activities. Dugan identified three binary factors, which combined to create eight groups including:

- affinity group affiliates;
- identify and expression leaders;
- academic careerists;
- cultural collegiate;
- athletes;
- social recreators;
- recreational academics; and
- social collegiates.

Finally, in an Australian context, Coates (2007) used 1051 student responses to the Student Engagement Questionnaire to develop a two-dimensional scale based on academic and social engagement in interpersonal as well as online learning. This typology was based on data from full-time undergraduates and was developed via analysis of covariation in instrument scales and k-means cluster analysis. The four groups described included:

- ‘intense’ (high academic and social engagement);
- ‘independent’ (high academic engagement);
- ‘collaborative’ (high social engagement); and
- ‘passive’ (low academic and social engagement).

There are two important considerations about behaviour-based taxonomies. The first is that these typologies are impoverished without data about the motivations of students, and authors are often required to speculate about the motivations of students in order to explain their cluster analyses or place them within a theoretical framework. The second consideration (which applies equally to motivation-based typologies) is that, although many groups appear broadly stable over time, the change in group composition with year of study may suggest that an individual's membership within a group may not be. That is, as students progress through their studies, the ways they spend their time and approach their studies may change, and students who were interested in the social aspects of campus life (the 'socialisers' in Kuh, Hu and Vesper's typology, the 'social recreators' in Dugan's and the 'collaboratives' in Coates' typology) may decide to focus on their future careers or have their interest sparked by their studies and become 'conventionals' (or 'recreational academics' or 'intense students') instead. An individual's type, particularly in Coates' typology, may differ depending on subject content, curriculum design or mode of learning. Of course, some groups may be more likely to drop out of university in the early stages, also contributing to the change in group composition. There is little longitudinal data examining this at present.

Hyper-intersectionalities

Traditional research in student development has provided frameworks to describe several aspects of student identity, such as ethnicity (Cross, 1991; Ferdman & Gallegos, 2001; Helms, 1995; Kim, 2001), sex and gender (Bem, 1981; Carter, 2000) and sexual orientation (Cass, 1979). As the above analysis has asserted, these frameworks are inadequate when trying to explain the complexity of student identity in which personal characteristics (socio-economic status, gender, race, sexual orientation, plus a host of highly individual factors) intersect with features of the collegiate environment (institutional type, academic program, extra-curricular activities) (Braxton, 2009). Rather than box people into groups, it is helpful to take a different analytical stance that identifies people as a series of intersecting vectors.

We draw on the idea of intersectionality to extend this approach. Dill and Zambrana (2009: 1) define intersectionality as 'an innovative and emerging field of study that provides a critical analytic lens to interrogate racial, ethnic, class, physical ability, age, sexuality, and gender disparities and to contest existing ways of looking at these structures of inequality'. Research in intersectionality presents a way in which the connection between aspects of identity are influenced by context (Torres, Jones & Renn, 2009). Despite this movement within higher education research being more in line with our experience, research in this area has been limited to mostly binary understandings of intersectionality, such as race and international status (Malcolm & Mendoza, 2014), gender and race (Linder & Rodriguez, 2012), or race and religion (Rockenbach, Mayhew & Bowman, 2015).

The concept of 'hyper-intersectionality' forwarded in this project is the idea of using intersecting vectors of quantitative measures to account for differences in the numerous identity criteria listed above. Using algorithms to connect student admissions data, education analytics can predict student performance in desirable student outcomes such as grades, persistence and retention. The appeal of this process is that, unlike the a-theoretical nature of analysis of click-stream data for example, the interpretations of these findings can be applicable to theoretical understandings of student development. This approach to considering student identity does not address an issue inherent in this work, which is that researchers in this area are not well equipped to study

intersectionality itself beyond considering an individual a sum of their parts (Abes, 2009). New typologies predicated on data beyond demographics information will need to be created.

Considering hyper-intersectionality in analytic programs can provide a theoretical anchor for connecting various data to other information describing student context (e.g. financial aid, academic program, co-curricular activities like study abroad or pursuing an internship) as well as behaviour (Learning Management System online behaviour, card-swipe data from building access or accommodation plans, and class registration information). Furthermore, this idea can provide a middle ground between individual attention, like guidance from academic advisors or personalised notifications, and group-centred initiatives, like campus-wide policy to encourage four-year graduation or centres that cater to a specific skill (such as writing centres). For example, a dean could use hyper-intersectionality to identify students who may be predicted to struggle getting summer internships and invite them to resume writing sessions. Of course, cultural and societal considerations of employing hyper-intersectionality must be considered.

Concluding remarks

This brief review of student typologies stretches the analytic gaze beyond static sociological classifications to embrace also consideration of experience based on attitude and behaviour. Before expanding the analysis even further to explore what we term 'hyper-intersectionalities', it is helpful to explore how such typologies augment the earlier analysis of success.

It is clear that it is possible to divide students into meaningful groups, based on behaviour, motivation or other factors. The similarities between different typologies also suggest that there are indeed particular stable and robust groupings, although other groups may be specific to particular cultures or eras. It is clear that there are at least four (and possibly more) broad types of students (in the US, at least), including:

- 'Academics', who are highly engaged with subject material, and likely motivated by intrinsic interest in their disciplines.
- 'Vocationals', who are engaged with the subject material but more likely to be outcome-focused and motivated by their future career prospects rather than intrinsic interest in their material per se.
- 'Collegiates', who are engaged with the extra-curricular aspects of university rather than the academic aspects; some may be interested in developing skills through these activities (Astin's 'leaders') or simply in having a good time ('hedonists')—potentially forming two sub-groups.
- There may also be meaningful groups formed by overlaps between 'academics' and 'vocationals' and 'collegiates', who are highly interested in both the academic and extra-curricular aspects of university. These form the majority of groups in Kuh, Hu and Vesper's typology, but whether they exist as independent groups or are products of fuzziness in the three main groups may depend on the resolution of the analysis.
- 'Disengaged students', who are not interested in either the extra-curricular or academic aspects of university and are unlikely to complete their study; they may be more likely to be extrinsically motivated for higher education (enrolling because of parental expectations etc.).
- There may also exist a group of 'exploratory' students who are unsure what to expect of university and want to try it out.

What is particularly important in terms of today's student experience is that different groups are likely to consider different achievements as constituting study success, and that these definitions may not align with the typical definitions used by institutions and governments. A career-oriented student may be satisfied simply with passing their subjects and gaining a qualification. An aspiring academic may not be satisfied with anything less than a high GPA, but have little interest in obtaining skills that aren't relevant outside the discipline. A social activist may not be interested in passing subjects at all, but highly engaged with their academic knowledge and broadening their social network and 'soft skills'. The type of an individual could also change over time, or with the type of the degree studied. The quality of each student's experience in higher education is likely to depend intimately on their motivations for study and how well those needs are being met.

A limitation of these studies is that they are almost exclusively based in the US context. They are typically relatively old, although the observed stability of these groups over time may suggest that this is not a significant problem. However, the influence of Clark and Trow's original 1966 study, and the fact that many typologies were derived using similar analyses of relatively similar survey instruments, may also go some way to explaining this stability.

A next step could be to develop new student typologies suitable to contemporary Australian contexts, and investigate patterns of student experience. New typologies, based on more relevant criteria, will hopefully be able to more effectively account for variation in the student experience and allow institutions to more effectively meet the needs of diverse groups of students in more tailored and nuanced ways.

4 Empirical strategies: Education analytics

Introduction

With a picture of success and a broader frame for thinking about students, it is helpful to turn to consider how all of this can be aligned with data. There is a need to make more use of the data that abounds in higher education, and to ensure that any perspective on students is able to be underpinned by data. The guiding questions for this chapter are: What could we know about our students? What data and analyses are useful and exist? Broadly, we contend, this involves a shift away from the conventional methods used to study the student experience into new territory defined in terms of various forms of 'analytics'.

Effective applications for such analytics in higher education are now considered necessary elements of sound institutional and pedagogic practice. Higher education institutions have always collected vast amounts of information relating to internal systems, staff and students. Traditionally, this information has been leveraged to produce institutional and student performance data to inform high-level administrative or academic decisions. The need to produce datasets relating to institutional finances, human resources and student performance has also been motivated by requirements of external regulatory, governmental and quality assurance bodies.

As online systems are now integrated into the architecture of higher education operations, including to manage admission, enrolment, fees and loans, curriculum, assessment, resources, student support, library, survey instruments, applications, general and official communication, higher education institutions—particularly large universities—have the opportunity to utilise a wealth of student data for broader and more diverse functions. Additionally, more and more data

is being produced formally through online application and management systems, by online behaviour in learning management systems ('click-stream') and informally as by-products of interaction with online platforms ('data-exhaust'). Data from official sources, that is, demographic and personal information submitted by the student to enable ongoing enrolment in student information systems (SIS) and academic information submitted and generated by students and staff through interaction with sanctioned online resources and tools such as learning management systems (LMS), constitute baseline information used in learning analytics. As valid and internal systems holding reliable information, analytics applications to date have primarily utilised data held and generated in these internal systems.

While valuable information can be gained by institutions to improve student experience through such analytics, limitations on the completeness and connectivity of data sources within and across institutions restricts strategic and distributed use of data (Long & Siemens, 2013). Furthermore, limited research providing a systematic overview of the field to identify various challenges for the future (Chatti et al., 2014) remains problematic. International and domestic scholarship (in 2013 there were eight OLT funded projects related to the use of learning analytics) exploring the theory and practice of analytics in higher education is rapidly developing, yet in Australia institutional and national frameworks for the use of analytics are limited (Siemens, Dawson & Lynch, 2013). While the application of analytics in Australian higher education is developing, currently practices are fragmented and opportunistic and the pedagogical benefits are uncertain.

Significant issues related to the institutional adoption of analytics include the lack of integration across data systems, particularly SIS and LMS systems, and the inability to capture online student learning undertaken in unsanctioned online environments. The focus on student activity in online environments as a proxy for engagement also ignores offline learning activities that could potentially be 'evidenced' by card-swipe data. Furthermore, a complex set of institutional, academic, pedagogic, social, ethical and cultural issues associated with the design and use of learning analytics needs to be explored and resolved by government and higher education institutions alike to enable an operating framework for the use of learning analytics nationally and institutionally.

This chapter seeks to critically examine the role of analytics within the context of the contemporary higher education landscape in Australia. Traditional pedagogical approaches, including curriculum design, delivery and assessment, are experiencing shifts as higher education institutions begin to adapt to learning styles and new skill and knowledge sets sought by today's students. As teaching and learning practices evolve, so too the use of analytics needs to reflect current and emergent higher education priorities that define the student experience rather than reflecting educational approaches and theoretical frameworks developed for higher education students a generation ago. As this section explores, the integration of analytics into educational practice has the potential to not only enhance student experience into the future but also influence the skills and knowledge sets developed in higher education.

What is the most useful to think about analytics?

Analytics uses data to improve student experience (Buckingham Shum, 2012b). The use of computational data or analytics in higher education is considered to have evolved from 'data-driven decision making' that defined 'business intelligence' during the 1980s and 1990s (Picciano, 2012). With origins of practice in commerce for business management, the use of analytics in pedagogical environments has taken longer to develop (Goldstein & Katz, 2005) and is currently in

an early adoption phase. However, over the last five years the use analytics in higher education settings has rapidly developed and diversified as the use of digital systems, platforms and devices has been integrated into operating models of higher education institutions to facilitate pedagogical practice.

Analytics, most broadly, is understood as the use of data in statistical, and quantitative methods to explain and predict, allowing action on complex issues (Oblinger, 2012). This baseline definition facilitates a tiered approach of differentiated types of analytics currently used and emerging within higher education institutions. In this way, ‘academic analytics’ describes how institutional data is used to ‘explain and predict’ strategies for business management and improvement at the institutional level, while ‘learning analytics’ situates the object of analysis as the learning process or learner, as represented in Table 1 (Long & Siemens, 2013).

Table 1: Learning and academic analytics (Siemens, 2013)

Type of analytics	Level or object of analysis	Who benefits?
Learning Analytics	Course-level: social networks, conceptual development, discourse analysis, ‘intelligent curriculum’	Learners, faculty
	Departmental: predictive modeling, patterns of success/failure	Learners, faculty
Academic Analytics	Institutional: learner profiles, performance of academics, knowledge flow	Administrators, funders, marketing
	Regional (state/provincial): comparisons between systems	Funders, administrators
	National and International	National governments, education authorities

Educational data mining (EDM) is often differentiated from learning analytics by emphasising the size of the datasets used in mining for unspecified purposes, contrasted with the specific datasets and purposes of learning analytics. For institutions that collect large amounts of data, information can be arranged according to levels of granularity or associations and clusters to discover patterns in enrolment, assessment or student behaviour not previously considered. In practice, and as learning analytic systems evolve to incorporate both activities, the distinction may not be useful (Long & Siemens, 2013).

One of the primary stimulators for furthering the academic dialogue of learning analytics is The Society for Learning Analytics Research (SoLAR). Established in 2011, SoLAR is a network of leading researchers in the field. The network has sought to advance knowledge and discourse through a variety of initiatives, including the annual International Conference on Learning Analytics & Knowledge (LAK) and, recently, by the establishment of the Journal of Learning Analytics. In its inaugural conference in 2011, SoLAR defined learning analytics as ‘activities concerned with the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs’ (Siemens & Gašević, 2012).

Considered a subset of analytics, ‘social learning analytics’ seeks to provide information about the construction of knowledge through the use of tools and contexts by groups of learners (Buckingham Shum & Ferguson, 2012). The emergence of social learning analytics reflects broader shifts in educational approaches developing for contemporary students. ‘Social learning’ exemplifies how online environments, both social and academic, promote collaboration and networking skills. Rather than constitute a means to achieve student success, these ‘new’ 21st

century skills, such as networking and collaborative problem solving, constitute elements necessary for a generation that must be technologically literate to operate within a largely participatory (online) culture (Jenkins, 2006). These new 'multiliteracies' are considered the 'the new basics' for 21st century learning in higher education (Dawson & Siemens, 2014).

Other iterations of analytics in higher education include 'assessment academics', which refers to the use of statistical information about assessment available to teaching staff in learning management systems. Assessment analytics could be used to identify frequent student error or misunderstanding through pre-programmed rubrics within the LMS. These reports may inform course or assessment review; facilitate benchmarking and consistency of assessment within units; and be used to identify areas for improvement (McNeil & Ellis, 2013).

As a 'bricolage field' (Dawson & Siemens, 2014), learning analytics is an intersection of research, practice and technology from a variety of disciplines and industries, including computer science, management, science, statistics, sociology, psychology and education. While higher education institutions (including administrative, academic and student interests) are primary stakeholders in the development and adoption of learning analytics to improve student outcomes, other stakeholders include governments, quality assurance and regulatory bodies and commercial technology companies. While improving student outcomes may be a shared priority for all stakeholders, other drivers also underscore the interests of these diverse entities, including establishing mechanisms for accountability, institutional performance, benchmarking and profit.

With these different definitions and conceptions of analytics, it is important to clarify how this project will consider the term. To avoid limiting the discussion and utility of analytics in higher education, especially during a period of significant evolution and development, the broad use of 'analytics' to include the full range of data stewardship/governance, query, reporting and analytics activities is useful (see Table 2). This framework reflects the use of data to inform actions and decision making, taking into consideration the capacity for data collection and analysis to increase understanding of the past, present and future, and reflects how data has been used to date for reporting (internal and external), to collect transactional information (LMS and other systems) and to provide predictive models (identifying potential threats and opportunities).

Table 2: Uses for analytics

Type	Focus	Use
Optimisation	What's the best that can happen?	Alignment of institutional and student outcomes
Predictive Modelling	What will happen next?	Enrolment management and strategy Financial management Identification of students at risk Attrition
Forecasting	What if this continues?	Refine and review strategies and actions for institutional and teaching and learning purposes
Statistical Analysis	Why is this happening?	Support strategic direction Evidence for decision making Design intervention and support strategies for students
Real-Time Alerts	What actions are needed?	Develop automatic triggers to identify and initiate interventions for at-risk students Recommendations to students/staff
Query and Discovery	Where is the problem?	Data from various and distributed sources to test hypothesis and/or discover issues
New Reports	What is happening?	Dashboards and other visualisation reporting to communicate and measure current events.
Standard Reports	What happened?	Dashboards and other visualisation reporting to communicate and measure past actions

How analytics has been used

The use of information to improve student experience and educational outcomes in a digital environment underscores various definitions of analytics. In short, analytics are intended to improve student success (Buckingham Shum, 2012a). Yet, in the absence of a shared understanding of 'student success' within higher education, the use of analytics for this purpose requires critical examination.

While applications for learning analytics are not theoretically limited, to date the primary use has focused on reducing attrition. Examples of analytics designed for this purpose have been executed by different institutions through a variety of methods and supplemented by a range of interventions, both digital and physical. One of the most cited examples is Course Signals, developed at Purdue University in the US (Arnold & Pistilli, 2012). The analytic system uses data from LMS in combination with demographic and other information mined across university sources to gather prior academic history (including secondary school) and academic preparedness information. Teachers are able to run an algorithm to produce what is essentially a risk assessment of the student. The system is able to make predictions of risk status within two weeks of the study period to maximise intervention strategies, which consist of digital communication to the student through email or signalling in the LMS and a range of other traditional student support mechanisms already in place.

This example demonstrates the potential for analytics to have immediate impact with little need for technical expertise on the part of the end user, in this case the teacher or instructor. However, the 'invisibility' of potential assumptions governing algorithms, based on a range of demographic and historical data, that predict success levels should be considered. As the rhetoric of learning analytics promotes an evidence base of information not without prejudice, higher education institutions must ensure that data systems and algorithms do not inadvertently confirm cultural bias. As a support technology for decision-making processes for data clients about data subjects (Greller & Drachsler, 2012) the role of perspective, purpose and judgement is highlighted.

One of the main sources utilised for the retrieval of information about student behavior and learning is institutional online learning environments, such as the LMS, and any other online system with which students are required to interact. LMS sites provide evidence relating to the frequency and duration of student log-ons and records information about the LMS features accessed, including academic journals, chat-rooms and recorded lectures. This information can be used to inform a variety of views about that student, both individually and in relation to the cohort.

Increasingly, a link between LMS student activity and academic results (Dawson, Heathcote & Poole, 2010) has influenced the use of LMS to identify 'at-risk' students. These findings reinforce pedagogical theories that posit that levels of student engagement in educational processes can act as proxies for educational outcomes (Ewell & Jones, 1996). However, as academic practitioners seek more diverse and interactive platforms from which to deliver curriculum outside LMS environments, and while offline learning activities remain unaccounted for within the dataset used by analytics, the premise that student activity on LMS approximates level of engagement is inexact. Recent research findings (Dawson, Gašević, Siemens & Joksimovic, 2014) indicate limitations on indicators for student use in LMS to predict performance, signalling the need for more research into this area.

Primary use of this information has been in the identification of 'at-risk' students to enable remedial action by teaching staff or institutions to assist students. Focusing analytic power to 'at-risk' students has clear benefits and is influenced by a combination of regulatory, reputational, pedagogic (Tinto, 2014) and economic factors. In this way, learning analytics has largely been utilised to facilitate traditional 'top-down' approaches to student support by harnessing information that identifies a 'problem' for the teacher or institution to resolve.

In Australia, almost all universities engage in learning analytics to some degree (Siemens, Dawson & Lynch, 2013). The following examples of learning analytics therefore reflect limited practice but are indicative of current application. The University of Wollongong's Social Networks Adapting Pedagogical Practice (SNAPP) generates visual representations (social network diagrams) of student interactions and activities in the discussion forum on the LMS to reflect engagement levels. By identifying lower activity in discussions, SNAPP indicates lower participation levels, which indicates the risk of underperformance. Edith Cowan University's Connect for Success (C4S) is a university-wide system that utilises comprehensive data sources to create an automated early-warning tool. The combination of demographic data, behavioural data, student survey and self-report information with other data sources, including LMS, academic referrals and mid-semester results is used to identify students who are likely to require extra support to complete their studies. University of New England utilises an early-alert system to support retention through data retrieval in multiple university systems and through the use of student emoticons to provide feedback. Open University Australia's Personalised Adaptive Study Success (PASS) is also an early-alert retention tool using demographic, online and curriculum data drawn from a variety of systems, including online student support and social media pages, to identify high-risk students. PASS generates visual signals, performance levels and self-assessment tools and recommends content and activities for each student.

These examples reflect the primary use of analytics for early identification of students at risk, based on theories of engagement. The application of learning analytics to support retention and to maximise timely interventions and support strategies for students is a significant benefit for

students and institutions, and reflects in part the increasingly competitive and marketised environment within a demand-driven system. Yet the use of personalised and adaptive systems to enhance students regardless of performance, and even to identify high performers, has been largely untapped. Broadening the scope of learning analytics using more diversified data sources has the potential to inform a greater range of purposes, such as scholarship eligibility, suitability for international exchanges, internships, alternative course offerings and employment opportunities, through personalised environments that connect internal and external platforms and utilise recommender systems directly to students.

Where is the data

Higher education institutions, especially large universities, have always collected volumes of data about their students (Table 3). As large, complex systems, the integration and exchange of information across different administrative and academic systems is challenging and often bureaucratic. With various collection points and administration of information, the usability of data is limited due to inconsistent data formats, the combination of online and manual systems, the timeliness of data availability and the limitations on access to and dissemination of data.

As technological systems become more integrated, and the use of online data systems within institutions becomes incorporated into student information systems (SIS), data can be more easily and quickly harnessed for learning analytics. Coupled with official LMSs or equivalents, institutions are able to extract valuable information to inform a range of improvements, actions or reviews. However, two main obstacles limiting the use of data for learning analytics are the lack of interoperability between datasets, both within and across institutions, and the gaps in data collection from non-official systems and platforms used by staff and students alike.

Factors steering the application of analytics towards the goal of retaining students include regulatory reporting on attrition, a crowded market, an uncertain funding environment and well-tested pedagogy theory. Yet the information explicitly sought by institutions about students has also been designed to facilitate the identification of 'at-risk' students. In this way, the results of the 2014 University Experience Survey (UES) report that students with a disability, older students, Aboriginal and Torres Strait Islander students and students who were first in their family to attend university were most likely to consider early departure (SRC, 2014). These findings reflect the level of demographic detail collected by universities about students. If institutions and, by extension, governments are able to identify students through more diverse descriptors with greater information about their learning contexts that go beyond blunt demographic instruments, the application of learning analytics to enhance student experience will be realised. Rather than replace traditional surveys, the utilisation of more diverse data sources may supplement current student survey data, which is currently unable to explain why students hold particular perceptions or to account for data anomalies (Savage & Burrows, 2007).

Table 3: Student experience-related data collections in institutions

Phase	Data type	Provenance	Information
Admission	Demographic Academic history Equity status Fee-paying status	Tertiary Admission Centres (TAC) Registrar/Admission Student Information System/Portal Student services	Prior academic history Personal details Residency, citizenship, cultural background, medical information, family background, financial information, fees, loans
Engagement	Academic performance Curriculum Learner behaviour Leave of absences Special consideration Disciplinary action Student support Library Scholarships, exchanges Timetable Student surveys Affiliations	Student Information System/Portal Learning Management System (LMS) Student Support systems Library Mobility, exchange, international office Student Administration divisions (institutional and departmental)	Results for each unit and by assessment type Scope, frequency and duration of LMS use Attendance on/off campus Course details (subjects and units undertaken, attempted). Types of student support applications and interventions Volume and frequency of library use Withdrawal and deferment Representation, contribution to and memberships of clubs, societies or interest groups. Satisfaction and feedback through survey instruments
Completion	Exit tests Academic performance Student surveys Exit surveys for withdrawals, deferred students	Student Administration (institutional and departmental) Registrar	Qualifications Academic results Exit testing results Intentions to pursue further study Reasons for leaving institution before graduation
Postgraduation	Alumni Graduate destinations Graduate feedback surveys Exit surveys for withdrawals, deferred students	Alumni and Engagement Office Student Administration (institutional and departmental)	Further study Employment details Perception and rating of institution/course Reasons for leaving institution before completion

While analytics has primarily relied on existing data, such as student demographics and performance data, more recent approaches rely on information ‘passively’ left by students through trace data in a variety of online systems. The use of data sources from systems not designed to ‘speak’ to each other is a significant issue of data interoperability and has both technical and resource implications for institutions (Cooper, 2014). However, the potential for the use of learning analytics to retrieve student data not just from official sources but from platforms and applications not technically supported by institutions reflects broader potential for use. For example, the use of social media and sensing devices as part of teaching and learning activities provides rich behavioural and highly personal information. Academics leveraging social media and other online forums as part of a teaching and learning strategies reflect a shift towards student-preferred environments and also reflect a more significant shift in pedagogical approach and philosophy aligned to ‘multiliteracies’ required for employment. While the increase and diversification of information sources to better reflect the ‘whole picture’ of learning activities is

desirable, the challenge for institutions to integrate larger amounts of data from heterogeneous sources in different formats is significant (Chatti et al., 2014).

The issue of data interoperability for learning analytics was highlighted at the 2015 Learning Analytics and Knowledge Conference and has stimulated the Learning Analytic Community Exchange (LACE) to submit a call for datasets across the education sector to enable a maturation of learning analytic applications. The specifications for relevant datasets reflects the broad scope and potential for more diverse applications in higher education and includes:

- datasets from formal or informal online learning environments (for instance, MOOCs, LMSs, digital games for learning, online inquiry tools or professional learning communities);
- datasets gathered from face-to-face learning environment (for instance, eye-tracking or motion-capture traces);
- datasets about cognitive development, social learning, discourse progression, network interactions, learning paths through courses, competency completion, help-seeking behaviour, and distributed multi-spaced interactions; and
- complementary data gathered through surveys, for instance, about learner demographics, background knowledge, goals, perceptions, experiences and attitudes (LACE, 2015).

What about pedagogy

While analytics may promise innovative approaches to support higher education students, there is a risk that institutions adopt practices due to the capabilities of ICT programs rather than because of a pedagogical need or enhancement. Adopting and investing in learning analytic tools in the absence of clear academic rationales and without perceived student benefit presents an institutional risk in terms of resources and pedagogical culture. The view that ‘analytics allows us to increase the degree to which our choices are based on evidence rather than myth, prejudice or anecdote’ (Cooper, 2014) belies a technological determinist philosophy that suggests analytics presents ‘neutral’ evidence.

Rather, as Buckingham Shum (2012a) observes, ‘our learning analytics are our pedagogy’. Just as language and physical infrastructure are designed to support and facilitate a pedagogic approach, analytic infrastructure reflects an institution’s, or perhaps even broader national or cultural, approaches to education. The nomenclature and architectural design of traditional higher education institutions naturalise pedagogic and cultural stances. The design of traditional lecture theatres, tutorial rooms, libraries, and even communal on-campus spaces, are artefacts of pedagogy and culture that favour broadcast modes of delivery from an authority figure and individual assessment frameworks. Re-design of libraries in universities that facilitate group work at the expense of silent individual study carrels reflects a shift in assessment design, which in turn reflects a shift in learning outcomes, employment outcomes and broader changes in social values.

The notion that culture is ‘hidden’ in urban and technology design is well established in post/modernist sociological and cultural theories of the 20th century. Similarly, Greller and Drachsler (2012) argue that pedagogic approaches make invisible the implicit theories of knowledge and learning that are bound to cultural values. Learning analytics further distances explicit pedagogic and cultural assumptions through the production of data and, in effect, has the potential to normalise cultural, educational and, potentially, social theories.

If we accept, then, that analytics are not benign but have been designed to implicitly or explicitly promote particular regimes underpinned by pedagogical and cultural values (Knight & Buckingham Shum, 2014), the stakes for institutions in adopting and investing in them are high. The challenge for administrators and educators when investing in learning analytics in a quest to improve student experience will be to ensure that the technological opportunities are aligned to the teaching and learning philosophies and cultural character of institution (Lockyer, Heathcote & Dawson, 2013).

Strategic adoption

Although the use of analytics is increasingly adopted in varying scale by other industries to improve practice, predict outcomes, inform decision making and provide evidence to stimulate research and development, the fitness of purpose for analytics in higher education has been less clear. As complex systems with multiple stakeholders and missions, higher education institutions, and in particular universities, occupy contested spaces within which political, cultural, social, economic, technological and industrial interests have always been performed. Within this space, the potential uses for analytics are many and varied.

The collision of new commercial ICT capacities and traditional pedagogical practice within traditional higher education settings such as universities has also exposed a culture of practice that is incompatible with rapid change. As noted by Siemens, Dawson and Lynch (2013) ‘the promise of educational technology to underpin and drive a transformative learning experience will not be delivered through a simple adoption process. This will require educators to revisit and break the historical pedagogical, socio-cultural and economic assumptions that can stifle education practice’. While Australian universities currently use large amounts of institutional data to inform business decisions (academic analytics/business intelligence), few are engaged in strategic, intentional and institution-wide approaches to learning analytics to improve the student experience that are founded on robust teaching and learning philosophies.

Strategic goals and planning determine the use of learning analytics within higher education institutions, which are traditionally resistant to change (MacFadyen et al., 2014). As learning analytics involves the use of institutional and student data, significant resources, networked environments and a policy environment that accounts for the legal, ethical, financial and pedagogic rationale, it is unsurprising that the ‘maturity level’ of institutional use of learning analytic internationally and in Australia is low (MacFadyen et al., 2014; Siemens, Dawson & Lynch, 2013).

Table 4 has been adapted from the Educause Center for Analysis and Research (ECAR) Analytics Maturity Index (EDUCAUSE, 2012) to assist in rating institutional learning analytic capability by assessing culture, technological frameworks, resources, capacity and skills. The adaptation reflects the breadth and scope of the complexities in realising and implementing a robust and strategy-led learning analytic environment.

Table 4: Analytic maturity index

Categories	Indicators
Culture	Senior Leaders committed to making decisions based on data
	Culture of evidence (data)-based decision making
	Identifiable outcomes to be achieved from the use of data
	Process in place to enable change from analytics
	Faculties/Schools/Departments accept the use of analytics
	Students and prospective student are aware of how the institutions use learning analytics
Data integrity	Institutional data is collected according to established processes and protocols
	The data is appropriate to support the desired outcomes
	Data is standardised across different areas of the institution to support comparisons and inter-operability
	Reports are clear and unambiguous to inform decision making
	ICT infrastructure supports the use of analytics to perform the functions
Investment	Ongoing institutional funding is allocated to the use of analytics
	Funding is considered as an investment in future outcomes for the institution
	Expenditure for analytics is included in financial planning and includes provisions for both technical infrastructure and human resources required
Human resources	A dedicated and qualified team or division of the institution supports the use of analytics
	Appropriate number of specialist data analysts are on staff
	Administrative staff understand how to use analytics to support business decisions
	Professional development training is provided for academic staff for use or interpretation of analytics for teaching
Governance	Governing policy framework for learning analytics
	Academic policy for learning analytics
	Learning analytics align to teaching and learning plan
	Student complaint mechanisms account for review of decisions based on learning analytics.
	Reporting mechanisms for outcomes based on learning analytics built into corporate academic governance bodies
	Legal and ethical frameworks explicitly and publicly identified for the collection, warehousing, destruction and dissemination of data for learning analytics
	The planning, implementation and review of learning analytics is subject to regular quality assurance cycles for improvement.

Adapted from ECAR Institutional Maturity Index (EDUCAUSE 2012)

Future use

As a young field of practice and research, the potential use for analytics has yet to be considered in full. As potential information sources expand and diversify, and as the political economy of student data emerges, opportunities for the application of learning analytics will be tempered by a wide range of challenges for institutions. There will be a growing shift from outcomes (retention) to processes of learning and other factors (Teasley, 2014).

Legal and ethical issues surrounding the collection, warehousing and ownership of student data will become elevated issues as the use of learning analytics increases (Greller & Drachsler, 2012). Legal and administrative frameworks need to adapt to an environment that will use data to guide practice and inform decision-making. In this way, national frameworks and institutional policy settings will need to address these issues if the full potential for learning analytics is to be realised (Siemens, Dawson & Lynch, 2013).

Without addressing the political and cultural issues at the heart of using student data, the willingness and goodwill of ‘data-subjects’, that is, students, is diminished. This may lead to students manipulating or ‘evidencing’ progress (Knight & Buckingham Shum, 2014), aware that

their online behaviour is being tracked, leading to outcomes. Another consideration is how students react to negative findings about their learning in an unsupported environment and the potential for abuse of learning analytics to influence a result.

An important use of learning analytics for future use is to re-orient the use and 'sense-making' (Knight, Buckingham Shum & Littleton, 2014) of learning analytics towards the student (Long & Siemens, 2011). Students interpreting, understanding and acting on learning analytics to influence their own learning behaviours and academic attitudes, addresses issue of agency and also supports the development of 21st century skills. Furthermore, the use of analytics for student use to self-identify and regulate by interpreting data about themselves and their learning highlights more significant shifts in higher education generally, which refer to self-regulation as ways that students regulate their thinking, motivation and behaviour during learning (Pintrich & Zusho, 2002).

Higher education is no longer a rite of passage for school-leavers. Students invest heavily in higher education to realise a multitude of outcomes. No longer passive actors whose status as 'students' defines them, students in higher education today are diverse learners in an increasingly diverse and evolving environment resistant to traditional descriptors based on broad demographic categories. The advent of learning analytics promises to provide personalised, adaptive and real-time learning environments for each individual student. Additionally, the use of learning analytics is accompanied by shifts in higher education more generally, concerning learning styles, modes and outcomes reflective of broader social, technological and cultural change. This environment may influence more sustainable change, realising Long and Siemens's (2011) reflection: 'analytics in education must be transformative, altering existing teaching, learning and assessment processes, academic work and administration'.

5 Enhanced academic leadership

Introduction

Effective academic leadership lies at the heart of any improvement. Such leadership must come from a variety of sources—people in formal leadership roles, teaching academics, support and advisory personnel, the environments people establish and, of course, learners themselves. It is important to keep squarely in mind in any such analysis that the nature of academic work is changing (Coates & Goedegebuure, 2012) and new hybrid functions, and hence roles, are emerging, not least in the field of analytics. As well, higher education is an essentially co-produced activity, and even the best institutions in the world will not inspire success unless students particularly, and also a range of other agents, engage.

This chapter focuses on identifying the academic leadership required to help people succeed. Specifically, we advance a model of distributed leadership as a means for affirming the focus and strategies of effective change efforts. What, in essence, can be done to make things better? Partly, this can be addressed through the study of institutional maturity, but to spur change we see the need to delve deeper into how individuals perform. Hence, we tackle this question by first setting forth a model of effective academic leadership, then by looking at options for developing such leadership.

Effective distributed leadership

Though difficult to generalise across institutions and people, higher education has been slow to adopt evidence-based approaches to leadership. There would appear to be various reasons for this, not least the political economy of the sector, history and culture, the rapid growth of institutions and analytics, and the fact that much that matters in higher education can be very difficult or complex to measure. Nonetheless, there is a growing need for more evidence-based forms of leadership given change in higher education's individuals, institutions and settings.

'Leadership', of course, is a broad and complex topic that can be defined and operationalised in many different ways. For this project, we begin with a model already theorised and validated in Australian higher education. This model has been validated in studies of successful early career university graduates in nine professions (Vescio, 2005), in a detailed system-wide study of effective school leaders (Scott, 2003), in a national study of higher education leadership (Scott, Coates & Anderson, 2008) and in a further national study of leadership in vocational education (Coates et al., 2012). This model provides a basis for marking out the capabilities required for effective leadership and, most particularly, ascertaining the areas and approaches to target for development.

Figure 1 shows three overlapping aspects of leadership capability: personal, interpersonal and cognitive. These domains are underpinned by two overlapping forms of skill and knowledge: role-specific and generic leadership competencies. The overlapping nature of the framework indicates that all five dimensions are necessary for effective leadership, and that the five domains identified both feed into and off each other. In this model, 'competence' refers to knowledge and skill that can be documented in discrete units, learned and demonstrated, whereas 'capability' refers to largely intangible or holistic psychological qualities that may be characterised as an enduring talent or gift. Prior leadership research has focused on both these dimensions of leadership (Rankin, 2004; Byham, 1996; Tucker, 1992; Ramsden, 1998).

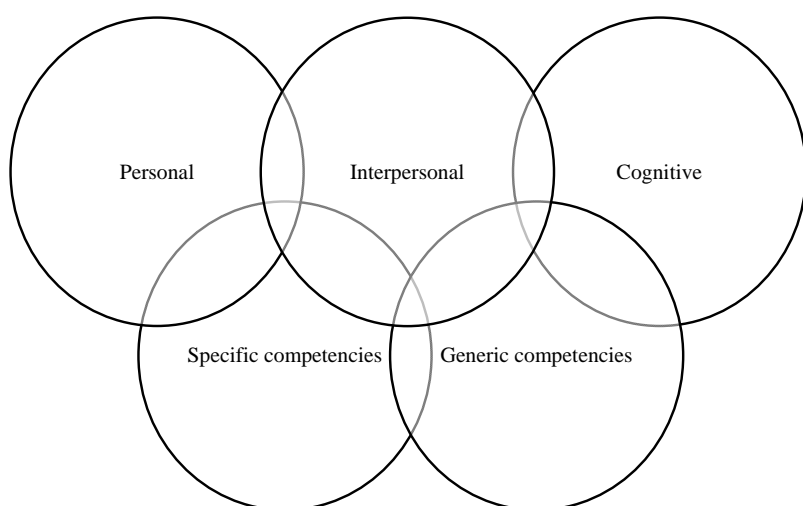


Figure 4: Leadership model

The model assumes leadership involves reading human and non-human situations, interpreting situations and problems, forming and drawing on response strategies and implementing solutions through a mixture of generic and role-specific competencies. The model helps clarify how effective leaders work with, learn from and respond to changing circumstances. It allows for the fact that leadership is a highly contextualised phenomenon. It blends the competency and capability perspectives on leadership. It emphasises that possessing a high level of skill and knowledge about how one's organisation operates, or what makes for a productive approach to education, is necessary but is not sufficient for effective leadership. It is also essential to have a highly developed emotional intelligence and a contingent way of thinking that enables people to know when to deploy these competencies.

This is, of course, a very general model of distributed academic leadership which must be contextualised. In this connection, it is important to focus on the capabilities and competencies required by higher education students and educators alike for evidence-based leadership of a successful student experience. To what extent do institutions and students see these as required or helpful and, most particularly, what areas are identified as most in need of improvement?

Developing leadership

Ensuring that people have a successful student experience is underpinned by the capability and regeneration of academic leadership. Hence, as well as identifying what counts for effective leadership of a successful student experience, it is important to identify what practical steps can be taken to help institutions and people do better.

Capacity development on the scale we envisage it can be conceptualised in many ways. To identify and evaluate development approaches, we again draw from the precursor study on academic leadership in higher education (Scott, Coates & Anderson, 2008). That study reviewed extensively the adult learning and professional development literature (Ramsden, 1998; Tough, 1977; Foley, 2000) and research on productive learning in higher education (Scott, 2006). The ideas were tested in the national consultations and fieldwork, as well as in subsequent replication.

The approach embraced both formal and informal forms of development, a broad scope clearly necessary given the breadth of the topics and stakeholders in play. A schedule was developed

charting approaches for academic leadership, which grouped opportunities into those that included self-managed learning, practice-based learning and more formal forms of leadership development.

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