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Learning power in the workplace: the effective lifelong learning inventory and its reliability and validity and implications for learning and development

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An organisation’s ability to learn, to harness collective intelligence and to translate that learning rapidly into action in response to environmental challenges is the ultimate competitive advantage in the constantly changing context of the information age. It is an indicator of the organisations’ resilience and adaptability in the face of uncertainty and change. Improving an organisation’s capacity to learn will only have the desired impact on performance if it improves employee engagement at the same time. In this paper, we introduce the concept of learning power into the context of the workplace, drawing on what has been learned from its application in education and recent studies in the corporate and community sector in the UK and beyond. The seven dimensions of learning power were identified by Deakin Crick, Broadfoot and Claxton (2004, Assessment in Education Principles Policy and Practice, 11, 247–272) in the development of the effective lifelong learning inventory (ELLI), an assessment tool designed to enable learners to become aware of their own learning power and to turn diagnosis into strategies for improvement. We present the psychometric properties and the validity and reliability statistics of ELLI as the Learning Power assessment tool for learners in the world of work and community, based on an adult workplace population of over 5000. Finally, we explore the implications of these ideas and practices for learning in corporate organisations.

Keywords: employee engagement; learning and development; learning power; resilience

Introduction

Learning power is a concept which has been used extensively in education contexts in the last 10 years. It is based on the seven dimensions of learning power identified by Deakin Crick, Broadfoot and Claxton (2004) in the development of the effective lifelong learning inventory (ELLI), an assessment tool to assist students in schools to become aware of and improve their capacity to learn, to enable a more rigorous pedagogical focus on the processes of learning and enable an individual to engage effectively with new learning opportunities rather than focusing solely on the summative assessment of traditional learning outcomes (Deakin Crick et al. 2004). The term learning power has been widely used to describe the personal qualities associated with the seven dimensions, particularly by Claxton (1997, 1999), and in this paper its meaning is specifically related to the ELLI inventory. This was first designed for a school-aged population with the specific purpose of
measuring student’s values, attitudes and dispositions towards learning through self-report and reflecting those measurements back to students in the context of a coaching relationship in order to provide a stimulus for self-directed change. The inventory was designed to be administered by teachers in the context of classroom learning and, from the start, the process of accrediting teachers in its use involved subjecting them as adult learners to the same inventory and feedback as the best means of induction into its purpose and practice. From this point, it became clear that the inventory had an application in employee learning and development, and so in 2003 the wording of some of the items of the inventory was amended for an adult population, and an adult version was created and used extensively in research and development contexts.

Purpose
The purpose of this paper is to introduce the concept of learning power into the debate about employee learning and development and its role in employee engagement and corporate performance.

Our aim is also to present the psychometric properties and the validity and reliability statistics of ELLI as the learning power assessment tool for learners in the world of work and in the community. First, we explore the rationale for a richer approach to learning and development in the workplace; next, we introduce and discuss the concept of learning power and describe how we identified and secured the adult sample; then, we present the quantitative findings from our study, demonstrating the reliability and validity of the instrument; finally, we explore the implications of these ideas and practices for learning in corporate organisations.

The problem we are addressing
The links between learning, capability development and corporate performance are well understood and well argued for not least in the call for a new emancipatory agenda (Burgoyne and Reynolds 1997), in the invitation to see organisations as learning systems (Senge 1990) and in the identification of ‘learning agility’ as a critical indicator of future potential (Eichinger and Lombardo 2004). An organisation’s ability to learn, to harness collective intelligence and to translate that learning rapidly into action in response to environmental challenges is the ultimate competitive advantage in the constantly changing context of the information age. It is an indicator of the organisations resilience and adaptability in the face of uncertainty and change.

However, given the link between employee engagement and corporate performance (Rucci, Kirn and Quin 1998) and the more recent Towers Perrin (2008) study of nearly 90,000 employees in 18 countries which found that only 21% of employees were fully engaged, it appears that improving an organisation’s capacity to learn will only have the desired impact on performance if it improves engagement at the same time. The performance advantage for organisations who successfully improve employee engagement through more engaging learning practices is especially significant because the Towers Perrin study identified the opportunity to ‘improve my skills and abilities in the last year’ as the second most important driver of engagement across all career stages.

The Towers Perrin study defined employee engagement in three ways: (i) how well employees understood their roles and responsibilities; (ii) the passion and energy they bring to their work and (iii) how well they perform their roles. Those who were giving full discretionary effort to their work scored high on all three dimensions (cognitive, emotional and motivational) and were described as engaged, whilst 41% had high scores on the
cognitive dimension but were less connected emotionally and motivationally, and these were described as ‘enrolled’. The disenchanted and disengaged groups had lower scores on all the three dimensions or were disconnected cognitively, emotionally and motivationally. Towers Perrin’s definition of engagement is the extent to which employees put discretionary effort into their work and contribute more of their energy, creativity and passion on the job.

The same study identified the primacy of the organisation itself in creating the conditions which stimulate employee engagement, and among these the most significant were (i) the extent to which senior leaders were sincerely interested in employees' well-being, (ii) the learning and development opportunities the organisation provides and (iii) its image and reputation particularly in relation to social responsibility. These factors are highly reminiscent of research into learner-centred practices in education — the key indicator of a teacher or school’s learner-centred practices according to McCombs is the extent to which students believe that their teachers are able to create positive inter-personal relationships with them, to honour student voice, to stimulate higher order thinking and to cater for individual differences (McCombs and Lauer 1997; McCombs and Whisler 1997; Deakin Crick and McCombs 2006). Learner-centredness in education is a complex interaction of the programmes, practices, policies and people as perceived by the individual learners.

Conditions for engagement — in school or workplace — require fidelity to human-learning principles and an understanding of organisations as complex adaptive systems that are driven by human beings as agents of change. The ‘industrial paradigm’ that characterises most twenty-first century organisations reflects the mismatch between human-learning principles and traditional institutions in which leaders are pre-eminent and organisations are machine-like. There is a similar mismatch in leadership characteristics. According to Towers Perrin, leaders who are highly engaging are characterised by emotional intelligence, great communication skills, a coaching/involving orientation, the ability to inspire, authenticity and humility. However, characteristics of traditional leaders are to be rational, analytical and dispassionate; to direct and delegate, to instruct, to be ‘afraid of the soft stuff’ and to have high ego needs. Wielkiewicz and Stelzner (2005) argue that effective leadership processes involve temporary resolutions of the tension between traditional and ecological approaches, that the context is more significant than what individual leaders decide to do and that organisations are more able to adapt when there is genuine diversity of input into decision-making processes. They propose that leadership is an emergent process arising from the human interactions that constitute the organisation. In this context, the capacity to learn and adapt, for the individual employee (including leaders) and thus the collective capacity of the organisation to learn and adapt, becomes a crucial element in the successful management of change.

Theoretical rationale for learning power
Learning power provides a language and a framework with which the learner (employee or student) and their learning facilitator (leader, coach or teacher) can understand and develop the self-concept, their identity and their motivations to learn. Together with the self-assessment tool (ELLI), learning power provides an understanding of what it takes to learn well, how effectively they apply this understanding and how they might improve it in ways that they choose in relation to the context(s) of their performance. Learning power enables and is improved by enquiry-based learning and through the construction of new knowledge which has an authentic application in the world.

‘Learning power’ is described as a complex mix of dispositions, lived experiences, social relations, values and attitudes that combine to influence how an individual engages
with particular learning opportunities (Deakin Crick et al. 2004). The seven empirically derived dimensions of learning power are as follows:

**Changing and learning**
Effective learners know that learning itself is learnable. They believe that, through effort, their minds can get bigger and stronger, just as their bodies can and they have energy to learn. The opposite pole of changing and learning is ‘being stuck and static’.

**Critical curiosity**
Effective learners have energy and a desire to find things out. They like to get below the surface of things and try to find out what is going on. The opposite pole of critical curiosity is ‘passivity’.

**Meaning making**
Effective learners are on the lookout for links between what they are learning and what they already know. They like to learn about what matters to them. The contrast pole of meaning making is ‘data accumulation’.

**Dependence and fragility**
Dependent and fragile learners more easily go to pieces when they get stuck or make mistakes. They are risk averse. Their ability to persevere is less, and they are likely to seek and prefer less challenging situations. The opposite pole of dependence and fragility is ‘resilience’.

**Creativity**
Effective learners are able to look at things in different ways and to imagine new possibilities. They are more receptive to hunches and inklings that bubble up into their minds, and make more use of imagination, visual imagery and pictures and diagrams in their learning. The opposite pole of creativity is ‘being rule bound’.

**Learning relationships**
Effective learners are good at managing the balance between being sociable and being private in their learning. They are not completely independent, nor are they dependent; rather, they work interdependently. The opposite pole of learning relationships is ‘isolation and dependence’.

**Strategic awareness**
More effective learners know more about their own learning. They are interested in becoming more knowledgeable and more aware of themselves as learners. They like trying out different approaches to learning to see what happens. They are more reflective and better at self-evaluation. The opposite pole of strategic awareness is ‘being robotic’.

The original rationale for this research into learning power and the quest for new forms of assessment that enable improvement in the ability to learn remains valid today. In the
information age, the acquisition of knowledge is not enough for survival and success in the face of massive and immediate data availability, rapid change, risk and uncertainty. What is needed in addition to specialist knowledge acquired from experts is the ability to identify and nurture a personal portfolio of competencies that enable a collective and productive response to the challenges arising from the changed condition of humanity. Competence is about a combination of knowledge, skills, understanding, values, attitudes and desire which lead to effective, embodied human action in the world, in a particular domain. Achievement in the world is not based simply on the accumulation of second-hand knowledge stored as data, but as a combination of this knowledge with skills, values, attitudes, desires and motivation and its application in a particular socio-historical context, involving a sense of agency, action and value (Hoskins and Deakin Crick 2009). Such competencies according to Haste (2001) can be summarised in an overarching ‘meta-competence’ which is the ability to manage the tension between innovation and continuity, and this is constituted in five sub-competences – the ability to (i) adaptively assimilate changing technologies (ii) deal with ambiguity and diversity (iii) find and sustain community links (iv) manage motivation and emotion and (v) enact moral responsibility and citizenship.

To be competent in this way, the ‘possession’ of knowledge is necessary but not sufficient. What are also required are personal qualities and dispositions, a secure-enough sense of identity and a range of new skills that enable links to be made across domains and processes. The growth in the job market is in knowledge processing, manipulation and transmission, and key skills are mastery of state-of-the-art communication tools and the confident and speedy handling of culturally and technically changing and overflowing data. Such data invariably originate in dissimilar domains, where the focus tends to be on specialised knowledge and skill acquisition, rather than on transferable skills across domains. It must then be processed for and communicated to a distant group of people using a different vocabulary in a manner which takes account of whole systems design – both technical and social since technical systems are always embedded in social systems. Where formal learning is highly specialised and discipline bound, very often graduates, including those with traditional degrees in ‘vocational’ subjects like engineering or law, find themselves with jobs in which they cannot make much use of whatever specialist knowledge they possess (Jaros and Deakin Crick 2007).

A sense of identity – defined by Sfaard and Puzak as discursive counterparts of one’s ‘lived experiences’ (2005, p. 16) which are told and retold in the narratives we live and are shaped by – is crucial for the development of competence in the world for two reasons. First, because learning is about closing the gap between ‘actual’ and ‘designated’ identity (ibid.), and second because competence in the world is about making decisions about direction, action and value, moving beyond merely being a technician doing other people’s bidding to leading change, even if that change is as simple as ‘replenishing shelves more effectively in the supermarket’. Both of these require the ability to articulate one’s identity as story and a compass point on a journey. For example, a shop assistant may have a designated identity as a new ‘apprentice’, and she needs to develop the personal qualities necessary for learning and acquiring new knowledge and skills, e.g. her strategic awareness, and she also needs to have the confidence to apply that knowledge and skills to an authentic solution – a better way of replenishing the shelves in the bakery, effectively offering leadership in her domain. She is moving between her actual identity and her designated identity as apprentice, and it is this personal journey that empowers that process. The same could be articulated for, say, a CEO of a multi-national corporate organisation. Rapid change, adaptation, risk and uncertainty require such a dynamic and systems model of learning and change. It requires
fluid movement between the personal and the public and a range of ways of knowing, including experiential knowledge of self.

Heron and Reason (1997) argue, along with Guba and Lincoln (1994), Bateson (1972), Macmurray (1957) and others, that in order to develop collaborative enquiry and other forms of learning and change which impact on the world we need to develop a participatory world view which is able to acknowledge and value extended epistemologies and is fundamentally reflexive. Such a worldview requires the development of critical subjectivity. They say:

A participative worldview, with its notion of reality as subjective-objective, involves an extended epistemology. A knower participates in the known, articulates a world, in at least four interdependent ways: experiential, presentational, propositional and practical. These four forms of knowing constitute the manifold of our subjectivity, within which, it seems, we have enormous latitude both in acknowledging its components and in utilizing them in association with, or dissociation from, each other. This epistemology presents us as knowers with an interesting developmental challenge. We call this challenge critical subjectivity. It involves an awareness of the four ways of knowing, of how they are currently interacting, and of ways of changing the relations between them so that they articulate a reality that is unclouded by a restrictive and ill-disciplined subjectivity. (Heron and Reason 1997, p. 279).

The ability to develop critical subjectivity requires a reflexive self, the ability to engage one’s own learning power, to generate new knowledge and to apply that in the world. Figure 1 represents this in diagrammatic form.

**Determining the validity of ELLI for adult learners**

**Methodology**

In this section, we describe the sample of adult learners in this study, describe the inventory in more detail and discuss the standard forms of feedback and its purpose and ethical considerations.

**Measures**

ELLI is a self-report questionnaire in which respondents indicate their approach to various aspects of learning through completion of an online four-point Likert-type questionnaire (Likert 1932). The items in the questionnaire (for a sample see Appendix 1) elicit information about what the individual thinks, feels and tends to do in relation to their learning. The respondents’ judgements are based on their own experience and story to date and the context in which they find themselves.

![Figure 1. Learning as a dynamic and complex process.](image-url)
The seven dimensions of learning power form seven scales with items ranging from 4 to 17 (Table 1).

Because the inventory was designed to stimulate change in personalised feedback, the scale that measures fragility and dependence is reversed in the feedback and described to users as ‘resilience’.

**Feedback from the ELLI questionnaire**

The scales for the seven dimensions of learning power are calculated online and used to produce feedback for the individual about their perception of their own learning power on these dimensions. The scores are produced as a percentage of the total possible score for that dimension. Feedback is in the form of a spider diagram (see Figure 2) without numbers which indicates the pattern and relative strength of individual scores. It provides the framework for a coaching conversation which moves between the self-perception and identity of the learner (Is this like me?) and a projected learning outcome (Where do I need to get to?) (Deakin Crick and Yu 2008; Deakin Crick 2009). This assessment event is thus a starting point moving from self-diagnosis to strategy and forms the basis of authentic enquiry projects that lead to different types of performance outcomes. The seven dimensions of learning power also support personal knowledge construction – e.g. critical curiosity is a foundation for generating questions, or meaning making is a necessary part of knowledge mapping, both of which are primary forms of knowledge generation (Deakin Crick 2009).

![Figure 2. Example of a spider diagram feedback.](image-url)
Participants and procedure

The ELLI data for adult learners for use in this study were taken from three sources, each originally developed to serve various ELLI research programmes over a period of 7 years, between October 2003 and May 2010. Each source contained the ‘common 72’ core ELLI items relevant for adult learners, standardised in terms of administration and representation in each database. In addition to this, ELOISE and the Learning Warehouse repository contained an additional 18 items that were passive – not used for calculating dimensions and feedback to individuals and organisations. These items were designed theoretically to extend the seven scales to be used for research purposes. Thus, there was a total of 90 items. Extracting the data from the three research repositories [ELOISE \((N = 2864)\); ELLI online \((N = 1217)\) and the Learning Warehouse \((N = 1641)\)] allowed the creation of an adult data-set with an overall \(N\) of 5762.

The respondents (all over the age of 18 years) were drawn from 79 organisations in the UK or Australia, representing a variety of sectors including institutes of higher education, training organisations, private sector corporations, as well as staff from primary, secondary and further education. Each participant undertook their own learning power profile either as part of their accreditation training to incorporate learning power in their personal professional development practice for others within that organisation or as part of their own personal development.

Indicative demographics of the adult sample are presented in Tables 2 and 3. It should be noted that the submission of participant’s biodata was not a mandatory requirement, and as a result Table 1 does not include data from the entire sample. The potential for bias in the reporting of such data is recognised.

Ethical considerations

All of the adults who provided survey data did so voluntarily and agreed to allow their anonymised data to be stored for research purposes through an explanation online and prior to the survey, which they then agreed to by tick box. Anonymised data were stored in a secure online repository whilst identifying data, needed for the personalised feedback, were stored separately. Personalised feedback was provided immediately online and formed a focus for a coaching conversation with each individual led by an accredited learning power coach.

Data analysis and findings

In this section, we describe the computations we performed on the data in order to establish the reliability and validity of the scales and to explore their composition in this adult population.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>810</td>
<td>14.1</td>
<td>14.1</td>
<td>14.1</td>
</tr>
<tr>
<td>F</td>
<td>2883</td>
<td>50.0</td>
<td>50.0</td>
<td>64.1</td>
</tr>
<tr>
<td>M</td>
<td>2069</td>
<td>35.9</td>
<td>35.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>5762</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Exploratory factor analysis

With the exclusion of missing data cases, an \( N \) of 5090 from a total \( N \) of 5284 were available for an exploratory factor analysis. An initial assessment of the Cronbach’s \( \alpha \) for the ‘common 72’ items indicated high reliability at 0.881 (Field 2004) with the lowest resultant \( \alpha \) on item deletion being listed at 0.877 and the greatest at 0.884. This suggests that items contributed to learning power consistently in adult learners throughout the item bank.

A principal components analysis (PCA) with varimax rotation and Kaiser normalisation was performed. In this, a seven-factor solution was specified in order to assess the reliability and validity of the seven ELLI dimensions established in a previous ELLI research with school-age groups (Deakin Crick and Yu 2008) for this adult sample. The assessment of overall Kaiser-Meyer-Olkin (KMO) for the adult sample was reported as 0.935, and Bartlett’s test of sphericity was significant (\( df = 2556; p < 0.000 \)) supporting the factorability of the correlation matrix.

Table 4 details the reliabilities of the seven established dimensions. Internal reliabilities for the dimensions assessed through the use of Cronbach’s \( \alpha \) are mostly above 0.7 – the level generally taken as demonstrating acceptable reliability (Nunnaly 1978; Field 2004).

The exception to apparently reliable dimensions, however, is changing and learning at 0.694 and meaning making at 0.640. However, one of the caveats of using Cronbach’s \( \alpha \) is that it tends to be an overly conservative estimate of reliability which might not be robust with smaller (>10) item sets (Streiner and Norman 1989). The meaning making dimension comprises seven items, of which only six evidenced a factor loading \( >0.4 \) (Manly 1994). Attempts have been made to increase the reliability of meaning making (MM) through including a number of other ‘common 72’ items, but this would appear to be possible only with the effect of reducing the clarity of the dimension when assessed through further PCA. With only six items loading onto the factor, it may be that entirely new items will need to be introduced and assessed.

Internal structure of the scales

The reliability of the scales with this adult data-set, compared to the student data, suggests that the concept of learning power is appropriate for an adult population. However, because the data-set included 18 additional ‘latent’ items and because theoretically learning power might have a different structure in adults from students, it was determined that an exploratory factor analysis would be repeated on the same data-set using 90 items, but the number of factors would be un-restricted so the items within them would be determined wholly through PCA rather than forced on the basis of previous findings. Through doing this exploratory factor analysis, any differences in the conceptual basis of
<table>
<thead>
<tr>
<th>Dimension</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Cronbach's $\alpha$</th>
<th>Overall dimension KMO</th>
<th>Variance explained</th>
<th>$N$ of sub-component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing and learning (4 items)</td>
<td>13.15</td>
<td>2.25</td>
<td>0.69</td>
<td>0.65</td>
<td>52.9%</td>
<td>1</td>
</tr>
<tr>
<td>Critical curiosity (9 items)</td>
<td>26.38</td>
<td>4.37</td>
<td>0.72</td>
<td>0.82</td>
<td>42.9%</td>
<td>2</td>
</tr>
<tr>
<td>Meaning making (7 items)</td>
<td>23.24</td>
<td>3.13</td>
<td>0.65</td>
<td>0.72</td>
<td>52.3%</td>
<td>2</td>
</tr>
<tr>
<td>Creativity (10 items)</td>
<td>28.78</td>
<td>5.44</td>
<td>0.80</td>
<td>0.86</td>
<td>48.9%</td>
<td>2</td>
</tr>
<tr>
<td>Learning relationships (12 items)</td>
<td>34.34</td>
<td>5.78</td>
<td>0.74</td>
<td>0.79</td>
<td>54.9%</td>
<td>3</td>
</tr>
<tr>
<td>Strategic awareness (13 items)</td>
<td>37.76</td>
<td>6.28</td>
<td>0.82</td>
<td>0.89</td>
<td>41.2%</td>
<td>2</td>
</tr>
<tr>
<td>Fragility and dependence$^a$ (17 items)</td>
<td>38.32</td>
<td>8.37</td>
<td>0.84</td>
<td>0.91</td>
<td>42.2%</td>
<td>3</td>
</tr>
</tbody>
</table>

$^a$ Due to missing data for 194 cases from item 72, overall $N$ was 5284 when data were examined as a whole to minimise list-wise deletion (see above). When individual factors were specified, $N = 5284$ for all factors excepting fragility and dependence which included item 72 (where $N = 5090$).
the seven dimensions of learning power between the mixed age and the adult groups could be examined, as well as the relationships between the factors. The Cronbach’s α for the 90 items was 0.901, suggesting that the items contributed consistently to learning power across the data bank (Field 2004).

A PCA with Oblimin rotation and Kaiser normalisation was performed (Field 2004) which produced 18 factors that accounted for 50.73% of the total variance. The assessment of the overall KMO was 0.936 and Bartlett’s test of sphericity was significant (df = 4005; \( p \leq 0.000 \)), supporting the factorability of the correlation matrix. The rotation converged in 51 iterations.

On detailed examination, the items within each factor comprised groups of items that aligned conceptually to aspects of the learning power dimensions assessed within the original scales. A careful mapping of these 18 components onto the seven dimensions suggests a rich internal structure to each dimension and ways which the internal profile of each scale may be different from the response patterns for the under 18s. Table 5 shows the factor labels and number of items loading at more than 0.4.

What was of interest in this exploratory factor analysis was the contribution it makes to understanding of the nature of the seven dimensions because scales which in the under 18 version of ELLI emerged from one factor are now differentiated, giving greater insight into the meaning of each dimension. This is presented in Table 6.

### Relationship between scales

Theoretically, the concept of learning power has been described as one complex entity which can be understood through a number of dimensions – an important consideration in the design of this instrument. In terms of feedback for learning, a rich and nuanced language provides greater discretion for individuals and their tutors, preventing a crude ‘on–off’ analysis, or a tendency to use the instrument for labelling and grading (Deakin Crick 2007). There are, however, benefits associated with independent scales (Maxwell and Delaney 2003) which would be useful for research studies. Our final computation in

<table>
<thead>
<tr>
<th>Learning power scale</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Changing and learning</td>
<td>3</td>
</tr>
<tr>
<td>2 Fragility and dependence</td>
<td>7</td>
</tr>
<tr>
<td>3 Learning relationships</td>
<td>6</td>
</tr>
<tr>
<td>4 Creativity</td>
<td>5</td>
</tr>
<tr>
<td>5 Learning relationships</td>
<td>4</td>
</tr>
<tr>
<td>6 Strategic awareness</td>
<td>3</td>
</tr>
<tr>
<td>7 Learning relationships</td>
<td>6</td>
</tr>
<tr>
<td>8 Strategic awareness</td>
<td>3</td>
</tr>
<tr>
<td>9 Meaning making</td>
<td>3</td>
</tr>
<tr>
<td>10 Creativity</td>
<td>5</td>
</tr>
<tr>
<td>11 Learning relationships</td>
<td>1</td>
</tr>
<tr>
<td>12 Fragility and dependence</td>
<td>4</td>
</tr>
<tr>
<td>13 Fragility and dependence</td>
<td>4</td>
</tr>
<tr>
<td>14 Critical curiosity</td>
<td>4</td>
</tr>
<tr>
<td>15 Changing and learning</td>
<td>1</td>
</tr>
<tr>
<td>16 Meaning making</td>
<td>2</td>
</tr>
<tr>
<td>17 Meaning making</td>
<td>4</td>
</tr>
<tr>
<td>18 Learning relationships</td>
<td>2</td>
</tr>
</tbody>
</table>
this study, therefore, was to explore whether there are two independent scales: a ‘negative’ learning power scale, learning fragility and dependence and contrasting ‘positive’ learning power scale.

The analysis returned two factors which accounted for 21.87% of the variance. The KMO was 0.936 and the Bartlett’s test of sphericity was significant (df = 4005; \( p \leq 0.000 \)). By taking items which loaded at 0.4 and above on each factor, we were able to achieve a ‘learning power’ scale comprising 34 items and a ‘learning fragility’ scale comprising 20 items. There was a very weak correlation between the two scales (\( r = 0.067 \)) which supports the use of the learning power composite and the learning fragility as separate scales. The learning power composite scale returned a Cronbach’s \( \alpha \) reliability coefficient of 0.906, whilst the learning fragility scale returned a Cronbach’s \( \alpha \) reliability of 0.880, indicating the internal coherence of each scale.

These scales, which can be derived for statistical purposes from the ELLI Adult Version 2.0 Inventory, will make a stronger contribution to large-scale statistical studies, whilst the full ELLI Adult 2.0 version is more appropriate for feedback to users.

**Improving the instrument**

A more detailed examination of reliability and validity on an item-by-item basis led to the development of a new version of ELLI for adult populations (ELLI Standard Release Table 6. Factors contributing to ELLI scales.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Factor</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing and learning</td>
<td>1 and 15</td>
<td>Factor 1 is about changing and growing. Factor 15 is about lifelong learning.</td>
</tr>
<tr>
<td>Fragility and dependence</td>
<td>2, 12 and 13</td>
<td>Factors 2 and 12 reflect on dependence passivity in learning and negative self-orientation. Factor 13 is about fragility and brittleness in learning.</td>
</tr>
<tr>
<td>Learning relationships</td>
<td>3, 5, 7, 11 and 18</td>
<td>Factor 3 is about working alone. Factor 5 is about emotional support in learning from close family and friends. Factor 7 is about discussing and debating problems with colleague or friends. Factor 11 is about respecting other people’s views, and Factor 18 is about easy relationships in learning.</td>
</tr>
<tr>
<td>Creativity</td>
<td>4 and 10</td>
<td>Factor 4 is about trying things out differently, playfulness and risk-taking. Factor 10 is about imagination and intuition in learning.</td>
</tr>
<tr>
<td>Strategic awareness</td>
<td>6 and 8</td>
<td>Factor 6 is about being able to manage the processes of learning, e.g. how long something might take, and managing the feelings associated with challenge. Factor 8 is about an agency in taking responsibility for learning processes and procedures.</td>
</tr>
<tr>
<td>Meaning making</td>
<td>9, 16 and 17</td>
<td>Factor 9 is about sense-making. Factor 16 is about learning that really matters to me emotionally. Factor 17 is about making connections in learning particularly over time building on what is already known.</td>
</tr>
<tr>
<td>Critical curiosity</td>
<td>14</td>
<td>This factor remains very similar to the under-18 scale and is about liking to bring discretionary energy to learning tasks in order to understand and ‘get to the bottom’ of something.</td>
</tr>
</tbody>
</table>
Version 2). Items reporting factor loadings < 0.4 or reducing the Cronbach’s $\alpha$ coefficient of the scale were removed. Items which appeared to load onto dimensions other than those established previously were recategorised, e.g. item 54 ‘I often change the way I do things as a result of what I have learned’ was reclassified from ‘strategic awareness’ to ‘changing and learning’. This led to ELLI version 2 (referred to as ELLI Adult Standard Release Version 2) in which 67 of the ‘common 72 items’ were used, plus 4 from the ‘passive’ items, and we created 3 new items for meaning making in order to test these in future datasets. On rerunning, the SPSS analyses above for ELLI v2, further reliability and factor statistics were determined (Table 7 below). The mean values and standard deviations for the dimensions remained largely comparable. Cronbach’s $\alpha$ increased for all dimensions, excepting creativity and strategic awareness which both exhibited very slight reductions – although such shifts may be considered negligible (Field 2004).

**Discussion of findings**

In this section, we summarise the findings from this study and discuss the application of learning power as an enabler of employee learning and change with a view to the improvement of employee effectiveness and its potential contribution to corporate performance.

First, the empirical evidence reported above shows that the seven dimensions of learning power and our ability to measure them consistently in adult learners using ELLI are reliable and valid in this population. We can conclude that the seven dimensions originally identified in younger populations for the purpose of enabling their learning in formal education can be applied to adults as learners and the improvement of their learning power in the world of work.

What is interesting is that with the adult population it is possible to be clearer about the constitution of each dimension and the differences between the under 18 version and the adult version. Fragility and dependence as a scale remains a strong, single factor that is negatively correlated with the positive learning power dimensions. Learning relationships for adults are complex and be understood in different ways: first the interactive elements of discussing and debating learning with colleagues or friends, and second the need for emotional support in learning from close family and friends. Then, there is the ability to work independently at times and finally the capacity to learn from other people’s ideas. Creativity has two parts: first trying things out, risk-taking and lateral thinking, together with use of image and metaphor and second the use of intuition and imagination. Meaning making is clear theoretically from this study as the tendency to make connections in

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Cronbach’s $\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing and learning (5 items)</td>
<td>16.14</td>
<td>2.7319</td>
<td>0.730</td>
</tr>
<tr>
<td>Critical curiosity (8 items)</td>
<td>22.70</td>
<td>4.212</td>
<td>0.724</td>
</tr>
<tr>
<td>Meaning making (7 items)</td>
<td>22.68</td>
<td>3.346</td>
<td>0.662</td>
</tr>
<tr>
<td>Creativity (9 items)</td>
<td>25.80</td>
<td>5.016</td>
<td>0.797</td>
</tr>
<tr>
<td>Learning relationships (10 items)</td>
<td>29.58</td>
<td>5.371</td>
<td>0.764</td>
</tr>
<tr>
<td>Strategic awareness (12 items)</td>
<td>34.77</td>
<td>5.896</td>
<td>0.805</td>
</tr>
<tr>
<td>Fragility and dependence (20 items)</td>
<td>48.82</td>
<td>10.023</td>
<td>0.872</td>
</tr>
</tbody>
</table>

*Overall $N$ was 5284 when data were examined as a whole to minimise list-wise deletion. When individual factors were specified, $N = 5284$ for all factors excepting fragility and dependence which included items that only exist in 90-item version of ELLI (where $N = 3471$).*
learning over time and to build on what is already known, and second about learning that matters emotionally to the learner. In terms of the factor loadings, fragility and dependence came first, followed by meaning making and strategic awareness, then learning relationships and creativity. In the school-age population, changing and learning was first, whilst strategic awareness and fragility and dependence were last (Deakin Crick et al. 2004; Deakin Crick and Yu 2008).

These findings require further study, particularly the internal relationships between the scales and the structure of learning power as an entity. Learning relationships is the most complex and could be the focus of a study in its own right.

These findings are relevant for the application of learning power assessment and strategies in the workplace, particularly in terms of learning relationships. Creating a workplace culture where learning together is the norm, and conversations about one’s own learning and the learning of the team are common place is one obvious example. However, the time and space for reflection and conversation about learning on tasks at work are also likely to be important since it is through trusted relationships and dialogue, including coaching, that learning power is best strengthened (Deakin Crick 2007, 2009).

As the seven dimensions are dispositions, attitudes and qualities that lie deeper in the concept of personality than competences, skills and behaviours, for example, it is also relevant to acknowledge that a coaching conversation around a person’s learning power profile can make a contribution to the formation of identity at work – a more confident sense of ‘who I am’ – as well as the development of more effective learning practices associated with each of the dimensions – a more effective approach to ‘how I learn’.

The holistic nature of the seven dimensions – that they include ‘how I think, how I feel and what I do’ – and the life-long/career-long and life-wide/career-wide role that the capacity to learn plays in our lives both point to the benefits that an improvement in learning power might make in enabling sustainable and transferable improvements in individual and corporate performance.

It is already well accepted that employees need to learn and change as well as perform and improve – the use of performance management systems with a combined focus on ‘performance objectives’ and ‘personal development plans’ is a common practice in the world of work. So, it would be a natural innovation for organisations to consider by how much more they could facilitate employees’ performance and development by improving employees’ capacity to learn using a research-validated model like learning power and a reliable instrument for assessing it such as ELLI. Whilst the application of learning power in enabling performance and development generally makes logical sense, the real value of an improvement in employee learning power is likely to be realised in the context of specific work-based learning and performance-improvement programmes and projects. Examples might include the following:

- Improve employee engagement with individualised investment in employee development.
- Ensure critical talent, and future successors are helped to realise their full potential.
- Create a learning culture in which everyone is open to and engaged in learning.
- Improve processes and enable employees to implement and adapt to change.

Where employees take part in structured learning and development programmes, the assessment and improvement of learning power might be used to enable the successful achievement of both individual and corporately determined learning outcomes. These might include the following:
apprentice development and technical skill programmes; 
- talent pool development to ensure high potential is fully realised; 
- professional and functional knowledge and skills development; 
- executive coaching in support of succession planning.

We know, however (Handfield-Jones 2000), that the greater proportion of effective development at work takes place on the job itself rather in the classroom. For this reason, it would make sense for the improvement of learning power to be integrated within the working relationship between employees and their immediate supervisor. For this to work, as with so many performance-improvement innovations, organisations will need to embed an understanding of learning power and how to improve it in the capability and language required of leaders at every level. And, given that a recent generation of leadership development has equipped leaders with the generic ability to coach those they lead, it would be a natural evolution of current good practice to equip leaders with more precise ‘coaching for learning’ skills to complement their established ‘coaching for performance’ capability.

A number of good practice examples are emerging including one in which a major UK retail company is working with the University of Bristol, the Open University and ASDAN. In this project, learning power and enquiry-led learning are the ‘core curriculum’ for all employees, who are able to acquire credits aligned to the national qualification framework – from entry-level credits for operational staff through to Masters level credits for senior professional and managerial staff.

Conclusions
From its origins in the world of education, the concept of learning power and its assessment tool, ELLI, offer research-validated promise for corporate organisations that are seeking next generation innovation in employee learning. The link between higher employee engagement and higher performance – notably in financial measures – and the high engagement value placed on learning opportunities by employees indicate the potential corporate benefit of innovations that increase engagement in learning. This paper has provided the evidence that supports the valid application of learning power at work and presented the argument for embedding it within performance management, learning and development and more importantly, within the relationship between employees and their leaders.

As organisations and HR leaders look for the next generation of innovation in human performance, we propose that the research-validated proposition in learning power and its potential role in enabling individual and corporate performance that is sustainable in today’s complex world are worthy of their attention.

Acknowledgements
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References


### Appendix 1. Sample of items used in the seven scales

**Changing and learning**

I expect to go on learning for a long time.

I like to be able to improve the way I do things.

I’m continually improving as a learner.
Critical curiosity
I don’t like to accept an answer till I have worked it out for myself.
I like to question the things I am learning.
Getting to the bottom of things is more important to me than getting the perfect result.

Meaning-making
I like to learn about things that really matter to me.
I like it when I can make connections between new things I am learning and things I already know.
I like learning new things when I can see how they make sense for me in my life.

Creativity
I get my best ideas when I just let my mind float free.
If I wait quietly, good ideas sometimes just come to me.
I like to try out new learning in different ways.

Strategic awareness
If I get stuck with a task, I can usually think of something to do to get round the problem.
If I do get distressed when I’m learning, I’m quite good at making myself feel better.
I think about everything that I will need before I begin a task.

Learning relationships
I like working on problems with other people.
I can usually work well with people I have just met.
There is at least one person in my community/social network who is an important guide for me in my learning.

Fragility and dependence
When I have trouble learning something, I tend to get upset.
When I have to struggle to learn something, I think it’s probably because I’m not very intelligent.
When I’m stuck, I don’t usually know what to do about it.

Glossary
Exploratory Factor Analysis: A means by which covariance, correlations and partial correlations are used to determine any underlying commonality in how people respond to questionnaire items. Where commonalities exist, questionnaire items can be grouped together into factors, the precise nature of which can be determined through examining the questions associated with each item within that factor.

Confirmatory factor analysis: Where previous research has shown through analysis or suggests through theoretical argument that a number of factors may underpin some construct.

Cronbach alpha: A measure of the internal consistency of a scale, dimension or factor. It can vary between 0 and 1, where lower values indicate greater variability across items purported to measure the same construct. If items are indeed tapping into the same construct or factor, some degree of consistency in response patterns for items in this factor would be expected – thus giving a higher Cronbach’s alpha value.

Varimax rotation: An orthogonal rotation method, i.e. a procedure which minimises the correlations between factors.
**Kaiser normalisation**: A procedure allowing factors to be developed without undue distortion from individual items.

**Kaiser-Meyer-Olkin (KMO)**: This statistic is a means through which ‘sampling adequacy’ can be gauged, i.e. whether the underlying correlation and partial correlation calculations suggest data are suitable for factor analysis. It is possible to calculate a KMO statistic for individual variables in a dataset and an overall KMO statistic can also be calculated for groups of variables. KMO statistic values range from 0 to 1.0, where lower values suggest less coherence or ‘sampling adequacy’. A KMO value of 0.6-0.7 or above is generally considered to support the use of factor analysis methods (Field 2004; Nunnaly 1978).

**Bartletts Test of Sphericity**: This is a test which is used in factor analysis to test whether a correlation matrix might be considered to be an identity matrix (in which between item correlations lie at 0 and items correlate perfectly with themselves. An identity matrix would show that the items were highly uncorrelated). A statistically significant result (\(p > 0.05\)) indicates that there are correlations between variables. This is required before a factor analysis can proceed.

**Latent and passive items**: Interchangeable terms which refer to ELLI items additional to the core dataset or ‘common 72’.