

Student dispositions towards learning: A cross-sectional analysis

Erika Spray (✉ erika.spray@newcastle.edu.au)

University of Newcastle <https://orcid.org/0000-0002-0367-4508>

Allyson Holbrook

University of Newcastle <https://orcid.org/0000-0002-8441-4256>

Jill Scevak

University of Newcastle <https://orcid.org/0000-0002-8257-9583>

Robert Cantwell

University of Newcastle

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Abstract

This article reports the dispositional profile of 880 Masters students in Australia, based on their responses to an online survey. Learners' dispositional attributes form the foundations for learning behaviour and therefore academic outcomes. The profile of the cohort overall was as expected for an elite academic group, yet there was substantial variation between individuals. Cluster analysis identified three groups of students with meaningfully different dispositional profiles. These profiles related to academic achievement, with participants' academic achievement most closely related to their epistemic attributes. It is argued that students at the Masters level typically possess the agentic attributes necessary for effective self-regulation. Epistemic attributes are therefore more relevant for differentiating between higher and lower achieving students at this level. The importance of sophisticated epistemic attributes is in line with the stated goals of postgraduate education around the world. Collectively, this evidence supports the explicit teaching of metacognitive and epistemic skills within postgraduate coursework degrees.

Introduction

In Australia, as elsewhere, increasing numbers of students are undertaking postgraduate coursework (PGCW) degrees, typically Masters degrees, and there is increasing diversity within the cohort. Enrolments in PGCW programs in Australia increased by two thirds (64%) over the last decade for which data are available (2009-2019), and for international students the growth was 123%. By 2019 over half (52%) of PGCW enrolments came from overseas (Department of Education and Training 2021). The growth and diversification of the PGCW population makes it increasingly important to understand their learning. Students at this level are under-represented in the literature, which typically addresses the school or undergraduate contexts. Even at those levels, there remain substantial gaps in explanations of the metacognitive development that supports complex reasoning and problem solving. It is expected that PGCW students will become capable in these areas. The challenge, however, is to gain a more comprehensive picture of individual learning differences at this level. This paper contributes to the field by reporting the dispositional attributes of PGCW students in Australia, and identifying underlying clusters of students with meaningfully different profiles. The importance of particular attributes, and consequences for learning and pedagogy, are then discussed.

Dispositions towards learning

The epistemic, metacognitive and affective attributes that a learner brings to the task of learning may collectively be termed their 'disposition' towards learning. The term 'disposition' thus describes tendencies to believe and behave in particular ways. Learners' dispositions evolve in response to, and operate within, socio-cultural contexts, meaning that individual variation both shapes, and is shaped by, learners' experiences. A learner's dispositional profile makes her more likely to attend to particular foci, interpret them in particular ways, and thus to behave in certain ways. Dispositions are relatively stable, yet are mutable in the sense that they can evolve in response to experience and may therefore be responsive to instructional intervention. This creates opportunities for research in to learner dispositions to generate theoretical understanding that can readily translate into pedagogical practice.

Various relationships have been demonstrated between dispositional attributes and both academic behaviours (Entwistle and McCune 2013; Franco et al. 2012; Mason et al. 2013) and academic achievement (Mega, Ronconi, and De Beni 2014). However, because attributes do not operate in isolation, it is argued here that analysis of students' learning beliefs is most meaningful at a truly dispositional level; that is by collectively considering attributes representing various dispositional domains. Few studies to date have included such a range of attributes, although many have combined two or three; for example, academic self-efficacy and evaluative anxiety (Sotardi and Brogt 2017), metacognitive awareness and academic motivation (Öz 2016), personality traits, self-esteem and self-efficacy (Giunta et al. 2013), and implicit theories of intelligence and locus of control (Bodill and Roberts 2013). In some cases, results have clearly shown interaction between attributes, such as the moderating effect of positive academic emotions on the relationships between self-regulation and academic achievement (Villavicencio and Bernardo 2013). It is also possible that different combinations of attributes differentially influence academic achievement, as shown by the person-centred analysis of test anxiety and academic buoyancy (Putwain and Daly 2013). There is, therefore justification to explore learners' attributes at the dispositional level to better understand relationships between dispositions and academic achievement.

A measure of overall disposition can be obtained by combining established instruments to represent an appropriate range of attributes. The scores of such a composite survey can then be analysed in the form of a dispositional profile. In the present study, a composite survey measured attributes from three dispositional domains: epistemic, metacognitive and affective. These domains covered elements of students' regulation of learning (metacognition), their perceptions of knowledge and knowing (epistemic beliefs), and also how all this is influenced by their feelings (affective beliefs), and the use of coping strategies to effectively manage these. The three dispositional domains are outlined in the following sections.

Epistemic attributes

Epistemic beliefs are tacit assumptions about what knowledge is and how it is achieved. These beliefs are fundamentally important for various metacognitive processes, including initial decisions about setting learning goals, the subsequent monitoring of progress towards them, and the judgments of their achievement. All these processes are informed by individuals' underlying ideas about what knowledge is and how it comes to be known. This means that we must understand students' epistemic beliefs in order to understand their learning behaviours and academic achievement, at the Masters level as much as at any other.

The seminal work in epistemic beliefs, Perry (1970), inspired other developmental theories maintaining his assumption of uni-dimensional progression from epistemic naivety to sophistication, including the Reflective Judgement Model (Kitchener and King 1981) and Epistemological Reflection Model (Baxter-Magolda 1992). A second wave of research, led by Schommer (1990, 1994), conceptualised epistemic beliefs as independent dimensions, and the current study adopts this approach. Schommer proposed five dimensions, labelled from the naïve perspective: simple knowledge, certain knowledge, omniscient authority, innate ability and quick learning. Other researchers have continued to work with these dimensions, demonstrating their relevance to academic achievement and relationships with other attributes including self-efficacy (Tsai et al. 2011), moral reasoning (Bendixen, Schraw, & Dunkle 1998), and achievement goals, (Mason et al. 2013).

Metacognitive attributes

Metacognitive processes are those by which individuals direct their own thinking, deciding what to achieve, how to proceed, and when to stop. Various metacognitive sub-processes are also recognised: metacognitive knowledge is divided into declarative, procedural, and conditional knowledge, and metacognitive regulation into planning, monitoring and evaluation (Schraw & Dennison 1994; Schraw & Moshman 1995). These processes are important elements of successful learning behaviour, and are therefore relevant to Masters students' academic achievement.

Following metacognition's inception (Flavell 1979), relationships were quickly proposed between metacognition and other regulatory constructs such as cognition and epistemic cognition (Kitchener 1983) and executive control and self-regulation (Brown 1987). Connections have also been found with motivation (Buehl and Alexander 2005), conceptual change (Mason and Boldrin 2008) critical thinking (Ku and Ho 2010; Magno 2010), need for cognition (Coutinho 2006), self-regulated learning (Tuysuzoglu and Greene 2015), and academic outcomes (Coutinho 2007; Vrugt and Oort 2008; Wood and Kardash 2002). The clear connectivity between metacognition and other constructs means that the broadest views of metacognition become almost synonymous with self-regulation (Alexander 2008; Hofer and Sinatra 2010). Metacognitive attributes are therefore essential in assessing students' dispositions towards learning.

Affective attributes

Human decisions are not calculated in a purely rational sense but are influenced by feelings and emotions, or 'affective attributes'. These form the third dispositional domain of this study. At least since Pintrich, Marx and Boyle's (1993) 'warm cognition', it has been clear that affective attributes are essential in understanding learning. Motivational-affective constructs such as engagement, volition and resilience, have been shown to relate directly to academic achievement (Ketonen et al. 2016). In this study, three constructs were selected to represent the affective dispositional domain. These are not emotions in the sense of 'optimism' or 'anxiety'. Rather, they represent the affective aspects of students' dispositions towards learning, i.e. how they feel about their own ability (self-efficacy), about complex tasks (need for cognition), and about managing difficulties in their study (coping strategies).

Self-efficacy describes an individual's belief in their ability to do something. Students with a strong sense of self-efficacy feel confident that they can achieve a goal; those with a weaker sense will experience more doubts. These beliefs may be specific to one context or one time (Bernaki, Nokes-Malach, and Alevan 2015), but there is also strong evidence for a domain-general sense of self-efficacy (Luszczynska, Scholz, and Schwarzer 2005; Scholz et al. 2002; Schwartz and Jerusalem 1995), which can therefore be considered as a dispositional trait. Self-efficacy has been shown to mediate the effects of some personality traits, such as conscientiousness and openness, on academic achievement (Giunta et al. 2013), and has also been directly associated with higher grades (Muis and Duffy, 2013).

Need for cognition describes individuals' tendency to enjoy effortful cognitive endeavours (Cacioppo and Petty 1982; Cacioppo, Petty, and Kao 1984; Cantwell et al. 2017). This is separate from cognitive ability. Rather, need for cognition refers to an individual's desire to engage in and persist with challenging or complex tasks. This construct has been connected with a deep approach to learning and strategic flexibility (Evans, Kirby, and Fabrigar 2003). Need for cognition may also relate to the development of epistemic judgement (Jensen 1998), and a tendency to approach rather than avoid argumentation (Nussbaum and Bendixen 2003). In line with this is a strong connection, perhaps even conceptual overlap, with epistemic curiosity (Mussel 2010) and epistemic beliefs such as speed of learning and structure of knowledge (Wood and Kardash 2002). The third affective attribute included was coping. Postgraduate study may generate particular stresses for students. For most students a Masters degree represents a higher level of study than they have previously experienced, and many are also juggling work and families, or have sacrificed a professional income to study full-time. Stress is amplified for international students who may also face language issues, culture shock, and academic adjustments (Wu and Hammond 2011). Students' ability to cope with these issues, alongside the intellectual challenges of their study, is thus important to their overall well-being and their academic achievement.

Masters level learners

Defining 'Masters' students

In Australia, Masters students are typically enrolled in postgraduate coursework (PGCW) programs, meaning that they complete a pre-determined program of courses and submit assignments to demonstrate their achievement. A much smaller number of students undertake Masters of Philosophy programs, requiring submission of an original research project to achieve an MPhil qualification. MPhil students were not included in

the present study. At the Masters level, students usually hold an undergraduate degree, or possess an equivalent level of professional experience. They are therefore more mature than most undergraduate students, and more advanced in their academic and/or professional knowledge and experience. In contrast to postgraduate research students, PGCW students typically take taught courses that are highly structured in their content and assessment. PGCW courses are predominantly assessed via assignments and exams, rather than through an independent research project. The most common degree at this level is a Masters, for example a Master of Business Administration (MBA), however there are other options such as a Graduate Certificate or Diploma. Regardless of degree title, all these qualifications require completion of postgraduate level courses with graded assessments. This is significant because students need to regulate their learning towards externally defined tasks that are held constant for all students in any particular course. It also allows students' reported grades to provide a measure of academic outcome.

Characteristics of Masters Learners

Despite growing numbers of Masters students, little research has investigated the Masters-level learner. Masters students' previous academic success makes them an elite group. They would be expected to show characteristics adaptive for study in general, more so than the wider non-university population. Further, because Masters degrees are post-compulsory qualifications, all Masters students possess a degree of individual motivation. Most make significant sacrifices to dedicate time and energy to their studies – they may forgo a full-time professional salary, or time with family, or both. They might therefore be expected to show more commitment to their studies than students at lower levels; although perhaps also to face greater stress in terms of competing priorities.

While core aspects of their learning processes are likely common to all learners, the requirements of PGCW degrees differ from other levels, so it is reasonable to consider that Masters study may demand a dispositional profile distinct from those at other levels. Masters students might be expected to hold well-established dispositional attributes, shaped by successful academic and professional experience within their particular field. Such attributes may or may not support effective PGCW because this level requires higher order abilities than required at subordinate levels of study. This qualitative shift into a new modality of thinking presents a challenge for all students. In Australia, standards of higher education are defined by the Australian Qualifications Framework (AQF). Where undergraduates require broad and coherent theoretical knowledge, Masters students must show integrated understanding of a complex body of knowledge. Similarly, where undergraduates must analyse and evaluate, Masters students should 'analyse critically, reflect on and synthesise complex information, problems, concepts and theories' (Australian Qualifications Framework Council 2013). Equivalent comparisons can be made in the United Kingdom using descriptors provided by the Quality Assurance Agency for Higher Education (QAA 2014), or in Europe using the Framework of Qualifications of the European Higher Education Area (European Ministers Responsible for Higher Education 2005).

However, the Masters cohort is unlikely to be homogenous. Individual differences in learning profiles would be expected at this level as they have already been demonstrated at other levels (Cantwell et al. 2012; Entwistle and McCune 2013; Mega, Ronconi, and De Beni 2014). This variation in beliefs and behaviours means that some students will be better dispositionally adapted than others to rise to the challenges of Masters level study. The present study therefore sought to address the following research questions:

RQ1 What is the dispositional profile of the Masters cohort in Australia?

RQ2 Does analysis of variation reveal underlying student clusters?

RQ3 To what extent do students' dispositional profiles relate to academic achievement?

Methodology

Participants

Participants were 1051 students enrolled in PGCW programs at Australian universities. When the data were collected, there were 284,690 students enrolled in postgraduate non-research degrees in Australia (Department of Education and Training 2020). For a population of this size, a 95% confidence level and 5% confidence interval requires a sample of just 384 (ABS 2020). The present sample is therefore more than adequate, providing a 95% confidence level, with a confidence interval of 3%. A precise response rate was unavailable, due to the third party delivery of invitations, but it was estimated that approximately 9-15% of invited students responded to the survey (see Spray 2018). After the data were checked, 980 cases were retained. Responses from 41 undergraduate or postgraduate research students were excluded. This left 939 cases, of which 880 were entirely complete and 59 were substantially complete, including all demographic responses and at least one entire scale. The 880 complete cases still constitute a sufficient sample for 95% confidence level and 3.3% confidence interval (ABS 2020).

The sample was predominantly Australian (68%), female (75%), native English speaking (72%) and enrolled in Masters degrees (89%). Those not in Masters Degrees were studying for Postgraduate Certificates or Diplomas. Although these degrees are considered 'below' a Masters, they require

completion of courses at the same level Participants were evenly split by mode of study (50% on campus, 50% by distance) and approximately evenly across study load (58% part-time, 42% full time). The demographic profile of the cohort approximated that of the population, see Table 1.

[Table 1 here]

Procedure

Australian University websites were used to build a list of academic staff leading PGCW programs across various disciplines. Particular effort was made to target universities with large postgraduate coursework cohorts and high numbers of international students. Following institutional agreement and ethics approval, 312 postgraduate Program Conveners were contacted with by email and asked to share the invitation with their students and 164 responses were recorded. Invitations were shared with students by 96 academics from 22 universities, either as emails or online posts via Blackboard or Moodle, with reminders after two and four weeks to maximise response rates. The anonymous online survey began with demographic items followed by established dispositional scales representing the three dispositional domains of epistemic beliefs, metacognition, and affect. For consistency, a six-point Likert scale was used for all items, labelled from 'strongly disagree' to 'strongly agree'. All survey materials are presented in full in Spray (2018).

Confirmatory factor analysis validated most scales in their original form. Two instruments with sub-scales were collapsed, because psychometrically they performed best as a single scale: the Extended Cultural Intelligence Scale (Van Dyne et al. 2012) and Self Efficacy Scale (Adapted from Schwarzer and Jerusalem 1995). The only problematic results were those for the Epistemic Beliefs Inventory (Bendixen, Schraw, and Dunkle 1998), designed to gauge five dimensions of epistemic beliefs. Only two of the five scales showed good internal reliability (Innate ability, $\alpha = .748$; Quick learning, $\alpha = .748$). The other three scales (Certain knowledge, $\alpha = .568$; Simple knowledge, $\alpha = .537$; Omniscient Authority, $\alpha = .451$) were combined into a higher order construct, 'structure of knowledge' ($\alpha = .710$). For consistency, quick learning and innate ability were also combined into 'acquisition of knowledge' ($\alpha = .829$). The items retained in these final scales are provided in the appendix. These higher order epistemic dimensions reflect established theoretical positions, such as Hofer and Pintrich's (1997) 'beliefs about knowledge' and 'beliefs about knowing', and Greene, Torney-Purta and Azevedo's (2010) 'ontological cognition' and 'epistemic cognition'. Analysis proceeded using these two epistemic constructs alongside the other twelve scales, giving a total of fourteen dispositional attributes. These, and the Cronbach's alpha for each scale, are detailed in Table 2.

[Table 2 here]

Results

The dispositional profile of the Masters cohort (RQ1)

Participants reported a generally elite dispositional profile, based on the mean scores for each dispositional attribute. Unweighted mean scores, with standard deviations, are shown in Table 3. The standard deviations illustrate variation between individuals within the sample. Maximum mean scores for all variables were 6, but minimum scores varied; i.e. for some attributes the lowest mean response was >1 . As can be seen, the sample demonstrated above mid-point scores across all variables, with the lowest mean score being 3.53 for irresolute control.

[Table 3 here]

However, these scores must be interpreted with care considering that three variables had opposite valence to the other eleven, because they described maladaptive attributes: avoidance coping, inflexible control and irresolute control. For these three variables, a higher score indicates a higher tendency to exhibit these maladaptive attributes; therefore in a truly elite cohort one would expect scores below the mid-point scores. Table 3 shows the mean scores in descending order, and it can be seen that three of the four lowest mean scores are for the three maladaptive attributes: avoidance coping (3.90), inflexible control (3.77) and irresolute control (3.53). The strongest dispositional variables for the cohort were self-efficacy (4.84) and knowledge of cognition (4.80).

Cluster analysis of the dispositional profile (RQ2)

The dispositional profile of the sample indicated an elite academic group, yet there was great variation between individuals. *Cluster analysis was employed to investigate whether this variation concealed latent classes of participants, i.e. unobservable but 'natural' subgroups (Hair et al. 2006).*

Weighted scale scores were calculated to better discriminate between participants. Because of the large dataset and lack of theoretical basis for specifying cluster number a priori, two-step analysis was employed. The two-step cluster analysis for this study was conducted using IBM SPSS, with the Schwarz Bayesian Information Criterion used to determine number of clusters.

The most stable cluster solutions identified three clusters of participants, and K-means analysis was then used to specify cluster memberships. The three emergent clusters represented 16.25%, 40.5% and 43.4% of the sample, and were significantly different on all dispositional variables. These differences revealed a meaningful pattern of variation (see Figure 1). On the left of Figure 1 are variables for which two clusters scored positively and the other scored below average. These variables measure coping and metacognitive awareness, and henceforth are referred to as agentic variables. To the right are variables for which one cluster scores above average, one scores close to average, and one is very much below average – in some cases more than one standard deviation below the whole-cohort mean. This latter group of variables all relate to students' engagement with complexity, and are referred to as epistemic variables.

[Figure 1 here]

The three clusters show clear overall profiles: one is entirely above average (shown in green), one almost entirely at or below average (red), and the third is well above average on some variables and well below average on others (blue). The above average cluster portrays complex-agentic learners, who score highly for both agentic and epistemic attributes. The below average cluster has average scores for epistemic variables, but is defined by its low scores for agentic variables, for which both other clusters score above-average. This cluster is therefore described as representing low-agentic learners. Finally, the third cluster represents naïve-agentic learners. These students score above average on the agentic variables, yet this sits alongside epistemic scores that are well below average.

Relating dispositional profiles to academic achievement

As theory would predict, the complex-agentic learners had the highest average grades (mean = 3.99^[i]). They were .252 above the low-agentic learners (mean = 3.74), and .429 above the naïve-agentic learners (mean = 3.56). This may indicate that strong academic agency does not compensate for unsophisticated epistemic engagement. This explains the otherwise paradoxical low achievement of the naïve-agentic learners, whose strong agency would generally be viewed as positive, but whose very low epistemic engagement related to that of the low-agentic learners. This suggests a stronger connection between epistemic engagement and achievement than agentic engagement and achievement at the Masters level. Further, these results may position agentic beliefs and behaviours as products of the interaction between epistemic engagement and the academic context. Students with stronger epistemic engagement may interpret tasks differently, and then regulate their behaviour differently than those with a more simplistic view.

^[i] Average grades were calculated based on participants' self-reported grades, with High Distinction allocated 5 points, Distinction 4, Credit 3, Pass 2 and Fail 1.

Discussion

It was anticipated that participants would have well-established dispositional attributes due to their prior experience. However, it was not known to what extent these established dispositions would prove adaptive at the PGCW level. Nonetheless, it was reasonable to expect an academically elite cohort, and this was supported by the data. However, within this overall elite profile there was significant variation between individuals on all attributes.

The greatest variation is in the epistemic variables; the students who obtained higher grades were those who recognised the complexity of knowledge and the effortfulness of learning. Alongside this, they reported enjoyment of complexity, and confident and flexible control of learning strategies. This means they were operating metacognitively in a deliberate fashion, recognising the complexity and effort that is integral to postgraduate study, and consciously controlling their learning to achieve academic success. Successful metacognitive behaviour is therefore deliberate in two ways: in the sense that it is consciously executed, and in the sense that it is reflective and iterative.

Conversely, students who cannot recognise what is required epistemically are unable to engage so well with the intellectual challenges of a Masters degree. They struggle with irresolute and inflexible control and find little pleasure in the complex ideas by which they are confronted. They are therefore less able to perform successfully in the postgraduate context. Consistent correlations were evident in all three dispositional clusters. The complex-agentic students achieved most highly, followed by the low-agentic students. The naïve-agentic students achieved at the lowest level; despite their strong regulatory behaviour, they did not demonstrate epistemic engagement.

The importance of epistemic beliefs for students' achievement reflects the stated goals of PGCW study, as described in qualifications frameworks (Australian Qualifications Framework Council 2013; European Ministers Responsible for Higher Education 2005; QAA 2014). These frameworks articulate the importance of complex analysis and critical thinking which are fundamentally dependent upon epistemic beliefs. Of course it is also important for students to be able to regulate their learning behaviour, using metacognitive strategies and coping strategies to manage the cognitive and affective elements of their learning. However, at the Masters level this appears less relevant or differentiating between higher and lower achieving students. The cohort as a whole can self-regulate successfully as demonstrated in the overall dispositional profile (Fig. 1), where the six highest means are all for agentic attributes. The important variation is found in standards of epistemic engagement.

Conclusion

Masters level learning in Australia requires engagement with complex disciplinary knowledge, thus demanding strong metacognitive and affective regulation. The importance of deliberate metacognition is promising pedagogically, because awareness is something that can be influenced via instruction (McCune and Entwistle 2011; Schraw 1998). Encouraging students to consciously engage with metacognitive processes should promote more sophisticated metacognition, more effective self-regulation and higher quality learning. However, strong self-regulation is insufficient for academic success at this level. The most significant dispositional predictor of successful Masters learning is sophisticated epistemic beliefs. The most successful students at this level are those whose epistemic beliefs enable them to recognise and engage with the complexity that is required. This enables appropriate metacognition and more positive affect, which in turn result in higher quality learning outcomes in line with the intellectual standards required.

There is some evidence that epistemic beliefs can be responsive to instruction (Muis and Duffy 2013; Spray, Scevak, and Cantwell 2013). This means that Masters programs could incorporate metacognitive and epistemic teaching within course design, to raise students' awareness and encourage dispositional attributes that are adaptive within the postgraduate coursework context. In other contexts successful study might be underpinned by a different dispositional profile, yet the principle of teaching students to adopt adaptive attributes would remain valid.

Such explicit focus on metacognitive and epistemic attributes logically connects with existing academic literacies teaching, which concentrates on the communication of disciplinary knowledge and thinking. Teaching that articulates the process of critical thinking, and explains the techniques for communicating this, not only provides the practical skills to produce academic work but also guides the development of sophisticated epistemic beliefs. There may also be opportunities to integrate learning analytics data. Students' dispositional profiles could be analysed alongside data describing their online learning behaviour, to provide tailored feedback including suggestions for development. These possibilities offer productive avenues for the application of dispositional learning theory in educational contexts.

References

- Alexander, P. 2008. "Why This and Why Now? Introduction to the Special Issue on Metacognition, Self-Regulation and Self-Regulated Learning". *Educational Psychology Review* 20 (4): 369-372. doi:10.1007/s10648-008-9089-0.
- ABS (Australian Bureau of Statistics). 2020. *Sample Size Calculator*. <http://www.abs.gov.au/>
- Australian Qualifications Framework Council. 2013. *Australian Qualifications Framework*. 2nd ed. South Australia: Australian Qualifications Framework Council. <http://www.aqf.edu.au>
- Baxter-Magolda, M. 1992. *Knowing and Reasoning in College: Gender-related Patterns in Students' Intellectual Development*. San Francisco: Jossey Bass.
- Bendixen, L., G. Schraw, and M. Dunkle. 1998. "Epistemic Beliefs and Moral Reasoning." *The Journal of Psychology* 132 (2): 187-200. doi:10.1080/00223989809599158.
- Bernaki, M., T. Nokes-Malach, and V. Alevan. 2015. "Examining Self-Efficacy during Learning: Variability and Relations to Behavior, Performance, and Learning." *Metacognition and Learning* 10: 99-117. doi:10.1007/s11409-014-9127-x.
- Bodill, K., and L. Roberts. 2013. "Implicit Theories of Intelligence and Academic Locus of Control as Predictors of Studying Behaviour." *Learning and Individual Differences* 27: 163-166. doi:10.1016/j.lindif.2013.08.001.
- Brown, A. 1987. "Metacognition, Executive Control, Self-Regulation and Other More Mysterious Mechanisms." In *Metacognition, Motivation and Learning*, edited by F. Weinert and R. Kluwe, 65-116. Hillsdale: Lawrence Erlbaum Associates.
- Buehl, M., and P. Alexander. 2005. "Motivation and Performance Differences in Students' Domain-Specific Epistemological Belief Profiles." *American Educational Research Association* 42 (4): 697-726. doi:10.3102/00028312042004697.

- Cacioppo, J., and R. Petty. 1982. "The Need for Cognition." *Journal of Personality and Social Psychology* 42 (1): 116-131. doi:10.1037/0022-3514.42.1.116,
- Cacioppo, J., R. Petty, and C. F. Kao. 1984. "The Efficient Assessment of Need for Cognition." *Journal of Personality Assessment* 48 (3): 306-307. doi:10.1207/s15327752jpa4803_13.
- Cantwell, R., S. Bourke, J. Scevak, A. Holbrook, and J. Budd. 2017. "Doctoral Candidates as Learners: A Study of Individual Differences in Responses to Learning and its Management." *Studies in Higher Education* 42 (1): 47-64. doi:10.1080/03075079.2015.1034263.
- Cantwell, R., and P. Moore. 1996. "The Development of Measures of Individual Differences in Self-Regulatory Control and their Relationship to Academic Performance." *Contemporary Educational Psychology* 21: 500-517. doi:10.1006/ceps.1996.0034.
- Cantwell, R., J. Scevak, S. Bourke, and A. Holbrook. 2012. "Individual Differences That Affect the Quality of Learning in Doctoral Candidates." In *Enhancing the Quality of Learning: Dispositions, Instruction and Learning Processes* edited by J. Kirby and M. Lawson, 93-116. New York: Cambridge University Press.
- Coutinho, S. 2006. "The Relationship Between the Need For Cognition, Metacognition, and Intellectual Task Performance." *Educational Research and Reviews* 1 (5): 162-164. <https://academicjournals.org/ERR>.
- Coutinho, S. 2007. "The Relationship Between Goals, Metacognition, and Academic Success." *Educate* 7 (1): 39-47. <http://educatejournal.org/index.php/educate/article/viewFile/116/134>.
- Department of Education and Training. 2020. "Higher Education Data Cube." <http://www.highereducationstatistics.education.gov.au/>
- Entwistle, N., and V. McCune. 2013. "The Disposition to Understand for Oneself at University: Integrating Learning Processes with Motivation and Metacognition." *British Journal of Educational Psychology* 83: 267-279. doi:10.1111/bjep.12010.
- European Ministers Responsible for Higher Education. 2005. The Framework of Qualifications for the European Higher Education Area. Bergen Conference 19-20 May: European Higher Education Area Retrieved from http://www.ecahe.eu/w/images/7/76/A_Framework_for_Qualifications_for_the_European_Higher_Education_Area.pdf
- Evans, C., J. Kirby, and L. Fabrigar. 2003. "Approaches to Learning, Need for Cognition, and Strategic Flexibility Among University Students." *British Journal of Educational Psychology* 73: 507-528. doi:10.1348/000709903322591217.
- Flavell, J. 1979. "Metacognition and Cognitive Monitoring: A New Area of Cognitive-Developmental Inquiry." *American Psychologist* 34 (10): 906-911. doi:10.1037/0003-066X.34.10.906.
- Franco, G., K. Muis, P. Kendeou, J. Ranellucci, L. Sampasivam, and X. Wang. 2012. "Examining the Influence of Epistemic Beliefs and Knowledge Representations on Cognitive Processing and Conceptual Change When Learning Physics." *Learning and Instruction* 22: 62-77. doi: 10.1016/j.learninstruc.2011.06.003.
- Giunta, L., G. Alessandri, M. Gerbino, P. Karanci, A. Zuffiano, and G.V. Caprara. 2013. "The Determinants of Scholastic Achievement: The Contribution of Personality Traits, Self-Esteem and Academic Self-Efficacy." *Learning and Individual Differences* 27: 102-108. doi:10.1016/j.lindif.2013.07.006.
- Greene, J., J. Torney-Purta, and R. Azevedo. 2010. "Empirical Evidence Regarding Relations among a Model of Epistemic and Ontological Cognition, Academic Performance, and Educational Level." *Journal of Educational Psychology* 102 (1): 234-255. doi:10.1037/a0017998.
- Greenglass, E., R. Schwarzer, D. Jakubiec, L. Fiskensbaum, and S. Taubert. 1999. "The Proactive Coping Inventory (PCI): A Multidimensional Research Instrument." Paper presented at the 20th International Conference of the Stress and Anxiety Research Society, Cracow, Poland July 12-14. <https://pdfs.semanticscholar.org/f5ab/54d3d33f4fa8f96652b6d904967547c6b96d.pdf>
- Hair, J., W. Black, B. Babin, R. Anderson, and R. Tatham. 2006. *Multivariate Data Analysis*, 6th ed. New Jersey: Pearson.
- Hofer, B., and P. Pintrich. 1997. "The Development of Epistemological Theories: Beliefs about Knowledge and Knowing and Their Relation to Learning." *American Educational Research Association*, 67 (1): 88-140. doi:10.3102/00346543067001088.
- Hofer, B., and G. Sinatra. 2010. "Epistemology, Metacognition, and Self-Regulation: Musings on an Emerging Field." *Metacognition and Learning* 5 (1): 113-120. doi:10.1007/s11409-009-9051-7.
- Jensen, L. 1998. "The Role of Need for Cognition in the Development of Reflective Judgement." PhD diss., University of Denver.

- Ketonen, E., A. Haarala-Muhonen, L. Hirsto, J. Hanninen, K. Wahala, and K. Lonka. 2016. "Am I in the Right Place? Academic Engagement and Study Success During the First Years at University." *Learning and Individual Differences* 51: 141-148. doi:10.1016/j.lindif.2016.08.017.
- Kitchener, K. 1983. "Cognition, Metacognition, and Epistemic Cognition: A Three-Level Model of Cognitive Processing." *Human Development* 26 (4): 222-232. doi:10.1159/000272885
- Kitchener, K., and P. King. 1981. "Reflective Judgement: Concepts of Justification and Their Relationship to Age and Education." *Journal of Applied Developmental Psychology* 2: 89-116. doi:10.1016/0193-3973(81)90032-0.
- Ku, K., and I. Ho. 2010. "Metacognitive Strategies that Enhance Critical Thinking." *Metacognition and Learning* 5: 251-267. doi:10.1007/s11409-010-9060-6.
- Luszczynska, A., U. Scholz, and R. Schwarzer. 2005. "The General Self-Efficacy Scale: Multicultural Validation Studies." *The Journal of Psychology* 139 (5): 439-457. doi:10.3200/JRLP.139.5.439-457.
- Magno, C. 2010. "The Role of Metacognitive Skills in Developing Critical Thinking." *Metacognition and Learning* 5: 137-156. doi:10.1007/s11409-010-9054-4.
- Mason, L., and A. Boldrin. 2008. "Epistemic Metacognition in the Context of Information Searching on the Web." In *Knowing, Knowledge and Beliefs: Epistemological Studies Across Diverse Cultures*, edited by M. S. Khine, 377-404. New York: Springer.
- Mason, L., P. Boscolo, M. Tornatora, and L. Ronconi. 2013. "Besides Knowledge: A Cross-Sectional Study on the Relations Between Epistemic Beliefs, Achievement Goals, Self-Beliefs and Achievement in Science." *Instructional Science* 41: 49-79. doi:10.1007/s11251-012-9210-0.
- McCune, V., and N. Entwistle. 2011. "Cultivating the Disposition to Understand in 21st Century University Education." *Learning and Individual Differences* 21 (3): 303-310. doi:10.1016/j.lindif.2010.11.017.
- Mega, C., L. Ronconi, and R. De Beni. 2014. "What Makes a Good Student? How Emotions, Self-Regulated Learning, and Motivation Contribute to Academic Achievement." *Journal of Educational Psychology* 106 (1): 121-131. doi:10.1037/a0033546.
- Muis, K., and M. Duffy. 2013. "Epistemic Climate and Epistemic Change: Instruction Designed to Change Students' Beliefs and Learning Strategies and Improve Achievement." *Journal of Educational Psychology* 105 (1): 213-225. doi:10.1037/a0029690.
- Mussel, P. 2010. "Epistemic Curiosity and Related Constructs: Lacking Evidence of Discriminant Validity." *Personality and Individual Differences* 49 (5): 506-510. doi:10.1016/j.paid.2010.05.014.
- Nussbaum, M., and L. Bendixen. 2003. "Approaching and Avoiding Arguments: The Role of Epistemological Beliefs, Need for Cognition, and Extraverted Personality Traits." *Contemporary Educational Psychology* 28: 573-595. doi:10.1016/S0361-476X(02)00062-0.
- Öz, H. 2016. "Metacognitive Awareness and Academic Motivation: A Cross-Sectional Study in the Teacher Education Context of Turkey." *Procedia: Social and Behavioural Sciences* 232: 109-121. doi:10.1016/j.sbspro.2016.10.035.
- Perry, W. 1970. *Forms of Intellectual and Ethical Development in the College Years: A Scheme*. Holt, NY: Rinehart and Winston.
- Pintrich, P., R. Marx, and R. Boyle. 1993. "Beyond Cold Conceptual Change: The Role of Motivational Beliefs and Classroom Contextual Factors in the Process of Conceptual Change." *Review of Educational Research* 63 (2): 167-199. doi:10.3102/00346543063002167.
- Putwain, D., and A. Daly. 2013. "Do Clusters of Test Anxiety and Academic Buoyancy Differentially Predict Academic Performance?" *Learning and Individual Differences* 27: 157-162. doi:10.1016/j.lindif.2013.07.010.
- QAA (Quality Assurance Agency). 2014. UK Quality Code for Higher Education: Part A: Setting and Maintaining Academic Standards: The Frameworks for Higher Education Qualifications of UK Degree-Awarding Bodies. <https://www.qaa.ac.uk/docs/qaa/quality-code/qualifications-frameworks.pdf>.
- Scholz, U., B. Dona, S. Sud, and R. Schwarzer (2002). "Is General Self-Efficacy a Universal Construct?" *European Journal of Psychological Assessment* 18 (3): 242-251. doi:10.1027//1015-5759.18.3.242.
- Schommer, M. 1990. "Effects of Beliefs About the Nature of Knowledge on Comprehension." *Journal of Educational Psychology* 82 (3): 498-504. doi:10.1037/0022-0663.82.3.498
- Schommer, M. 1994. "Synthesizing Epistemological Belief Research: Tentative Understandings and Provocative Confusions." *Educational Psychology Review* 6 (4): 293-319. doi:10.1007/BF02213418.

- Schraw, G. 1998. "Promoting General Metacognitive Awareness." *Instructional Science* 26: 113-125. doi:10.1023/A:1003044231033.
- Schraw, G., and R. Dennison. 1994. "Assessing Metacognitive Awareness." *Contemporary Educational Psychology* 19: 460-475. doi:10.1006/ceps.1994.1033
- Schraw, G., and D. Moshman. 1995. "Metacognitive Theories." *Educational Psychology Review* 7 (4): 351. doi:10.1007/BF02212307.
- Schwarzer, R., and M. Jerusalem 1995. "Generalized Self-Efficacy Scale." In *Measures in Health Psychology: A User's Portfolio* edited by J. Weinmann, S. Wright, and M. Johnston, 35-37. Windsor, UK: NFER-Nelson.
- Sotardi, V., and E. Brogt. 2017. "Academic Self-Efficacy, Evaluative Anxiety and Achievement During Transition to University." Paper presented at the SELF Conference, Melbourne, Australia, September 2017.
- Spray, E. 2018. "A Cross-Cultural Study of Dispositions Towards Learning." PhD diss., The University of Newcastle, Australia. https://nova.newcastle.edu.au/vital/access/%20manager/Repository/uon:32876jsessionid=E93BD05DEC6C28276791214071C11BE6?view=grid&f0=sm_identifier%3A%22http%3A%2F%2Fhdl.handle.net%2F1959.13%2F1389330%22&sort=null
- Spray, E., J. Scevak, and R. Cantwell. 2013. "Personal Epistemological and Metacognitive Awareness in First Year Preservice Education Students." *Australian Journal of Educational and Developmental Psychology* 13: 44-57. https://www.newcastle.edu.au/_data/assets/pdf_file/0010/100243/V13_Spray_Scevak_Cantwell.pdf
- Tsai, C.-C., H. N. J. Ho, J. -C. Laing, and H. -M. Lin. 2011. "Scientific Epistemic Beliefs, Conceptions of Learning Science and Self-Efficacy of Learning Science Among High School Students." *Learning and Instruction* 21: 757-769. doi:10.1016/j.learninstruc.2011.05.002.
- Tuysuzoglu, B. B., and J. Greene, J. 2015. "An Investigation of the Role of Contingent Metacognitive Behavior in Self-Regulated Learning." *Metacognition and Learning* 10 (1), 77-98. doi:10.1007/s11409-014-9126-y
- Van Dyne, L., S. Ang, K. Y. Ng, T. Rockstuhl, M. L. Tan, and C. Koh, C. 2012. "Sub-Dimensions of the Four Factor Model of Cultural Intelligence: Expanding the Conceptualization and Measurement of Cultural Intelligence." *Social and Personality Psychology Compass* 6 (4): 295-313. doi:10.1111/j.1751-9004.2012.00429.x.
- Villavicencio, F., and A. Bernardo. 2013. "Positive Academic Emotions Moderate the Relationship Between Self-Regulation and Academic Achievement." *British Journal of Educational Psychology* 83 (2): 329-340. doi:10.1111/j.2044-8279.2012.02064.x
- Vrugt, A., F. Oort. 2008. "Metacognition, Achievement Goals, Study Strategies and Academic Achievement: Pathways to Achievement." *Metacognition and Learning* 3 (2): 123-146. doi:10.1007/s11409-008-9022-4.
- Wood, P., and C. Kardash. 2002. "Critical Elements in the Design and Analysis of Studies of Epistemology." In *Personal Epistemology: The Psychology of Beliefs about Knowledge and Knowing* edited by B. Hofer and P. Pintrich, 231-260. New York: Routledge.
- Wu, W., and M. Hammond. 2011. "Challenges of University Adjustment in the UK: A Study of East Asian Master's Degree Students." *Journal of Further and Higher Education* 35 (3): 423-438. doi:10.1080/0309877X.2011.569016.

Tables

Table 1: A demographic comparison of the sample and the population

Demographic variables	Population (n. 284,690) (DĒEWR, 2013)	Sample (n.939)
Gender	56% Female	75% Female
Citizenship	67% Australian	68% Australian
English Speaker Status	(not available)	72% Native speakers
Degree level	(not available)	89% Masters
Mode of attendance	65% On campus	50% On campus
Study load	53% Part time	58% Part-time

Table 2: Final fourteen subscales included in analysis

Survey instrument		Retained items	Scales	Items	α
Epistemic	Epistemic Belief Inventory (Bendixen et al., 1998)	20	Structure of knowledge Acquisition of knowledge	8	.71
				12	.83
Metacognitive	Metacognitive Awareness Inventory (Schraw & Dennison, 1994) <i>As adapted by Cantwell et al. (2012)</i>	11	Knowledge of cognition Regulation of cognition	5	.73
				6	.84
				6	.82
				7	.87
	Strategic Flexibility Questionnaire (Cantwell & Moore, 1996)	20	Adaptive control Inflexible control Irresolute control	7	.84
	Expanded cultural intelligence scale (E-CQS) Metacognitive CQ scale (Van Dyne et al., 2012)	9	Metacognitive cultural intelligence	9	.87
Affective	Self-efficacy <i>Adapted from Schwarzer and Jerusalem (1995)</i>	10	General self-efficacy	10	.89
				8	.87
				8	.87
	Need for Cognition (Cacioppo & Petty, 1982) <i>As adapted by Cantwell et al. (2012)</i>	8	Need for cognition	8	.87
	Reactions to Daily Events <i>Adapted from Greenglass et al. (1999)</i>	18	Proactive Reflective Help seeking Avoidance	5 5 5 3	.76 .67 .75 .61

Table 3: Unweighted mean scores for all dispositional variables

Dispositional variables	N	Minimum	Maximum	Mean	s.d.
Self-Efficacy	9391.90	6.00	4.84	.654	
Knowledge of Cognition	8942.40	6.00	4.80	.578	
Support Seeking	8981.80	6.00	4.68	.642	
Reflective Coping	8982.20	6.00	4.56	.616	
Proactive Coping	8981.60	6.00	4.53	.665	
Regulation of Cognition	8921.33	6.00	4.41	.779	
Need for Cognition	9292.10	6.00	4.39	.750	
Cultural Intelligence	8801.33	6.00	4.26	.734	
Acquisition of Knowledge	9061.00	6.00	4.19	.727	
Adaptive Control	8851.33	6.00	3.98	.720	
Avoidance Coping	8981.00	6.00	3.90	.866	
Structure of Knowledge	9071.00	6.00	3.90	.683	
Inflexible Control	8851.43	6.00	3.77	.749	
Irresolute Control	8851.00	6.00	3.53	.846	
Valid N (listwise)	880				

Declarations

Competing interests: The authors declare no competing interests.

Figures

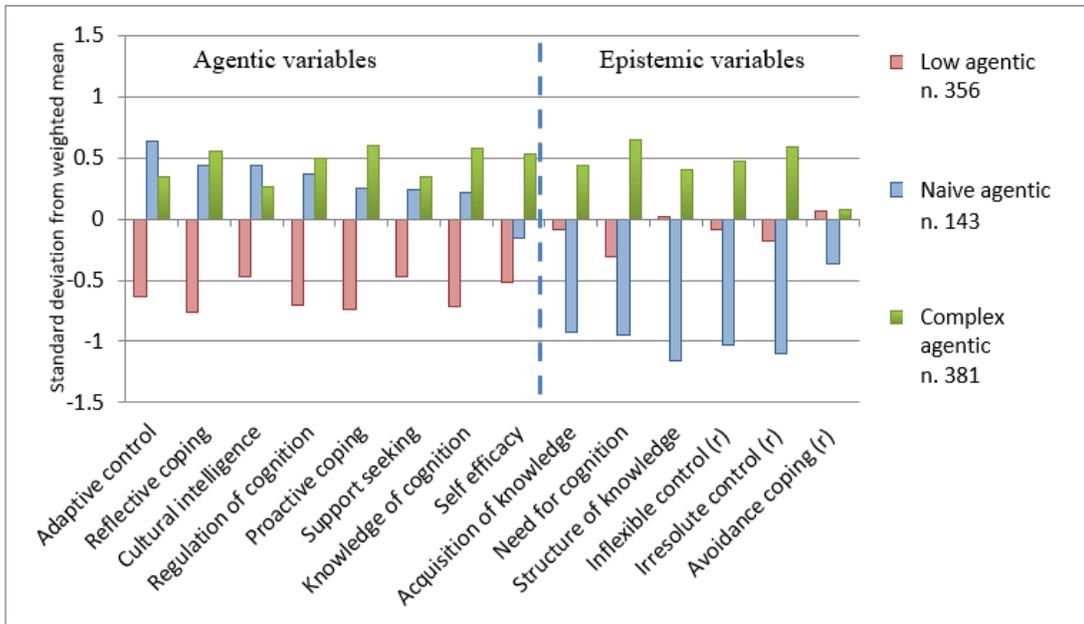


Figure 1

The dispositional profiles of the three clusters

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