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Learner Dispositions, Self-Theories and Student Engagement

Ruth Deakin Crick and Chris Goldspink

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1 Introduction

For some time there has been a widespread concern among both academics and practitioners about student engagement in school and in learning (Fredricks et al., 2004, Zyngier, 2004). Engagement is seen as important due to its association with achievement (Marks, 2000) school retention and favorable lifelong outcomes (Taylor and Nelms, 2006), as well as with social and psychological wellbeing. The concern also springs from the sometimes alarming evidence that many students are not engaged. For example, research undertaken for the English Department for Education suggests that 10% of students 'hate' school, and that such 'hate' is highest amongst less privileged learners (Gilby, 2008). Significant levels of disengagement appear to be the norm in many countries and even more concerning it increases with years spent at school often culminating in early school leaving. The Canadian Education Association, which regularly surveys students' attitudes to school, found that levels of engagement fall steadily from Grade 6 to Grade 12, while intellectual engagement falls during the middle school years and remain at a low level throughout secondary school (Dunleavy and Milton, 2010). In the US also, a study of over 350,000 students in 40 States (Yazzie-Mintz 2010) found that:

- 98% of students feel bored at school at least some of the time; two thirds feel bored every day;
- 50% of students have skipped school;
- 25% of students feel unchallenged by lessons;
- 20% of students have considered dropping out.

Businesses also are becoming increasingly concerned by 'disengaged achievers': students who achieve high grades yet cannot deal with the more complex real-world challenges they face in the workforce and community (Price, 2012). The data points to a widening gulf between what interests, motivates and engages young people in their 'real' lives and their experience of schooling; and the gulf widens steadily during the secondary school years. The problem appears more severe with students from disadvantaged backgrounds, but privilege does not guarantee that students will emerge as lifelong and successful learners.

Engagement is of interest because it forms a critical variable linking learning institutions and professional practice - the context in which educators have some control - and achievement and life outcomes which are the ultimate purposes of education. Within the literature, however, the variables identified as having an impact on engagement are wide, including: indirect and direct environmental factors; personal factors such as temperament and intelligence; slow changing personality characteristics such as self-esteem; institutional environment; and the quality of teaching and pedagogy (see for example Leithwood and Jantzi, 1999; Fullarton, 2002; McFadden, 2002; Harmer and Cates, 2004; Zyngier, 2004).

The study which we discuss below explores the relationship between students' learning dispositions, their identity and their engagement in learning. It has significant implications for the design of pedagogy needed to support student engagement in learning.

2 The UK Study: Learning Dispositions

Research into learning dispositions in the UK grew from a concern to address the need for deep engagement in learning and for an approach to pedagogy which allowed the learner and their teachers to focus on improving the processes of learning, enabling the individual to reflect on their approach to learning and to begin to navigate their own pathway through the curriculum rather than to depend on teacher direction. Successive studies aimed at identifying those dispositions which are important for an individual to engage profitably with new learning opportunities produced a set of seven 'learning power dimensions' which have proved stable in both student and adult populations (Deakin Crick et al., 2012, Deakin Crick and Yu, 2008, Deakin Crick et al., 2004). These dimensions are measured through seven scales in a self-report questionnaire, known as the Effective Lifelong Learning Inventory. These are presented in Table 1.

Table 1 Learning Power Scales

<i>Name of scale</i>	<i>Conceptual definition</i>
Changing and learning	A sense of myself as someone who learns and changes over time
Critical curiosity	An orientation to want to “get beneath the surface”.

Meaning making	Making connections and seeing that learning “matters to me”.
Creativity	Risk-taking, playfulness, imagination and intuition.
Learning relationships	Learning with and from others and also able to manage without them
Strategic awareness	Being aware of my thoughts, feelings and actions as a learner, and able to use that awareness to manage learning processes.
Resilience	The readiness and openness to persevere in the development of my own learning power in the face of challenge.

The feedback to individuals is in the form of a spider diagram which returns a profile of all seven dimensions, derived from the scales. This is designed to stimulate self-reflection and self-directed strategies for change in the context of learning relationships, rather than to provide the individual with a summative score.

3 Learning Power, Self Theories and Identity

The original formulation of the learning power scales drew, amongst other things, on research into self-theories and goal orientations. The relationship to the self-theory based approach to dispositions is that a student's goal orientation is directly related to their achievement orientation. Learning goals promote a challenge seeking and mastery oriented response to failure, regardless of perceived ability whilst performance goals produce challenge avoidance and learned helplessness (Elliot & Dweck, 1988). Dweck's research demonstrates that an individual's implicit theories about their self-attributes - such as intelligence and capability - orient them towards specific learning goals - which lead to either self-judgement or self-development (Dweck, 2006, Dweck, 2000). The learning power dimensions of changing and learning and resilience, are similar to these Dweckian dispositions, since they measure how much a person believes they are able to change over time and how quickly they give up in the face of challenge or confusion. Five of the remaining learning power dimensions relate to pro-active learning strategies - which are both personal qualities and strategies for knowledge construction. For example critical curiosity, meaning making, strategic awareness and creativity are qualities someone 'has' and which someone can 'use' to generate knowledge. The final learning power dimension relates to the degree to which a person is able to

generate and maintain learning relationships - as opposed to being isolated or dependent. The learning power dimensions, each of which gather data about what a student thinks, feels and reports about behaviour, provide an individual with a language and information for understanding themselves as a learner. This data empowers them to challenge, to formulate or re-formulate a self-story that constitutes their learning identity at a particular point in time. This is closely related to the notion of self-theories - beliefs about the self which through people make meaning out of their world and their experiences and which orient them towards, or away from, new learning opportunities.

4 Relationship between learning power measures and Dweck's self-theory measures

A South Australian study conducted by the Department for Education and Children's Services (Goldspink et al 2014) demonstrated this relationship empirically. The data were derived from the Teaching for Effective Learning initiative research which involved 23 primary schools, 245 teachers and 4500 students from years 3-7 over a period of three years.

It collected learning power measures as well as Dweck's standard measure designed to establish whether a student held an entity view of intelligence or an incremental one and a measure, unique to that research, designed to establish the students' openness to new learning. This latter variable proved fundamental to engagement – explaining a very high level of variance on learners self-reported interest, positive affect and subsequently their active participation in learning (Goldspink and Foster 2013). The Alpha Reliability Co-efficient for these scales ranged from 0.78 to 0.6. The relationship between Dweck's entity theory of intelligence and the learning power scale of resilience was investigated using Pearson product-moment correlation co-efficient. Preliminary analysis was performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. There was a negative correlation between the two variables ($r = -.020$, $n = 1629$, $p = .002$). Thus the more a person reported themselves as resilient the less likely they were to hold an 'entity' view of their intelligence. The relationships between the learning power dimensions and the new measure of a students orientation to new learning (Openness to Learning) was also investigated in the same way. There was a positive correlation between Changing and Learning and Dweck's openness to learning ($r = .076$, $n = 1629$, $p = .033$); between Critical Curiosity and Openness to Learning ($r = .134$, $n = 1629$, $p = .000$); between Meaning Making and

Openness to Learning ($r=.020, n=1629, p=.002$); between Creativity and Openness to Learning ($r=.085, n=1629, p=.001$); between Strategic Awareness and Openness to Learning ($r=.091, n=1629, p=.000$); and between Learning Relationships and Openness to Learning ($r=.083, n=1629, p=.001$).

This data supports the notion of a relationship between the ways in which a person understands themselves as a learner in terms of their learning power, their basic beliefs about their identity as learners in terms of entity theory and their approach to learning which orients them to be either open to, or closed towards new learning opportunities. However this relationship is not one of simple equivalence. The various existing measures and their attendant theories position dispositions at varying locations along a notional nature/nurture continuum and therefore with varying degrees of sensitivity to environment and differing levels of plasticity. While the above empirical analysis suggests that they may be measuring some similar underlying construct or a set of associated constructs, the effect size is weak. This suggests either that the association is weak and/or that the theorisation of each construct is partial and incomplete along with their relationship to one another. Either way benefit would flow from further empirical and theoretical exploration. We will return to this point in the summary and conclusions section of this paper.

5 The UK Learning Futures Study

The Learning Futures programme (Paul Hamlyn Foundation and Innovation Unit 2011) began with 40 schools and 15 sites in 2009 with the purpose of exploring how futures oriented approaches to learning and teaching might lead to more young people actively and positively engaged in their learning, achieving better outcomes and retaining a commitment to learning beyond school (Deakin Crick et al., 2011, Deakin Crick et al., 2010). Based on 'next-practice' methodologies, these schools collaboratively explored models of pedagogy which were designed to have a positive impact on student engagement in learning. The pedagogy which formed the interventions in the Learning Futures schools was based on the four approaches defined by the Learning Futures project team in the pamphlet 'The Engaging School' (Price et al., 2010). These approaches were thought to be most powerful when employed holistically and coherently.

- Enquiry-based learning: learning by seeking out and evaluating information, often within an extended project

- School as Base Camp: the school as a base for enquiries that will take students into their communities and further afield, rather than as a final destination
- Extended learning relationships: reciprocal relationships that support learning – these are as often lateral ('peer-peer') as they are hierarchical ('teacher-student')
- School as Learning Commons: the school as 'common ground', with all its users sharing access to its resources, and responsibility for its development.

These four approaches were underpinned by four principles of 'deep engagement', (Price, 2009): that learning is most engaging when it is placed, purposeful, pervasive, and principled.

- Placed: reaches (and has relevance to) students in the space that they inhabit, connecting with the student's family/community and interests outside school;
- Purposeful: absorbs the student in actions of practical or intellectual value, fosters a sense of value and agency – students have the chance to work like professionals;
- Pervasive: extends beyond examinations, is supported by family, carers, and peers, and can be prolonged through independent (and interdependent) informal learning;
- Principled: appeals to the student's passions or moral purpose - it matters to the learner

During 2010/11 three of these schools, from a sample of nine, were selected as overall exemplars of best practice. One teacher and one class from each school participated in a qualitative study designed to explore the nature of students understanding of themselves as learners, learning relationships and the pedagogical scaffolding and support structures involved in generating student engagement in learning.

A stratified random sampling strategy was employed to select three students from each of the high, medium and low learning power categories from the three schools. This was based on data collected across the schools, using the Effective Lifelong Learning Inventory. This took place after the pre-test and before the post-test. In this sample of students in the Learning Futures study (n=1462) the reliability of the seven scales using Cronbach's Alpha range from .72 to .81 and this is

comparable with previous published reliability of the Effective Lifelong Learning Inventory on KS3 pupils (Deakin Crick & Yu 2008).

The students selected for this qualitative study participated in two narrative interviews at six-month intervals, during the Learning Futures programmes of work. These interviews invited students to talk about their experience of the Learning Futures pedagogy, their learning identity and their engagement in learning tasks. All interviews were video recorded and transcribed, analysed thematically and entered into an Nvivo software programme for further analysis. In addition each of the teacher researchers set students an authentic assessment event which was video recorded and analysed by the research team as part of the qualitative analysis. All teachers were also interviewed.

6 Links between Learning Dispositions, Identity and Agency

This analysis showed that students whose learning power profiles indicated higher scores on the seven learning power dimensions were articulate about themselves as learners and confident in their ability to take responsibility for their learning and achievement. That is, they used a rich and authentic language about themselves as learners and about their learning processes which they mobilized effectively in different contexts. Conversely, those whose learning power profiles were lower used negative language about themselves as learners and about their learning processes and tended to be passive and dependent in their approach to learning tasks.

For example the learning power profile of a girl in one school (Figure 3), was identified from data and categorised as 'low' and accompanied by a transcript which recorded her as saying *'I am a little bit rubbish'* and later *'sometimes I feel I hate being me and sometimes I love being me'* with little focus on her own learning processes. The feedback to the user from the Learning Power self-assessment tool is represented in a spider diagram, without numerical values, as a framework for a conversation about learning identity and purpose, which can then stimulate the achievement of agency and strategies for change.

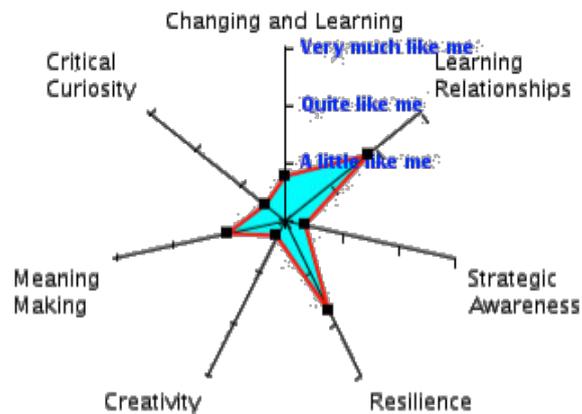


Figure 1 Female year seven student, low learning power sample

This eleven year old girl had not been identified by the school as being ‘at risk’ in any way. Her learning power profile suggested that she had little self-awareness of or confidence in her own learning capability, little willingness to take risks, or to generate questions. However, relative to this, she was on the look out for meaning, she tried hard and had some positive learning relationships. Her orientation to the processes of learning – such as her ability or willingness to generate questions, or her capacity for reflexive self-awareness are inextricably linked with her sense of self – her implicit self-story – encapsulated in the phrase ‘I am a little bit rubbish’. Her transcript showed little evidence of agency: she was a passive learner, dependent on teacher or peers for direction.

In contrast a student selected as ‘high’ (Figure 4) used a rich language for learning, which demonstrated agency and purpose in his interview. For example he said

‘learning is like a road.....you can get tow trucks that can help you... like my friend - it doesn't have to be a friend it can be a parent – they can give you support and they can like say maybe you could do this. They won't actually tell you what to do but they will give you some options. You can choose them or make your own up but they will help you’.

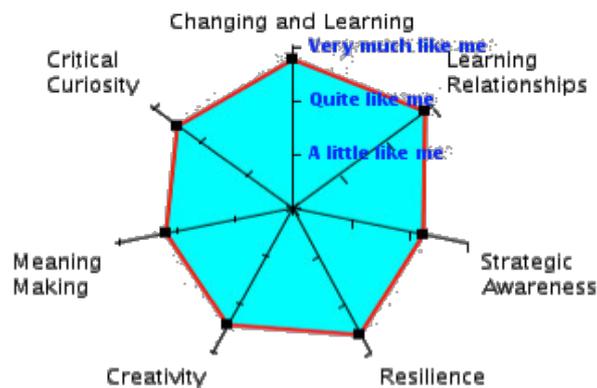


Figure 2 Male year 7 student, high learning power sample

This student reported high levels of all seven learning power dimensions, suggesting he was confident in his capability to learn and engage (changing and learning), reflexively self aware, pro-active in terms of curiosity, creativity and meaning making and willing to persevere in the face of difficulty. He was also able to engage profitably in learning relationships and his transcript revealed an eleven year old who was taking responsibility for his own learning and achievement.

The first student demonstrated a negative view of herself as a learner. Her learning power profile suggests she was passive and unlikely to take initiative for herself in engaging with learning opportunities. Whereas the second student, even in this excerpt, demonstrated a positive sense of self and agency - the disposition to engage actively with new learning opportunities and to be open to options and help when it is required.

For both students, the learning power assessment event provided a framework for a rich coaching conversation which moved between their sense of themselves as learners (their learning identity) and the learning power qualities (Learning dispositions) they can mobilise to engage or not (agency) in learning and achievement.

7 Becoming a generative knowledge worker

The evidence for identifying students who embodied the characteristics of deep, engaged learning and high levels of learning power was qualitative, quantitative and narrative and supported by teacher observation and assessment. The study team defined the term 'generative knowledge workers' to describe these

students. The term was selected because it encapsulates the notion of a self-directed creative process of engagement in which students took responsibility for the process of data collection, construction and production of new knowledge. This was contrasted with the term 'knowledge receivers' where students were passive recipients of the knowledge pre-packaged for them by their teachers and the curriculum were either compliant or actively disengaged and demonstrated low levels of learning power.

Transcripts from interviews with this sample of students identified by their learning power scores (high medium and low) from four schools were analysed inductively by four researchers to identify common themes relating to student engagement in learning. Qualitative and narrative analysis provided themes which were moderated independently and combined into the following set of characteristics of 'generative knowledge workers' (see Appendix One):

1. **Authenticity** - characterised by intrinsic interest and flow in learning; active learning; authentic performance as assessment; learning which connects to the students' wider life; and personal pride in learning.

2. **Identity** - characterised by an ability to use a rich, owned language for learning about the self; an integrating life narrative; and awareness, ownership and responsibility for the development of personal learning dispositions.

3. **Agency** - characterised by choice making in learning; generating new knowledge; taking responsibility for learning and engaging in learning relationships.

Detailed exploration of these findings is beyond the scope of this paper. What is relevant to this discussion are the descriptions or characteristics of engaged and active learners including particularly, the notion of identity demonstrated in the self-stories of the learner linked to their life narrative and expressed through action in an authentic context.

8 Exploring the term 'dispositions'

The studies reported here, as elsewhere point to a key role for learning dispositions in student engagement in learning and, from this it may be extrapolated - learning achievement. The term disposition itself is however quite vague - suggesting little more than 'a tendency to behave in a certain way'. It conveys nothing about implicit causes of subsequent behaviour and nor does it point to mechanisms by which dispositions themselves may be formed, rather the idea of

learning dispositions simply refers to a person's particular behaviours in new learning contexts. We have now examined the conceptualisation of learning dispositions in several different ways as a part of related studies. We have linked these to an individual's orientation to themselves as a learner.. What can we conclude?

Firstly each can be shown to relate to the concept and behaviour of engagement in learning. The UK study suggests that learning dispositions are intimately linked with identity or self-stories, and that these are articulated in the language with which students talk about themselves as learners. The Australian study suggests that learning power is related to students' orientation towards risk and uncertainty. The implication of learning dispositions for pedagogy is significant in relation to both measures of dispositions and indicate that pedagogical design should account for students' learning identity and dispositions in order to stimulate ownership and agency – and thus engagement in learning. Dweck's work over three decades has also shown that self-theories are responsive to what teachers and significant others say and do, that they shape engagement and predict learning outcomes.

We have also shown that the measures are related in some way - albeit partially. The qualitative study suggests that the overlap or point of intersection between the different measures may be that each picks up on some manifestation of authenticity, identity and agency afforded by the learning environment. What is still required is a theoretical frame which can serve to integrate these different yet apparently overlapping perspectives.

We can theorise about learning dispositions by drawing on social theorists commonly associated with education and learning, Bourdieu's work appears to offer some scope for linking ideas about dispositions. Bourdieu argues that behaviour is not an independent entity: it always emerges out of a person's values, attitudes and beliefs about life and learning and the habitus in which they find themselves (Bourdieu, 1993). Bourdieu was concerned with mechanisms of social domination and reproduction and his focus was on bodily know how and competent practices in the social world. He defined the term habitus as a system of cognitive and somatic dispositions internalised through socio-historical experience (1993:86). Bourdieu therefore casts dispositions as a form of embodied cultural capital, inculcated through childhood experiences and the cultural practices and values of the classroom, which in turn are shaped by the structures and practices of the schooling

system. The formation of dispositions is the site for the development of agency in the learner within a limited arena of choice.

An alternative theoretical lens is furnished by Vygotsky who referred to the sum of a person's affective and experiential knowledge as 'perezhivanie' (Vygotsky, 1978, Vygotsky, 1962/1934). It is a term used to describe the personal resources of the self that a person brings to a learning encounter: the accumulated lived emotional experience, including values, attitudes, beliefs, schemas and affect. What a learner brings to learning in this context is deeply personal and unique, although necessarily experienced and accumulated over time in the context of relationship, community and tradition.

What has emerged from research and practice in pedagogy which attends to learning power (for example Deakin Crick et al., 2004; Deakin Crick, 2012; Deakin Crick, 2009a; Goodson and Deakin Crick, 2009), is the powerful link between dispositions and identity (Deakin Crick 2012:677). Learning dispositions are the site for the development of identity and agency precisely because our learning dispositions are uniquely personal yet socially situated, shaping the stories we tell about ourselves as well as framing our future learning trajectories.

In their seminal work on identity, Sfard and Prusak (2005) suggest it is the missing link between learning and its socio-cultural context. They propose replacing the traditional discourse on schooling with talk about construction of identities, or the longer term task of identity building. They argue that identity is a 'collection of stories about a person that are reifying, endorsable by others and significant' (2005:16) and that a person's identity is profoundly shaped by the stories which other people tell about that person. For Sfard and Prusak, learning is a narratable pathway of identity formation.

From these perspectives a learning disposition is an embodied characteristic which is maintained in and through the learner's engagement with their environment, and reflexively through affective states and self-narrative. The current dispositional state reflects the individual's history; including the wider social and cultural experiences which have shaped them as learners' and which now influence their very being and their beliefs about themselves.

While the theories of Bourdieu and Vygotsky and others offer some treatment of this problem, all tend to remain vague about the mechanisms involved. A more

general theory which has at its centre an attempt to explain this type of intimate coupling between the biological and cognitive characteristics of individuals and the social environment and context in which they operate exists in the theory of autopoiesis and more particularly through the synthesis of autopoietic and complexity theory proposed by Goldspink and Kay (Goldspink and R., 2007, Goldspink and Kay, 2003).

Autopoietic theory (Maturana and Varela, 1980) is based upon a very different set of assumptions to the approaches described above and provides a basis for understanding the co-constitutive nature of the relationship between individuals and society and the implications this has for human learning and knowing. Most importantly for the purposes of this discussion, Maturana and Varela's theories encompass the role of cognition, cognitive change and language in identity formation. Furthermore, they involve considerable discussion of the relationship between the individual and their environment. This is significant as Bruner argues the structure of the learners environment plays a significant role in the way they come to narrate self as learner.

Maturana and Varela account for the relationship between the system and its environment through the concepts of ontogeny and structural coupling. The ontogeny of a unity denotes the history of structural change within that unity, without the loss of its organisation (Maturana and Varela, 1992). Structural change within a unity can take two forms, either a change that is triggered by interactions with the environment in which it exists, or by its internal dynamics (ibid). So although environmental perturbations may trigger changes in the structure of a unity, they have no control over the results of those changes. The unity persists due its self-organisation, which is geared to the maintenance of its viability. An individual's behaviour is determined by particular states of nervous system activity (Maturana & Varela, 1980). The nervous system's activity is defined by what Maturana and Varela have described as operational closure. This presupposes that in all cases nervous system activity results from, and leads to, further nervous system activity in a closed cycle (Maturana & Varela, 1980). Possible and actual changes in state of the nervous system are therefore dependent on the nervous system's structure and not external forces. External or environmental forces may act as triggers for change but it is the nervous system's structure that dictates which forces can be a trigger (Mingers, 1991). Therefore changes to the structure of one person's nervous system, and consequently their behaviour, will be unique to that person. The environmental

perturbations that act as a change trigger in one person will not necessarily trigger a change in another, or if they do, the change that is triggered may take a different form and/or have different implications for the viability of that person in his/her environment, given his/her history.

As part of the structure of the human nervous system, it is possible for humans to generate a domain of self or self-consciousness. For Maturana & Varela, this domain exists through language or a linguistic domain. They describe linguistics as

“...an ontogenic communicative behaviour, i.e. a behaviour that arises in an ontogenic structural coupling between two organisms...” (Maturana & Varela, 1992 pp209).

The recurrent interactions that form this ontogeny create what they describe as a consensual domain. Within the consensual domain individual's orient themselves against the background of all the other possible interactions and individuals in the environment. The process of orientation is symbolic, involving the development of descriptions. Mingers has eloquently described this process.

“Initially these symbolic gestures are closely related through metaphor and metonymy (Wilden, 1977), to the activity that they connote. However, the nervous system can interact with the corresponding states of neuronal activity as if they were dependent entities and thus generate descriptions of descriptions in an endlessly recursive manner. In this way the symbols become further removed from their origin, and the domain of essentially arbitrary signifiers that we call language emerges” (Mingers, 1995,pp74).

It is through the process of description that the 'I' arises. The 'I' is a linguistic distinction within the linguistic domain of the individual and represents a means of differentiating one's self and one's circumstances from all the other distinctions that occur within one's linguistic domain. The linguistic domain of an individual is the domain of all linguistic behaviours and therefore is also in a process of continual change, responding to and affecting the individual's continuous interactions with the

environment. As the individual operates within a linguistic domain with other people, the self and its circumstances will be generated as linguistic distinctions of his or her participation in that linguistic domain.

This theoretical standpoint carries with it a distinctive ontological and epistemic position – that of radical constructivism. This poses some significant challenges to many mainstream theories of learning, including those from which many existing concepts of dispositions and engagement have been drawn. It suggests an alternative, and perhaps more integrated way of measuring dispositions as a phenomenon in learning.

9 Conclusions

The two studies discussed here indicate that dispositions do matter and that pedagogy can be designed to increase engagement if teachers attend to students' learning dispositions. Learning dispositions have been shown to contribute to the establishment of learner engagement by different pathways.

One of the key issues emerging from these findings was the learner's orientation towards the unknown, uncertainty and ambiguity and their tendency to either retreat from it, or move into it. The former effectively precludes deep learning and the latter is the beginning point for it. This appears to operate at a visceral level and has the hall marks of what Damasio (Damasio, 2000; Priestley et al., 2012) describes as affective pre-appraisal – a rapid emotional assessment of the presenting situation. What we know from the literature is that negative affect is associated with a narrowing and closing down of behaviour that presents as fight or flight mechanisms. In classrooms these could manifest as passive dis-engagement or physical absence, or in disruptive behaviour. How a learner responds to ambiguity and uncertainty at a visceral/emotional level orientates them toward learning in fundamentally different ways. While part of this response may be innate – associated with curiosity or ambiguity tolerance (Ainley, 1987; Budner, 1962) there is growing evidence that it is responsive to context and relationships and trust as a social resource. The question arises how can we understand what is happening for the individual at any point in time and equip educators to recognise these basic states and respond appropriately.

This 'Openness to Learning' dispositional variable developed as a part of the Australian study is correlated to all of the active dimensions of ELLI as well as the

learning relationships dimension. This may indicate that it is primary - without attention to this visceral emotional pre-appraisal of a situation, the learner cannot use their learning power - which operate in contexts of openness rather than one of avoidance.

The self-theory meanwhile also appears primary - holding an entity view of intelligence predicts negative affect and social functioning and is negatively correlated with resilience but a visceral/emotional response to uncertainty appears to be closer to a basic biological impulse while a belief is associated with a higher cognitive function.

In this evidence as well as the prior research we therefore encounter what appears to be an entanglement between multiple levels of human functioning - from the most basic impulses through to that characteristic which most defines humans - the capacity for language and narration of and about 'self'. This may appear paradoxical if thought about in terms of simple linear causation but if approached as suggesting levels of recursive phenomena - what I believe changes how I feel and what I do and the subsequent experience of doing and either failing or succeeding changes what I believe, then it becomes intelligible.

The concern with something as apparently straight forward as engagement in learning leads us to have to confront our role as educators. While engagement is most commonly thought about in behavioural terms - a concern with whether learners are on task and maintain a focus on learning - the evidence from the studies set out here takes us to a different place altogether. To address the behaviour of the learner we have to confront not just the learner as a whole - but the learner and his/her history and context. In this way the relationship between the educator and the learner is inevitably and necessarily deeply relational - dealing with each learner's sense of themselves. Ignoring the quality of relationships, or the emotional and experiential resources the learner brings is perhaps one of the shortcomings of pedagogy framed in the context of modernity where the focus is on the transmission of knowledge, with the purpose of achieving a narrow set of measurable outcomes. This suggests a very different direction for further developing measures of engagement and dispositions - such measures will increasingly need to focus on the quality of relationships and the meaning spaces these afford rather than on the 'state' - self-reported or otherwise - of any one of the agents who make up the relationship. Without this we likely will have to make do with partial and overlapping measures.

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