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The Selection of Potential Undergraduate Students who Lack Customary Academic Qualifications: is a toolkit possible?

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Abstract

Widening participation in higher education is now seen as desirable in much of the West, if only for its economic benefits. It can, however, present problems for admissions tutors as applicants can vary widely in age and experience, and may lack conventional educational qualifications and material evidence of their potential for success.

This study focused on the selection of students for a one-year, university-based, foundation course aimed at preparing students with diverse backgrounds for undergraduate study in a variety of disciplines. The aim was to consider the potential of 'non-cognitive attributes' in the selection process, and reflect on their inclusion (with caveats) in selection toolkits (assortments of ways used to identify students for admission).

To that end, information was collected from research literature, the views of foundation studies tutors, potential students, existing students, and from correlates between various attributes and examination attainment. It was concluded that a single toolkit could not do justice to the applicants' variety. Instead, a toolbox and a choice of tools to reflect the age, gender, and target discipline would be better. Furthermore, it could strengthen decisions if admissions tutors were supported by teachers of the discipline concerned in order to draw on their implicit discipline knowledge.

Keywords: widening participation, student selection, foundation programmes

Introduction

The diverse group of people who have not engaged in higher education may be encouraged to do so on grounds of 'equity' (Gale and Parker , 2013), but society also benefits from their contribution to the economy (Callan, 2008). Universities are expected to respond constructively to this widening of participation (Osborne, 2010), but it can be with some reservation as they suspect there may be a diversity-performance trade off (Covarrubias, Gallimore and Okagaki, 2016; Sackett, 2005). Admissions tutors, therefore, carry a heavy burden when judging the potential of such students. Helms (2015) surveyed undergraduate admissions practices

worldwide and found most relied on examination or test performance of one kind or another. These include, for instance, school leaving examinations scores, as in Ireland, university entrance examinations, as in China, aptitude tests and other psychometric tests, as in the USA, and variations of these. For a variety of reasons, applicants may not have the relevant examination certificates, test scores or grades which allow them to be considered in such systems (Hoare and Johnston, 2011; Tight, 2012). Nevertheless, their interests and ambitions may have changed since they were last in school, older applicants may not have qualifications which are now seen as necessary, and some may have poor grades but now feel able to engage appropriately in academic work. Given an expectation of wider participation in higher education, and of fairness to those with 'diverse backgrounds and academic profiles', some institutions look to what noncognitive measures might offer (Oliveri and Ezzo, 2014; Gibson et al., 2016). These may include personal qualities, such as, 'enthusiasm for learning', 'tolerance', 'leadership potential', 'concern for others', 'creativity', and 'determination', with varying degrees of clarity, relevance and justification (Rigol, 2003). Some institutions have taken this further by, for instance, looking at social media use to form judgments about applicants' suitability, not without some applicants' concerns about fairness and validity (Law et al., 2016). Matters of fairness also exercise leaders of institutions in their wish to avoid legal actions (Bryant, Montgomery and Smith, 2015).

The selection of students without the conventional indicators of potential used by universities can be difficult and disquieting. It is unjust if those who have potential are overlooked, and, equally, it does no favours to a policy of 'widening participation', or for the institution if those selected fail or drop-out. This article collects and reflects on a variety of evidence about the potential of non-cognitive attributes to inform the selection of students. While it focuses on those applying for a one-year, university-based, foundation course prior to undergraduate studies (largely in Science, Technology, Engineering and Mathematics (STEM) subjects and the social sciences, but also in the humanities), we believe its findings are likely to be relatable to other contexts. Of specific interest was the inclusion of non-cognitive attributes which might, in principle, be included in an admissions 'toolkit' (an assortment of instruments used to identify students for admission), and what caveats might apply to their use.

In attempting to construct an admissions toolkit tuned to students who may lack conventional indicators of potential, we took the view that future academic success does not simply rest on past test results, but on various personal attributes which directly and indirectly support and drive the processes of learning, adaptation, and change (Heckman and Rubinstein, 2001). Attributes which might bear on a student's success in higher education could be both internal (such as, traits, beliefs, tendencies and habits of mind) and external (for example, personal circumstances, university regulations, and government policy), and vary in mutability. They can be visualised as the layers of an onion with those least open to change at the core, and more open to it in the outer layers (e.g. Fitzgerald and Fitzgerald, 2005). Accordingly, we drew on: (i) literature about personal attributes, (ii) the notions of tutors who taught such students, (iii) the views of the students themselves, and (iv) on various correlates of

academic success extracted from student data, to suggest attributes for consideration. For this purpose, knowing a causal relationship between attribute and success may be useful but is not essential. Pragmatically, any reliable correlate of success could offer a convenient tool, whether or not a direct causal link is evident. The optimist might expect there to be a complete and simple agreement between these sources. In practice, some lesser and more complex consensus is more likely, reflecting the students' diversity, and the different needs of disciplines. We now describe each of these contributions in turn.

Some lessons from the literature
There are some personal attributes referred to in the literature which seem worthy of consideration. These include conscientiousness, motivation, self-efficacy, hardiness, resilience, and readiness for higher education.

The personality construct most often linked with success is Conscientiousness (e.g. Best and Dunlap, 2014; Busato et al., 2000; Chamarro-Premuzie and Furnham, 2003; Conard, 2006; Duff et al., 2003; Noftle and Robins, 2007; Cela-Ranilla, Gisbert and de Oliveira, 2011; Van Bragt et al., 2010). Conscientiousness is generally taken to describe a responsible and dependable nature, coupled with persistence and good organisation, and is an antecedent of effort (Trautwein et al., 2009). Trautwein et al. add that conscientious people tend to be hardworking, industrious, systematic, dutiful and strive for achievement. Usefully, this association with academic performance in higher education has been found to be independent of ethnicity or culture, so Wagerman and Funder (2007) recommend that it has a part in the selection process.

Motivation can mean different things to different people. Schunk, Meece and Pintrich (2014, 5) define it as, 'the process whereby goal-directed activities are instigated and sustained'. Robbins et al. (2004) found strong evidence associating motivation with student performance in higher education. According to Dornyei (2001), motivation is highest when people are competent, have sufficient autonomy, set goals they perceive to be worthwhile, and are affirmed by others. Vermunt (1992) listed five motivational orientations: certificate/qualification, vocation, competence, interest, and ambivalent or mixed.

Readiness for higher education refers to a degree of maturity and an ability to fit in to an academic community (Walton, 1979). This attribute points to a need for expectations, conceptions, and social skills which help a student adapt to and function effectively in a higher education context more broadly (Conley, 2008). Although somewhat vague, the construct may have relevance for transition into higher education for those applicants without knowledge of higher education. Not 'fitting in' could also lead to an abandoning of studies.

Self-efficacy is 'the belief in one's capabilities to organize and execute courses of action required to produce given attainments' (Bandura, 1997, 3) and provides the answer to, 'Can I do this?' In an academic context, this has been interpreted as, 'self-evaluation of one's ability and/or chances of success in the academic environment'

(Robbins et al., 2004). Several studies have found self-efficacy to predict students' learning and success (e.g. Zimmerman, 2000; Patchin, 2016; Robbins et al., 2004; Voung, Brown-Welty and Tracz, 2010), and a longitudinal study by Chemers, Hu and Garcia (2001) found a powerful relationship between self-efficacy and academic performance amongst students described as 'non-traditional', often those without the conventional academic qualifications customarily used as indicators of suitability.

Hardiness, encompassing the notions of control, commitment and challenge, has also been linked with students' performance (e.g. Kobasa, 1979; Maddi et al., 2009; Sheard and Gilby, 2007). Control refers to the capacity to maintain control of events, commitment is a sense of purpose which mitigates stressful events, and challenge refers to positive anticipation of new situations. Similar qualities have been described by Duckworth et al. (1987, 2007) as 'Grit', a 'perseverance and passion for long-term goals'. Grit, they argue, is important for activities requiring sustained effort and interest.

Resilience refers to a set of behaviours which enable adaptation to and recovery from difficult circumstances and events. Inevitably, students will experience disappointment in their learning and resilience has the potential to see them through such setbacks. Webb (2014, 153) found resilience to be 'salient to widening participation initiatives in higher education', by helping such students flourish, and there is evidence that it supports academic achievement (Allen, McKenna and Dominey, 2014; Johnson et al., 2015).

The boundaries between such attributes may be blurred because when share some common ground, interact with, or contribute to each other. For instance, self-efficacy could benefit from the good organisation associated with conscientiousness; hardiness, when it includes perseverance, benefits from the coping skills of resilience. In turn, resilience is a complex attribute which can incorporate elements of self-efficacy, as well as skills to do with coping, adaptation, and dispositions like optimism (Wang, Haertel and Walberg, 1998; Wayman, 2002). The labels for these attributes help in the identification of appropriate measures. Collectively, they offer offer some confidence in their individual assessments.

While the presence of such attributes may be seen as positives, there may be other attributes which act against achievement. For instance, not all kinds of motivation are associated with success; Van Bragt et al. (2010), in the Netherlands, found that ambivalence (having a variety of motivations to learn) and lack of regulation (not knowing what, when, or why to do things) adversely affect student success. But the presence of a negative attribute, or simply the absence of one that is potentially useful, may not be grounds for rejection. It may be possible to remedy a maladaptive belief or make good a deficit. Some studies reflect on this.

While particular aspects of conscientiousness may respond to training (such as persistence or perseverance, improved by teaching self-regulation skills) there remains doubt about the effectiveness of interventions aimed at developing conscientiousness more broadly (Della Porta, 2013). Srivastava et al. (2003) found

that conscientiousness tends to increase with age, although it does so more slowly after 30 years of age, suggesting that life experience is the teacher. Providing positive experience by rewarding conscientious behaviour may be useful (Hill and Jackson, 2016). Nevertheless, specific aspects of traits, tendencies and behaviours may be developed more readily (Van Bragt et al., 2010). Strategies for developing motivation have received a lot of attention in the workplace where employees are required to make goals specific, concrete and clear, keeping them in mind though various 'reminders', and reviewing and updating them regularly. Dweck (2000) has expressed amazement at the difference this can make to motivation and behaviour for a small investment of time. Self-efficacy responds well to positive feedback: with it, students feel more capable, they set higher goals and are better at problem-solving and self-evaluation than those whose feedback is negative (Bouffard-Bouchard, 1990). Hardiness, on the other hand, has been found to respond to training which focuses on coping strategies, social support, relaxation techniques, nutrition, and exercise (Khoshaba and Maddi, 2001; Maddi et al., 2009). Similarly, aspects of grit, like tenacity, may be promoted by helping students acquire long-term goals which they perceive to be worthwhile, and by guiding their progress towards these goals (Shectman et al., 2013). Shectman et al. believe that even relatively brief training (from two to ten hours) can make a difference. Peer mentoring by students who are models of resilience themselves has been found to develop this capacity in mentees (Johnson et al., 2015), and it may be supported by establishing a belief in the malleability of human nature (Yeager and Dweck, 2012). Pre-courses materials and training which prepares students for university life may support useful attributes, including that of readiness (Newton, 2014; Sedlacek et al., 2007; Cannell, Macintyre and Hewitt, 2015).

Thought about remediation needs to be careful. Sometimes, evidence for its effectiveness is mixed and needs to be tempered by consideration of the study's cultural context: what works in one culture may not do so in another. At times, remediation may only call for thought about existing practices, as in the nature of the feedback to avoid damaging self-efficacy, but some remediation requires additional time and prolonged practice which may be not be easy to accommodate. Where deficits are evident in an applicant, an admissions tutor will need to weigh their number and nature against the availability of effective support for overcoming them. In addition, it could be a mistake to seek an excess in students' attributes, or to cultivate them to excess: at what point does conscientiousness become obsessive perfectionism, or hardiness become foolhardiness?

Some lessons from tutors and students
Much of what has been said could apply to all would-be students. It would be useful to add the thoughts of tutors who work with students without the usual entry qualifications and those of the students themselves. Twelve tutors in four higher education institutions were interviewed. These worked on widening participation courses (sometimes called Year 0 courses) preparing students for entry to undergraduate courses. Five students on such a course and eight applicants for the course were also interviewed. Responses were elicited to the question: What qualities are important for students to be successful in higher education? The nature

of the student was clarified then, when needed, bridging questions (e.g. For example ...? Which means ..?'), encouragement to continue, and positive body language were used to facilitate responses. These were recorded, transcribed, and divided into statements to make a data pool. For example, this included: 'Almost anybody has the ability, if the circumstances are right to get a degree', and, 'An attitude that does not expect to be spoon-fed with answers'. These statements were subject to phenomenographic analysis (Marton, 1981) involving an iterative sort into self-consistent and mutually exclusive 'categories of description' which reflected the conceptions of the interviewees regarding the attributes of the successful student. There were only a few ambiguous statements and, after discussion amongst the authors, there was 100% agreement about the categories which emerged from the data pool.

As a whole, the categories that emerged ('emerged', as recommended by Walsh (2000), rather than shaped by some pre-existing framework or theory) were as follows:

Category 1: Motivation
Here, motivation is seen as the driving force behind a student's academic study.
Example: 'Can see a very clear reason for wanting that degree.'

Category 2: Learning Processes and Skills
This category is about the mechanics of learning and the skills needed to accomplish it, including cognitive skills (such as numeracy and literacy) and a wide range of other skills, from time-management to co-operation.
Example: 'Organisational skills are very important.'

Category 3: Broad Perceptions of the Educational Process
This category refers to student expectations of the process of education and their realism, both in terms of input (what a student needs to put into the process) and output (what the student can expect from the process).
Example: 'Awareness of what it's about. Have they spoken to people who have done something similar?'

Category 4: Notions of support.
This category is about providing help for students which includes, for instance, helping them acquire subject-related knowledge and skills. It reflects on what tutors might (or should) do to help students be successful.
For example: "Getting the right staff is key to the students' success."

Category 5: Personality and Values.
Collected here are personal traits, like determination, seen as contributing to a student's success.
Example: 'It is like a hill with no way round – so you have to go over it; you have to find a solution.'

Category 1, Motivation, was the most common response amongst tutors, students and applicants (41%, 41%, and 29% of statements, respectively). There were, however, differences between tutors and students. For example, tutors provided he majority of the responses in Category 3: Broad perceptions of the educational process, amounting to 31% of their responses in all. The students, for their part, did not mention notions of support. A word of caution might be appropriate here: the approach does not guarantee that all existing conceptions of what makes a successful student are collected, nor is it intended to demonstrate the perceived importance of particular conceptions. For our purposes, the products simply offer potential items for a toolkit. With this in mind, figures 1 to 3 depict the distributions of responses for the tutors and students.

<Figures 1, 2 & 3>

In broad terms, the responses of those intimately involved in the process of teaching reflected those found in the literature on students in general, although often expressed in more sweeping terms. Thus, there is reference to 'motivation' and 'personality' and to perceptions of education and the learning process. Tutors also tended to recognise that they might, even should, try to remedy deficits. Worth bearing in mind is that students and tutors may place different weights on such attributes and may not agree on what is important. The need for particular actions may have to be justified clearly.

Some lessons from a correlational study
Students engaged in a university-based Foundation Year (Year 0) routinely had their success assessed at the end of that year. Early in the year, seventy such students completed various measures of personal attributes and their scores were correlated (Pearson correlation coefficient) with their final examination scores. Of these students, 41 were enrolled on Social Science courses, 21 on Science, Technology, Engineering and Mathematics courses (STEM), and 8 on Arts and Humanities courses. Overall, 44 were male, 26 were female; 20 were less than 21 years of age, 27 were between 21 and 24 years, and 23 were 25 years or more.

One measure was a simple test of 'conscientiousness' in which students were required to find specific, simple pieces of information overnight for the next day and then given a point for each item collected (cf McLachlan, Finn and Macnaughton (2009) who used a version of this for medical student assessment). Conscientiousness scores were also obtained from an adapted subset of a personality inventory (Costa and McCrae, (1992); these two indicators of conscientiousness may not gauge quite the same thing, the first being taken as an indicator of a willingness to complete a task as and when required, the second being one of the Big Five personality constructs). A second measure, an adaptation and extension of a student motivation questionnaire (Neill, 2004), gauged aspects of intrinsic and extrinsic motivation. A third measure was of self-efficacy (adapted from Luszczynska, Gitiérrez-Doña and Schwarzer, 2005). The fourth measure assessed resilience (Bryant, 1995).

Taking the sample as a whole, correlations with end-of-the-year assessment scores were not large. For example, that of the simple, practical measure of conscientiousness was 0.26 (p<0.05)[1]. It was higher for females (0.39, p<0.05) and for those over 25 years of age (0.45, p< 0.05). For older students, it was also associated with instrumental attraction, being motivated by a desire for better employment, qualifications, and useful skills (0.71, p<0.01).

Of course, the sample comprised those studying different subjects. When partitioned accordingly, different patterns of attributes were associated with success in different domains. For example, attainment in social sciences was associated with altruism, a desire to help others or improve society (0.37, p<0.05), while in STEM subjects, it was associated with 'hedonism', an interest in widening the circle of friends (0.58, p<0.01), self-image, and a desire for prestige and approval (0.49, p<0.05). Successful younger students tended not to pursue STEM subjects for instrumental reasons but for interest in the subject (0.64, p<0.01). Little that was reliable could be said about those studying Arts and Humanities as this group was small, but the important lesson from this strand is that attainment, a proxy for success in this context, is likely to be associated with different attributes in different subjects, and they could be different for students of different ages and gender.

The overall lesson is that it is simplistic to believe that there is one attribute, or even one set of attributes, which indicates potential for academic success in all students – it depends on who they are and what they want to do. Furthermore, the contribution of an attribute may be relatively small, but it is a collection of attributes which, together, is associated with student success. This has significant practical implications for the selection process. (It should be added here that this is not to suggest that correlates of success are necessarily causes of success. Furthermore, performance was measured in Year 0; it may have been better to use final year degree scores but these students often disperse after Year 0 to various institutions with no common system of grading.)

Conclusion: Is a toolkit for the selection process possible?
The literature points to some personal attributes associated with success, most of which were endorsed by tutors and students in at least a general way. Support for some of these was found in the correlational study but this mainly served to remind us that no single attribute is likely to be sufficient alone. Furthermore, one set of criteria is unlikely to select suitable students for different subjects: while they may share certain needs, each subject also has its own. Equally, success in a given subject may be associated with more than one cluster of attributes, as reflected in differences in older and younger students' reasons for wanting to study.

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[1] Statistical correlation measures the association between two variables (here, between conscientiousness and examination attainment). The most common measure is the Pearson correlation coefficient which can range from -1 to +1. Positive coefficients indicate that attainment increases as the attribute (e.g. conscientiousness) increases. Larger coefficients suggest stronger associations. p is the probability that the observed coefficient, or one greater, would be obtained if there was, in fact, no association. Customarily, p < (less than) 0.05, or, better < 0.01, is taken to indicate that some confidence in the association is justified (see also, Agresti & Finlay, 2009).

This means that a single, self-contained toolkit is unlikely to prove effective in selecting students when the aim is to widen participation. It could result in the rejection of potentially successful applicants and the selection of inappropriate students for particular courses. Moreover, while the literature points to some attributes as useful, we can never be sure that the list is complete, or even always appropriate over time. This suggests that a toolkit cannot be considered forever fixed. Perhaps, what is more appropriate is a toolbox into which tools to suit the occasion are collected. To that end, we offer a general model for constructing a toolkit to suit a particular purpose, provided that the caveats are kept in mind (Table 1).

The purpose of this model is to help to structure and crystallise some of the selectors' thoughts about what they look for in a particular applicant who wants to study in a particular domain. The first column collects information about the applicant's thinking qualities and skills, and, perhaps, evidence of aptitudes, formally assessed or otherwise. The second column collects information about 'non-cognitive' attributes considered to be relevant to the domain. There is evidence from the literature, subject tutors, and from the correlational analysis that attributes like motivation, conscientiousness, persistence, readiness, and resilience have a significant role in the success of the students studied here, and beyond that group. These, therefore, must be considered for a place in the list. Note also that some attributes may overlap, which can be useful as an overlap builds in checks on attribute appraisals. The correlational data also drew attention to differences between sub-groups of students: what is associated with success can vary with gender, age, and discipline. For example, the motivation associated with the success of mature students tends to be associated with a desire for more satisfying, fulfilling, and rewarding employment, while for younger students it is often interest in the subject. Equally, the motivation associated with success in different disciplines is not always the same. Accordingly, Table 1 needs to record such information to support a fair judgment of attribute strengths.

Such information can come from a variety of sources, such as responses to activities, short tests, and interview questions. One such source is the multiple-mini-interview (MMI; e.g. Barnett et al., 2015) in which applicants engage with short, structured scenarios designed to reveal for example, motivation, conscientiousness, readiness, or whatever attributes are relevant to that applicant and subject. The third column is to reflect on the absence of information in the first two columns and on how the likelihood that a deficiency might be remedied (by, for instance, supported self-development, mentoring, training courses). In addition, there should be a willingness to engage with this remediation on the part of the applicant. The whole has to be synthesised in a summative evaluation.

<<< Table 1>>>

Such guidelines, based on the available evidence, are unlikely to be sufficient in themselves, and should not be reduced to checklists. Thagard (2001) argues that

complex decision-making of this nature is best done through 'informed intuition', the gathering of data or evidence and then allowing the unconscious mind to process it. Weighing and combining essentially incommensurable information in this way is something the unconscious mind can do well and often quickly (Dijksterhuis and Nordgren, 2006). However, this is better done by a tutor who is a subject specialist and has experience of students and teaching and learning in higher education (Amabile, 1983; Salvi, et al., 2016). Experience has taught them what matters for their subject in that context. The admissions tutor should, then, be a specialist in the subject concerned or should be supported by such person.

It is to be expected that some applicants will not show themselves to be sufficiently strong in all the attributes seen as necessary or supportive for a given subject. The tutor must consider the deficiencies carefully: Can they be remedied? Are there too many to deal with? Is instruction available? Will the applicant take the opportunity? Would the applicant need further support in subsequent years? (It is, of course, possible that it is not a deficit that has been noted: an applicant may show maladaptive excesses.) The answers will determine the size of the risk in accepting the applicant (and the applicant is also taking a risk as dropping out later has wasted his or her time and money). In this way, a combination of a research-informed toolkit, tailored by direct experience of students studying the subject, and knowledge of remediation services leads to a decision about the applicant.

While this was constructed within the context of widening participation and recruitment to pre-undergraduate courses, and so is not, strictly speaking, necessarily generalisable to other contexts, Bassey's (2010) concept of relatability is useful here. While findings and recommendations may not be directly or entirely transferrable to other contexts without further study, those working in other contexts are likely to be able to relate the findings to their contexts, taking or adapting them to inform their practice. For this, admissions tutors may need further training. They also need to be aware that what is needed for success is open to revision as areas of study and ways of teaching and learning change.

Further research might usefully explore the non-cognitive needs of other disciplines and kinds of students, and seek strategies which are effective yet economical in time. At the same time, students recruited as a part of widening participation may need support over longer periods of time so there needs to be a 'whole institution' approach which makes this possible.

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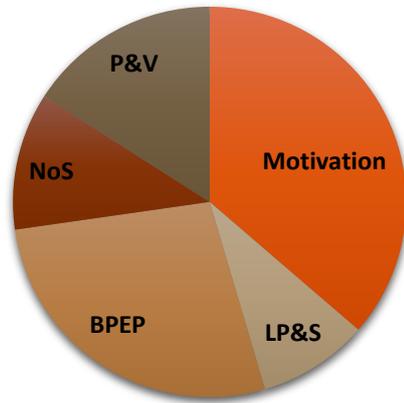
Figure 1: Tutors' notions of what it takes to be a potential student.
Key: BPEP: Broad perceptions of the educational process.
LP&S: Learning Processes and Skills.
NoS: Notions of Support, including remedying deficits.
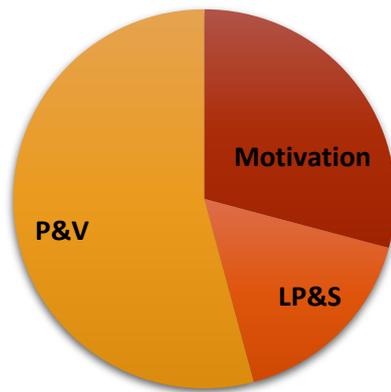Motivation: motivation (various).
P&V: Personality and Values.

Figure 2: Potential students' notions of what it takes to be a successful student.
Key:
LP&S: Learning Processes and Skills.
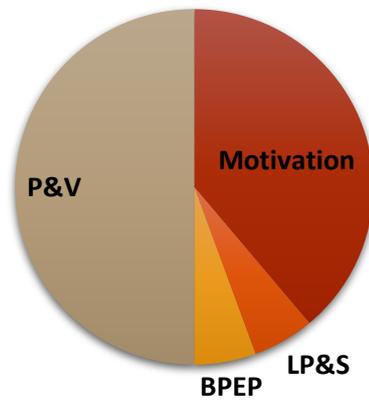Motivation: motivation (various).
P&V: Personality and Values.

Figure 3: Current students' notions of what it takes to be a successful student.
Key:
BPEP: Broad perceptions of the educational process.
LP&S: Learning Processes and Skills.
Motivation: motivation (various).
P&V: Personality and Values.

Applicant's name:	M/F Age: Subject:	
Indications of cognitive attributes	**Indications of non-cognitive attributes**	**Possible deficits and feasibility of remediation**
Examination success (1)	MMI (1)	Supported self study for …
Examination success (2)	MMI (2)	Course A on …
Examination success (3)	MMI (3)	Peer support for …
Aptitude indications	Task A	Tutor mentoring for …
Entry test score	Task B	
Interview indications	Interview indications	
Overall summary and recommendation, including the applicant's response to any perceived needs and the suggested remediation(s).		

Table 1: A selection process toolbox (reduced in size) populated with an indicative selection of tools to collect information about those attributes seen as contributing to a particular student's success on a particular course, and the feasibility and availability of remediation. (MMI refers to multiple mini interview scenarios, for which, see text. Tasks A, B etc. would be to provide evidence of, for example, conscientiousness, resilience, and motivation.)