

The relationship between learning potential, English language proficiency and work-related training test results

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Abstract

The first objective of the study was to determine whether there is a relationship between a test of learning potential, the Learning Potential Computerised Adaptive Test (LPCAT), and language proficiency as measured by the Proficiency Test English Second Language. The second objective was to establish whether learning potential and English language proficiency were predictors of the number of job-related training tests that respondents passed after job-related training. The sample consisted of 52 production employees at a polymers company. Strong relationships between learning potential and English language proficiency were confirmed by means of correlations representing medium to large effect sizes. No support was found for the hypotheses relating to the predictive validity of the LPCAT and the Proficiency Test English Second Language when the criteria were training results as defined in the present study.

1 Introduction

The World Competitiveness scorecard (Garelli 2007) highlighted the “horizontal” relationships between nations based on 286 criteria related to economic performance (including employment rates), the efficiency of government administration, business efficiency (education and productivity of the workforce) and infrastructure. In this report South Africa was ranked 50th out of 55 countries. In 2001 South Africa was ranked 42nd out of 49 countries (Garelli 2001). This clearly indicates that the country is not regarded as competitive as far as its workers’ level of education and productivity is concerned. In a global market, the best human capital is drawn towards countries that appear attractive as business locations and hubs of investment.

In a knowledge-based economy, the most competitive nations also have the power to attract the best people. In the case of South Africa, many skilled workers leave the country for more prosperous working environments and better opportunities (Garelli 2001, 2007). South Africa’s need for skills training is reflected in the fact that it is rated close to the bottom for total public expenditure on education as a percentage of gross

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domestic product (Garelli 2007). This problem can only be addressed by continuous investment in training and competence (Lessing & Maritz 2001; Paloniemi 2006), because competitive organisations require a focus on capability rather than on structure, rules and roles (Rhodes & Shiel 2007). Work-related training for improving relevant competencies is an important feature of lifelong learning (Coetzer 2006, 2007; Rhodes & Shiel 2007).

2 Learning potential assessment

To ensure that training and education are aimed at potentially the most responsive and deserving individuals, it is essential that such individuals have the potential to develop the required skills and abilities. In view of the high levels of cognitive ability currently needed as a result of changes in the marketplace, cognitive assessment is being used widely for selection, training and placement purposes. In South Africa the approach to cognitive assessment has to be considered carefully in view of the cultural diversity of the South African population, coupled with the varying educational opportunities and discriminatory practices of the apartheid era. The measurement of learning potential, rather than the measurement of innate and learned aptitudes, is increasingly being used in South Africa for the assessment of cognitive functioning (Murphy 2002). Many standard cognitive tests are problematic, because they measure current cognitive abilities, and do not assess individuals' capacity to apply acquired skills, strategies and operations in new situations (Feuerstein, Feuerstein & Gross 1997; Foxcroft 1997). This situation has given rise to techniques referred to as culture-fair, such as learning potential assessment (Budoff 1986; Murphy 2002, 2007; Taylor 1994).

It is known that individuals from particular ethnocultural and low socioeconomic subgroups regularly perform below the typical or average levels of functioning on cognitive tests (Claassen 1997) and therefore the use of conventional tests for these subcultures has become questionable (Taylor 1994). Low scores on standard cognitive tests can be ascribed to a number of factors other than manifest levels of ability (Gupta & Coxhead 1988). For instance, the scores of intelligence tests correlate with the amount and quality of schooling received (Sternberg 1997). Test scores may also be influenced by perceptions of the testing process, low expectations of success, speed requirements, poor test taking skills and unfamiliar content of test items (Budoff 1986). Improper and inappropriately mediated learning experiences or guidance may furthermore lead to cognitive limitations (Narrol & Giblon 1984). These concerns suggest that conventional cognitive tests such as intelligence tests may be inappropriate for historically disadvantaged individuals and that these tests can also be damaging when individuals are led to believe that they do not have the ability to perform certain tasks (Feuerstein 1979; Murphy 2007).

To address the limitations of conventional intelligence testing, learning potential assessment has been developed as an alternative strategy for the assessment of cognitive functioning (Feuerstein 1979; Murphy 2002, 2007). Potential is often defined as individuals' unrevealed innate capacities, which are probably greater than their manifest level of functioning (Feuerstein, Feuerstein & Gross 1997). Learning potential assessment measures individuals' present levels of ability as well as their potential for improvement with help (Haywood & Tzurriel 1992). This definition of learning potential implies that some form of training that allows for differences in prior learning experiences must be incorporated into the way in which learning potential is measured. This approach to learning potential testing is called dynamic assessment and is based

on Vygotsky's concepts of proximal and actual levels of development (Haywood & Tzurriel 1992; Lidz 1997; Vygotsky 1978).

The measurement of learning potential comprises two distinct approaches, namely the enrichment approach adhered to by Feuerstein, Rand, Jensen, Kaniel and Tzurriel (1987), in which testing is used to diagnose and change the thinking processes of the individual, and the psychometric approach, which is geared to measurement rather than enrichment (De Beer 2006). In the psychometric approach, learning potential tests are standardised to ensure measurement accuracy to allow for comparison between individuals. These tests focus on current and improved levels of functioning to evaluate the capacity for acquiring new skills or knowledge when training is provided (De Beer 2000a).

The psychometric approach to the measurement of learning potential is based on Vygotsky's zone of proximal development (ZPD) and zone of actual development theory (similar to Feuerstein's enrichment approach), but the measurement component is emphasised. A pretest provides the actual developmental level, whereas the difference between a post-test and the pretest is taken as the ZPD measure (De Beer 2000a). Learning potential is a combination of the two (De Beer 2006). The psychometric approach has been used effectively for the development of learning potential measuring instruments in South Africa (De Beer 2000a; Murphy 2002; Taylor 1997).

A recent innovation in the field of cognitive assessment has been the development of adaptive testing (De Beer 2006, 2007; Ittenbach, Esters & Wainer 1997). The availability of computer technology and item response theory (IRT) has made computerised adaptive testing possible. As applied to this study, IRT is used to predict the likelihood that an examinee will answer a particular item correctly. Computerised adaptive testing was the method used by De Beer (2000a) to construct, standardise and evaluate the Learning Potential Computerised Adaptive Test (LPCAT) for the measurement of learning potential aimed at a target population of individuals from all the cultural groups in South Africa. Training was incorporated into the assessment procedure. The primary aim of testing was not to modify the cognitive ability of the examinees, but to obtain accurate assessments of current and projected future levels of reasoning ability.

Another very important factor that may influence the test performance of individuals is language, particularly when the test is not administered in people's home language. Language proficiency is also of particular importance when individuals receive their training in a different language (Abrahams & Mauer 1999; Foxcroft 1997). In multilingual South Africa, fair testing practices require the testing of individuals' language proficiency in the language in which the test is to be administered. English is used as the business language and is also the most common language of communication between the various South African population groups. However, when English is not the home language of individuals, English language proficiency influences their learning, training and performance (Huysamen 1999; Van Eeden, De Beer & Coetzee 2001; Van Rooyen 2001). Despite the fact that all of the 11 South African languages have the same status, most black people currently prefer to receive their education in English (Rossouw 1999). The acquisition of second language literacy is influenced by proficiency in the first language, the incentive to learn the second language, as well as cultural determinants. To be academically literate, second language Englishspeakers need to master English for academic purposes over and above English as a second language (Gruenewaldt 1999). It is clear that language

proficiency is a determining factor that influences individuals' performance and that this issue should be addressed during assessment.

3 Research context

A safety incident at a company that produces polymers led to the realisation that appropriate training for staff was a key factor in avoiding future incidents. Training shifts were subsequently introduced whereby each production employee underwent 38 hours of formal training per month in order to complete 165 competency tests and assessments based on unit standards accredited by the Chemical Industries Education and Training Authority (CHIETA), (CHIETA 2007). The progress per employee per month on the tests and assessments was monitored and reported. The training test results improved from a mean number of tests passed of 61,27 on 1 December 2000 to 101,71 on 31 December 2001, that is a mean improvement of 40,44 tests passed within a time span of 13 months. The maximum improvement by any individual employee was 99 additional tests passed and the minimum improvement of any particular individual was one additional test.

In view of the variability of the work-related training results obtained among the group of production employees, it was decided to investigate possible reasons for these differences. The extra training and assessments were costly in terms of time and money. It was therefore important to establish why the training was evidently successful for some employees, but not for others. It was observed that some employees with many years of service did not make adequate progress with the tests, whereas some newly appointed employees advanced at a rapid pace.

Although it was recognised that the training results may have been influenced by various factors, a decision was made to investigate the influence of only two such factors, namely learning potential and English language proficiency. These factors were chosen on the basis of the review of the literature, which indicated the relevance of learning potential in the training of skilled workers. Similarly, English language proficiency was regarded as important, because only five of the production employees in the sample were English mother tongue speakers. All of the training material, tests and assessments were conducted in English and therefore it was decided that English proficiency should be investigated as a possible moderating factor.

The objectives of the present study were therefore to determine whether there is a relationship between a test of learning potential and a measure of language proficiency. A second objective was to establish whether learning potential and English language proficiency were predictors of the number of job-related tests that respondents were able to pass or progress made with job-related training.

4 Method

4.1 Research design

In the empirical field study a series of measurements were obtained from a sample of employees. The nature of the measurements and the statistical analysis of the data indicate that a quantitative correlational research design was used.

4.2 Respondents

The sample consisted of 52 production employees of a polymers company. With the exception of two employees who were absent on the days of testing, the entire production workforce who were obliged to complete the work-related tests participated in the study. They were informed of the aims of this research project and permission to use their results was obtained. All the respondents were males, but they differed with regard to the other biographical variables. Their ages varied from 20 to 59 years and the mean age was 32,58 years. With regard to the racial composition of the sample, it was found that the sample was not culturally representative of the South African population (owing to a disproportionately large percentage of whites), nor was it representative of the employees of the polymers company as a whole. The decision to include English language proficiency as a predictor was reinforced when the home language distribution of the sample was observed. Forty-seven percent were Afrikaans-speaking, 43% used an African language as their home language and only 10% were English-speaking.

The work-related experience of the respondents in terms of years of service at the company varied from one to 13 years. Twenty-nine of the respondents (55,77%) had been employed for six or more years. The majority of respondents (N=41 or 78,80%) had received 12 years or more of formal education – making this sample a reasonably highly qualified group.

4.3 Measures

The independent variables of the study were learning potential, English language proficiency, years of education, age and years of work experience. Learning potential was measured by the Learning Potential Computerised Adaptive Test (LPCAT) and English language proficiency was measured by the Proficiency Test English Second Language (Advanced Level). The dependent variable was progress made in training and was measured by means of work-related training tests. Biographical information on the respondents (age, years of relevant experience, culture, home language and years of formal education) was obtained from personnel records.

4.3.1 Learning Potential Computerised Adaptive Test (LPCAT)

The LPCAT was developed by De Beer (2000a; 2006) specifically to address concerns about the comparability of cognitive test scores across cultures in South Africa. It measures learning potential in the domain of nonverbal figural reasoning ability and was published in 2000. In its development emphasis was placed on achieving cultural fairness, in line with the requirements subsequently stipulated in the Employment Equity Act 55 of 1998, by using nonverbal figural item content in an attempt to minimise the influence of language proficiency and prior scholastic learning opportunities. The LPCAT can be used for all cultural groups in South Africa as a screening instrument. It measures individuals' present levels of general non-verbal reasoning ability as well as the extent to which they are able to improve upon this level when relevant training is provided (De Beer 2000c). The item types used in the LPCAT are figure analogies, pattern completion and figure series items, similar to figural items typically found in many non-verbal cognitive ability tests.

The LPCAT makes use of a dynamic test-train-retest format which is based on Vygotsky's theory of the zone of proximal development, which is the difference in performance levels and learning that can be measured with and without help. By

means of computerised adaptive test techniques based on item response theory, test items are selected according to the appropriate level of difficulty to match the estimated level of ability of the individual being tested (De Beer 2000b). The advantage of using this approach is that the total testing time is reduced by matching the items presented to the level of the examinee, thus requiring fewer items than standard tests to achieve comparable measurement accuracy. The number of items administered per individual is therefore reduced. The LPCAT administers between eight and 12 items in the pretest, depending on the individual's performance, and between ten and 18 items in the post-test. The test has a specific starting point. Based on the examinee's responses, additional items are selected from a database of items of known difficulty. When an item is answered incorrectly, the estimated ability is adjusted downwards and the next question administered is an easier one. The opposite happens when questions are answered correctly. Finally, test termination is based on the number of items that have been administered and the accuracy index of the ability estimation (De Beer 2000c).

Two forms of the test are available. One version is a "text-on-screen" one, where examinees read the instructions and feedback by themselves (in English or Afrikaans), whereas in the second version, no language appears on the screen and instructions are read to the examinees in any of the 11 official South African languages. The "text-on-screen" LPCAT can be used for respondents with an English or Afrikaans reading proficiency level of at least Grade 6. For this version of the test instructions, explanations and feedback on examples are provided in text format on the computer screen. No computer literacy is required, because only the space bar and enter key are used by the respondents. The "text-on-screen" version of the test was used in the present study, because the lowest educational level of any of the respondents in the sample was Grade 10.

Individual test results consist of four scores: pretest scores, post-test scores, difference scores (referred to as ZPD) and composite scores, which are combined scores incorporating pretest scores and proportional credits for improvement that took place during the test. Composite scores were used for the present study, because this option allows for the comparison of individuals at different levels of performance and with different ZPD scores (De Beer 2000b). For this study the scores were expressed as T scores. The norms provided indicate that T scores on the LPCAT of 52 and 55 relate to nonverbal reasoning ability equivalent to NQF Levels 4 (Grade 12) and 5 (tertiary level diplomas) respectively (De Beer 2003).

Internal consistency reliabilities ranging from 0,92 to 0,98 have been obtained for the LPCAT (De Beer 2000c). In addition, construct and predictive validity studies have provided further evidence in support of the psychometric soundness of the LPCAT (De Beer 2003, 2006).

4.3.2 *Proficiency Test English Second Language (Advanced Level)*

The Proficiency Test English Second Language (Advanced Level) for Grades 10, 11 and 12 was developed by the Human Sciences Research Council in response to the needs of education departments (Chamberlain & Van der Schyff 1991). It was included in the study because it was expected that proficiency in English might affect some individuals' training test results. The test consists of 40 multiple-choice items, measures the level of general language development of respondents and is not based on any specific syllabus. The aspects of language proficiency being measured include reading comprehension through the denotation and connotation of words, phrases, sentences

and reading passages. It also focuses on acceptable language usage. An internal consistency reliability coefficient of 0,89 had previously been obtained for this test and there was validity evidence for its content validity (Chamberlain & Van der Schyff 1991).

4.3.3 Work-related training tests

Progress being made during training was measured by means of work-related training tests and assessments that were based on the generic unit standards for the chemical industry developed by the CHIETA (CHIETA 2007). The training methodology employed provided employees with a qualification that was transferable between companies. Using as base documents seven generic unit standards of the CHIETA that were applicable to the polymers company where the study was carried out, 165 plant-specific assessment training documents, assessments and tests (called "caps") were developed.

Assessment checklists were drawn up that listed all the items relating to the knowledge and skills required for particular plant-specific assessments and tests. Assessment checklists covered the minimum standards required by the various unit standards, but they also included the additional requirements that were applicable to the business. Hereafter training modules were developed for the assessment checklists to assist learners in their efforts towards assessment. The technical correctness/validity of the modules was confirmed by the process technicians (process experts) and the training technological correctness by the process trainers. The Operations Training Scheme (OTS) modules, developed in the USA for people who need a basic understanding of chemical industries, formed the foundation of the advanced plant-specific training. In addition to the training modules, the candidates were also helped in learning on-the-job, as a coach appointed by the shift manager assisted them. The learners were allowed study time during the formal training days, of which they had five every five weeks. Furthermore, all the employees were allowed three chances to pass a test or assessment.

Seven subject matter experts were trained as assessors by the internal verifier/moderator. Learners required 165 caps altogether for promotion to a journeyman position, for which they were expected to be multi-skilled process artisans. Caps were tests or assessments that were administered by means of computerised multiple-choice tests, handwritten plant-specific tests and plant-specific practical assessments, during which competence had to be demonstrated. The final assessment was evaluated by a panel of assessors.

The test results were captured on a spreadsheet indicating the number of caps obtained per employee per month, as well as the percentage improvement of caps completed per employee per month. No numeric test results were recorded, because a pass rate of 90% was required. The respondents' training progress was therefore measured in terms of the number of caps acquired during a period of 13 months.

No reliability information was available on the work-related tests, but considerable attention was paid by subject matter experts to verifying their content validity. Furthermore, the internal verifier was continuously moderated by the CHIETA.

4.4 Procedure

The LPCAT and Proficiency Test English Second Language were administered over a period of four days to accommodate the shifts worked by the respondents and the

criterion data was obtained from the training department of the polymers company. The timed Proficiency Test English Second Language was administered first, after which the LPCAT was administered for groups of five respondents at a time. Employees that were not available on the testing days were tested individually on a later occasion. The Proficiency Test English Second Language was scored using a scorecard, and the LPCAT results were available electronically.

5 Results

The first step in the analyses entailed computing descriptive statistics for the LPCAT, Proficiency Test English Second Language and the work-related tests. The results are presented in table 1. The LPCAT pretest and post-test scores are indicated as T scores. The mean difference score was equal to 1,59, which represents the magnitude of undeveloped potential. It appears that this group functioned at a reasonably high level of general reasoning ability and that they were generally performing close to their optimal level, as indicated by the relatively small difference score between the pre-test and post-test scores. The composite score is a combined score, incorporating the pretest score and a proportional credit for the improvement that took place during the test. The minimum composite score was 34 and the maximum was 69. When these scores were interpreted using the LPCAT interpretation guidelines (De Beer 2000b), it appeared that the sample varied from ABET Level 1 (Grade 0-3) to NQF Levels 6 to 8 (tertiary degree to advanced degree). The distribution of the composite scores was negatively skewed with a mean of 55,41 (SD=6,70), indicating average performance at a tertiary Technikon level (De Beer 2003, 2006).

Table 1
Descriptive statistics for the LPCAT (N=51), English language proficiency test (N=52) and work-related training tests (N=52)

	M	SD	Minimum	Maximum
LPCAT				
Pretest	55,20	6,59	34	67
Post-test	56,73	7,31	33	72
Composite	55,41	6,70	34	69
Difference	1,59	2,22	-4	6
English Language Proficiency				
English raw	21,31	8,10	9	38
English T score	51,29	9,03	36	73
Training Tests				
Training 1	61,30	37,85	0	124
Training 2	101,71	30,41	33	165
Improvement from T1 to T2	40,44	26,95	1	99

For the Proficiency Test English Second Language Advanced Level, descriptive statistics for raw and T scores are provided in table 1. The distribution of the scores was approximately normal and the mean T score was equal to 51,29 (SD=9,03). These results indicate that the respondents overall demonstrated average language proficiency.

The results for the work-related tests indicate the number of tests passed at the beginning of the 13-month period (Training 1), the number of tests passed at the end of

the period (Training 2), and the improvement over the 13-month period. Newly appointed employees started off with no tests passed, whereas employees with work experience had already passed some tests. The minimum number of tests passed at the end of the training period was 33 tests and the maximum was 165. The mean improvement was 40,44 caps (SD=26,95). The production employee with the poorest improvement managed to achieve only one additional cap over the 13-month period. However this employee started at 122 caps and improved to 123, whereas the employee with the best improvement passed an additional 99 tests, having started at a total of 0 caps and finally achieving 99 caps at the end of the training period. The mean of caps attained at Training 1 was 61,30, but this mean improved to 101,71 caps at Training 2. This indicates that the dedicated time allowed for training in the company did show positive effects in terms of the overall training results achieved.

In the second step of the analyses the correlations between years of work experience, years of education, age, LPCAT scores, English Language Proficiency and the work-related tests were computed. The Pearson correlations and two-tailed p values are reported in table 2. In view of the relatively small sample size, Spearman rank correlations were also computed. In general, the Spearman correlations were somewhat larger than the Pearson correlations, but these differences did not materially affect the statistical significance of the results, with the exception of the correlations of years of work experience with the LPCAT post-test and composite scores. Unless indicated otherwise, the Pearson correlations are commented on.

The intercorrelations between the pretest, post-test and composite LPCAT results were strong and highly significant, and they ranged between 0,96 and 1,00. The LPCAT difference scores did not correlate significantly with the LPCAT pretest scores, nor with the composite scores. However, the correlation of 0,46 ($p=0,001$) between the LPCAT difference scores and post-test scores approached a large effect size. There was also a strong positive correlation between Training 1 and Training 2 ($r=0,71$, $p<0,001$), but the correlation between Training 1 and Training Improvement was strong and negative ($r=-0,61$, $p<0,001$). Training 2 and Training Improvement was uncorrelated.

Raw scores on the English Language Proficiency test correlated strongly with all of the LPCAT scores, namely 0,45 ($p<0,001$) with the LPCAT pretest, 0,51 ($p<0,001$) with the LPCAT post-test, 0,46 ($p<0,001$) with the LPCAT composite, and 0,41 with the LPCAT difference scores. These results provide strong support for the hypothesised relationships between English language proficiency and learning potential, because the correlations represented medium to large effect sizes.

Similarly, years of education correlated statistically significantly with the LPCAT pretest ($r=0,29$, $p=0,04$) as expected, but the magnitude of the correlations failed to reach statistical significance in the case of the LPCAT post-test and composite when the Pearson correlations are considered. The Spearman correlations were statistically significant in these instances. The LPCAT difference scores were uncorrelated with years of education ($r=0,01$, $p=0,967$). The negative correlation obtained between years of education and Training 2 ($r=-0,30$, $p=0,03$) was unexpected. The correlation between years of education and Training 1 was also negative, but not statistically significant ($r=-0,25$, $p=0,07$).

Table 2
Correlations between years of work experience, years of education, LPCAT, English language proficiency test and work-related training tests

Variable	Correlation	Age	Years of work exp.	Years of education	English raw	LPCAT pretest	LPCAT post-test	LPCAT composite	LPCAT Diff.	Training 1	Training 2	Improvement
Age	Pearson	1,00										
	Spearman	1,00										
Years work experience	Pearson	0,75** (0,000)	1,00									
	Spearman	0,77** (0,000)	1,00									
Years of education	Pearson	-0,52** (0,000)	-0,61** (0,000)	1,00								
	Spearman	-0,60** (0,000)	-0,59** (0,000)	1,00								
English raw	Pearson	-0,23 (0,104)	-0,23 (0,101)	0,16 (0,259)	1,00							
	Spearman	-0,24 (0,084)	-0,21 (0,134)	0,25 (0,081)	1,00							
LPCAT pretest	Pearson	-0,49** (0,001)	-0,42** (0,002)	0,29* (0,043)	0,45** (0,001)	1,00						
	Spearman	-0,53** (0,000)	-0,46** (0,001)	0,36** (0,009)	0,42** (0,002)	1,00						
LPCAT post-test	Pearson	-0,46** (0,001)	-0,38** (0,006)	0,26 (0,065)	0,51** (0,000)	0,96** (0,000)	1,00					
	Spearman	-0,52** (0,000)	-0,40** (0,004)	0,32* (0,024)	0,52** (0,000)	0,89** (0,000)	1,00					
LPCAT composite	Pearson	-0,50** (0,000)	-0,42** (0,002)	0,27 (0,057)	0,46** (0,001)	1,00** (0,000)	0,97** (0,000)	1,00				
	Spearman	-0,54** (0,000)	-0,45** (0,001)	0,35* (0,012)	0,42** (0,002)	0,99** (0,000)	0,91** (0,000)	1,00				
LPCAT diff.	Pearson	-0,03 (0,854)	0,01 (0,955)	0,01 (0,967)	0,41** (0,003)	0,18 (0,205)	0,46** (0,001)	0,22 (0,118)	1,00			
	Spearman	-0,06 (0,669)	-0,02 (0,888)	0,04 (0,775)	0,37** (0,008)	0,05 (0,714)	0,42** (0,002)	-0,09 (0,544)	1,00			
Training 1	Pearson	0,11 (0,442)	0,11 (0,440)	-0,25 (0,071)	0,05 (0,752)	0,05 (0,709)	0,07 (0,611)	0,07 (0,629)	0,04 (0,797)	1,00		
	Spearman	0,11 (0,437)	0,13 (0,361)	-0,25 (0,069)	0,05 (0,752)	-0,08 (0,602)	-0,03 (0,814)	-0,05 (0,743)	0,06 (0,697)	1,00		
Training 2	Pearson	0,20 (0,163)	0,28* (0,048)	-0,30* (0,029)	0,09 (0,511)	0,01 (0,927)	0,07 (0,620)	0,03 (0,856)	0,19 (0,178)	0,71** (0,000)	1,00	
	Spearman	0,27 (0,053)	0,37** (0,007)	-0,30* (0,033)	0,09 (0,532)	-0,24 (0,084)	-0,14 (0,337)	-0,22 (0,130)	0,19 (0,180)	0,75** (0,000)	1,00	
Improvement	Pearson	0,07 (0,630)	0,16 (0,265)	0,01 (0,935)	0,04 (0,767)	-0,06 (0,675)	-0,02 (0,870)	-0,07 (0,636)	0,16 (0,263)	-0,61** (0,000)	0,13 (0,346)	1,00
	Spearman	0,05 (0,739)	0,12 (0,395)	0,07 (0,622)	0,06 (0,658)	-0,04 (0,783)	0,01 (0,960)	-0,05 (0,711)	0,16 (0,275)	-0,61** (0,000)	-0,02 (0,873)	1,00

p values are indicated in parentheses

* Significant at 0,05 level

** Significant at 0,01 level

There was a highly significant positive correlation between age and years of work experience, as could be expected ($r=0,75$, $p<0,001$). However, the correlations of years of education with age ($r=-0,52$, $p<0,001$) and years of work experience ($r=-0,61$, $p<0,001$) were both strong and negative. Furthermore, both age and years of work experience yielded highly significant, albeit negative correlations, ranging between $-0,38$ and $-0,50$, with the LPCAT pretest, post-test and composite scores, but the LPCAT difference scores were uncorrelated with age and years of work experience. Years of work experience also correlated statistically significantly with one of the criterion measures, namely Training 2 ($r=0,28$, $p=0,048$). This correlation approached a medium effect size.

6 Discussion

The first objective of the study was to determine whether there is a relationship between a test of learning potential, the LPCAT, and language proficiency as measured by the Proficiency Test English Second Language. This relationship was confirmed in the present study by means of correlations representing medium to large effect sizes. The second primary objective was to establish whether learning potential and English language proficiency were predictors of the number of job-related test caps that respondents passed following job-related training. No support was found for the hypotheses relating to the predictive validity of the LPCAT and the Proficiency Test English Second Language when the criteria were training results as defined in the present study.

As a secondary objective, the correlations between the various study variables were studied. These correlations revealed a number of notable relationships that shed light on the nature of the variables. In the first instance, the near-unity correlations between the pretest, post-test and composite LPCAT results indicate that the individuals were consistent in their performances in the pre- and post-tests. The negatively skewed distribution of the LPCAT scores and the high levels of education of the sample probably resulted in the respondents already performing close to their optimal levels in terms of the reasoning measured by the LPCAT. Although strong correlations were not expected between the LPCAT difference scores and the other LPCAT scores, the post-test scores did correlate strongly with this variable. In other words, respondents who improved markedly between the two testing sessions tended to obtain higher post-test scores.

The intercorrelations between the training test results indicate that individuals who had obtained a large number of caps at the beginning of the 13-month period also tended to obtain a relatively large number of caps at the end of the training period. It makes sense that the negative correlation between number of caps at the beginning of the 13-month period and number of caps gained during the period (training improvement) represented a large effect size, because one would expect that respondents who started off with a small number of caps would be able to improve the most. However, the lack of correlation between training improvement and the number of caps obtained at the end of the 13-month period also made sense, because all respondents had by then been given the opportunity to attain the maximum number of caps.

The obtained negative correlation between years of education and number of caps attained at the end of the training period appeared to represent a paradox, because they indicate that individuals with fewer years of education tended to score better on

work-related tests than individuals with more years of education. A logical explanation for this result could not be found.

The highly significant negative correlations found between years of education and both age and years of work experience indicate that older and more experienced individuals in the sample generally had lower levels of education than younger individuals with less work experience. The relationships of age and years of work experience with the LPCAT scores indicate that older individuals and those with more years of work experience generally performed at lower levels on the LPCAT than younger individuals and those with fewer years of work experience. This trend is similar to that found in terms of the relationship between education levels and work-related tests.

Despite the earlier mention of the casual observation that some employees with many years' service had not made adequate progress, a significant positive relationship between years of work experience and final training results indicates that individuals who had been working for a long time generally obtained good results in the training caps – possibly indicating that practical experience in the work environment made attainment of the caps easier. Contrary to expectation, a significant negative correlation between years of education and final training results was found, indicating that individuals with lower levels of education obtained better final training results than those with higher levels of education. However, a significant positive correlation between LPCAT scores and years of education indicated that individuals with higher scores on the LPCAT generally had higher levels of education than those with lower scores on the LPCAT.

Furthermore, the highly significant positive correlations between English proficiency and all of the LPCAT scores indicate that individuals with a better command of English performed better in terms of their general non-verbal reasoning and also showed higher improvement scores than those with weaker English proficiency – possibly benefiting more from the training as a result of their higher levels of understanding of the “text-on-screen” training included in the LPCAT training section. Since correlations do not indicate causality, this finding could also be interpreted in the opposite way, namely that the higher the learning potential, the higher the proficiency in English (second) language.

The highly significant positive relationship between initial training results and final training results indicates that individuals who had obtained a high number of caps on their own also obtained a high number of caps when further opportunities and time for training were provided. The highly significant negative relationship between initial training results and improvement in training results indicate that individuals with low initial performance in terms of training results showed more improvement in the number of caps obtained than individuals with high initial performance. This may be an indication that because these individuals started with a relatively low score there were still a large number of caps left for them to obtain. It also indicates that the dedicated training focus during the time may be considered successful in helping individuals achieve the required training outcomes.

In terms of the training results, none of the English Language Proficiency or LPCAT scores correlated significantly with the dependent variable measures, namely the passing of (or improvement in the passing of) work-related tests. In fact, the only statistically significant independent variables presented in table 2 for predicting scores on the work-related tests (the criteria) appeared to be years of education (negative

relationship) and years of work experience (positive relationship) when predicting the number of caps attained at the end of the 13-month period. The fact that employees were allowed up to three chances to pass a test or assessment and that a pass rate of 90% was required should also be kept in mind. In the circumstances, it was decided that conducting multiple regression analyses or simple regression analyses on these data would be redundant.

In terms of the objectives of the present study, a significant positive relationship was found between a test of learning potential and a measure of language proficiency. However, neither learning potential nor English language proficiency was a predictor of the number of job-related tests that respondents passed or progress on job-related training. As other results have shown significant positive correlations between LPCAT results (pretest, post-test and composite scores) and academic performance (De Beer, 2003; Van der Merwe & De Beer, 2006), the current findings are somewhat contradictory. The fact that a significant negative correlation was found between years of education and the final training results, whereas a highly significant positive correlation between years of work experience and final training results was obtained, may indicate that actual practical experience in the particular work environment was more important than qualifications or levels of general reasoning ability in obtaining the caps.

6.1 Limitations

One of the limitations of the study is the small sample size, which – although all but two of the total target group were included – is somewhat small for investigating relationships between variables. Furthermore, the sample could not be considered to be culturally representative of the general South African population or even the company itself. Another limitation to be considered is the restriction of the range of the performance measure in that a pass rate of 90% was required and that participants were given three chances to pass. This could also have impacted on the magnitude of the correlations found, as no statistical corrections were made. Lastly, the training that was provided was very specific to the industry and context of the particular company, which limits generalisation of the results.

6.2 Recommendations

It seems that work experience contributes positively to the attainment of work-related practical training. The fact that work experience was the strongest predictor of achievements in the practical training provides support for the recognition of prior learning in the work environment. Furthermore, there is strong evidence that the dedicated time set aside for employees for training had a positive effect in terms of achieving higher levels of practical training outcomes.

Continued life-long training in the work environment is crucial in improving the competencies and the productivity of workers in the South African context. As indicated in the introduction, South Africa is not rated well in terms of these indicators. Training programmes and the improvement of skills and competencies should be monitored in order to ensure awareness of factors that impact on their effectiveness and to bring about changes where required to optimise results.

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