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Appendix 1 Meta-analysis of South African dynamic assessment research

Section A Meta-analysis

1. Introduction

This meta-analysis has two aims: the first aim is to determine the efficacy of dynamic assessment as intervention strategy to improve on pretest scores as evidenced in South Africa research and secondly to analyse and compare two separate meta-analytic software programmes in terms of their robustness and utility value. The need for such a study is expanded upon below, followed by a brief tour of meta-analysis as technique. The method of data gathering is discussed next and includes a discussion of the reason given for the two-fold purpose of the study. Two software programmes and there subsequent structures are explored, compared and critiqued. The results section tackles the criteria used for inclusion of studies, followed by results from two data runs. A discussion then focuses on the two programmes utilised for the study; a search for potential moderators is included and limitations of the study are viewed. Implications of the results for dynamic assessment research in South Africa are discussed along with recommendations and is then followed by a conclusion which forms the final section. Lastly, an aside to the meta-analysis is included and deals with a potentially rich method of information extraction which is considered useful for assessment in psychology. During 2001-2002 a study was undertaken to detail the then current research situation into dynamic assessment in South Africa (Murphy, 2002; Murphy & Maree, 2006). This study was a narrative exposition on the status on this field of enquiry and did not seek to quantify the results but merely to survey the area.

A meta-analysis was conducted on the studies surveyed during 2001-2002[1] in an attempt to emulate and bring to the field of South African dynamic assessment results similar to those offered by Lussier and Swanson (2002). The aforementioned authors' study yielded more effect sizes than did the present study, due entirely to the paucity of primary studies in this field in South Africa in comparison to the field surveyed by Lussier et al. which included other studies than those conducted in the United States of America (although being limited to English studies). Considering a potential database of 303 articles, Lussier et al. refined their criteria to a point which allowed for only 30 articles to be included in their final analysis. Lussier and Swanson (2002) investigated the degree to which effect sizes, as a function of dynamic assessment as opposed to static assessment, were statistically comparable between ability groups. They also investigated the question of whether the effect size was related to dynamic assessment intervention purely as a methodological artifact or if the effect size was due to the type of research design, intensity of treatment and nature of instructions given. Lussier and Swanson (2002) sourced PSYCINFO for their database of dynamic assessment intervention studies.

Secondly, this South African meta-analysis was deemed timely due to the sufficient number of studies available for such an analysis to be conducted and more importantly the study was warranted based on the unknown summarized significance of the quantitative effect sizes (based on posttest score results). Assessing the efficacy of dynamic assessment interventions within single case studies may not reflect the true cumulative efficacy of such interventions. Meta-analysis is a quantitative statistical review technique, which summarizes the empirical results of any number of studies (Lussier & Swanson, 2002; Wolf, 1987). Isolated studies can never solve any one particular problem and the foundation of scientific progress can be regarded as the accumulation of knowledge gathered from the results of many studies resulting in a quantitative synthesis of research (Hunter, Schmidt & Jackson, 1982; Wolf, 1987). Meta-analysis is an independent specialty within statistics and is specifically suited to the calculation of the various effect sizes emanating from individual studies and determining the significance of the combined effect size (i.e. the cumulated effect size for all samples) (Cooper & Hedges, 1994a). In cumulating each study's effect size the significance of the overall effect size across all studies can be computed. As meta-analysis is a quantitative statistical technique it cannot comment on the qualitative value that dynamic assessment as an intervention strategy offers individuals.

Thirdly, South Africa is unique in terms of the need to assess many prospective tertiary education students, the majority of whom can be considered as previously disadvantaged. Of all learners enrolled in tertiary education institutions in South Africa, 60% are

[1] It was decided to use 2002 as a cut-off point for inclusion of studies into the meta-analysis. Studies included herein range from those conducted in 1961 - 2001. However, it must be noted that only two studies could be found that had since been added to the field of dynamic assessment in South Africa which included the article by Skuy, Gewer, Osrin, Khunou, Fridjon & Rushton (2002) which would have been a welcome addition to this meta-analysis as the empirical study would have added another independent sample finding. These findings were ascertained by searching South African databases, such as the NRF database, SABINET databases including among others, completed masters and doctoral research dissertation and theses, electronic databases, research conducted at Technikons and Universities as well as South African article searches (SAE publications). SABINET is linked to all South African research institutions and only publications that are indexed in individual library collections are included. Thus, this present search did not locate sources which were not indexed. However, any potential null ''file drawer'' results are factored into the meta-analytic results (as originally highlighted by Rosenthal, 1979).

previously disadvantaged students (Department of Education, 2003).[2] In other countries these students are almost always considered the minority in terms of number. There is thus an urgent need to fill the assessment gap for potential tertiary education students and the focus in many of the studies surveyed here have as their sample such individuals.

Murphy (2002) as well as Murphy and Maree (2006) reviewed 29 studies dealing with dynamic assessment in South Africa. Six were purely qualitative studies and one was a validation study. These studies were thus not amenable to a quantitative synthesis. This left 22 studies that were considered for possible inclusion in a meta-analysis. Of the 22 studies considered for inclusion only 7 studies complied with the necessary requirements for a meta-analysis to be conducted using the two software packages. This resulted in the exclusion of 15 studies. The format for the data necessitated by the software packages led to the inclusion of only between-groups research designs. All 15 excluded studies contained data from within-groups research designs and could thus not be included. The small number of studies eventually included in the study may militate against conducting such a study yet this leaves one of two options open to the prospective researcher; either wait until more studies avail themselves or conduct a study now and conduct another one at a later date. Nevertheless, not only is the original pool of studies small but the further delimitation of only seven as final amount included warrants due caution for any and all conclusions that are reached in this study. Readers are warned at the outset that the results of this study are to be considered tentative. Further details pertaining to all the studies can be found in Section B of this appendix, including all primary study characteristics and their statistical results as well as more specific results. This has been included for those readers who wish to replicate the analysis using the data in section B, for which purpose, all primary data has already been extracted from the original texts. The question to be answered by this meta-analysis is as follows:

does dynamic assessment intervention make a significant difference as opposed to no (static) intervention across separate studies? In other words, regardless of the significance of the original primary findings, what does the cumulative finding result in?

This study also investigates the usefulness of two meta-analytic software programmes freely available via the internet. The programmes are compared in terms of their ease of use, documentary user-support and final analysis that is outputted as results.

1.1The need for a meta-analysis of South African dynamic assessment

As at 2001, 29 empirical studies utilising dynamic assessment in South Africa had been conducted yielding results mostly in favour of the efficacy of dynamic assessment interventions when compared to static or no interventions (Murphy, 2002; Murphy & Maree, 2006). In order to determine whether the cumulative effect of dynamic assessment was in keeping with the individual case study results a meta-analysis of these studies was deemed necessary. Secondly, there was no empirical study, which had as yet, investigated the efficacy of dynamic assessment across studies. Thirdly, due to the unique nature and challenges facing South African higher education, where 60% of higher education students are considered previously disadvantaged, the case for the utilisation of dynamic assessment as potential entrance assessment tool becomes an even more urgent one (Department of Education, 2003).

Dynamic assessment as a method of testing is uniquely placed in South Africa as the majority of learners in this country have suffered moderate to severe educational handicaps due to past segregationist policies, the results of which are still prevalent (Skuy, Gewer, Osrin, Khunou, Fridjon, & Rushton, 2002). As such, dynamic assessment is considered a method less biased towards the socially disenfranchised (Elliott, 2000) and hence more suitable as a viable alternative to current psychometric tests (Hessels & Hamers, 1993; Sewell, 1987; Van de Vijver, 1993). Gains in scores between pretest and posttest South African dynamic assessment interventions has evidenced that, in general, dynamic assessment has proved efficacious as a method of helping individuals improve on tasks requiring skills in varying test batteries (Murphy, 2002; Murphy & Maree, 2006).

The current educational crisis within South Africa and the assessment of previously disadvantaged learners and their entrance to tertiary educational institutions is of concern. Dynamic assessment may well prove a viable option as choice of assessment instrument, if as evidenced from South African studies (Murphy, 2002; Murphy & Maree, 2006), dynamic assessment does in fact have a significant and sizeable effect. In order to determine this, a meta-analysis is conducted on the current research in South Africa, the results of which will help to inform future policy governing the assessment of previously disadvantaged individuals and their entrance to institutions of higher education. Dynamic assessment is not only a method of assessment but serves in the capacity of mediatory tool which can result in effects other than those obtained in pretest-posttest studies. The importance of the qualitative relationship between the assessor and the testee is one such aspect (Lidz & Elliott, 2000b) that cannot, for instance, be measured by only studying posttest scores.

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[2] These figures are based on 2001statistics reported in the Department of Education's 2003 report.

However, the individual studies did not assess for this relationship and likewise neither did the meta-analysis. In order to determine the full efficacy of the mediatory aspect inherent in dynamic assessment, means, other than those utilised by cumulating effect sizes across studies is necessitated. There is thus a limitation to which such a meta-analysis can proceed. Effect size results will not necessarily highlight the total effect of dynamic assessment intervention on posttest scores. They will also not necessarily inform the process as to the overall effect that such an intervention will have on individuals undergoing such intervention strategies. For instance, looking at only posttest scores after sessions of dynamic assessment interventions can in no appreciable way be informative regarding any potential long-term effects of cognitive mediation. More qualitative and long-term research investigations are necessary to determine the fuller impact that dynamic assessment may or may not evidence. The effect size results in this study are thus to be interpreted as evidencing either a cumulative effect or lack of such effect across studies, but the results do not in any manner reflect the value and nature of the full scope that dynamic assessment interventions have to offer. The original intention within each of the individual studies was to determine the significance of dynamic assessment interventions. The meta-analysis merely reviews this endeavour by synthesizing the effect of dynamic assessment interventions. If the original studies were able to conclude that dynamic assessment did or did not have a significant effect, then by extension this too can be applied to the meta-analysis.

Since 1961 a number of studies in South Africa have used dynamic assessment interventions as instruments of mediation in order to have as a result increased scores on pretest-posttest research designs. The results of each study when taken in isolation from other studies yields results evidencing the efficacy of these dynamic assessment interventions. However, in order to empirically investigate whether cumulative efficacy is apparent across all studies, a meta-analysis needs to be conducted. Murphy (2002) as well as Murphy and Maree (2006) reviewed South Africa dynamic assessment research (1961-2001) and used the primary studies highlighted in the research for purposes of this meta-analysis. Making use of vote counting, Murphy (2002) as well as Murphy and Maree (2006) concluded that of 29 primary empirical studies, 21 revealed that dynamic assessment interventions indeed had a significant effect as intervention strategy to improve scores on pre-tests. Two primary empirical studies yielded non-significant effects evidencing lack of support for the notion that dynamic assessment interventions significantly improve post-test scores. Six studies yielded confounding results, evidencing both significant and non-significant results (i.e. in these studies the same sample would be utilised for more than one experiment). The study concluded, that, based on these findings dynamic assessment in South Africa was efficacious in bringing about significant change in pretest scores. As is at times the case, a meta-analysis will either reveal significant effects across cumulated studies or non significant effects (contrary to those effects evidenced within individual studies). In order to determine whether dynamic assessment was efficacious an empirical meta-analysis was conducted to either further support the original conclusions in Murphy (2002) as well as Murphy and Maree (2006) or to caution against possible inferences made from the conclusion.

1.2 A brief tour of meta-analysis

In essence meta-analysis seeks to cumulate findings across primary studies, analyse the combined findings and derive conclusions from the total number of studies. In so doing, it may happen that results counter findings in the primary studies, in other words, what may have seemed to be an effectual experimental intervention in a study may not in fact contribute much proportionally on a larger scale thus nullifying the original results. This is not necessarily the case in all studies but such findings are not outside the norm. It may happen that experimental results are indeed robust in terms of results when compared to control groups for many studies and when cumulated result in even greater yield in terms of effectiveness. Meta-analysis typically finds its niche in studies designed to test the differences between experimental and control groups but is not limited to such designs (Chambers, 2004; Kulik & Kulik, 1989). The *d* family of effect sizes is used in this study including Hedge's *g*, Glass' delta and Cohen's *d* (Rosenthal, 1994) which necessitates both control and experimental groups (Schwarzer, 1989; Strube & Hartmann, 1983). This fact along with the fact that the two software programmes utilised in this study also made use of this family of effects size statistic led to the preference in this meta-analysis to locate studies with between-groups designs only, i.e. studies with comparisons between experimental and control groups.

The name for this technique was first introduced by Gene Glass in 1976 (Chambers, 2004) and as such is quite recent in terms of statistical methodology, however Pearson had already in 1904 taken the average correlation results of medical studies and utilised them in research, with similar techniques being used throughout the early half of the twentieth century (Bangert-Drowns, 1992; Cooper & Hedges, 1994a). The need to allocate an effect size for each study in terms of it's overall contribution to the final result was an outgrowth of behavioural scientists' need to summarise large databases of literature in as systematic a fashion as possible (Rosenthal, 1979, 1995). The quantitative generalisation of such a systematic investigation into the results of many primary studies would seem to offer more value; the ''strengthening'' of methods (Hall, Tickle-Degnen, Rosenthal & Mosteller, 1994) in terms of strategic recommendations based on such findings (Cooper & Lemke, 1991; Arthur, Bennett & Huffcutt, 1994; Hunter, Schmidt & Jackson, 1982; Strube, 1985; Wolf, 1987), notwithstanding the usefulness of narrative reviews of studies (Strube & Hartmann, 1983). The above-mentioned 2001-2002 narrative study could be crudely construed as a vote-counting

method of sorts[3] (Bushman, 1994; Kline, 2004; Schwarzer, 1989) and hence arose the need to test and quantify similar hypotheses results across independent studies[4] (Kalaian & Raudenbush, 1996). This reflects a normal advance in any area of research interest, signifying the entry of the particular area into mainstream research territory and alerting the reader to a new body of research (Myers, 1991). As mentioned, Section B contains further information pertaining to each individual study and can be construed as a coding scheme for this analysis' purposes (Orwin, 1994; Schwarzer, 1989; Stock, 1994).

Synthesising research can never replace the need for reading original sources, and this statement is made apart from the fact that it is merely good practice to do so, but is sated more as a result of the number of discretionary steps taken by meta-analysts when deciding on what to include and what to leave out in their final analysis (Arthur et al., 1994). For instance, although fail-safe computation has partially addressed the problem of excluding null findings in the meta-analysis (a result partly due to publication bias favouring significant findings[5] for example; Begg, 1994; Hunter, 1997; Nester, 1996; see chapter 4's discussion on the statistical issue surrounding significance testing), the onus rests with the researcher to locate any and all information pertaining to the area of study (Glass et al, 1981; Strube & Hartmann, 1983). It is not the opinion of this author to obviate the need to study previous research results regardless of the findings of the overall result as has been alluded to by David Hilbert albeit in a somewhat different context (Glass, McGraw and Smith, 1981). The researcher has to decide on the criteria for inclusion of studies, the model assumptions to be used, the use or lack thereof of programmes individually tailored to the needs of the particular meta-analytic study, the necessity of inter-rater reliability when coding large numbers of studies and much else besides (Dickersin, 1994; Hunter et al.,1982; Reed & Baxter, 1994; Rosenthal, 1994; White, 1994; Wortman, 1994).

Meta-analysis approaches are often found to emanate from one of two major groupings, namely the combination of significance levels and the combination of effect sizes; the latter being used in this particular study (Strube & Hartmann, 1983). Combining statistical significance levels indicates the degree to which chance plays a role in the findings whereas the combination of effect sizes examines the magnitude of effect across studies (Becker, 1994; Shadish & Haddock, 1994; Wolf, 1987). Two ''families'' of effect sizes are available to the meta-analyst and include the *r* family (which also includes *Zr*, Fisher's transformation or *r*); and the *d* family which includes Hedge's *g*, Glass' delta and Cohen's *d* (Rosenthal, 1994). The latter family of statistics are used within this analysis.

2. Method

2.1 Two-fold purpose of the meta-analysis

The overriding reason for running the meta-analysis is to impart to the field of dynamic assessment pertinent information regarding the scope of dynamic assessment in South African research. Moreover, it was thought prudent to run the analysis on two separate computer software programmes in order to highlight advantages and disadvantages of these programmes so as to offer the reader a choice of application should further analysis be undertaken. Statistical packages such as SAS and SPSS run standard statistical techniques used in the behavioural sciences and are thus fairly widespread, as such, details of statistical runs are not often discussed in research reports.

However, the same cannot be said of meta-analytic packages which do not run ''as a programme'' or subroutine within SPSS nor SAS, although macros and more programmes are becoming available.[6] Initially most meta-analytic software was available only for mainframes and not microcomputers, however this has now changed (Arthur et al., 1994). Standardised packages are however not yet the norm as each package assumes various models, theoretical and conceptual underpinnings (Arthur et al., 1994). Is it for this reason that these packages are compared and detailed in their functioning. This section thus serves two purposes: to assess the primary study results cumulatively across studies and to evaluate the usefulness of two software

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[3] As Bushman rightly adds, "when effect sizes are medium to small [as is the case with this study], the conventional vote-counting procedure frequently fails to detect the differences" (1994, p.195).

[4] Combining independent studies sharing the same or at the very least similar hypotheses are the necessary requirements when conducting a meta-analysis. Combining studies at will without due consideration of various hypotheses is blatant nonsense. Cf. Eysenck (1995) for an attack launched at unthinking use of meta-analysis in just such a scenario.

[5] Hopefully something of the past and if the social sciences are to follow suit, something similar to an initiative to publish negative findings from clinical trials will result, especially in the psychological discipline (Editorial, New Scientist, 2005).

[6] For the interested reader the following are a few programmes currently available. Commercial programmes include: '**Comprehensive meta-analysis**' by Borenstein, M & Rothstein, H. available at www.MetaAnalysis.com; '**DSTAT**' by Johnson, B.T. available at www.erlbaum.com; '**ES**' an effect size computational programme by Shadish, W.R., Robinson, L & Wu, C. ; '**FAST*PRO**' by Eddy, D.M. & Hasselblad, V.; '**MetaWin**' by Rosenberg, M.S., Adams, D.C. & Gurevith, J. available at www.metawinsoft.com; '**Metaxis**' available at www.update-software.com/metaxis/metaxis-frame.html. As availability of demonstration programmes changes from month to month on the internet it is possible that some of these programmes might be available at no cost for a specified length of time. There are a host of programmes freely available as freeware as well as shareware. The above-mentioned information as well as information pertaining to the freeware as well as SAS and SPSS macros are available at the following comprehensive website as at April 2005: www.um.es/facpsi/metaanalysis/software.php. Some of these programmes are reviewed in the professional literature (cf. Arthur, et al., 1994; Normand, 1995). Of interest is the number of meta-analytical models "on the market" each with its own advantages and disadvantages (Bangert-Drowns, 1992).

programmes. The latter will be addressed in 2.2 and 2.3 below. Comparison of meta-analytic programmes has in the past offered researchers the opportunity to make informed decisions when deciding on the use of one programme over another (Arthur et al., 1994; Normand, 1995). The choice of these two programmes were made due to their availability and cost (they are both freeware products) and their accompanying recommendations made by peers within the field. Both programmes were fairly small to download (91 and 212 kilobytes for both the Kenny and Schwarzer programmes respectively); run hassle-free within the windows environment and have fairly good to good manuals which accompany the software. The author of the first programme (Kenny) is also available for questions about his programme. No information was sought from Schwarzer.

2.2. ''META – Easy to answer'' version III by D. A. Kenny

This software programme was developed by David A. Kenny at the University of Connecticut, United States of America and is a compiled version of a QuickBasic programme with a DOS-like appearance which runs in the windows environment.[7] This is a shareware version offered free of charge and can be downloaded over the internet at the following address: http://davidakenny.net/meta.htm. Kenny (2003) cautions the user however as to its as yet demonstration status and the user is advised to check computational output. This cautionary note further propelled the need for a second programme's analysis and a double-check of sorts was conducted to compare output. This programme computes effect sizes for each study, pools the results and calculates the degree to which the result differs from zero and also tests for homogeneity of effect sizes across studies. It allows for the weighting of studies based on sample size, variance or user-inputted values.

2.2.1 Programme structure

The programme encompasses three stages; the first stage seeks overall study information, and prompts for the following user information:

Effect size option
Cohen's d: D
Correlation: R
Difference between proportions: P
None (only combine p's): N

If **Cohen's D** is chosen as an option, the programme seeks the following information:
Do you want the Hedge's correction to d? Yes or No?
Do you want to assume equal group sizes? Yes or No?
Do you have an input data file? Yes or No?
Do you want to weight studies? Yes or No?
If Yes, weight by:
Degrees of freedom: D
Sample size: N
Study variance (inverse): V
Other: O
Take the square root for weight? Yes or No?
Does sample size equal degrees of freedom plus two? Yes or No?
Completed stage 1

If **correlation** is chosen as an option, the programme seeks the following information:
Do you want to use the Fisher's Z transformation? Yes or No?
Do you have an input data file? Yes or No?
Do you want to weight studies? Yes or No?
If Yes, weight by:
Degrees of freedom: D
Sample size: N
Study variance (inverse): V
Other: O
Take the square root for weight? Yes or No?
Does sample size equal degrees of freedom plus two? Yes or No?
Complete stage 1

If **difference between proportions** is chosen as an option the programme seeks the following information:
Transformation options:
Difference in proportions: P
Probit: N
Logit: L
Arcsin: A

[7] A larger windows environment programme is also available but caution was attached to the use of this programme (Kenny, personal communication, 23 March, 2005).

Do you want to assume equal group sizes? Yes or No?
Do you have an input data file? Yes or No?
Do you want to weight studies? Yes or No?
If Yes, weight by:
Degrees of freedom: D
Sample size: N
Study variance (inverse): V
Other: O
Take the square root for weight? Yes or No?
Does sample size equal degrees of freedom plus two? Yes or No?
Complete stage 1

If **none (only combine p's)** is chosen as an option the programme seeks the following information:
Do you want to assume equal group sizes? Yes or No?
Do you have an input data file? Yes or No?
Do you want to weight studies? Yes or No?
If Yes, weight by:
Degrees of freedom: D
Sample size: N
Study variance (inverse): V
Other: O
Take the square root for weight? Yes or No?
Does sample size equal degrees of freedom plus two? Yes or No?
Complete stage 1

Only Cohen's D was made use of for this meta-analysis. No further information will be provided for the programme regarding the remaining options. The second stage in the programme prompts the user for the following information:

Type of test statistic:

T - t test	M (means and variances)
F - f test	P (p values)
R - correlations	S (proportions)
X - Chi square	Z (z test)
E - (no more studies)	

If the **t test** results are used the programme seeks the following information:
Enter the t statistic for study X
Group sizes equal? Yes or No?
If yes, enter the N (at least 1) for group 1
Enter the N (at least 1) for group 2
If no, enter the N for study X (*Kenny's programme will then divide this N by two, hence not allowing the user to make use of within-groups studies*)
Is the result in the expected direction? Yes or No?
OUTPUT screen includes the following:

N (number)	df (degrees of freedom)
d (effect size)	r (effect size r)
z (z statistic)	t (t statistic for variance)
Variance	BESD (binomial effect size distribution)
Effect size	
Weight	

Do you want to include these results in the meta-analysis? Yes or No? *(The user has to write out per hand the results of each study, should they find this necessary, as this demonstration edition offers no saving or printing options)*

If the **f test** results are used the programme seeks the following information:
Enter the F statistic for study X
Group sizes equal? Yes or No?
If yes, enter the N (at least 1) for group 1
Enter the N (at least 1) for group 2
If no, enter the N for study X
Is the result in the expected direction? Yes or No?
OUTPUT screen includes the same information as given in the "t test" option

If the **correlation** results are used the programme seeks the following information:
Enter the correlations <-1> and <1> for study X
Enter the N for study X
Is the result in the expected direction? Yes or No?
OUTPUT screen includes the same information as given in the "t test" option

If the **Chi square** results are used the programme seeks the following information:
Enter the chi square for study X
Group sizes equal? Yes or No?
If yes, enter the N (at least 1) for group 1

Enter the N (at least 1) for group 2
If no, enter the N for study X
Is the result in the expected direction? Yes or No?
OUTPUT screen includes the same information as given in the ''t test'' option

If the **means and variances** results are used the programme seeks the following information:
Enter the mean for group 1
Enter the mean for group 2
Group sizes equal? Yes or No?
If yes, enter the N (at least 1) for group 1
Enter the N (at least 1) for group 2
If no, enter the N for study X
Are you entering standard deviation (s) or variances (v)?
If (s), are they pooled (p) or unpooled (u)
If (p), enter the pooled variability measure
Is the result in the expected direction? Yes or No?
OUTPUT screen includes the same information as given in the ''t test'' option
If (u), enter the variability measure for group 1 *(Kenny refers to this standard deviation as 'variability' which may be confusing if one is not really working with variance)*
Enter the variability measure for group 2
Is the result in the expected direction? Yes or No?
OUTPUT screen includes the same information as given in the ''t test'' option
If (v), the same procedure as above is followed but variance and not standard deviation is used

If the **p value** results are used the programme seeks the following information:
Enter the two-tailed p value for study X
Is the p value from t or F (T) or chi square (Z)
If (T), Group sizes equal? Yes or No?
If yes, enter the N (at least 1) for group 1
Enter the N (at least 1) for group 2
If no, enter the N for study X
Is the result in the expected direction? Yes or No?
OUTPUT screen includes the same information as given in the ''t test'' option
If (Z), Group sizes equal? Yes or No?
If yes, enter the N (at least 1) for group 1
Enter the N (at least 1) for group 2
If no, enter the N for study X
Is the result in the expected direction? Yes or No?
OUTPUT screen includes the same information as given in the ''t test'' option

If the **proportion** results are used the programme seeks the following information:
Enter the proportion for the first group for study X
Enter the proportion for the second group for study X
Is there a chi square? Yes or No?
If yes, enter the chi square for study X
Group sizes equal? Yes or No?
If yes, enter the N (at least 1) for group 1
Enter the N (at least 1) for group 2
If no, enter the N for study X
Is the result in the expected direction? Yes or No?
OUTPUT screen includes the same information as given in the ''t test'' option
If no, group sizes equal? Yes or No?
If yes, enter the N (at least 1) for group 1
Enter the N (at least 1) for group 2
If no, enter the N for study X
Is the result in the expected direction? Yes or No?
OUTPUT screen includes the same information as given in the ''t test'' option

If the **Z statistic** results are used the programme seeks the following information:
Enter the Z statistic for study X
Group sizes equal? Yes or No?
If yes, enter the N (at least 1) for group 1
Enter the N (at least 1) for group 2
If no, enter the N for study X
Is the result in the expected direction? Yes or No?
OUTPUT screen includes the same information as given in the ''t test'' option

The third stage integrates the input from stages 1 and 2. The results of the third stage are in fact the meta-analytic results of the combined studies and includes the following output:
Study number
Subject n
Average effect size

Effect size standard deviation
T test of effect size
Average d
Average r
BESD
Homogeneity of effect sizes
Chi square
Average Z
Fail-safe N (*The user has to write out per hand the results of the final analysis, as this demonstration edition offers no saving or printing options)*

The data that is entered into META is placed into a data file which is then used by META to compute the final analysis. This data file consists of numeric characters but occasionally alpha-numerics are used. The data file is easy and flexible to manage and changes can be made directly in the data file, although this is not recommended unless the user understands the derivation of all the computations. However, studies can be deleted and weightings changed as desired by going through the data within the META programme itself as opposed to changing the data within the data file itself. Table 9 shows the second data file run in META. Both individual study results as well as the final output has to be written out by hand as there is no print and save option available.

2.3 Meta-analysis programme version 5.3 by R. Schwarzer

This programme was developed by R. Schwarzer at the Freie Universität Berlin, Germany and was written in Turbo Pascal 5.0. The program is not public domain but is distributed under the User Supported Software concept (Schwarzer, 1989) and can be downloaded from http://www.RalfSchwarzer.De. Schwarzer's programme allows for the computation of probabilities, effect sizes *d*, and effect sizes *r* (correlations). Depending on the data available to the researcher, any of these three can be selected. Also available is a data editor and a number of utilities which provide transformed data results. The main menu consists of the following:

Appendix 1 Table 1 Schwarzer programme menu options (Schwarzer, 1989)

GENERAL	*p* VALUES	*d* VALUES	*r* VALUES	UTILITIES
Editor	Meta-analysis	Meta-analysis	Meta-analysis	Conversion r
Directory	r-File	Cluster		
Effect Size d				
Change Dir	r-File	StemLeaf	Signif. Of corr	
Info		Weighted M, V, C		
Calculator		t-Tests		
Quit				

2.3.1 Programme structure

The general menu allows the user to access the data file (editor) which has to be entered according to a specific format (depending on which data are entered, i.e. correlations, proportions or d values). The programme reads the data file and computes the final result which can be saved and/or printed. The individual results, however, have to be hand written. For this study, the ''utilities'' menu was used to compute the individual study effect sizes based on group mean and standard deviation. The data file can then be assembled and is shown in the tables that follow.

Depending on which test statistic is available for computation into an effect size and also depending on how the final analysis will be run, Schwarzer's programme requires that the data be in certain formats. Effect size computation using *d* facilitates up to 10 groups. For instance, when computing effect sizes using *d* values, the data file needs to include the study number, sample size for group 1, sample size for group 2, effect size and a reliability coefficient. As reliability coefficients were not available in the primary studies, unity was maintained throughout the studies by inputting 1.0 as suggested by Schwarzer (1989). For probabilities, study number, sample size and p-values are needed; for effect sizes *r*, the study number, sample size as well as correlations and the variables' reliabilities are needed. In essence, after having computed the effect sizes for each study using the utilities menu and compiling a data file, this programme merely runs the file according to the chosen statistic. Schwarzer (1989) maintains that meta-analysis of effect sizes are superior to those using only combinations of probabilities. Table 2 illustrates the utilities menu, ''conversion to *r*'', in which Schwarzer offers the following options:

Appendix 1 Table 2 Utilities menu in Schwarzer's programme

Select a coefficient to be transformed	
Point biserial correlation coefficient	p)oint
t-value for 2 independent samples	t)value
F-value for 2 or more independent samples	F)value
Chi square value for contingency tables	x)square
•Four cells frequencies	c)ells
•U-value (Mann-Whitney)	U)value
Exact one-tailed probability p	e)xact p
Effect size g (standardized mean difference)	g)value
r to Fishers z transformation:	r) to z
Back transformation	z) to r
Normal distribution Z to probability p	N)ormal
Quit Transformation Program	Q)uit

The ''effect sizes *d*'' option seeks the number of groups to be compared and whether standard deviation or variance is available. The ''significance of correlation'' option seeks correlation values for the chosen number of groups. Means, variances and correlations can also be input and weighted. Lastly *t* values can be computed for the chosen number of groups. Schwarzer is cognisant of the broad variety of available primary statistics to the meta analytic researcher and as such, this programme offers a variety of statistical manipulations for the chosen transformation statistic and is flexible in terms of the data available from the primary research.

2.4 Comparison of the two programmes

Both programmes output similar results in terms of individual studies, although Schwarzer's programme is more comprehensive and offers more variation in types of output. Kenny's programme offers less variation in output results. During the input stage, Kenny's programme requires more information per study, integrates the data file with the output and allows for a more comprehensive data file. Schwarzer's programme is not integrated in similar fashion and does not require as much detail during input. However, Schwarzer's programme allows for very comprehensive transformation utilities which can then be used within the data editor for the meta-analysis of choice (either analysis based on *d* values, *r* values as well as cluster analysis output and stem-and-leaf displays).[8]

Unlike Kenny's programme where the data input and calculation take place in seemingly one step, Schwarzer's programme requires the user to first compute effect sizes using the ''utilities'' option. These results are then recorded by hand and typed into the data file. The final analysis simply runs the data file. Thus, two separate steps are necessitated. For input, Kenny makes use of an effect size which is the equivalent of the Schwarzer's ''*g*'' which is the effect size based on pooled variance. Kenny refers to Schwarzer's ''*g*'' as ''*d*'', which can lead to some confusion, this being acknowledged by Schwarzer (1989). Kenny makes use

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• Schwarzer's programme makes available non-parametric transformation formulae that Kenny's does not.

• Although derivation of effect size computation (such as delta) can be computed from available *t* statistics, conversions from non-parametric statistics is more difficult than originally thought. As Glass et al. state, ''no simple transformation of U into delta is possible since the U test...[does] not test simple hypotheses about population means" (1981, p.130). Nevertheless this option is available in Schwarzer's programme allowing meta-analysts to conduct runs on older non-parametric data.

[8] Stem-and-leaf displays are not used for this data as there are too few effect sizes for a reasonable display; moreover, these displays are better suited to correlation values.

of Hedge's unbiased estimator *d* in his meta computation. There is a slight difference in the numerical value of the statistic that both programmes use.

Individual study results are however exactly the same. Kenny's programme in essence works on a random model principle (Kenny, personal communication, 11 April 2005) and Schwarzer's programme presents both fixed and random-effects model results. Fixed-effects models assume that any differences between samples are strictly due to sampling error with an average effect size simply being an unbiased estimate or simple average of a population effect whereas random-effects models assume that differences may also be attributed to aspects other than sampling error with the assumption that the sample has been drawn from a population. Therefore there is not only one population effect size but a distribution of populations effects size resulting in sample characteristics that are not only dissimilar but which also reflect true underlying population differences (Cooper & Hedges, 1994b; Cooper, 1994; Normand, 1995; Schwarzer, 1989; Shadish & Haddock, 1994). Residual variation indicated among others include results from the chi square analysis and tests of homogeneity (Chambers, 2004) the significance of which will prompt further investigation into random model usage. Kenny's programme, based on a random-effects model, assumes that the study is used as the sampling unit (Kenny, personal communication, 11 April 2005; Kenny, 2003) unlike fixed-effects models which use as their sampling unit individuals within the studies (Rosenthal, 1995).

The manuals that accompany both programmes offer the necessary and requisite information in order for correct data input; knowledge of how the programme functions within the operating environment; both allow printing options on only some menus and are consistent across manuals in terms of current research into the statistical area of meta-analysis. Both manuals enable the user to perform the necessary computation in order to obtain output. Schwarzer's manual is however more comprehensive, serving as an introduction to and brief overview of the field of meta-analysis. It also elucidates the statistical formulae used within the computations themselves which Kenny's manual does not offer. Schwarzer's programme also offers more variety in terms of output, such as cluster analysis for both *d* and *r* values and visual display of effect sizes which Kenny's does not. Cluster analysis allows the user to search for potential moderating factors which present themselves in terms of how the effect sizes are clustered. Kenny's manual states that the researcher look for moderator variables but does not allow a similar option. The manuals are available for downloading at the same above-mentioned web addresses that are accessed to download the programmes. It is advisable that the researcher study both manuals before attempting to use either programme.

2.5 Limitations of the programmes and violation of assumptions

Neither Kenny's nor Schwarzer's programme can handle within-groups studies nor repeated-measures designs and it is for this reason that only between-groups studies were included in the analyses and this criterion results in the further delimitation of the number of studies eventually included in the study and can be considered as a type of selection bias.[9] The fact that some meta-analytic studies are not based on repeated-measures designs (Normand, 1995) is noted, however, multiple end-point studies do complicate the methodology involved in synthesising such data. It is reasoned that more commercially available software would better cater for such studies and is perhaps something to think about in terms of re-conducting this study so as to include those studies left out of this one. For the seven primary studies used for this analysis, 22 effect sizes were generated. This was possible due to the input of more than one dependent samples per study. However, two primary studies generated three and four independent results respectively thus averaging 10 independent effect sizes. An option to average out the effect sizes per study was considered but rejected as too few effect sizes would have made this endeavour superfluous. This study has thus violated an assumption inherent in both programmes, that of independent samples. When interpreting the results it is prudent to keep in mind this violation.

3. Results

3.1 Criteria used for inclusion of studies

Of the original 22 studies considered for inclusion, Murphy (2002) as well as Murphy and Maree (2006), surveyed 29 studies. However 7 studies were purely qualitative studies and thus not amenable to a meta-analytic study, 7 made use of a within-groups design and 14 made use of between-groups design. The two programmes chosen to conduct the meta-analysis do not allow for the analysis of within-group studies, as the main aim of the analysis is to determine the effect of dynamic assessment on an experimental group versus the effect of no dynamic assessment on the control group.The between-groups assumption inherent in both these programmes therefore cannot run analyses on repeated measures designs on one-group scenarios. This cannot be said to be a major flaw in the programmes because most meta-analyses are utilised for the express purpose of determining effects on experimental groups as opposed to the lack thereof on control groups. It is perhaps telling then, that local research designs veer more towards within-group analyses and not between-group analyses.

[9] It is a pity that their programmes are unable to contend with such study characteristics as the Lussier and Swanson study (2002) was able to compute for repeated-measures design.

Of the original 22 studies, eleven used means and standard deviations; five used correlations; three used *t* tests and the remaining two used multiple regression as well as discriminant analyses. Of the final seven chosen for inclusion (i.e. the between-groups studies) six used means and standard deviations and one used a combination of *t* test results as well as means and standard deviations. For the sake of complete comparison between the two programmes used, only means and standard deviations were utilised (including the means and standard deviations for one study which also included *t* test results). Two analyses were conducted as the first analysis yielded effect sizes that were very large, too large in fact when compared to normal effect sizes as emanating from meta-analysis research literature. Due to the unusually large effect size results obtained from both programmes (1.26 and 1.72 respectively), the data was studied and three outliers were identified. These outliers emanated from two primary studies, namely Lloyd and Pidgeon (1961) (study numbers 20 and 21 samples 1 and 2) and Gewer (1988) (study 19 sample number 4). Effect sizes greater than two to three standard deviations of the mean may be construed as outliers (Chambers, 2004).

Individual effect sizes for these studies ranged from 2.2 - 13.8. Analysing the primary research yielded the reasons for these effect sizes: the Lloyd et al. study presented with very small standard deviations for both the control and experimental groups (0.83, 0.85, 1.08) which was exacerbated by the already large differences between the means of both groups. As the calculation of effect size is very dependent on standard deviation and mean, it stands to reason that this would be the case. Lloyd et al. state the following: ''it is not thought that the low variance can be attributed to unrepresentativeness but rather to the greater homogeneity of the Natal children when compared to the English children" (p.150). It is for this reason that these two samples were eliminated from the data during the second analyses (yielding effect sizes of 6.416 and 13.806 respectively). The sample of Gewer presents with a large difference between both groups (yielding an effect size of 2.211). Thus this particular sample was also eliminated during the second analyses. Table 3 shows study numbers referring to the following primary study authors and the results of the initial data run which yielded 25 effect sizes. Asterisked studies are those with outliers identified as above and were eliminated during the second analysis, thus lowering the total number of effect sizes down to 22.[10] It is this data (22 effect sizes) with which this study concerns itself. A brief descriptive outline of the seven studies included for the analysis is presented in Table 4.

Appendix 1 Table 3 Study numbers and sample classification

Study 1	Andrews (1996)	sample 1	dependent sample
Study 2	Andrews (1996)	sample 2	dependent sample
Study 3	Andrews (1996)	sample 3	dependent sample
Study 4	Andrews (1996)	sample 4	dependent sample
Study 5	Boeyens (1989)	sample 1	dependent sample
Study 6	Boeyens (1989)	sample 2	dependent sample
Study 7	Murray (1988)	sample 1	dependent sample
Study 8	Murray (1988)	sample 2	dependent sample
Study 9	Murray (1988)	sample 3	dependent sample
Study 10	Murray (1988)	sample 4	dependent sample
Study 11	Murray (1988)	sample 5	dependent sample
Study 12	De Villiers (1999)	sample 1	independent sample
Study 13	De Villiers (1999)	sample 2	independent sample
Study 14	De Villiers (1999)	sample 3	independent sample
Study 15	De Villiers (1999)	sample 4	independent sample
Study 16	Gewer (1988)	sample 1	dependent sample
Study 17	Gewer (1988)	sample 2	dependent sample
Study 18	Gewer (1988)	sample 3	dependent sample
Study 19*	Gewer (1988)	sample 4	dependent sample
Study 20*	Lloyd and Pidgeon (1961)	sample 1	independent sample
Study 21*	Lloyd and Pidgeon (1961)	sample 2	independent sample
Study 22	Lloyd and Pidgeon (1961)	sample 3	independent sample
Study 23	Hoffenberg (1988)	sample 1	dependent sample
Study 24	Hoffenberg (1988)	sample 2	dependent sample
Study 25	Hoffenberg (1988)	sample 3	dependent sample

[10] For the following studies; 12, 13, 16 and 17 the authors divided both experimental and control groups into two groups each, thus yielding four sub-groupings. In order to benefit from an increased sample size for the purposes of the meta-analysis the four sub-groupings were ''collapsed'' into two groups. In order to do so the following formulae were used to calculate means and standard deviations respectively: Average mean: $M= [(M_{Exp} \times n_1) + (M_{Con} \times n_2)]/n_1 + n_2$; Average standard deviation: $SD= [(n_1-1)SD_1 + (n_2-1)SD_2)]/(n_1 + n_2 - 2)$.

Appendix 1 Table 4 Brief description of the seven studies included in the meta-analysis

Study	Brief description
Andrews (1996)	To determine if cognition is modified in a group administration of the LPAD; and to detect differences in the degree of modifiability
Boeyens (1989)	To evaluate the performance of a learning potential instrument and to investigate the relationship between academic performance and learning potential
De Villiers (1999)	To investigate the practical application of Vygotsky's construct of the zone of proximal development to the selection of disadvantaged students in higher education and to determine alternative predictors of academic performance other than the traditional matriculation examination results used in South Africa
Gewer (1988)	The study investigated the application of dynamic assessment to a sample of black children within a South African township clinic setting
Hoffenberg (1988)	The study aimed to assess the effectiveness of dynamic assessment among a group of academically superior individuals from a disadvantaged black community in South Africa.
Lloyd and Pidgeon (1961)	To compare the performance of children from different cultural groups on non-verbal tests, half the children were coached and the other half were not
Murray (1998)	To test the effectiveness of a dynamic assessment approach (LPAD) among groups of socio-politically and educationally disadvantaged Indian and Coloured adolescents

3.2 First run with outliers included (25 effect sizes)

3.2.1 Results using META by Kenny

Table 5 shows the results for the meta-analysis

Appendix 1 Table 5 Meta analysis results using Kenny's programme

Study Number	25
Subject n	2619
Average effect size	1.7288•
Effect size standard deviation	5.09
T test of effect size	1.6982 p 0.1024 df 24
Average d	1.7384
Average r	0.2816
BESD	0.3592 - 0.6408
Homogeneity of effect sizes Chi Square	1032.7149* *df* 24
Average Z	24.4208*
Fail-safe N	3857

Note. • Figures are accurate till four decimal places.
* $p < .0001$

The data file is a normal ASCII file which was saved in notepad. For the sake of clarity the following key is provided for interpretation of the data file:

Appendix 1 Table 6 META data file using Kenny's programme

Study number	Degrees of freedom	Total N per study	Effect size	d	r	z	t	p2 (confidence interval)	p1 (confidence interval)	n1 (experimental group 1)	n2 (control group 2)	weight
1	19	21	1.1221	1.1689	0.5230	2.4319	2.6752	0.7615	0.2384	10	11	4.5825
2	19	21	0.6204	0.6463	0.3213	1.4201	1.4792	0.6606	0.3393	10	11	4.5825
3	19	21	0.7252	0.7554	0.3687	1.6441	1.7289	0.6843	0.3156	10	11	4.5825
4	19	21	0.1232	0.1283	6.7253	0.2895	0.2938	0.53362	0.4663	10	11	4.5825
5	181	183	-8.1786	-8.2127	-4.1288	-5.5472	-5.5549	0.49793	0.5020	91	92	13.5277
6	181	183	0.8667	0.8704	0.4008	5.6236	5.8874	0.70044	0.2995	91	92	13.5277
7	106	108	0	0	0	0	0	0.5	0.5	54	54	10.3923
8	106	108	0.2482	0.25	0.1251	1.2908	1.2990	0.5625	0.4374	54	54	10.3923
9	106	108	0.9929	1	0.4505	4.8927	5.1961	0.7252	0.2747	54	54	10.3923
10	106	108	8.2456	8.3045	4.1875	0.4303	0.4315	0.5209	0.4790	54	54	10.3923
11	106	108	0.1985	0.2	0.1004	1.0341	1.0392	0.5502	0.4497	54	54	10.3923
12	60	62	0.3057	0.3096	0.1541	1.1965	1.2088	0.5770	0.4229	35	27	7.87400
13	61	63	0.5386	0.5453	0.2670	2.1154	2.1640	0.6335	0.3664	32	31	7.93725
14	100	102	0.9937	1.0012	0.3892	4.0434	4.2260	0.6946	0.3053	79	23	10.0995
15	67	69	0.4101	0.4148	0.2059	1.6977	1.7227	0.6029	0.3970	34	35	8.30662
16	70	72	0.5013	0.5068	0.2354	1.9912	2.0272	0.6177	0.3822	48	24	8.48528
17	70	72	0.7047	0.7123	0.3223	2.7617	2.8495	0.6611	0.3388	48	24	8.48528
18	34	36	1.0931	1.1180	0.4767	2.9388	3.1622	0.7383	0.2616	24	12	6
19	34	36	2.1627	2.2119	0.7315	5.0657	6.2562	0.8657	0.1342	24	12	6
20	274	276	6.3990	6.4166	0.9549	25.7780	53.2658	0.9774	2.2524	143	133	16.6132
21	273	275	13.7687	13.8067	0.9897	32.5656	114.4726	0.9948	5.1283	136	139	16.5831
22	264	266	-0.5047	-0.5061	-0.2462	-4.0592	-4.1274	0.3768	0.6231	133	133	16.3095
23	98	100	-0.1290	-0.1300	-6.5503	-0.6474	-0.6498	0.4672	0.5327	52	48	10
24	98	100	-8.8529	-8.9214	-4.4978	-0.4443	-0.4457	0.4775	0.5224	52	48	10
25	98	100	0.1547	0.1559	7.8443	0.7757	0.77894	0.5392	0.4607	52	48	10

3.2.2 Results using meta-analysis by Schwarzer

Table 7 shows the results for the meta-analysis

Appendix 1 Table 7 Meta-analysis results using Schwarzer's programme

Statistic	Result	Statistic	Result
Number of effect sizes	25	Total sample size	2619
Unweighted mean of effect sizes g	1.2614	SE	0.5845
Observed variance of effect sizes g	8.5416	SD	2.9226
Unweighted mean of adjusted effect sizes d	1.2500	SE	0.5829
Observed variance of adj. effect sizes d	8.4967	SD	2.9149
"Weighted Integration Method"			
Mean effect size d+	0.4675	SE	0.0400
Significance Z	10.4424*		
Variance	0.0016	SD	0.0400
95% Confidence interval	0.3798 to 0.5553	Homogeneity Q	1032.6967 df = 24
"Random Effects Model"			
Mean effect size DELTA	1.2313	SE	0.5829
95% Confidence interval	0.0887 to 2.3739**	Significance Z	2.1122
Observed variance	8.49671	Error variance	0.0957
Population variance	8.4009	Homogeneity Q	1013.7210 df = 24
Amount of variance explained by sampling error	1.13		
Kraemer (1983) method			
Mean effect size d	1.2621	95% Confidence interval	1.1712 to 1.355
Population effect size Rho	0.5336	Variance of rho	0.0003
95% Confidence interval	0.5053 to 0.5609	Homogeneity Chi-square	2138.8561
Orwin's Fail-safe n based on "random effects model" DELTA			
Fail-safe for critical d of .20	128.9151	Fail-safe for critical d of .50	36.5660
Fail-safe for critical d of .80	13.4787		

* $p < .0001$. ** $p < .005$.

The data file is a normal ASCII file which was saved in notepad. Table 8 delineates the data file from Schwarzer's programme.

Appendix 1 Table 8 Data file from Schwarzer's programme

Study number	Sample size group 1 (experimental group)	Sample size group 2 (control group)	Effect size	Reliability coefficient
1	10	11	1.1689	1
2	10	11	0.6205	1
3	10	11	0.7554	1
4	10	11	0.1232	1
5	91	92	-0.0082	1
6	91	92	0.87041	1
7	54	54	0	1
8	54	54	0.25	1
9	54	54	1	1
10	54	54	0.083	1
11	54	54	0.2	1
12	35	27	0.3096	1
13	32	31	0.5454	1
14	79	23	1.0013	1
15	34	35	0.4148	1
16	48	24	0.506	1
17	48	24	0.7124	1
18	24	12	1.118	1
19	24	12	2.2119	1
20	143	133	6.4167	1
21	136	139	13.8067	1
22	133	133	-0.5061	1
23	52	48	-0.1301	1
24	52	48	-0.0892	1
25	52	48	0.1559	1

3.3 Second run with outliers excluded (22 effect sizes)

3.3.1 Results using META by Kenny

Table 9 shows the results for the meta-analysis using the programme by Kenny and Table 10 includes the data file created by the programme.

Appendix 1 Table 9 Meta-analysis results using Kenny's programme

Study Number	22
Subject n	2032
Average effect size	0.3354
Effect size standard deviation	0.4787
T test of effect size	3.2863 * *df* 21
Average d	0.3408
Average r	0.1540
BESD	0.4230 - 0.5770
Homogeneity of effect sizes Chi Square	103.3336 ** *df* 21
Average Z	5.5697 **
Fail-safe N	156

* $p < .005$. ** $p < .0001$

Appendix 1 Table 10 META Data file using Kenny's programme

Study Number	Degrees of freedom	Total N per study	Effect size	d	r	z	t	p2 (confidence interval)	p1 (confidence interval)	n1 (experimental group 1)	n2 (control group 2)	weight
1	19	21	1.1221	1.1689	0.5230	2.4319	2.6752	0.7615	0.2384	10	11	4.5825
2	19	21	0.6204	0.6463	0.3213	1.4201	1.4792	0.6606	0.3393	10	11	4.5825
3	19	21	0.7252	0.7554	0.3687	1.6441	1.7289	0.6843	0.3156	10	11	4.5825
4	19	21	0.1232	0.1283	6.7253	0.2895	0.2938	0.5336	0.4663	10	11	4.5825
5	181	183	-8.1786	-8.2127	-4.1288	-5.5472	-5.5549	0.4979	0.5020	91	92	13.527
6	181	183	0.8667	0.8704	0.4008	5.6237	5.8872	0.7004	0.2995	91	92	13.527
7	106	108	0	0	0	0	0	0.5	0.5	54	54	10.392
8	106	108	0.2482	0.25	0.1251	1.2908	1.2990	0.5625	0.4374	54	54	10.392
9	106	108	0.9929	1	0.4505	4.8927	5.1961	0.7252	0.2747	54	54	10.392
10	106	108	8.2456	8.3045	4.1875	0.4303	0.4315	0.5209	0.4790	54	54	10.392
11	106	108	0.1985	0.2	0.1004	1.0341	1.0392	0.5502	0.4497	54	54	10.392
12	60	62	0.3057	0.3096	0.1541	1.1965	1.2088	0.5770	0.4229	35	27	7.8740
13	61	63	0.5386	0.5453	0.2670	2.1154	2.1640	0.6335	0.3664	32	31	7.9372
14	100	102	0.9937	1.0012	0.3892	4.0434	4.2260	0.6946	0.3053	79	23	10.099
15	67	69	0.4101	0.4148	0.2059	1.6977	1.7227	0.6029	0.3970	34	35	8.3066
16	70	72	0.5013	0.5068	0.2354	1.9912	2.0272	0.6177	0.3822	48	24	8.4852
17	70	72	0.7047	0.7123	0.3223	2.7617	2.8495	0.6611	0.3388	48	24	8.4852
18	34	36	1.0931	1.1180	0.4767	2.9388	3.1622	0.7383	0.2616	24	12	6
19	264	266	-0.5047	-0.5061	-0.2462	-4.0592	-4.1274	0.3768	0.6231	133	133	16.309
20	98	100	-0.1290	-0.1300	-6.5503	-0.6474	-0.6498	0.4672	0.5327	52	48	10
21	98	100	-8.8529	-8.9214	-4.4978	-0.4443	-0.4457	0.4775	0.5224	52	48	10
22	98	100	0.1547	0.1559	7.8443	0.7757	0.7789	0.5392	0.4607	52	48	10

3.3.2 Results using meta-analysis by Schwarzer

Table 11 shows the results for the meta-analysis using the programme by Schwarzer and Table 12 includes the data file created by the programme.

Appendix 1 Table 11 Meta-analysis results using Schwarzer's programme

Statistic	Result	Statistic	Result
Number of effect sizes	22	Total sample size	2032
Unweighted mean of effect sizes g	0.41369	SE	0.09676
Observed variance of effect sizes g	0.20600	SD	0.45387
Unweighted mean of adjusted effect sizes d	0.40551	SE	0.09496
Observed variance of adj. effect sizes d	0.19839	SD	0.44541
"Weighted Integration Method"			
Mean effect size d+	0.23703	SE	0.04511
Significance Z	5.1901*		
Variance	0.00203	SD	0.04511
95% Confidence interval	0.1475 to 0.3265	Homogeneity Q	1032.2411 *df* = 21*
"Random Effects Model"			
Mean effect size DELTA	0.3481	SE	0.0910
95% Confidence interval	0.1697 to 0.5266	Significance Z	3.8237*
Observed variance	0.1983	Error variance	0.0788
Population variance	0.1195	Homogeneity Q	102.6985 *df* = 21*
Amount of variance explained by sampling error	39.73 %		
Kraemer (1983) method			
Mean effect size d	0.2587	95% Confidence interval	0.1698 to 0.3481
Population effect size Rho	0.12828	Variance of rho	0.0005
95% Confidence interval	0.0846 to 0.1715	Homogeneity Chi-square	109.9362
Orwin's Fail-safe n based on "random effects model" DELTA			
Fail-safe for critical d of .20	16.2940	Fail-safe for critical d of .50	-6.6824
Fail-safe for critical d of .80	-12.4265		

Note. * p < .000

Appendix 1 Table 12 Data file using Schwarzer's programme

Study number	Sample size group 1 (experimental group)	Sample Size group 2 (control group)	Effect size	Reliability coefficient
1	10	11	1.1689	1
2	10	11	0.6205	1
3	10	11	0.7554	1
4	10	11	0.1232	1
5	91	92	-0.0082	1
6	91	92	0.87041	1
[11]7	54	54	0	1
8	54	54	0.25	1
9	54	54	1	1
10	54	54	0.083	1
11	54	54	0.2	1
12	35	27	0.3096	1
13	32	31	0.5454	1
14	79	23	1.0013	1
15	34	35	0.4148	1
16	48	24	0.506	1
17	48	24	0.7124	1
18	24	12	1.118	1
19	133	133	-0.5061	1
20	52	48	-0.1301	1
21	52	48	-0.0892	1
22	52	48	0.1559	1

[11] Note that during data input it was necessary to swap some studies within Kenny's programme resulting in both programme's data input being in slightly different order

4. Discussion

As the first data run included outliers, these results will not be discussed. The results of the second analyses will however now be discussed.

4.1 Kenny's programme

It must be noted at the outset that scrutiny of normal data should not pose much of a problem seeing as meta-analysis cumulates findings resulting in large enough sample sizes to rest on the assumption of normality through reference to the central limit theorem (Krishnamurty, Kasovia-Schmitt & Ostroff, 1995; Normand, 1995). Twenty-two effect sizes with a sample of 2032 yielded an average effect size of 0.3354 which is significant when the *t* test results (two-tailed) is studied; 3.2863 $p < 0.005$ $df = 21$. Thus the effect size differed significantly from zero resulting in the conclusion that dynamic assessment did in fact have an effect on posttest scores when studies are cumulated. The *t* test treats *study* as unit of analysis, but *z* treats *person* as unit which also happens to be significant in this instance; average $z = 5.5697$ $p < 0.001$ This answers affirmatively the question presented earlier of whether dynamic assessment intervention makes a significant difference as opposed to no (static) intervention across separate studies on posttest scores. This result, as highlighted earlier, has no bearing on the value of dynamic assessment as method of mediatory tool and caution is attached to the interpretation of this significant value. In other words, regardless of the significance of the original primary findings, what does the cumulative finding mean?

The BESD (binomial effect size) measures the estimated difference between the experimental and control groups in terms of proportions. The test of homogeneity relies on the chosen statistic used to compute the effect size which in this case was *d* and thus Hedge's test of homogeneity was employed by the programme. The chi square statistic is used to compute the test for homogeneity which in this instance is highly significant thus indicating that the studies are not homogenous and hence effect sizes differ due to factors other than sampling error. The fail-safe number generated by Kenny's programme yields 156 null studies which would have to be generated for this test to be not significant i.e. 156 similar studies will need to be uncovered for this result to be nullified (Strube, 1985; Strube & Hartmann, 1983). No studies were transformed by any means other than by making use of Hedge's transformation[12] which as Kenny correctly points out is not truly a new weighting but merely a sample size correction factor (Kenny, 2003), thus, no untransformed estimate of average effect size is produced. Determination of effect size used by Cohen ranges from 0.2 (small effect), 0.5 (medium effect) and 0.8 (large effect) (Schwarzer, 1989). Thus the effect size of 0.334 can be considered as halfway between a small and medium effect size.

4.2 Schwarzer's programme

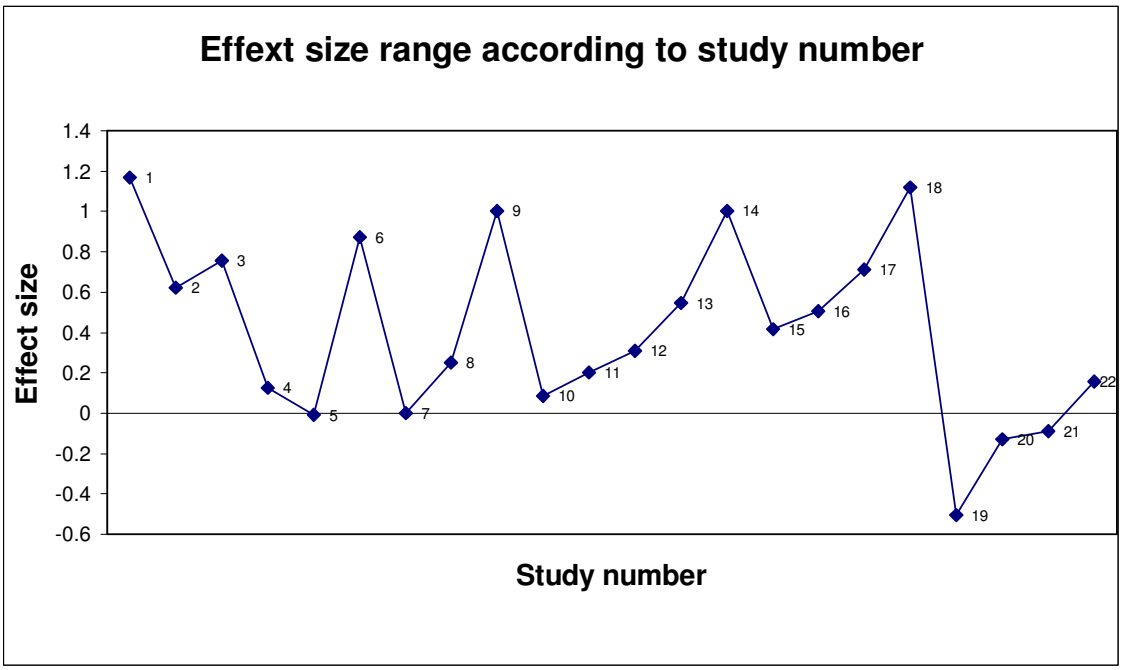
Twenty-two effect sizes with a sample of 2032 yielded an average effect size of 0.23703 which although significant was calculated using the ''weighted integration method'' and the subsequent chi square statistics yielded a highly significant result thus prompting the user to investigate the ''random effect model'' instead (as Schwarzer's programme offers three types of output). The mean effect size delta is 0.34813 and is significant in the random effects model. An aspect which is worrying is that 39.73% of the variance explained is due to sampling error. This underlies the original hesitation of running a meta-analysis with data from master's and doctoral studies in which original samples chosen for each study was not randomly chosen according to this meta-analysis. Nevertheless the effect size answers affirmatively the question presented earlier of whether dynamic assessment intervention makes a significant difference as opposed to no (static) intervention across separate studies on posttest scores. Once again, this result has no bearing on the value of dynamic assessment as such. In other words, regardless of the significance of the original primary findings, what does the cumulative finding mean?

The fail-safe number generated by Schwarzer's programme is interpreted differently from that of Kenny's fail-safe number. Schwarzer's number is the amount of studies needed for critical effect sizes of 0.2, 0.5 and 0.5 respectively. As the fail-safe for both the 0.5 and 0.8 delta levels exceed that of 0.34813 these two fail-safe numbers are meaningless. Although Kenny does not specifically mention how the fail-safe number is computed, it is assumed that Rosenthal's formula has been used. Schwarzer however makes use of Orwin's fail-safe number computation which is an adapted version of the original Rosenthal formula. Kenny's effect size of 0.3354 and Schwarzer's effect size of 0.34813 (delta, random effects model) differs by 0.01273 and is slight. Also, values from the various confidence intervals (the 95% confidence intervals described in the weighted integration, random effects and the Kraemer (1983) models used by Schwarzer, 1989) do not contain zeros, further supporting a significant effect; a zero in the interval could possibly indicate that there is no effect (Chambers, 2004). As has been highlighted (Arthur et al., 1994) any differences between packages usually results in fourth and higher decimal place differences which is acceptable.

[12] "A correction which improves the sample estimate of the standardized mean difference between the two groups" (Kalaian & Raudenbush, 1996, p.229).

The similarity of output further minimises any judgement calls used when making the decision to run the analyses on two software programmes. Figure 1 illustrates the range of effect sizes in study number order ranging from study 1 to study 22.

Appendix 1 Figure 1 Range of effect size across study number



4.3 A search for moderators

Due to the heterogeneity of effect sizes (the chi-square distribution indicating that homogeneity was rejected) an effect size cluster analysis was conducted in order to determine the heterogeneity of the data set. The resultant classification of two clusters is evident yet the second cluster comprises only one study and is thus considered an outlier in terms of heterogeneity of effect size when compared to the other 21 studies. A robust search for potential moderators was not carried out due to the small sample size of effect sizes, however this is strongly advised for larger data sets (Chambers, 2004; Eagly & Wood, 1994; Kenny, 2003; Rosenthal, 1995 Schwarzer, 1989). Cluster analysis decomposes the number of effect sizes into smaller sets and effect sizes are rank ordered according to their similarity and although this procedure is suited to smaller effect size samples (as is the case here), it works less well for unequal sample sizes (Schwarzer, 1989). A cursory glance of the output of effect size cluster analysis (see table 13) computed on the data file using Schwarzer's programme evidenced two clusters with only one study located in the second cluster (considered more of an outlier but this terminology is used by Schwarzer) and ranged from across the 1%, 5% and 10% levels of significance (the study by Lloyd et al; study number 19 in the second data run). According to Schwarzer (1989), "the formulae for the critical values and the computer algorithm for the disjoint cluster analysis have been taken from Mullen and Rosenthal, (1985)'' (p.33). Additional information is available at the end of table 13 and yields information on average sample size and standard deviation. A larger database would have allowed more probing investigative analysis in terms of moderator effects such as the potential moderating effects of gender, age, level of education and cultural grouping. The quality of the primary studies regarding greater elucidation of sample characteristics and also the small number of studies eventually included did not warrant such an investigation at this stage.

Appendix 1 Table 13 Effect size cluster analysis

CLUSTERS AT 1 % 5% and 10% LEVELS OF SIGNIFICANCE	
CLUSTER 1	
StudyID 1	Effect Size= 1.1689
StudyID 18	Effect Size= 1.1180
StudyID 14	Effect Size= 1.0013
StudyID 9	Effect Size= 1.0000
StudyID 6	Effect Size= 0.8704
StudyID 3	Effect Size= 0.7554
StudyID 17	Effect Size= 0.7124
StudyID 2	Effect Size= 0.6205
StudyID 13	Effect Size= 0.5454
StudyID 16	Effect Size= 0.5060
StudyID 15	Effect Size= 0.4148
StudyID 12	Effect Size= 0.3096
StudyID 8	Effect Size= 0.2500
StudyID 11	Effect Size= 0.2000
StudyID 22	Effect Size= 0.1559
StudyID 4	Effect Size= 0.1232
StudyID 10	Effect Size= 0.0830
StudyID 7	Effect Size= 0.0000
StudyID 5	Effect Size= -0.0082
StudyID 21	Effect Size= -0.0892
StudyID 20	Effect Size= -0.1301
CLUSTER 2	
StudyID= 19	Effect Size= -0.5061
Additional Information	
Average Sample Size = 92.3636	
Sample Size Std. Dev= 58.3006	
Correlation between Sample and Effect Sizes = -0.5098	

4.4 Limitations of the meta-analysis

Firstly only 7 studies were included (out of a potential number of 22) for this meta-analysis primarily due to the unavailability of the two software programs to proceed with the accumulation of within-groups studies and repeated-measures designs. Secondly of these 7 studies, 22 effect sizes were generated and of these 22 effect sizes, 12 were dependent samples and 10 were independent samples thus violating the inherent assumption of independence. The reason for violating this assumption was if only 10 independent samples were to be used the exercise of a meta-analysis would then be rendered null and void. The results should thus be interpreted with due caution. Although there is a significant small to medium effect size evident in the South African research literature pertaining to dynamic assessment as an effective intervention strategy in terms of effecting posttest score results, this effect is nevertheless resultant on the quality of studies included for assessment (mostly master's and doctoral studies); the small number of studies finally included (seven from twenty two studies) and the fact that fifteen of the original studies assessed within-groups results and not between-groups results. This is of itself an important finding which can be used to highlight the differences between the South African and overseas research literature in this area. Had the original pool of studies been larger and more varied in terms of quality, i.e. peer reviewed published results and had as their research designs between-groups as opposed to within-groups designs the results may have been even more significant in terms veracity, applicability and generalisability.

4.5 Implications of the findings for dynamic assessment research in South Africa

The effect size of 0.3354 obtained using Kenny's programme yielded a significant result with a similar effect size of 0.3481 obtained using Schwarzer's programme. In answer to the question of whether dynamic assessment interventions across cumulated South African research indeed had any cumulative significant effect, it can be stated that there is a small to medium effect size across studies thus supporting the utilisation of dynamic assessment in South Africa but only as it pertains to the improvement of posttest score results. The study cannot comment on the value of dynamic assessment as mediatory tool. This serves to add credence to an approach which seeks to assess individuals in as unbiased a manner as possible and which has

as a core philosophy the understanding of individual change through the learning process. These findings do, however, have to be tempered with the fact that these are results are based on only 7 studies.

4.6 Recommendations

Meta-analysis is dependent on the accuracy and robustness of primary research data and can never replace the need for primary research. Most of the studies included in this meta-analysis were Master's and Doctoral studies and the data was not, in most instances, in the correct format for a meta-analysis to be conducted. It is recommended that in future primary empirical dynamic assessment studies be conducted with future meta-analyses in sight and in so doing prepare the design and statistical analysis in such a way that the data becomes more amenable to meta-analytic data analysis. Much worthwhile data was not included in this analysis as much of the necessary data information was not included in the primary texts. As more primary research data is added to the field of dynamic assessment in South Africa it will become increasingly important for cumulative studies to be conducted in order to determine the cumulative efficacy of all the research and in order to do just this, the correct format of data needs to be included in the original studies. Although meta-analyses can be conducted on smaller sample sets it is also necessary that more primary empirical research be added to the field of dynamic assessment in order to make even more robust any future final meta-analytic results. It will be of great interest to conduct another such study once the primary pool has increased somewhat.

Regarding the utility of the two meta-analytic software programmes, both Kenny and Schwarzer's programmes yield similar effect sizes, both programmes differ in some ways and are alike in others. The programmes were freely available over the internet and as such functionality was not fully operational (such as the lack of saving and printing facilities) but considering that these programmes run at no cost this cannot be considered a criticism. Although more resources would allow for easier usage of purchased programmes these two programmes are considered worth the use if one is limited in resources. Dynamic assessment is more than a tool utilised for increasing scores within pretest-posttest research studies. Assessing the synthesized effect sizes of qualitative mediatory interventions through meta-analysis may also prove fruitful. However, most quantitative primary studies in South Africa do not study this aspect of dynamic assessment and have as their focus pretest-posttest research designs. It is recommended that primary studies could perhaps quantify such mediatory qualitative studies thus allowing later meta-analysts an opportunity to cumulate effect sizes across studies.

5. Conclusion

The aim of this study was two-fold: to determine the significance of the efficacy of dynamic assessment as a viable assessment strategy in South African studies in terms of increasing scores on posttest test results and to compare and analyse two meta-analytic software programmes. Meta-analysis is a powerful technique which can aid in the determination of how effectual cumulated studies in fact are and may evidence results contrary to individual study results. Twenty two studies were originally coded for inclusion into the meta-analysis but due to the nature of the original data only seven of these studies were included in the final analysis. Effect sizes of 0.3354 and 0.3481 respectively were calculated utilising two meta-analysis software programmes. Due to this small sample size, however, only limited conclusions can be drawn. Nevertheless, it was evidenced that the findings were indeed significant and had as a result the affirmation of the question posed as to whether dynamic assessment as an assessment tool is efficacious within South African research. Limitations surrounding the use of the two packages and violations inherent in the analysis of the data was addressed as further cautions against generalisation of results. It is suggested that any future research designs conducted within the field of dynamic assessment be set out in such a way as to accommodate future meta-analysis as this technique is dependent on data that can be successfully utilised within such an analysis. The recommendation concerning the utility of the two software programmes was based on their ease of use, technical features, similarity of output and cost-effectiveness.

6. Excursion into a potentially rich field of investigation – an aside to this meta-analysis

6.1 From GeneWays to MemeWays[13]

A concept, which has since 1996 come to fruition in the bioinformatics field[14] (in this instance genes), may be of potentially great significance within the behavioural sciences (for example the study of memes) and involves the amalgamation of computer

[13] Casting such a broad analogy might at first glance seem ill-conceived, however it is the author's contention that if a system such as GeneWays can culminate in such fruitful research within bioinformatics, then it can surely be conceived to bring to fruition a similar functioning system (albeit with severe modifications) to the social sciences and memes are hereby called to mind, serving at once a behavioural science counterpart (Blackmore, 2000) and an equally enticing homonym.

[14] The National Bioinformatics Network is just such an initiative which has been launched in South Africa (at present working with the University of Pretoria as a node within the network among others) and more information can be found at www.nbn.co.za. To see an endeavour of a similar nature burgeon within the social sciences in the field of cognitive informatics would further spur research and discovery in this area.

science, mathematics and information science. Although not intended as a review of this method of data extraction it is considered useful at least at this preliminary stage to consider the advantages that such a data mining technique might hold for fields as diverse and complex as intelligence research.

In essence, ''GeneWays'' (Rzhetsky, Lossifov, Koike, Krauthammer, Kra, Morris, Yu, Duboué, Weng, Wilbur, Hatzivassiloglou & Friedman, 2004) is an automated search tool that combs through bibliographical research literature databases, a task that is becoming increasingly difficult to conduct due to the sheer number of articles published currently in academia and industry (Stix, 2005). The mining of potential information and new links that can be found within and between a variety of research topics and domains remains within the grasp of behavioural as well as natural sciences. Making use of the speed and efficiency of such a search tool impacts significantly on the number of hidden or hitherto unknown variable linkages that occur within large databases, links that may not necessarily be found in the traditional literature search. Effectively this tool can partially replace the need for researchers to mine information from texts manually. Intelligence research of which dynamic assessment has of late become more prominent, may offer the researcher the opportunity thus far afforded by meta-analytic techniques[15] (see Appendix 1, Section A) the further opportunity of describing links within various data pools by using a technique similar to that of GeneWays. Briefly, the search tool functions as follows:

Online full-text articles are scanned for various key phrases pertinent to the topic at hand and are then downloaded to a computer, after which the articles are stripped of html and any other coding. Processing of the information includes the refining and defining of certain key words and the links these terms have to other phrases or key words. This 'filtered' text is then translated by a parser into machine-readable format (Stix, 2005). Once the information is filed into a database, various query languages can be used to ''ask'' the database questions, after which information can also be graphically displayed, illustrating links between different variables under scrutiny. Notwithstanding the technique's niche development within the area of molecular biology, the core principle operating within this nexus of research can be applied to other fields and can be harnessed, adapted and utilised within the social sciences model.

Together with tools from artificial intelligence and statistics this endeavour has opened up a vista large enough to warrant its use within social science research. Modelling links between variables, which would otherwise remain dormant,[16]can only aid in identifying veiled connections which can prove fruitful in establishing new domains and avenues to pursue. As much is conveyed in the statement by Wang (2003) in which is stated that along with energy and matter, information is the third essence for modelling the natural world and when combined amalgamate into a new transdisciplinary study of cognitive informatics (p.151). Towards just such an end within the behavioural sciences is the pioneering work being conducted within this field which currently encompasses the study of philosophy, psychology, neuroscience, neuropsychology, cognition (cognitive science), computer science, software engineering, artificial intelligence, mathematics and statistics (Chiew & Wang, 2003; Wang, 2002; Wang & Wang, 2002; Wang, 2003a; Wang, 2003b) which seeks to align these varied areas of interest in such a manner so as to allow for the discovery of how humans process information, sustain consciousness as well as memory storage and retrieval (Wang & Liu, 2003; Wang, Patel, Patel & Wang, 2003; Yao, 2004). Having as forerunners classical information theory through to contemporary classical informatics (the science of information), cognitive informatics can be said to be:

> the study of computing and information processing problems by using cognitive science and neuropsychology theory and studies cognitive information processing mechanisms of the brain by using computing and informatics theories
>
> (Wang, 2003b, p.151).

Not all proponents of this new field are, however, in agreement with exactly how such an endeavour should propel itself forward as much of the initial inherent assumptions are not entirely agreed upon (Bryant, 2003). As the above-mentioned list of fields of enquiry suggests, cognitive informatics can be understood as a loose term encompassing myriad definitions, either broad in range or narrowly focused on specified topics. This multi-faceted approach that cognitive informatics takes may result in the evasion of the broader cultural context in which this area of research finds its niche. In an attempt to bring back to this emerging discipline a core ideal of inclusiveness of other co-constructed realities (and not merely an endeavour to understand the transmission of data in a purely technical sense), Bryant argues that before this field becomes too immersed in terminology and

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[15] Of course the degree to which one is dependent on the accurate and reliable functioning of just such a search tool does not obviate the need to perhaps control for consistency within the programme in terms of how it might code for certain aspects; an inter-rater reliability scale of sorts could be devised. Meta-analytic techniques frequently make use of such inter-rater reliability scales to ensure the accuracy and reliability of coding across studies, both within and between researchers. However, with the past advances in the artificial intelligence field, this may not necessarily pose such a threat (Mullins, 2005). The process of curation however takes care of assigning levels of confidence to data by annotating original statements with statements of confidence (Rzhetsky et al., 2004).

[16] The fact remains that however global academic society becomes, no-one single human researcher can possibly be cognisant of every other researcher in the world who is actively engaged within the same research area. The need to establish potential links using automated software is one solution that should be encompassed by social scientists who would seek to remain at the forefront of their respective fields of enquiry.

research programmes which may flounder from the broader framework, the field should be recast in a new light which takes cognisance of the information disseminated as well as the *observers* present during such dissemination (Bryant, 2003).

The example of how data and information is transmitted along a conduit is often used to construe the nature of how language and the written word is conveyed which can at times be misleading as a representation of how in fact communication is achieved between human beings for instance. Another major point of contention detailed by Bryant, is the notion of a relational brain as evidence of how in fact cognition takes place within the brain whereas cognitive informatics as understood and propounded by more deterministic and analytic researchers, seems to relate to cognition from a more componential outlook stressing the symbolic nature of cognition. For instance, when recalling from memory one might believe that information is stored in symbolic networks as opposed to recalling a relational structure in which the memory is reactivated within a network and reconstructed each time the memory is needed.[17] A stern warning is issued by Bryant to those hoping to embark on a career within cognitive informatics;

we must be constantly aware of the role of the observer, the embodied nature of information, the lure of the conduit metaphor, the tendency to mechanize and technicize, and the weakness of the functionalist view of representation

(2003, p.227).

The final question to be answered though is what this new emerging field of cognitive informatics has to offer dynamic assessment within intelligence research. How is the power of this methodology to be harnessed and what are the end goals? Purely qualitative behavioural assessments are not truly the domain of quantitative high-speed amalgamated databases and the work carried out within neuroscience laboratories seems too distant to bridge within the assessment of human beings from a dynamic assessment point of view. However, the scope of dynamic assessment, being entrenched within the broader intelligence research field allows for myriad branches of these pursuits which can easily be brought into contact, namely through

- the power of meta-search tools as evidenced by GeneWays;
- the alluring appeal of a multidisciplinary co-operative focus area such as cognitive informatics which can aid in how knowledge is stored and represented within the brain;
- and the manner in which qualitative assessments can evolve alongside such endeavours.

This at least allows practitioners the opportunity to borrow from and inform other emerging and emerged disciplines from across the academic board. In essence, dynamic assessment, like any other research field, has something to offer human beings. It can also learn from other fields. It is the opinion of this author that the confluence of these above-mentioned areas will buoy dynamic assessment in the years to come.

[17] Of course by implication if memory were to work in this manner (i.e. reconstructed each time), reconstructing memories would entail past knowledge and feelings being evoked and thus distorting these memories. How accurate such memories would be is at present a contentious issue.

Section B Further information regarding studies used in the meta analysis

1. Introduction

The purpose of including this summarised information on the primary studies is to allow for replication of meta-analytic results making use of a variety of choice statistics. This also makes provision for those readers seeking more qualitative information regarding each study as this was not included in the meta-analytic analysis. Studies with asterisks are those included in the final analysis (seven in total). It also includes main characteristics of each study and takes the following format:

(1) Author
(2) Year
(3) Title
(4) Publisher
(5) Type of publication
(6) Geographical area
(7) Short description
(8) Sample size
(9) Number of groups
(10) Between/within groups design
(11) Ability group
(12) Chronological age
(13) Tests used
(14) Type of feedback
(15) Design and procedure
(16) Nature of sample
(17) Time between pre and posttest
(18) Hypotheses
(19) Mediation
(20) Measures
(21) Summary of findings
(22) Criterion and predictor variables
(23) Limitation

Each study is then summarised using the key number to reflect the data concerned. To ensure a smoother flow when reading the below mentioned results it is deemed better to make use of some shorthand:

Exp = experimental group; cont = control group; X = mean; SD = standard deviation; % = percentage; N = total number; n = number per group; t = t test result; F = f test result, p</p> = p value at the chosen significance level; btw = between; sig = significant; df = degrees of freedom; H0 = null hypothesis; HA or H1 = alternative hypothesis; Matric = matriculation level (last year of schooling)

(1)Andrews, S.G.**

(2)1996
(3) A small-scale investigation of the group administration of Feuerstein's learning potential assessment device
(4) University of Natal, Pietermaritzburg
(5) Unpublished Masters dissertation
(6) Kwa-Zulu Natal
(7)To determine if cognition is modified in a group administration of the LPAD; and to detect differences in the degree of modifiability
(8) 21 (originally 24)
(9) 2
(10) Within and between groups design - matched experimental and control groups
(11) Homogenous group - matched pairs in experimental and control groups
(12) Std 7 (new grade 9); therefore average of 14
(13) LPAD - numerical progressions, organizer and complex figure drawing
(14) Assisting questions from pupils, modelling, feedback and cognitive structuring
(15) Pretest-(mediation)-posttest of experimental group; control group received no mediation
(16) Black female high school pupils
(17) 14 days
(18) H01:Mediation will result in modified cognition and improved performance of the experimental group; H02: Group administration will detect differences in degree of modifiability (Andrews does not refer to the hypotheses as “null” but refers to them as main aims
(19) Mediation in cognitive operations, assisting questions, modelling, contingency management, feedback, cognitive restructuring and assistance in the functions required by instrument - completed in a 2 hour session
(20) Raw scores used for Organizer and Numerical Progressions as presented in Andrews’ appendix. Numerical progressions: Exp pretest X=25, SD=15.88,n=10; Exp posttest X=60, SD=15.32, n=10; t=2.97 (p<0.01). Cont pretest X=20.8, SD=17.64, n=11; Cont posttest X=42.5,

SD=14.65, n=11; t=0.02 (p>0.1). Organizer: Exp pretest X=21.9, SD=18.82,n=10; Exp posttest X=59.5, SD=19.5, n=10; t=4.05 (p<0.005). Cont pretest X=23.3, SD=9.49, n=11; Cont posttest X=46, SD=22.06, n=11; t=0.654 (p>0.1).Complex figure drawing - two phases (copy and recall): Copy: Exp pretest X=16.2, SD=2.23,n=10; Exp posttest X=15.5, SD=1.96, n=10. Cont pretest X=16.7, SD=1, n=11; Cont posttest X=13.5, SD=3.14, n=11. Recall: Exp pretest X=13.4, SD=4.86, n=10; Exp posttest X=7.2, SD=3.10, n=10; Cont pretest X=12.5, SD=2.93, n=11; Cont posttest X=6.8, SD=3.13, n=11. T test performed in order to determine whether there was any sig improvement from pre to posttest scores across all there instruments: Exp group t=1.75 at p<0.1 and for cont group: t= -6.87 at p<0.0005 - however, Andrews discards this aggregate across three tests due to an extraneous variable (complex figure drawing being more difficult in posttest than in pretest)
(21) Regarding H01 and H02 for numerical progressions and organizer both null hypotheses are supported (recall that Andrews refers to these hypotheses as ''aims'' and not ''null'', hence support for these aims translates into support for the null hypotheses although this would not be the conventional manner of describing it). Only limited support for both hypotheses for the complex figure drawing due to unforeseen factors.
(22) Criterion: only results on the posttest - compared with results on the pretest
(23) Small sample sizes, terminology of Organizer not familiar to students and first language of students was not English (the language of mediation). Complex figure drawing in posttest was more difficult than the pretest drawing.

(1)Shochet, I.M.

(2)1986
(3) Manifest and potential performance in advantaged and disadvantaged students
(4) University of the Witwatersrand
(5) Unpublished PhD thesis
(6) Johannesburg
(7) To search for culture-fair alternative predictors of tertiary academic success by making use of Feuerstein's philosophy (as encapsulated within the LPAD) and to operationalise the LPAD constructs for this environment by enriching static assessment tools
(8) 156
(9) 2
(10) Between and within groups design (dependent samples used)
(11) Advantaged and disadvantaged first year Arts faculty (BA) students at the University of the Witwatersrand. 52 male and 104 female
(12) Mean age 19.56 and range 17-31
(13) Deductive reasoning test (DRT) (both static and enriched versions, i.e. DR/T and DR/E) and Pattern relations test (PRT) (both static and enriched versions, i.e. PR/T and PR/E), both tests developed in South Africa. The differences in scores between the two yielded the difference score (DR/D and PR/D)
(14) Immediate. Mediation followed straight after the pretest. Feedback is given after each problem as well as modelling some of the logic and thinking processes necessary to solve the particular problems, giving advance warning about typical errors that could be made, giving students the opportunity in subsequent items to transfer this learning and thus demonstrate learning potential
(15) Pretest-mediation-posttest design for both DRT (static and enriched) and PRT (static and enriched) tests - Group administered to both the advantaged and disadvantaged groups (therefore 4 administration groups)
(16) Female n = 104 in total and divided into 77 advantaged and 27 disadvantaged students; male n = 52 in total and divided into 27 advantaged and 25 disadvantaged students
(17) immediate - pretest followed by mediation and posttest
(18) HA1: Advantaged and disadvantaged students will have different predictors correlating significantly with the criterion of university success. HA2: The prediction of university success will be significantly enhanced through the introduction of the enriched testing conditions as conceptualised by Feuerstein and operationalised for the purpose of the present study. Sub-hypothesis HA2 - The prediction of university success will be significantly enhanced for disadvantaged students through the enriched testing conditions
(19) Feedback is given after each problem and modelling some of the logic and thinking processes necessary to solve the particular problems, giving advance warning about typical errors that could be made, giving students the opportunity in subsequent items to transfer this learning an thus demonstrate learning potential
(20)To determine whether there was a sig difference btw the traditional and enriched versions of the tests (i.e. in order to determine whether mediation was effective), t-tests for paired differences for dependent samples was used. DRT Whole group: N=156, mean DRT(static) = 16.89, mean DRT (enriched) = 20.93 and mean DRT (difference btw static and enriched) = 4.13; t=10.94 significant at p=0.001. Disadvantaged group n=52, mean DRT(static) = 12.06, mean DRT (enriched) = 16.42 and mean DRT (difference btw static and enriched) =4.23; t=6.62 significant at p=0.001. Advantaged group n=104, mean DRT(static) = 19.31, mean DRT (enriched) = 23.18 and mean DRT (difference btw static and enriched) = 4.07; t=8.69 significant at p=0.001. PRT Whole group: N=156, mean PRT(static) = 10.56, mean PRT (enriched) = 17.32 and mean PRT (difference btw static and enriched) = 6.75; t=19.87 significant at p=0.001. Disadvantaged group, n=52, mean PRT(static) = 7.29, mean PRT (enriched) = 12.85 and mean PRT (difference btw static and enriched) = 5.19; t=7.78 significant at p=0.001. Advantaged group, n=104, mean PRT(static) = 12.20, mean PRT (enriched) = 19.56 and mean PRT (difference btw static and enriched) =7.53; t=20.68 significant at p=0.001.

Measures for investigating HA1: Pearson product-moment correlations were conducted: all predictor variables were correlated with both criterion variables (credits and average scores, see number 22 below) for each group (advantaged and disadvantaged groups). Advantaged group: Matric & credits = 0.34 (sig at p=0.01) two-tailed, matric & average 0.55 (sig at p=0.01), DRT(static) & credits -0.13, DRT (static) & average -0.04; DRT (enriched) & credits -0.19, DRT (enriched) & average -0.08; DRT(difference btw static and enriched) & credits -0.07, DRT (enriched) & average -0.07, PRT (static) & credits -0.12, PRT (static) & average -0.06, PRT (enriched) & credits -0.07, PRT (enriched) & average -0.04, PRT (difference btw static and enriched) & credits 0.10, PRT (difference btw static and enriched) & average 0.05. Disadvantaged group: Matric & credits = 0.20, matric & average 0.15, DRT(static) & credits 0.25, DRT (static) & average 0.26; DRT (enriched) & credits 0.03, DRT (enriched) & average 0.03; DRT(difference btw static and enriched) & credits - -0.26, DRT (enriched) & average -0.29 (sig at 0.05 two tailed), PRT (static) & credits 0.16, PRT (static) & average 0.21, PRT (enriched) & credits 0.05, PRT (enriched) & average 0.0, PRT (difference btw static and enriched) & credits 0.06, PRT (difference btw static and enriched) & average 0.03. Therefore different predictors for both groups. In order to determine whether there were sig diff btw the sig correlations for both groups, the correlations underwent Fisher's r-z transformations. Matric & credits 0.829, matric & average 2.565 (sig at p=<0.05 two tailed), DRT (difference btw static and enriched) & credits -1.846, DRT (difference btw static and enriched) &average -2.027 (sig at p=< 0.05 two tailed), DRT (static) & credits -2.126 (sig at p=<0.05 two tailed), DRT (static) & average -1.681. Hence some differences are significant for the two groups: therefore support for HA1.

Investigating HA2 through a main effect: i.e. to establish whether Feuersteinian mediation would significantly improve prediction from traditional measures. ADVANTAGED students only: Stepwise multiple regression models with unstandardised beta weights: dependent variable = CREDITS traditional measures - matric 0.08(beta), F(df1/88) 16.93, p = 0.000(sig at 0.05), PRT(static) -0.04(beta), F(df1/88) 1.98, p = 0.163, DRT (static) -0.05(beta), F(df1/88) 3.91, p = 0.051. Multiple r squared = 0.184(sig at 0.05 and 0.01). No Feuersteinian measure met the 0.10 sig level for entry into the model after the above model had been included therefore no Feuersteinian measures enhanced prediction. The same analysis was run with dependent variable: AVERAGE: traditional measures - matric 0.70(beta), F(df1/88) 45.76, p0.000(sig at 0.05 and 0.01), PRT(static) -0.22(beta), F(df1/88) 1.82, p=0.181, DRT (static) -0.22(beta), F(df1/88) 2.98, p=0.088 multiple r squared = 0.345(sig at 0.05 and 0.01). No Feuersteinian measure met the 0.10 sig level for entry into the model after the above model had been included therefore no

Feuersteinian measures enhanced prediction. DISADVANTAGED students only: Stepwise multiple regression models with unstandardised beta weights: dependent variable = CREDITS traditional measures - matric 0.05(beat), F(df1/44) 0.96, p=0.332, PRT(static) 0.04(beta), F(df1/44) 0.59, p=0.448, DRT (static) 0.05(beta), F(df1/44) 1.78, p=0.190 multiple r squared = 0.094. No Feuersteinian measure met the 0.10 sig for entry into the model after the above model had been included level therefore no Feuersteinian measures enhanced prediction. The same analysis was run with dependent variable: AVERAGE: step 0 traditional measures - matric 0.16(beta), F(df1/44) 0.34, p=0.562, PRT(static) 0.33(beta), F(df1/44) 1.01, p=0.320, DRT (static) 0.30(beta), F(df1/44) 2.26, p=0.140 multiple r squared=0.096. Step 1 traditional measures - matric 0.11(beta), F(df1/44) 0.16, p=0.689, PRT(static) 0.29(beta), F(df1/44) 0.81, p=0.373, DRT (static) 0.30(beta), F(df1/44) 2.48, p=0.122 DRT(enhanced) -0.42 (beta), F(df1/44) 3.52 p= 0.067 r squared=0.165. No Feuersteinian measure met the 0.10 sig level for entry into the model therefore no Feuersteinian measures enhanced prediction. No predictors were significant for disadvantaged students. HA2 is not supported through a main effect for either group.

Investigating HA2 through a moderator effect: ADVANTAGED students: two models used with different criteria: model 1 - predictors include DRT (static), DRT (difference) DRT (static) X DRT (difference): CREDITS: DRT (static) -0.06(beta) F(df1/88) 2.86 p = 0.094, DRT (difference) -0.12 (beta) F(df1/88) 1.14 p=0.288, DRT(static) X DRT (difference) 0.00 (beta) F(df1/88) 0.61 p=0.438 multiple r squared = 0.038. AVERAGE: DRT (static) -0.23(beta) F(df1/88) 1.16 p = 0.284, DRT (difference) -0.76 (beta) F(df1/88) 1.31 p=0.256, DRT(static) X DRT (difference) 0.03 (beta) F(df1/88) 0.91 p=0.342 multiple r squared = 0.019. Model 2 predictors include PRT (static), PRD (difference), PRT (static) X PRD (difference). CREDITS: PRT (static) 0.00(beta) F(df1/88) 0.00 p = 0.979, PR (difference) 0.09 (beta) F(df1/88) 0.92 p=0.341, PRT(static) X PRT (difference) -0.01 (beta) F(df1/88) 0.60 p=0.442 multiple r squared = 0.026. AVERAGE: PRT (static) -0.08(beta) F(df1/88) 0.06 p = 0.805, PRT (difference) 0.10(beta) F(df1/88) 0.03 p=0.859, DRT(static) X DRT (difference) 0.00 (beta) F(df1/88) 0.00 p=0.965 multiple r squared = 0.005 HA2 is not supported through a moderator effect for advantaged students. DISADVANTAGED students: two models used with different criteria: model 1 - predictors are DRT (static), DRT (difference) DRT (static) X DRT (difference): CREDITS: DRT (static) 0.12(beta) F(df1/45) 6.81 p = 0.012 (sig at 0.05), DRT (difference) 0.14 (beta) F(df1/45) 1.37 p=0.248, DRT(static) X DRT (difference) -0.02 (beta) F(df1/45) 3.47 p=0.069 multiple r squared = 0.192 (sig at 0.05). AVERAGE: DRT (static) -0.53(beta) F(df1/45) 3.72 p = 0.060, DRT (difference) 0.16 (beta) F(df1/45) 0.05 p=0.822, DRT(static) X DRT (difference) -0.05 (beta) F(df1/45) 0.85 p=0.363 multiple r squared = 0.165 (sig at 0.05). Model 2 predictors are PRT (static), PRD (difference), PRT (static) X PRD (difference). CREDITS: PRT (static) -0.01(beta) F(df1/45) 0.01 p = 0.929, PR (difference) -0.09 (beta) F(df1/45) 0.85 p=0.362, PRT(static) X PRT (difference) 0.02 (beta) F(df1/45) 1.95 p=0.170 multiple r squared = 0.079. AVERAGE: PRT (static) -0.02(beta) F(df1/45) 0.00 p = 0.972, PRT (difference) -0.62(beta) F(df1/45) 1.31 p=0.259, DRT(static) X DRT (difference) 0.11 (beta) F(df1/45) 2.46 p=0.124 multiple r squared = 0.100. For the deductive reasoning models, the multiple r squared on both criteria is significant at 0.05. This is not the case for the pattern relations model. DRT (difference) functions as a moderator of the relationship between DRT (static) and success. In order to determine whether the moderator effect is sufficiently strong to support HA2, the multiple r squared of DRT (static) must be compared to the multiple r squared of the moderated model. DRT (static) r squared = 0.063 against criterion of CREDITS and DRT (static) has an r squared = 0.068 against the criterion of AVERAGE. Thus for CREDITS the increment to r squared when DRT (static) is moderated by DRT (difference) is 0.063 subtracted from 0.192, increment to r squared = 0.129, F (df2/45) = 3.64 (sig at 0.05). For AVERAGE the increment to r squared when DRT (static) is moderated by DRT (difference) can be determined by subtracting 0.068 from 0.165, increment to r squared = 0.097, F (df2/45) = 2.6 which is not sig. Thus HA2 for disadvantaged students has been supported on the criterion of CREDITS. For every increase in modifiability, predictability on DRT (static) decreased. Other findings such as whether age and gender were predictors were also calculated as well as for attendance at an academic support programme.
(21) Enhanced results provided greater predictive value for those students who were more modifiable - but acted as moderator variables. The more the disadvantaged students were able to modify their cognitive functioning, the less predictable was their university success on the basis of the traditional intelligence test and vice versa. Mediation of tests can aid in predicting tertiary success.
(22) Criterion variables: University success at the end of the first year of studies - number of credits obtained in first year of study and as an alternative, the average marks obtained in BA 1. Predictor variables: both static and enriched versions of the DRT and PRT as well as Matric results. Also the difference btw the static and enriched conditions for both the DRT and PRT. Subject variable: level of disadvantage (advantaged and disadvantaged); sex, age, attendance at a special programme (attendees and non attendees).
(23) All four administration groups were of different sizes, which may have impacted on type and quality of mediation, hence ANOVA's were conducted to determine whether means differed significantly for the smaller groups, however, no sig. difference was found; F1.96 (for DRT/D) and F0.49 (for PRT/D) (df=3 for each) and p=0.120 and 0.696 respectively. PRT and DRT difference scores used as index of modifiability in the ANOVA. No difference in Scheffe post-hoc test. 15 students cancelled their studies hence sample size decreased from 156-141 (therefore no criterion results for them).

(1)Zolezzi, S.A.

(2) 1992
(3) Alternative selection measures for university undergraduate admissions
(4) University of the Witwatersrand
(5) Unpublished Masters dissertation
(6) Johannesburg
(7) The study aimed to assess the effectiveness of both traditional and learning process selection measures (including dynamic assessment) among a group of advantaged and disadvantaged students
(8) 26
(9) 1 group divided into two and further sub-divided into 4
(10) Within groups
(11) Students enrolled in the pre-university bursary scheme at the University of the Witwatersrand within the commerce Faculty. 14 male and 12 female. Whole group divided into advantaged and disadvantaged; also into low modifiable and high modifiable
(12) 17-25
(13) Static tests used: Biographical questionnaire (BQ); Intelligence test (MAT); inductive reasoning test static (PRT/T); an interview measure (IM), and Matriculation marks (MATRIC). Dynamic tests used: Pattern relations test enriched (PRT/E); the learning process measure (LSP); study process questionnaire of Biggs; the learning and study strategies inventory (LASSI). Learning potential is defined as the difference between the enriched and traditional scores.
(14) Enriched testing condition comprised four stages: introductory patter, intensive mediation, minimal mediation and no mediation.
(15) Group administration of tests. Pretest-mediation-posttest for whole group, statistically analysed afterwards according to group membership i.e. advantaged, disadvantaged and high/low modifiability
(16) Advantaged and disadvantaged commerce students
(17) Both static and dynamic testing took two days
(18) HA1:Learning potential is a better predictor of academic competence for the disadvantaged students than a traditional measure of general intelligence. HA2: learning potential is a better predictor of academic competence for the disadvantaged students than school marks. HA3: learning potential together with the learning process measures is a better predictor of academic competence for both advantaged and disadvantaged students than only learning potential or static measures alone.
(19) The criteria for mediation followed Feuerstein's principles of mediated learning experience

(20) Simple statistics for predictor and criterion variables. Whole sample. N = 26. First figure = Mean and second figure = standard deviation (incl. the sub-groupings within each predictor test, for instance LASSI includes L1-L10, and SPQ Biggs includes B1-B9). For ease of reading, the variables have been underlined. Matric 21.11, 6.80 , IQ 26.96, 6.35, PRT/T 8.88, 3.74, PRT/E 16.11, 4.81, LP 8.07, 3.49, BQ 57.15, 6.86, INTERVIEW 48.26, 11.61, LSP 49.57, 11.43, LASSI L1 32.07, 6.38, L2 30.03, 5.21, L3 25.57, 4.64, L4 23.53, 5.96, L5 28.8, 5.51, L6 27.26, 6.74, L7 17.42, 3.61, L8 25.92, 4.16, L9 26.61, 5.67, L10 27.65, 5.15; SPQ - B1 26.11, 3.99, B2 21.61, 4.68, B3 23.61, 4.8, B4 23.53, 5.47, B5 26.42, 4.65, B6 25.15, 5.55, B7 47.73, 7.32, B8 47.15, 8.71, B9 51.57, 7.93; Criterion: June Accounting 41.5, 17.25, June Stats 45.19, 15.72, June Maths 52.15. 13.6, June Average 46.07, 12.38, June Business studies 64.6, 14.25. ADVANTAGED students only: N= 8 . First figure = Mean and second figure = standard deviation (incl. the sub-groupings within each predictor test): Matric (N=7) 22.28, 3.72 , IQ 30.50, 5.58, PRT/T 11.37, 4.92, PRT/E 18.37, 2.87, LP 6.25, 2.81, BQ 62.25, 7.30, INTERVIEW (N=7) 52.00, 6.08, LSP 49.5, 12.61, LASSI L1 34.12, 4.51, L2 30.62, 4.47, L3 25.00, 4.59, L4 21.12, 6.49, L5 26.25, 5.39, L6 25.12, 8.85, L7 18.00, 3.54, L8 24.37, 4.10, L9 26.00, 7.15, L10 28.25, 6.08; SPQ - B1 27.5, 2.67, B2 23.75, 3.49, B3 23.62, 3.33, B4 22.37, 5.70, B5 25.62, 4.95, B6 23.75, 3.57, B7 51.25, 3.57, B8 46.00, 6.04, B9 49.37, 6.47; Criterion: June Accounting 42.87, 19.04, June Stats 46.5, 20.24, June Maths 55.25. 15.58, June Average 48.00, 16.86, June Business studies 65.37, 18.50. DISADVANTAGED students only: N= 18 . First figure = Mean and second figure = standard deviation (incl. the sub-groupings within each predictor test): Matric (N=17) 23.11, 2.57 , IQ 25.38, 6.16, PRT/T 7.77, 2.53, PRT/E 16.33, 3.88, LP 8.55, 3.79, BQ 54.88, 5.44, INTERVIEW 49.5, 6.39, LSP 49.61, 11.25, LASSI L1 31.16, 6.98, L2 29.77, 5.61, L3 25.83, 4.76, L4 24.61, 5.56, L5 29.94, 5.31, L6 28.22, 5.61, L7 17.16, 3.71, L8 26.61, 4.11, L9 26.88, 5.09, L10 27.38, 4.85; SPQ - B1 25.5, 4.38, B2 20.66, 4.91, B3 23.61, 5.42, B4 24.05, 5.45, B5 26.77, 4.62, B6 25.77, 6.22, B7 46.16, 8.08, B8 47.66, 9.77, B9 52.55, 8.48; Criterion: June Accounting 40.88, 16.94, June Stats 44.61, 13.92, June Maths 50.77. 12.87, June Average 45.22, 10.29, June Business studies (N=17) 64.23, 12.43. LOW MODIFIABLE students only: N=17. First figure = Mean and second figure = standard deviation (incl. the sub-groupings within each predictor test): Matric (N=15) 22.73, 2.31 , IQ 27.35, 6.66, PRT/T 9.58, 3.93, PRT/E 15.82, 3.50, LP 5.88, 1.79, BQ 56.82, 6.28, INTERVIEW 51.11, 6.42, LSP 50.88, 11.98, LASSI L1 33.23, 4.49, L2 30.41, 4.59, L3 24.52, 4.93, L4 22.47, 6.52, L5 28.76, 5.64, L6 28.29, 6.74, L7 17.58, 3.44, L8 25.58, 4.22, L9 26.76, 5.81, L10 28.52, 5.36; SPQ - B1 26.64, 4.10, B2 21.17, 3.74, B3 22.94, 4.84, B4 23.11, 5.77, B5 25.94, 3.99, B6 24.05, 5.29, B7 47.82, 6.39, B8 46.05, 8.66, B9 50.00, 7.80; Criterion: June Accounting 41.94, 16.80, June Stats 42.82, 17.52, June Maths 51.82, 15.28, June Average 45.29, 13.97, June Business studies 65.29, 14.52. HIGH MODIFIABLE students only. N=9. First figure = Mean and second figure = standard deviation (incl. the sub-groupings within each predictor test): Matric 23.11, 3.82, IQ 26.22, 6.03, PRT/T 7.55, 3.12, PRT/E 19.11, 3.10, LP 11.55, 3.32, BQ 57.77, 8.21, INTERVIEW (N=8) 48.25, 5.89, LSP 47.11, 10.51, LASSI L1 29.88, 8.88, L2 29.33, 6.46, L3 27.55, 3.43, L4 25.55, 4.36, L5 28.88, 5.60, L6 25.33, 6.68, L7 17.11, 4.10, L8 26.55, 4.21, L9 26.33, 5.72, L10 26.00, 4.55; SPQ - B1 25.11, 3.78, B2 22.44, 6.26, B3 24.88, 4.75, B4 24.33, 5.07, B5 27.33, 5.87, B6 27.22, 5.73, B7 47.55, 9.27, B8 49.22, 8.92, B9 54.55, 7.73; Criterion: June Accounting 40.66, 19.07, June Stats 49.66, 11.12, June Maths 52.77, 10.52, June Average 47.55, 9.20, June Business studies 63.12, 14.53. Correlations conducted for whole group, also for advantaged and disadvantaged sub-groups; and low/high modifiable sub-groups. Only noting sig correlations for the whole group (N=26 unless otherwise indicated): LSP and June Maths (0.55483, p = 0.0033); LSP and June Average (0.40393, p = 0.0407); L1 and June Stats (0.45108, p = 0.0207); B4 and June Business studies (0.42643, p=0.0335, N=25); B8 and June Business studies (0.43326, p=0.0305, N=25).
(21) All three hypotheses were supported, however, HA1 and HA2 were not supported through a main effect. Prediction was enhanced for academic success by supporting HA1 and HA2 through a moderator variable. Advantaged and disadvantaged students predict differently. The more modifiable the student, the less traditional predictors predicted and vice versa.
(22) Criterion variables: July examinations in three subject areas (accounting, Maths and stats) as well as the average score for all three subjects; business studies results; subject variables: advantaged and disadvantaged students; predictor variables: LP (enriched minus traditional); PRT (enriched); LSP, SPQ, LASSI, PRT (traditional), IM, BQ, MAT, MATRIC. There were various sub-groupings regarding the predictor variables, totalling 27 predictors, 5 criterion and 2 subject variables, namely, advantaged and disadvantaged students.
(23) The study did not explore the dynamics involved in the mediational process. Selection of students took place during the second semester, thus allowing students to benefit from enriched teaching. The number of predictors was larger than sample size (N=26 and predictors = 27).

(1)Lipson, L.E.

(2) 1992
(3) Relationship of static and dynamic measures to scholastic achievement of black pupils
(4) University of the Witwatersrand
(5) Unpublished Masters thesis
(6) Johannesburg
(7) This study aimed to compare the General Scholastic Aptitude Test (GSAT) with Feuerstein's Learning Potential Assessment Device (LPAD) in terms of the ability of each to predict achievement on a range of school subjects
(8) 27
(9) 1 divided into 2 for ease of administration
(10) Within groups
(11) Standard Four (grade 6) pupils from an English medium school serving a black community. 13 male and 14 female
(12) Mean of 11.84 and SD 0.53
(13) LPAD (selected subtests) and GSAT
(14) Mediation as prescribed by Feuerstein
(15) Pretest-mediation-posttest design for entire sample. The sample was divided into two groups to ensure effectiveness of mediation. Sample 1 n = 13 and sample 2 n = 14. Within group design. Independent variables: GSAT scores, pretest LPAD scores, postest scores on the LPAD, length of time of enrolment at school. Dependent variable: terms marks and examination marks
(16) Standard Four black pupils from an English medium school serving a black community.
(17) Both LPAD and GSAT administered over a 4 day period. Pretesting and posttesting took place either on the same day or were presented a day apart (Raven's and set variations)
(18) No hypotheses were stated but questions were stated instead: Q1 - Which battery is the better predictor in school subjects? Q2 - Do pupils who are provided with mediation in a test situation improve in their learning and their post-mediation performance? Q3 - Is there a positive relationship between the length of time a pupil has attended a school which provides adequate learning opportunities and his/her performance on the LPAD and GSAT? Q4 - Is the distribution of scaled GSAT scores among these pupils comparable to the general population?
(19) Interaction between tester and testee, mediation, understanding of applications and cognitive strategies underlying the tasks according to the principles of MLE as prescribed by Feuerstein
(20) Three sets of results included; namely correlations btw school results and the GSAT and LPAD batteries. Secondly, regression analysis compares the predictability of school achievement on each battery. Lastly a comparison of pre and posttest scores on the LPAD. Lipson includes other results not pertinent to the meta-analysis.

First set of results - Significant correlations - GSAT and LPAD with MARCH MARKS/JULY MARKS AND JULY EXAMINATION MARKS.

Key: only includes those variables that were sig
(* p<0.05, **p<0.01 ***p<0.001)

GSAT General Scholastic Aptitude Test
GWA word analogies
GVERBREA - verbal reasoning
GNUMPROB - number problems
GWRODPRS - word pairs
GSERIES - number series
GPATCOMP - pattern completion
GFIGAN - figure analogies
GRAWV - raw verbal
GRAWNV - raw non-verbal
LPAD - Learning Potential (Propensity) Assessment Device
NUMPRE - numerical progressions pretest
NUMPOST - numerical progressions posttest
RPRETOT - Raven's pretest
RPRETRANS - Raven's pretest transfer
RPOSTOT - Raven's posttest
RPOSTRANS - Raven's posttest transfer
PRECOPSD - Complex Figure Drawing - sequence of drawing copied on pretest
POSCOPPD - Complex Figure Drawing - precision of drawing copied on posttest
POSCOPPL - Complex Figure Drawing - precision of location copied on posttest
POSCOPSD - Complex Figure Drawing - sequence of drawing copied on posttest
POSMEMSD - Complex Figure Drawing - sequence of drawing memorised on posttest
TRACOPSD - Complex Figure Drawing - sequence of drawing copied on transfer
TRAMEMN - Complex Figure Drawing - number of item memorised on transfer

Subjects include: English, Afrikaans (Afr), Maths, Geography, Health, Science and Biology.

GSAT and PLAD with March Marks

GSAT: GWA - English 0.65(***), Afr 0.54(**), Maths 0.54(**), geography 0.71(***), health 0.59 (**), science 0.65(***), biology 0.71(***). GVERBAL REASONING - English 0.54(**), Afr 0.49(*), Maths 0.46(*), geography 0.57(**), health 0.53 (**), science 0.49(*), biology 0.63(***). GNUMBER PROBLEM - English 0.41(*), Afr 0.39(*), Maths 0.42(*), geography 0.60(**), health 0.61 (***), science 0.54(**), biology 0.42(*). GWORDPROCESSING -English 0.67(***), Afr 0.57(**), Maths 0.61(***), geography 0.62(***), health 0.51 (**), science 0.55*(*), biology 0.51(**). GSERIES - health 0.38(*). GPATCOMP - health 0.52(**). GFIGAN - English 0.56(**), Afr 0.38(*), Maths 0.51(**), geography 0.67(***), health 0.60 (**), science 0.66(***), biology 0.49(*).GRAWV - English 0.68(***), Afr 0.60(**), Maths 0.60(**), geography 0.74(***), health 0.66 (***), science 0.66(***), biology 0.70(***). GRAWNV - Maths 0.43(*), geography 0.52(**), health 0.64 (***), science 0.51(**), biology 0.50(*). LPAD - NUMPRE English 0.50(**), Maths 0.76(***), geography 0.40(*), health 0.59 (**), science 0.40(*). NUMPOST - maths 0.51(**), health 0.47(*). RPRETOT maths 0.50(**), geography 0.45(*), health 0.41(*), science 0.48(*). RPRETRANS English 0.43(*), Maths 0.52(**), geography 0.58(**), health 0.43 (*), science 0.46(*). RPOSTOT English 0.46(*), Maths 0.52(**), geography 0.58(**), health 0.46 (*), science 0.42(*), biology 0.48(*). RPOSTRANS English 0.43(*), Maths 0.52(**), geography 0.58(**), health 0.46 (*), science 0.42(*), biology 0.51(**). PRECOPSD - health 0.41 (*), science 0.41(*). POSCOPD - maths 0.43(*). POSCOPPL- maths 0.46(*). TRAMEMN - geography 0.43(*), biology 0.42(*).

GSAT and LPAD with JULY MARKS

GSAT: GWA - English 0.70(***), Afr 0.61(***), Maths 0.61(***), geography 0.76(***), health 0.53 (**), history 0.75(***), science 0.75(***), biology 0.55(**). GVERBAL REASONING - English 0.58(**), Afr 0.43(*), Maths 0.63(***), geography 0.50(**), health 0.48 (**), history 0.71 (***), science 0.44(*), biology 0.47(*). GNUMBER PROBLEM - Maths 0.40(*), geography 0.42(*), history 0.61 (***). GWORDPROCESSING -English 0.58(**), Afr 0.59(**), Maths 0.62(***), geography 0.61(***), health 0.60 (***), history 070(***), science 0.54(**), biology 0.59(**). GSERIES - history 0.49(**). GPATCOMP - history 0.42(*). GFIGAN - English 0.58(**), Afr 0.56(**), Maths 0.56(**), geography 0.56(***), health 0.40 (*),history 0.64(***), science 0.56(**).GRAWV - English 0.67(***), Afr 0.60(***), Maths 0.69(***), geography 0.70(***), health 0.59 (**), history 0.84(***), science 0.64(***), biology 0.56(**). GRAWNV - English 0.48(*), Afr 0.40(*), Maths 0.42(*), geography 0.41(*), health 0.27, history 0.64(***), science 0.46(*), biology 0.30. LPAD - NUMPRE English 0.59(**), Afr 0.42(*), Maths 0.73(***), geography 0.56(**), health 0.39 (*), history 0.57(**), science 0.45(*), biology 0.48(*). NUMPOST - English 0.42(*), maths 0.47(*), history 0.55(**), science 0.22, biology 0.31. RPRETOT English 0.40 (*), maths 0.50(**), geography 0.46(*), history 0.50(**), biology 0.40(*). RPRETRANS maths 0.48(*), geography 0.47(*), history 0.48 (*), biology 0.39(*). RPOSTOT English 0.47(*), Maths 0.52(**), geography 0.47(*), history 0.56 (**). RPOSTRANS English 0.44(*), Maths 0.48(*), geography 0.46(*), history 0.57 (**), science 0.39(*). POSCOPPL- maths 0.38(*). PSOMEMSD - English 0.42(*).

GSAT and LPAD JULY EXAMINATION

GSAT: GWA - English 0.73(***), Afr 0.58(***), Maths 0.67(***), geography 0.68(***), health 0.66 (***), history 0.56(**), science 0.86(***), biology 0.73(***), average achieve 0.77(***). GVERBAL REASONING - English 0.71(***), Afr 0.50(**), Maths 0.58(**), geography 0.52(**), health 0.60(***), history 0.67 (***), science 0.68(***), biology 0.63(***) average achieve 0.70(***). GNUMBER PROBLEM - English 0.45(*), Afr 0.52(**), Maths 0.49(**), geography 0.55(**), history 0.42(*), science 0.50 (**), biology 0.41(*), average achieve 0.51(**). GWORDPROCESSING -English 0.74(***), Afr 0.61(***), Maths 0.61(***), geography 0.55(**), health 0.71 (***), history 0.42(*), science 0.64(***), biology 0.76(***) average achieve 0.7(***). GPATCOMP - history 0.46(*). GFIGAN - English 0.59(**), Afr 0.56(**), Maths 0.61(***), geography 0.62(***), health 0.46 (*),history 0.62(***), science 0.70(***), biology 0.65(***) average achieve 0.66(***).GRAWV - English 0.80(***), Afr 0.66(***), Maths 0.71(***), geography 0.70(***), health 0.71 (***), history 0.64(***), science 0.82(***), biology 0.77(***) average achieve 0.82(***). GRAWNV - English 0.46(*), Afr 0.41(*), Maths 0.48(*), geography 0.47(*), health 0.39(*), history 0.58(**), science 0.60(***), biology 0.55(**), average achieve 0.53(**). LPAD - NUMPRE English 0.55(**), Afr 0.47(*), Maths 0.69(***), geography 0.49(**), health 0.50 (**), history 0.43(*), science 0.44(*), biology 0.55(**), average achive 0.63(***). NUMPOST-maths 0.42(*), geography 0.39(*), health 0.42(*), history 0.46(*), biology 0.44(*) average achieve 0.43(*). RPRETOT English 0.43 (*), Afr 0.48(*) maths 0.49(**), geography 0.54(**), history 0.46(*), biology 0.40(*), average achive 0.50(**). RPRETRANS English 0.44(*), Afr 0.50(**), maths 0.48(*), geography 0.56(**), health .39(*), history 0.48 (*), science 0.40(*), biology 0.41(*), average achive 0.50(**). RPOSTOT English 0.53(**), Afr 0.56(**), Maths 0.53(**), geography 0.60(***), history 0.50 (**), science 0.45(*), biology 0.42(*), average achive 0.56(**). RPOSTRANS English 0.51(**), Afr 0.56(**), Maths 0.50(**), geography 0.60(***), history 0.50(**), science 0.48(*) biology 0.40(*) average achive 0.54(**). POSCOPSD - biology 0.40(*). PSOMEMSD - English 0.47(*), health 040(*), biology 0.45(*), average achive 0.42(*). TARCOPSD - biology 0.40(*). TRAMEMN - health 0.43(*).

Second set of results(a) - Stepwise regression analysis regressing July results for each subject and composite result, firstly on GSAT and then LPAD batteries - Order of variables is criterion, battery, predictors at each step, R square, F(model) and df. ***p<0.001, **p< 0.01, *p<0.05.

English GSAT GRAWV0.65, 45.98***, 1 & 26; GRAWV, GPATCOMP 0.70, 28.28***, 2 & 26 - English LPAD LNUMPRE 0.31, 11.08**, 1 & 26; LNUMPRE, POSMEMSD 0.43, 8.96**, 2 & 26, LNUMPRE - POSMEMSD-PRECOPN 0.53, 8.78**, 3 & 26; - , Maths GSAT GRAWV 0.50, 25.27***, 1 & 26 Maths LPAD - LNUMPRE 0.48, 22.63***, 1 & 26, Geog GSAT GRAWV 0.48, 23.37**, 1 & 26 - Geography LPAD RPOSTOT 0.36, 14.12***, 1 &26, Biology GSAT GRAWV 0.59, 36.57***, 1 & 26 - Biology LPAD LNUMPRE 0.31. 11.04**, 1& 26, Science GSAT GWA 0.73, 68.05***, 1 &26; GWA, GFIGAN, 0.78, 42.95***, 2 &26, GWA, GFIGAN, GRNV, 0.83, 38.10***, 3.26; GWA, GFIGAN, GRNV, GVERBRE, 0.87, 36.07***, 4 & 26 - Science LPAD RPOSTRANS, 0.23, 7.41*, 1&26; POSTRANS, POSCOPN, 0.37, 6.93**, 2&26;, Health GSAT GRAWV, 0.51, 26.01***, 1&26; - Health LPAD LNUMPRE, 0.25, 8.46**, 1&26; LNUMPRE, TRAMEMN, 0.40 8.14**, 2&26, History GSAT GVERBRE 0.44, 20.42***, 1&26; GVERBRE, GFIGAN, 0.56, 15.30, 2&26 - History LPAD RPOSTRAN, 0.25, 8.53**, 1&26, Total GSAT GRAWV, 06.67, 51.43***, 1&26; GRAWV, GPATCOM, 0.70, 28.47***, 2&26, Composite LPAD LNUMPRE 0.40, 16.87***, 1&26.

Second set of results (b) Summary of stepwise regression analyses of July subject and composite results on combined gsat and lpad batteries. Order of variables is: criterion, predictor(s) at each step, r square, f(model) and df.

Eng (i) GRAWV 0.65, 45.98***, 1&25(ii) GRAWV, PRECOPPL, 0.74, 33.87***, 2&24 (iii) GRAWV, PRECOPPL, GNUMPROB, 0.81, 33.09***, 3&23 , Maths (i)GRAWV 0.50, 25.27***, 1&25, (ii)GRAWV LNUMPRE 0.61, 18.72***, 2 &24, (iii)GRAWV, LNUMPRE, LNUMPOST 0.68, 16.32***, 3&23, Geography (i)GRAWV 0.48, 25.37***, 1&25(ii) GRAWV, RPOSTOT 0.56, 15.50***, 2&24, Biology (i)GRAWV 0.59, 36.57***, 1&25 (ii) GRAWV, POSCOPSD 0.66, 22.81***, 2&24 (iii) GRAWV, POSCOPSD, TRAMEMPL 0.71, 18.82***, 3&23, Science (i) GAW 0.73, 68.05***, 1&25, (ii)GWA, GFIGAN 0.78, 42.95***, 2&24, (iii)GWA, GFIGAN, GRNV 0.83, 38.10***, 3&23, Health (i)GRAWV 0.51, 26.01***, 1&25 (ii) GRAWV, TRAMEMPD 0.62, 19.32***, 2&24, History (i) GVERBRE 0.45, 20.42***, 1&25 (ii) GVERBRE, GFIGAN 0.56, 15.30***, 2&24, Composite average achievement (i)GRAWV 0.67, 51.43***, 1&25.

Third set of results: DIFFERENCE SCORES on pre and posttest mediation on LPAD

Multiple analysis of variance repeated measures, extreme scores were excluded to avoid regression to the mean. Non-adjusted (cases were excluded, hence adjusted) and adjusted scores of the LPAD battery, examining pre and posttest differences. Order of variables: subscale, mean pretest, mean posttest, non adjusted SD pretest, nonadjusted mean posttest SD, F, mean pretest, mean posttest, adjusted scores, SD pretest, SD postest , F (df = 1&26). *p<0.05 ** p<0.01 ***p<0.001.

NUMPROG 48.65, 46.30, 19.51, 17.45. 1.06 (nothing for rest of variables), RAVTOT,39.19, 41.26, 7.93, 6.81, 5.17* (nothing for rest of variables) RAVTRANS 33.41, 35.00, 6.51, 5.58, 4.23* (nothing for rest of variables), CFD COPN 17.56, 17.78, 0.58, 0.51, 5.20* (nothing for rest of variables), MEMN 15.30, 17.70, 2.51, 0.47, 28.95*** (nothing for rest of variables), COPYPD 13.44, 15.15, 2.68, 2.09, 10.86**, 13.80, 15.04, 2.45, 2.09, 8.34**, MEMPD 10.19, 15.00, 4.24, 1.47, 36.32***, 11.48, 14.96, 2.94, 1.43, 38.85***, COPYPL 16.15, 16.67, 1.70, 1.14, 4.63* (nothing for rest of variables), MEMPL 12.07, 16.30, 4.14, 1.59, 29.33***, 13.52, 16.39, 2.06, 1.53, 34.55***, COPSD 2.52, 1.33, 1.12, 0.55, 30.74*** (nothing for rest of variables), MEMSD 2.37, 1.22, 1.55, 0.51, 15.07*** (nothing for rest of variables).

(21) Regarding Q1 - Based on correlation and regression, the subtests of the GSAT are more highly significant than the LPAD in terms of predicting the criterion. GSAT total verbal raw score was most correlated. Even when combined with LPAD, no single LPAD sub test can substantially complement GSAT sub tests. Q2 - All results were significant bar the numerical progressions - hence mediation worked - but due to a lack of control group this cannot be stated for certain.
(22) Criterion variables: composite term results and examination marks were collected for each subject at three time-intervals. These were collated and each school subject was weighted. Predictor variables: GSAT and LPAD results, as well as length of enrolment at school. GSAT: verbal - word analogies, verbal reasoning, number problems and word pairs. Non verbal - number series, pattern completion and figure analogies. LPAD: complex figure drawing, numerical progression, Raven's progressive (pretest and posttest)) matrices/set variations 1 (used for the mediation phase).
(23) Due to fatigue and time of day when numerical progressions was administered (LPAD) scores were lower. Lack of control group which would be necessary to establish whether or not mediation worked. Sample size small. Lack of fit of the scaled scores of the population tested, to the normal distribution was also evident.

(1)Henley, S.J.

(2) 1989
(3) An investigation of Feuerstein's theory of mediated learning experience with a disadvantaged community
(4) University of the Witwatersrand
(5) Unpublished Masters thesis
(6) Johannesburg
(7) The aim of the study was to investigate Feuerstein's theory of MLE as the underlying component of structural cognitive modifiability. This study does not make comparisons with static instruments - its purpose is to validate (or not) the theory behind this particular branch of dynamic assessment hence it is included here as it deals with the effectiveness of dynamic assessment as a method of valid assessment. What is being tested here is the theory behind the practice of dynamic assessment
(8) 100 were tested but analyses was only conducted on 30
(9) Originally 2 then 4 groups
(10) Mixed design - 100 subjects randomly sampled from population of 300. Random assignment to experimental and control groups. Regarding within groups comparison, 30 pupils (16 boys and 14 girls) from the experimental group were allocated to high and low Mediated Learning Experience (MLE) based on results from a questionnaire assessing their MLE is early childhood. Both the high and low MLE groups received mediation
(11) Disadvantaged pupils from a gifted child programme. 54 girls and 46 boys
(12) Range 12-19 with mean = 14.8
(13) LPAD - Organizer (A), Verbal analogies test and Set Variations I and II. Independent measures (transfer measures): Organizer (B), similarities subtests of the WISC-R and WAIS-R as well as Raven's standard progressive matrices. i.e. Pretest measures and their transfer counterparts included organizer A with an alternative form as well as organizer B; Verbal analogies transfer counterpart included similarities from the WISC-R and WAIS-R; set variations I and II transfer counterparts included the Raven's progressive matrices. A questionnaire was developed in order to determine the extent of MLE received at home, and on the basis of this the grouping of low and high MLE was based.
(14) As per Feuerstein's method of test-teach-test
(15) Solomon four group design, group administered- experimental and control groups; then half the experimental group and half the control group were tested on tasks similar to LPAD to control for practice effects. The experimental group pretest (group 1 n=24); Experimental group no pretest (group 2 n=28); Control group pretest (group 3 n=23) ; control group no pretest (group 4 n=25)
(16) Disadvantaged children on the gifted child programme in Soweto
(17) Mediation had already taken place in the study of Hoffenberg (1988), Henley made use of the same data and reanalysed the data based on the groupings of high and low MLE students (obtained from the questionnaire)

(18) HI: the group identified as having had high MLE will have a higher level of academic achievement than the low MLE group.H0 there will be no difference between the groups. H II: The group indentified as having had high MLE will have a higher level of achievement on LPAD tasks than the low MLE group.H0: there will be no difference between the groups. H III: The group indentified as having had high MLE will have a higher level of achievement on transfer measures comparable to the LPAD tasks than the low MLE group.H0: There will be no differences between groups
(19) As prescribed by Feuerstein
(20) Scores on the LPAD pre and posttest phases were compiled as follows: LPAD Index scores were converted to percentages - sum of Organizer A%+ Verbal analogies% + set variations I and II and all divided by 3. The same was done for the posttest scores: Organizer B% +Similarities% +Raven's% all divided by 3. These two indices were used in comparing groups. Based on the questionnaire that was designed to ascertain MLE status, 66.67% of high MLE were high achievers and 75% of the low MLE group were low achievers. Overall 70.8% of the MLE groups contained subjects that were expected to be in each group (discriminant analysis could not be conducted due to the small sample size).

LPAD scores (pretest scores): t test conducted to determine whether there was a significant difference between achievement groups. Mean of high achievement group (n=15)= 69.5333% (SD 5.79244)and low MLE group (n=15)= 45.4667%. (SD 7.94505) t=9.47986, df 28, $p<0.05$. Therefore sig difference.

H1t test used to compare academic performance of high and low MLE groups: mean of high MLE group (n=12) = 61.333% (SD 12.8015) low MLE group (n=12) mean = 50.667% (SD 12.1381) t=2.09455, df=22, $p<0.05$. Thus H1 confirmed.

H2 t test to compare the two MLE groups in terms of scores on the LPAD tasks t test: high MLE group mean = 58.8942%(n=12) (SD 11.7225) and low MLE group (n=12) (SD 14.0979) mean = 55.8408% t=0.576881, df=22 but $p>0.05$, not significant therefore H2 cannot be confirmed.

t test to compare means between high and low achievement groups on the LPAD tasks: high achievement group mean (n=15) (SD10.8878) = 65.1487% and low achievement group mean (n=15) (SD 10.8267) = 52.146%. t=3.279676, df=28 and $p<0.05$. Therefore significant difference between groups.

Posttest scores: Regarding H3; t test to compare differences on posttest scores on both high and low MLE groups. High MLE group mean (n=11) (SD 8.92848) = 65.3509%, low MLE group mean (n=11) (SD 12.2489) = 56.3309%. t=1.97366, df=20 and $p<0.05$, significant therefore H3 confirmed. Same t test conducted on high and low achievement groups: mean high MLE group (n=14) (SD 10.4939) = 68.2921% mean low MLE group (n=14) (SD 9.21918) = 55.0536%. t=3.54617, df=26 and $p<0.05$

(21) Support given to hypotheses I and III but not to Hypothesis II. Feuerstein's theory of higher amounts of early MLE leading to improved cognitive development and cognitive performance is confirmed. Support was given to Feuerstein's theory that mediated learning experience is the proximal factor in cognitive development
(22) Predictor variable: MLE status and criterion variables: LPAD scores, academic achievement and posttest transfer measures
(23) Two MLE groups were not established as comparable so differences between them may be due to differences in intelligence and not MLE alone. Small sample size. Questionnaire design and false answers on items etc. There was a significant difference between high and low MLE groups on academic performance and on posttest tasks, there was also no significant difference on the LPAD tasks for these two groups.

(1)Boeyens, J.**

(2) 1989
(3) Learning potential: an empirical investigation.
(4) Human Sciences Research Council
(5) Published
(6) Pretoria
(7) To evaluate the performance of a learning potential instrument and to investigate the relationship between academic performance and learning potential. Stages of the study: stage one is a pilot study (N=183), the second stage concerns itself with the scalability of the test (not included here) and the third phase deals with the reliability of the test (N=202). Two separate sets of results are given.
(8) First study: 183. Third study: 202
(9) 2
(10) First study n=91 and n=92, the first group was administered mediation, the second group was not administered mediation. Groups were further subdivided and analysed as within-groups designs.
(11) For the first group: disadvantaged black Matric pupils undergoing education during the time of apartheid under the Department of Education and Training and for the second group older adults who wished to obtain a matriculation pass
(12) Age was not given for first study but a figure of 17 is estimated. For the second study age ranged between 17-62 and the mean was = 25.5
(13) First study: The Learning Potential Test (LP) was used - a test developed by the author for the purposes of this study. For the second study the predictor variables consisted of the Learning potential test, pretest of the LP, the Intermediate Mental Alertness test and the Number Comprehension Test. The criterion variable consisted of academic maths performance on a mathematics achievement test taken twice in the year
(14) Administration of the lesson involved reading the text to the testees, who followed in their answer books
(15) The experimental group followed a pretest, mediation and posttest programme but no mediation was administered to the control group
(16) For the first study: Black matric pupils (DET) who were classified as "disadvantaged" and for the third study the sample consisted of black teachers who wanted to obtain a matriculation
(17) This was not indicated
(18) It is predicted that learning potential scores would be indicative of the amount of improvement in academic performance that a previously disadvantaged individual currently exposed to an enriched educational environment will evidence during the course of the academic year. H1: A positive relationship exists between improvement in academic competence and learning potential. H2: Learning potential scores correlate higher with improvement in mathematical competence as opposed to ability scores. Thirdly the relationship between learning potential and traditional ability test scores are investigated, fourthly the relationship between ability, learning potential and school marks is investigated and lastly, the investigation into low and high Learning potential groups' school results and how they will differ when correlated with static tests is undertaken.
(19) The administration of the lesson involved reading the text to the testees, who followed in their answer books
(20) The test consisted of the completion of a letter series by following patterns etc. Two systems of scoring were used, a micro and item scoring. The micro scoring consisted of assigning a score of one to each letter correctly supplied thus 30 items resulted in a score of 90 as there were three alternatives. The second scoring system takes each series as either being correct or wrong irrespective of whether or not some of the letters are correct. Therefore a total score of 30 was obtained. The following is presented: Exp n=91 and control n= 92 each group has scores representing micro-item and item scores, with means and standard deviations for each. Each group also has a pretest, posttest and differences scores in this order. Exp group pretest(n=91): Micro: mean 38.78, sd 11.53, item: mean 12.58, sd 4.34. Exp group posttest: Micro:

mean 46.90, sd 13.60, item: mean 15.66, sd 5.02. Exp group difference score: Micro: mean 8.12, sd 10.48, item: mean 3.08, sd 4.02. Control group (n=92) pretest: Micro: mean 38.70, sd 13.59, item: mean 12.53, sd 5.02. Control group (n=92) posttest: Micro: mean 47.03, sd 17.76, item: mean 15.42, sd 6.41. Control group (n=92) difference score: Micro: mean 8.34, sd 8.39, Item: mean 2.89, sd 2.99. No significant difference between ability groups and no significant difference between mean improvement. However, experimental group attempted fewer items on posttest than control group even though they did not differ significantly. Experimental group attempted 60.47 items with sd 15.44 on pretest and 61.74 with sd 13.32 on posttest while control group attempted 64.27 with sd 15.31 on pretest and mean 73.10 and sd 12.78 on posttest.

For further analyses experimental group was divided into (i) group who showed no sign that lesson (mediation) had an impact (ii) group who made use of lesson (mediation) and (iii) a group who too rigidly applied the lesson (mediation) in their tasks. The following is available for means and standard deviations of the DIFFERENCE scores in the groups : experimental group (n=92). Micro: mean 8.34, sd 8.39 and item: mean 2.89, sd 2.99. Group (i) (n=26) Micro: mean 11.00, sd 9.12 and item: mean 3.85, sd 3.65. Group (ii) (n=44) Micro: mean 11.82, sd 7.62 and item: mean 4.45, sd 3.36 Group (iii) (n=21) Micro: mean -3.19, sd 9.52 and item: mean -0.76, sd 3.37. t test indicated significant difference between group (ii) and control group when scored out of 90 p=0.02 and when scored out of 30 p<0.01. Mediation seems to have had some impact.

Third study's results - H1 Correlations between LP and maths scores (n=40) students who took maths: (**p<0.01 and * p<0.05). maths score 1 with LP pretest 0.10 and with posttest 0.11, and with LP (post-pre LP score) 0.03; maths score 2 with LP pretest 0.42** and posttest 0.47** and with LP 0.14 and difference score in maths (between score 1 and 2) and LP pretest 0.36* and posttest 0.40** and LP 0.12. Investigation for the group (ii) (n=29) who made use of the mediation offered - their maths scores 1 and 2 are correlated with pre and posttest LP: (**p<0.01 and * p<0.05). maths score 1 with LP pretest 0.02 and with posttest -0.06 and LP -0.12, maths score 2 with LP pretest 0.18 and posttest 0.35 and with LP 0.32 and difference score in maths (between score 1 and 2) and pretest 0.17, with posttest 0.44** and with LP 0.47**. Therefore there is a significant correlation between improvement in maths achievement and learning potential only for the group who used the mediation strategies though. Support for H1.

Regarding H2: Which scores correlate higher with improvement in maths achievement? LP or traditional tests? Propensity to improve should be correlated higher with LP than with current ability. traditional scores are correlated for the following maths improvement score (* p<0.05): Mental Alertness: all maths pupils (n=40) = 0.06 and those who applied mediation properly (n=29) = -0.15; Number comprehension: all maths pupils (n=40) = 0.15 and those who applied mediation properly (n=29) = -0.01; Learning potential pretest (recall that LP pretest is traditional form of testing): all maths pupils (n=40) = 0.36**and those who applied mediation properly (n=29) = 0.17. Due to the two sample sizes, the correlation between improvement in maths achievement(n=29) (0.47**) and number comprehension with improvement in maths (n=29) (-0.01) is taken and compared to see if 0.47 is significantly higher than -0.01. According to the author it is. Therefore H2 supported.

As current ability and LP are not the same construct, the two should not correlate and the following correlations for learning potential are presented: Entire sample (n=202): number comprehension 0.13, mental alertness 0.14, learning pretest 0.05. Group (i) (n=63): number comprehension 0.06, mental alertness 0.11, learning pretest 0.06. Group (ii) (n=127): number comprehension 0.13, mental alertness 0.15, learning pretest -0.00. Group (iii) (n=12): number comprehension 0.32, mental alertness 0.01, learning pretest 0.08. No significant correlations between any variable, therefore H3 supported (two concepts of ability and potential are independent).

Regarding H4, LP will add significantly to prediction of academic success over and above traditional tests. Stepwise regression conducted with March test results as dependent variable and Mental Alertness battery (MA), Number comprehension (NC) and LP as independent. Following are correlations for these variables (N=165) (** p<0.01): LP-MA=0.12; LP-NC=0.10; LP-March=0.23**; MA-NC=0.62**; MA-March=0.53**; NC-March=0.44**. Stepwise regression (N=165) for March as dependent variable: order of variables - test, partial r, multiple r, F and p.MA - 0.28, 0.28, 64.95, 0.0001. LP- 0.03, 0.31, 6.35, 0.01. NC- 0.01, 0.33, 4.65, 0.03. Better prediction can be obtained when using both MA and LP.Similar correlations carried out for the group (i) who integrated their mediation (N=109) :
(** p<0.01): LP-MA=0.17; LP-NC=0.12; LP-March=0.29**; MA-NC=0.54**; MA-March=0.47**; NC-March=0.38**. Stepwise regression also conducted for this group (N=109) for March as dependent variable: order of variables - test, partial r, multiple r, F and p.MA - 0.22, 0.22, 30.18, 0.0001. LP- 0.04, 0.26, 6.44, 0.01. NC- 0.02, 0.28, 3.00, 0.09. For this group LP improved prediction but NC did not add much. Thus LP added more than static tests for this group.

Regarding H5 - low and high LP groups will differ when correlated with static tests - i.e. low LP group will have significantly higher correlations with static tests than high LP group.Correlations are presented, first figure is correlation with high LP group followed by n and second figure is correlation with low LP group followed by n. (*p<0.05 **p<0.01): Eng (March)0.46** (88), 0.54** (77), Eng (June) 0.46** (88), 0.63** (77); Afr (March) 0.52** (88) 0.39** (75), Afr (June) 0.45** (88) 0.53** (73); Biology (March) 0.50** (64) 0.65** (54); Maths (March) 0.30 (27) 0.68**(14); Business (March) 0.36* (41) 0.47** (43), Business (June) 0.25 (41) 0.42** (43); Average (March) 0.48** (88) 0.56** (77). Although there were differences between the correlations for each subject, after Fisher's Z transformations, no significant differences between correlations for the two groups were found. The same correlations were run but for group (i) again - those who integrated the mediation: first figure is correlation with high LP group followed by n and second figure is correlation with low LP group followed by n. (*p<0.05 **p<0.01): Eng (March)0.36** (66), 0.53** (43), Eng (June) 0.36** (66), 0.58** (43); Afr (March) 0.38** (66) 0.40** (41), Afr (June) 0.36** (66) 0.41** (39); Biology (March) 0.33** (45) 0.69** (31); Maths (March) 0.10 (21) 0.85** (10); Business (March) 0.37* (33) 0.52** (22), Business (June) 0.23 (33) 0.15 (22); Average (March) 0.33** (66) 0.57** (43). Once again, differences in correlations are not significant, but they are consistently higher for the low LP group than for the high LP group.

(21) Learning potential is an effective predictor of the potential to benefit from instruction. Improvement between pre and post testing suggested that there was a higher correlation between those pupils receiving mediation as opposed to those who did not. This supports the first hypothesis. Also, no relation exists between learning potential and static tests and although not significant, correlations bewteen high and low learning potential groups regarding static tests evidenced higher correlations for the lower potential group, thus indicating that ability and potential are different constructs; also there were no significant correlations between static measures and learning potential measures, emphasising the difference in constructs. There were quantitative and qualitative differences between the three groups identified in terms of learning potential i.e. those who integrated the mediation, those who did not and those who applied the mediation too rigidly. Those who applied mediation properly benefited the most, their correlations between static scores and improvement in mathematical competence was lower than the correlation between the number comprehension scores and improvement in mathematical competence. This group thus had different predictive value in comparison to the other groups. Therefore, learning potential is a useful predictor of the outcome of exposure to an enriched educational environment, but its predictive validity is limited to a proportion of typical students. According to results from a multiple regression analysis, it was evidenced that learning potential in combination with other static assessment yielded greater predictability than when either of two static tests were used on their own (the learning potential results contributed significantly to the model). The lower learning potential group consistently averaged higher correlations between learning potential and static assessments contrary to what was expected, but Boeyens points out that this needed further investigation.
(22) Criterion variable: march and June school results; predictor variable: mental alertness battery, number comprehensions and LP test
(23) The qualitative differences between the three groups could receive more attention regarding non cognitive aspects.

(1)Murray, D.**

(2) 1988
(3) Effectiveness of Feuerstein's learning potential assessment device in a South African context
(4) University of the Witwatersrand
(5) Unpublished. Masters dissertation
(6) Johannesburg
(7) To test the effectiveness of a dynamic assessment approach (LPAD) among groups of socio-politically and educationally disadvantaged Indian and Coloured adolescents
(8) 108
(9) 4
(10) Mixed design, investigating both between and within-group aspects
(11) Disadvantaged Indian and Coloured high school pupils (from two different schools)
(12) Age ranged between 13-15. n=60 for Coloured sample and n=60 for Indian sample
(13) Two sets of measures were used, namely several tests from the Learning Potential Assessment Device (LPAD) and a set of independent measures to assess transfer of mediation. Dependent measures include the LPAD - Set variations I and II; Complex figure drawing (CFD) and the Lahi. Independent measures (transfer tests) include: Ravens' standard progressive matrices (RSPM) (parallel to set variations); equivalent complex figure (ECF) (parallel to CFD); coding subtest from the WISC-R (parallel to Lahi); and similarities subtest of the WISC-R (parallel to comparisons). A biographical questionnaire was developed to assess and compare differences between sub groups
(14) Mediation on all LPAD tasks except for set variations were administered by students, set variations were administered by a psychologist. Mediation involved the principles as described by Feuerstein. The control group were exposed to training, but no mediation other than having the tasks explained to them.
(15) The experimental group received a pretest, mediation and posttest programme but no mediation was administered to the control group.n=30 chosen from the top achievement and n=30 chosen from the lower achievement scale for both schools. Thus four groups of 15 each - 15 high achievers for Coloured, 15 low achievers for Coloured were arranged as well as 15 high achievers and 15 low achievers for Indians. 10% attrition rate resulted in a total sample of N=108. Due to random assignment of pupils to experimental and control groups, no socio-economic differences were found for either experimental and control groups nor for high and low academic groups. Thirty mediators were each randomly assigned two experimental and two control group subjects who were individually mediated on the LPAD
(16) Disadvantaged Indian and Coloured adolescents
(17) Independent measures were administered one week before and two weeks after the LPAD. LPAD involved six hours of interaction (four of the six hours was individual mediation and the remaining two consisted of group mediation (n=15))
(18) H1 - mediation on the various tasks of the LPAD was expected to be effective in improving the performance of subjects on these tasks relative to subjects who did not receive such mediation. H2 - effects of mediation provided by the LPAD were expected to generalise to performance on other comparable measures (transfer effect). H3 - it is believed that the Coloured sample was "more disadvantaged" and that mediation provided by LPAD would be more effective in improving performance for them compared to the Indian sample. H4 - it is expected that mediation would be effective in improving the performance of both high and low academic status students and that higher achieving students who were nevertheless deprived would show higher levels of potential
(19) As prescribed by Feuerstein
(20) Analysis of covariance was used as more than one dependent variable was included resulting in multiple analysis of variance and in order to test for main and interaction effects. Only significant results follow. Order of variables: variable; CFD (memory organisation), (memory accuracy), (production accuracy); Set variations I, set variations II (* p<0.05 ** p< .01, *** p<0.001) DF = 1 and 107. Race group (Indian and Coloured) 0.01, 0.01, 0.67, 1.32 6.85*. Group (Exp/control) 9.43***, 0.76, 11.10**, 1.48, 4.56*. Academic status (high/low) 6.20*, 4.72*, 0.13, 28.42***, 27.16***. Race group X exp/con group 0.90, 0.30, 0.38, 0.14, 0.43. Race group X academic status 0.22, 0.07, 0.07, 0.06, 0.20. Exp/Con group X academic status 0.12, 0.79, 1.67, 0.43, 0.09. Race group X Exp/Con group X academic status 2.09, 0.49, 1.45, 0.06, 2.09. Effects of mediation on transfer tasks, i.e. independent variables' means and standard deviations given for Exp/Con groups; high and low academic achievement groups and race group.Five measures used - RSPM, ECF (Accuracy (ACC); ECF Organisation(ORG), coding (COD) and similarities (SIMS). Means are given and in brackets standard deviations. First mean is pretest and second mean is posttest. First group is Exp/Control group: Exp group: RSPM 46 (8) and 49 (7) and control group 47 (6) and 49 (6). ECF (ACC) Exp group 30 (5) and 32 (4) control group 30 (5) 31 (4) ECF (ORG) Exp group 4 (1), 6 (1) control group 4 (1) 5 (1). COD exp group 51 (12) and 63 (11) control group: 53 (13) and 62 (13). SIMS Exp group 20 (5) and 23 (5) and control group 20 (6) and 22 (5).

Second group is high and low achievement status (Murray's heading on pg 25 do seem to be slightly confusing) RSPM high group: 50 (5) and 53 (4) and low group 43 (8) and 45 (6). ECF (ACC) high group 32 (4) and 32 (4) low group 29 (5) 31 (4) ECF (ORG) high group 6 (1), 5 (1) low group 4 (1) 5 (1). COD high group 53 (11) and 67 (11) low group 52 (13) and 58 (11). SIMS high group 22 (4) and 25 (4) and low group 17 (5) and 20 (4).

Third group is Indian and Coloured. RSPM Indian: 49 (6) and 51 (7) and Coloured 44 (8) and 48 (6). ECF (ACC) Indian 30 (4) and 31 (4) Coloured 30 (5) 32 (4) ECF (ORG) Indian 4 (1), 4 (1) Coloured 4 (1) 5 (1). COD Indian 58 (12) and 65 (10) Coloured: 48 (10) and 61 (13). SIMS Indian 20 (5) and 24 (4) and Coloured 20 (6) and 22 (5).

There were no significant difference between experimental and control groups even though there was a tendency for the experimental group to achieve higher scores on pretest scores. T tests for independent groups performed for high and low status groups were all significant except CODING. For RSPM t(df+106=5.6, p<.0001) for ECF (accuracy) t (df 106 = 3.7, p<0.001) for ECF (organisation) t = (df 106= 3.6, p<0.001) and for Similarities t (df 106=5.2, p<0.0001). Therefore on four of the five tests there was a significant difference between high and low academic achievement status groups both prior to and after intervention. For Indian and Coloured groups pretest differences were found to be significant on three of the five measure, ECF (organisation) t (df 106=2.0, p<0.05) RSPM t (df 106=4.1, p<0.0001) and coding t (df 106=4.8 p<0.0001). In other words, there were no significant differences to begin with for the experimental and control groups, but there were significant differences between race group and academic achievement groups.

To investigate the effects of the intervention on transfer (posttest), analysis of covariance was run. The following are results from an analysis of covariance on posttest tasks for race group, exp/con group and academic achievement group.Order of variables: variable stated, RSPM, ECF (ACC), ECF (ORG), Coding, Similarities. df = 1.07 *p<0.05 **p<0.01 **p<0.001. Race group 7.02*, 0.00, 6.90*, 1.59, 4.82*. Exp/con group 0.67, 0.01, 0.00, 0.48, 1.07. Academic achievement 14.66***, 5.20*, 0.00, 16.92***, 9.98**. Race X exp/con group 1.88, 0.71, 0.02, 10.43**, 0.05. Race X academic achievement 5.14, 0.03, 0.77, 0.37, 8.33. Exp/con group X academic achievement 0.52, 2.16, 2.10, 0.17, 4.04*. Race X academic achievement X exp/control groups 1.12, 3.29, 0.32, 2.35, 0.81. In no case was the result for the total experimental group significantly better than the control group.However, the Indian experimental group did significantly better than the Indian control group (mean for exp 64.3 and for latter 56.9); F (1.53)= 10.43 p<0.01. Thus for Indians mediation seems to have worked for coding. Mediation had no effect for the total sample on any of the transfer effects.

(21) Academic performance was the most significant variable differentiating among subjects. Bright students benefited more from mediation than there non-coping counterparts regardless of exp/con group status. Mediation was not generally effective but there was an interaction effect with other variables. H1 not supported through significant effects but trends are evident. H2 partially supported by interaction effects for transfer tasks (posttests). H3 only partially supported as both Indian and Coloured groups differed in terms of how they improved on various tasks. H4 accepted.
(22) Independent variables: academic performance, cultural group, and exp/ control group.Dependent variable: LPAD and transfer tasks
(23) Only two hours were allocated for mediation and the use of untrained LPAD testers

(1)De Villiers, A.B.**

(2) 1999
(3) Disadvantaged students' academic performance: analysing the zone of proximal development
(4) University of Cape Town
(5) Unpublished doctoral thesis
(6) Cape Town
(7) The aim of the study is to investigate the practical application of Vygotsky's construct of the zone of proximal development to the selection of disadvantaged students in higher education and to determine alternative predictors of academic performance other than the traditional matriculation examination results used in South Africa
(8) 400
(9) Two groups but further sub-divided for various analysis purposes; including the first study which comprised the use of two dynamic assessment batteries and the effect of the mediated lesson; the second study looked at correlations between the static and dynamic tests; while the third study sought to find predictors of academic performance
(10) Mixed design, incorporating both between and within study populations
(11) Disadvantaged first year Technikon students
(12) Not stated but an approximation 18 is estimated
(13) The Conceptual reasoning test (CRT) which was regarded as a cognitive dynamic assessment instrument (group administered), the Learning potential test (LPT) also considered a cognitive dynamic assessment instrument (group administered), the Reading comprehension test (RCT) used as a static cognitive assessment instrument, the Study process questionnaire (SPQ) used a static non-cognitive assessment instrument, the Motivated strategies for learning questionnaire (MSLQ) also used as a static non-cognitive assessment instrument, the Mental alertness test (MA) used as a static cognitive assessment instrument, and Electrical aptitude test (EAT) also used as a static cognitive assessment instrument all regarded as static assessment instruments. In sum two tests used as dynamic assessments and seen tests used as static instruments; five used as cognitive tools and two used as non-cognitive tools
(14) Both the CRT and LPT have a mediated lesson incorporated into the test and include written material and verbal interaction
(15) Pretest-standardised training-posttest. Only the posttest score of the LPT used and one score for the CRT is used. An investigation was done in the form of five different studies of first year Technikon students. Study no 1 focused on the effectiveness of the mediated lessons that form part of the two dynamic tests using a Solomon four group design. Solomon four group design for both (a) and (b) studies. LPT1 served as the pretest and LPT2 served as the posttest. Study no 2 compared the predictive validity of past academic achievement, conventional tests, noncognitive variables and two dynamic tests. Study no 3 analysed students' response to a period of mediation. Study no 4 compared different groups of students according to the following classification: schooling, gender, language, type of course and assessment and level of course to investigate whether any of the variables would have a moderator effect. Study no 5 differentiated between more and less successful students.
(16) Study 1 (a) Black students who had not yet matriculated (b) Black students in their first year education in commerce course (c) Black and Coloured first year electrical engineering students (d) Black and Coloured first year information technology students. Study 2 (a) Black and Coloured first year business students (b) first year electrical engineering students Study 3-5 used the same sample and further sub-divided for analyses purposes
(17) Study 1: one day between pre and posttest with mediation in between. The rest of the studies included statistical analyses of results
(18) H1 - there will be a significant difference between the scores of those students who received the mediated lesson as part of dynamic assessment as opposed to those who did not receive the lesson in both dynamic assessment tests. H2 -There will be a significant enhancement in the prediction of students' academic performance with the use of dynamic assessment as opposed to the use of static tests and previous academic achievement (matriculation marks). H3 - There will be significant difference in patterns of correlation with academic performance as well as in learning and cognitive profiles between the following groups: (i) ''modifiability'' i.e. a moderator effect will be evident on tests predicting academic success; static marks will be a better predictor for less modifiable group and dynamic assessment will be a better predictor for the more modifiable group (ii) ''schooling'' will also evidence a moderating factor; dynamic assessment will be a better predictor of matriculation marks for non-DET (non-Department of Education and Training schools (iii) ''Socio-economic status'' (SES), gender and language will not have a moderator effect and there will be no significant difference between high and low SES correlations nor male/female groupings nor language (iv) ''year of study'' and area of discipline - third year students will score higher than first year students on some factors and engineering students will have higher scores than business students
(19) Written material and verbal feedback
(20) Results analysed according to the number of sub-studies (numbers 1-5 as indicated in point 16 above). For the purposes of this study (in terms of effectiveness of dynamic assessment as opposed to the effectiveness of static assessment, statistical results pertaining to other aspects of De Villiers' study will not be documented in this section)

Study no 1: effectiveness of mediated lessons for (a) LPT and (b) LPT.

(a) LPT four groups, (i) n=19 engineering (exp group); (ii) n=13 science (con); (iii) n=16 business(con), (iv) n=14 business and building(con). Means and sd's for each group - group (i) (n=19): pretest 12.15 (3.84), posttest 14.57 (4.76), difference 2.47 (3.84). group (ii) (n=13): pretest 11.31 (3.98), posttest 14.53 (6.09), difference 3.25 (2.65). group (iii) (n=16): posttest 10.50 (3.24), group (iv) (n=14) posttest 8.21 (4.75). ANOVA conducted for pretested groups, no significant difference ($F=0.32$, $p>0.05$ df=1&30). groups (i) and (iii) who received mediation scored higher means than the other two but were not significant. Two way ANOVA conducted for the effect of mediation on posttest. Mediated lesson had no effect ($F=0.88$, $P>0.05$, df=2;58). No interaction between treatment and pretesting ($F=0.85$, $P<0.05$, DF=2&58). Groups (i) and (ii) compared to (iii) and (iv) i.e. pretested and not pretested groups - pretested groups (n=32, mean 14.56, sd 5.248) and without pretests (n=30, mean 9.43, sd 4.116). Total group (n=62, mean 12.08 sd 5.36). The pretest did sensitise the pretest group ($F=17.54$, $p<0.05$, df 2&58). For those students in the exp group (minus those who rigidly applied mediation tactics) (n=14): pretest mean 12.21, sd 4.14 posttest mean 16.36 sd 3.73, difference score mean 4.14 sd 2.93. Significant difference between pretest and posttest for the exp group($t = -2.78$, $p=0.001$, df 26).

(b) LPT same design as with (a) four groups (all commerce students), Means and sd's for each group - group (i) (n=15): pretest 5.53 (5.19), posttest 8.73 (5.77), difference 3.2 (3.05). group (ii) (n=16): pretest 3.5 (4.25), posttest 4.43 (5.08), difference 0.94 (2.05). group (iii) (n=16): posttest 7.52 (3.65), group (iv) (n=14) posttest 6.13 (6.39). Two pretested groups compared in ANOVA: no significant difference ($F1.43$, $p>0.05$, df=1&29). Two way ANOVA: effect of mediated lesson on posttest LPT scores. There was a significant effect($F=4.51$, $p<0.05$, df1&59) on the group who received the lesson. No interaction between lesson and pretesting ($F= 1.19$ $p >0.05$, df=1&59), pretesting had no significant effect ($F=0.03$, $p>0.05$, df=1&59). Difference score of group (i) significantly higher than group (ii) ($t=2.44$, $p=0.02$, df=29). Investigating the

retest effect (similar to Cohen's D) between (a) and (b): standardised mean change between pre and posttest for control group who did not receive mediation z(g)=mean of posttest-mean of pretest divided by sd pretest)=0.81 for (a) and 0..22 for (b), hence gains in the first group are due to retest and gains in second group are not due to retest effect. Remaining with study 1 but for (c) CRT and (d) CRT:

(c) CRT two groups n=79 electrical engineering (exp group); n=23 electrical engineering (control group). Means and sd's: exp group n=79: 1826 (5.06) and control group n=23; 13.47 (3.64). t=4.22, p<0.001 df =100. Recall that in the CRT test there is no pretest, just mediation and test. There was a significant difference.

(d) CRT: information technology exp group (n=34) and information technology control group (n=35). means and sd's: exp (n=34), 18.38 (6.61) and control group (n=35), 15.91 (5.24). T=1.4, P=0.09, DF=68. No significant difference. For study (d) another analysis was conducted, the sample was divided into DET and non-DET (i.e. ''disadvantaged'' and ''advantaged''). Non-DET (exp group) n=24 (mean 20.83 and sd 6.01); control group n=32 (mean 16.56 and sd 4.96); DET exp group n=10 (mean 12.5 and sd 3.68) and control group n=3 (mean 9 and sd 2.64). t=2.91, p<0.01 and df=54) for non DET exp and con groups - there is a significant difference between non DET exp and con groups but not for DET groups.

Study no 2: a comparison between past achievement, static tests and dynamic assessment as predictors.

(a) n=33 business management students. Pearson correlations conducted for MA (static), RCT (static), CRT (dynamic) and SR (Swedish rating) with academic results (YEAR, EXAM, FINAL, CREDIT). Order of variables: academic criterion correlated with MA, CRT, SR and RCT, first the correlation, then N, then p value: YEAR (MA) 0.368* N=33*, p=0.035*; YEAR (CRT) 0.372* N=33*, p=0.033*; YEAR (SR) 0.202 N=33, p=0.260;YEAR (RCT) 0.272 N=33, p=0.125;EXAM (MA) 0.279 N=33, p=0.116; EXAM (CRT) 0.303 N=33, p=0.086;EXAM (SR) 0.288 N=33, p=0.104;EXAM (RCT) 0.090 N=33, p=0.617; FINAL (MA) 0.287, N=33; p=0.106; FINAL (CRT) 0.324, N=33; p=0.066; FINAL (SR) 0.260, N=33; p=0.144; FINAL (RCT) 0.117, N=33; p=0.514; CREDIT (MA) 0.339, N=33; p=0.054; CREDIT (CRT) 0.349*, N=33*; p=0.046*;CREDIT (SR) 0.388*, N=33*; p=0.026*; CREDIT (RCT) 0.192, N=33; p=0.286. CRT and SR together proved better predictors.

To see which variable predicted better a stepwise multiple regression was conducted. For YEAR mark: R=0.371, R square=0.138, r square a=0.110, F=4.976, p=0.003, n= 33 variable selected CRT beta 0.371, std error of beta 0.166, t 2.23 p 0.033. For CREDITS: R=0.387, R square=0.151, r square a=0.123, F=5.493, p=0.025, n= 33 variable selected SR beta 0.387, std error of beta 0.165, t 2.343 p 0.025. Best predictor for YEAR is CRT and best predictor for CREDITS is SR. When CRT is added to CREDITS r squared increases by 0.08 which represents a low to medium increase (based on Cohen's D). Therefore CRT and SR contributed most to prediction explaining 14% and 15% of the variance respectively, hence other static tests did not prove as robust.

(b) n=41 electrical engineering students, who wrote the CRT, LPT1 and LPT2 (pre and post), RCT, EAT and SR was available. Pearson correlations: YEAR (SR) 0.424* n=41* p=0.006*; YEAR (CRT) 0.050 n=41 p=0.757; YEAR (LPT1) 0.234 n=41 p=0.140; YEAR (LPT2) 0.189 n=41 p=0.238; YEAR (RCT) 0.234 n=41 p=0.142; YEAR (EAT) 0.091 n=41 p=0.573; FINAL (SR) 0.421* n=41* p=0.006*; FINAL (CRT) 0.047 n=41 p=0.771; FINAL (LPT1) 0.201 n=41 p=0.207; FINAL (LPT2) 0.172 n=41 p=0.282; FINAL (RCT) 0.224 n=41 p=0.160; FINAL (EAT) 0.074 n=41 p=0.647; CREDIT (SR) 0.311* n=41* p=0.047*; CREDIT (CRT) 0.030 n=41 p=0.854; CREDIT (LPT1) 0.210 n=41 p=0.189; CREDIT (LPT2) 0.291 n=41 p=0.058; CREDIT (RCT) 0.291 n=41 p=0.065; CREDIT (EAT) 0.048 n=41 p=0.767. Only SR was significant. A stepwise regression for this group: For CREDITS: R=0.311, r square=0.096, r squared a =0.074, F=4.188, p=0.47, n=41. beta 0.311, std error of beta 0.152, t 2.046. when LPT2 is added to the model, it increases by 0.07 which is a low to moderate contribution. For this sample, SR did better than either static or dynamic assessments.

A sample of electrical engineering and information technology students were divided into those scoring less than 36 on the SR score and those scoring greater than 36 on the SR score.

For electrical engineering group:<36 (only correlations shown for static and dynamic tests). YEAR (SR) -0.315 n=18 p=0.202; YEAR (CRT) 0.440 n=18 p=0.067; YEAR (LPT1) 0.543* n=18* p=0.020*; YEAR (LPT2) 0.552* n=18* p=0.017*; YEAR (RCT) 0.290 n=18 p=0.243; YEAR (EAT) 0.396 n=18 p=0.103; FINAL (SR) -0.327 n=18 p=0.185; FINAL (CRT) 0.424 n=18 p=0.079; FINAL (LPT1) 0.498* n=18 p=0.035*; FINAL (LPT2) 0.530* n=18* p=0.023*; FINAL (RCT) 0.241 n=18 p=0.335; FINAL (EAT) 0.371 n=18 p=0.129; CREDIT (SR) -0.141 n=18 p=0.576; CREDIT (CRT) 0.300 n=18 p=0.226; CREDIT (LPT1) 0.435 n=18 p=0.071; CREDIT (LPT2) 0.515* n=18* p=0.028*; CREDIT (RCT) 0.215 n=18 p=0.391; CREDIT (EAT) 0.187 n=18 p=0.456.

Electrical engineering group >36: YEAR (SR) 0.318 n=9 p=0.183; YEAR (CRT) -0.541* n=19* p=0.017*; YEAR (LPT1) -0.175 n=19 p=0.472; YEAR (LPT2) -0.152 n=19 p=0.532; YEAR (RCT) 0.036 n=19 p=0.883; YEAR (EAT) -0.074 n=19 p=0.762; FINAL (SR) 0.293 n=19 p=0.222; FINAL (CRT) -0.534* n=19* p=0.018*; FINAL (LPT1) -0.223 n=19 p=0.358*; FINAL (LPT2) -0.183 n=19 p=0.451; FINAL (RCT) 0.030 n=19 p=0.900; FINAL (EAT) -0.088 n=19 p=0.720; CREDIT (SR) 0.286 n=9 p=0.235; CREDIT (CRT) -0.498* n=19 p=0.0.0*; CREDIT (LPT1) -0.252 n=19 p=0.296; CREDIT (LPT2) -0.091 n=19 p=0.710; CREDIT (RCT) 0.107 n=19 p=0.661; CREDIT (EAT) -0.041 n=19 p=0.866. Hence, for the lower scoring group, LPT correlated better and vice versa for the higher scoring group.Significant difference between the two groups for CRT (p 0.007), LPT1 (p 0.040) and LPT2 (p 0.039) using Fisher's z transformation.

Information technology sample divided into SR scores <27 and >27.

Information technology <27 group: YEAR (SR) 0.357 n=21 p=0.111; YEAR (CRT) -0.033, n=25, p0.873; YEAR (LPT1) -0.304, N=25, p 0.139; YEAR (LPT2) -0.181, N=25, P=0.385; YEAR (RCT) 0.223, n=25, p=0.283. EXAM (SR) 0.357, N=25, P=0.076; EXAM (CRT) -0.186, N=25, P=0.371; EXAM (LPT1) -0.182, N=25, P 0.384; EXAM (LPT2) -0.074, N=25, P=0.725; EXAM (RCT) 0.166, N=25, P=0.426. FINAL (SR) 0.415, N=21, P0.061; FINAL (CRT) -0.189, N=25, P=0.365; FINAL (LPT1) -0.215, N=25, P=0.301; FINAL (LPT2) -0.102, N=25, P=0.626; FINAL (RCT) 0.174, N=25, P=0.404; CREDIT (SR)0.333, N=21, P=0.139; CREDIT (CRT) -0.362, N=25, P=0.075; CREDIT (LPT1) -0.198, N=25, P=0.342; CREDIT (LPT2) -0.183, N=25, P=0.342; CREDIT (RCT) 0.313, N=25, P= 0.127.

Information technology >27 group: YEAR (SR) 0.605 *n=25* p=0.001*; YEAR (CRT) 0.045, n=25, p0.829; YEAR (LPT1) 0.108, N=25, p 0.607; YEAR (LPT2) 0.258, N=25, P=0.213; YEAR (RCT) -0.056, n=25, p=0.790. EXAM (SR) 0.560*, N=25*, P=0.004*; EXAM (CRT) -0.101, N=25, P=0.629; EXAM (LPT1) 0.089, N=25, P 0.671; EXAM (LPT2) 0.298, N=25, P=0.147; EXAM (RCT) -0.009, N=25, P=0.965. FINAL (SR) 0.580*, N=25*, P=0.002*; FINAL (CRT) 0.075, N=25, P=0.721; FINAL (LPT1) 0.086, N=25, P=0.681; FINAL (LPT2) 0.291, N=25, P=0.157; FINAL (RCT) -0.027, N=25, P=0.897; CREDIT (SR) 0.542*, N=25*, P=0.005*; CREDIT (CRT) 0.001, N=25, P=0.995; CREDIT (LPT1) -0.120, N=25, P=0.566; CREDIT (LPT2) 0.267, N=25, P=0.196; CREDIT (RCT) -0.103, N=25, P= 0.621. Matriculation marks still proved to better predictors for the higher scoring groups than dynamic assessment instruments. Neither static nor dynamic assessments were good predictors for the lower scoring group.

LPT1 and LPT2 scores for both electrical engineering and information technology students:

Information Technology (n=55) LPT1 (mean 16.56 sd=4.84) LPT2 (mean 20.98 sd 4.15) Difference score (mean 4.42 sd 2.97).
Electrical engineering (n=41) LPT1 (mean 17.54, sd 4.6) LPT2 (mean 21.41 sd 4.13) Difference score (mean 3.88 sd 2.92). T test for independent samples: t= -5.14, df=108, p<0.0001for information technology and for electrical engineering: t= -4.02, df 80, p<0.0001. therefore significant difference for both groups between pre and post test therefore mediation had an effect.

Study no 3: for both information technology and electrical engineering groups: samples were divided into those who were more modifiable (difference score >4) and less modifiable (difference score <4).

Information technology students more modifiable: YEAR (CRT) 0.167, n=23, p=0.446; YEAR (LPT1) 0.151, N=23, P=0.491; YEAR (LPT2) 0.157, N=23, P=0.473; YEAR (SR) 0.473*, N=22*, P=0.026*; YEAR (RCT) 0.213, N=23, P=0.328; EXAM (CRT) 0.091, =23, P=0.667; EXAM (LPT1) 0.105, N=23, P=0.631; EXAM (LPT2) 0.172, N=23, P=0.432, EXAM (SR) 0.430*,N=22*, P=0.045*; EXAM (RCT) 0.223, N=23, P=0.305; FINAL (CRT) 0.110, N=23, P=0.617; FINAL (LPT1) 0.123, N=23, P=0.573; FINAL (LPT2) 0.173, N=23, P=0.428; FINAL (SR) 0.458*, N=22*, P=0.032*; FINAL (RCT) 0.228, N=23, P=0.295; CREDIT (CRT) -0.110, N=23, P=0.615; CREDIT (LPT1) -0.034, N=23, P=0.876, CREDIT (LPT2) 0.010, N=23, P=0.961; CREDIT (SR) 0.507*, N=22*, P=0.016*; CREDIT (RCT) 0.159, N=23, P=0.466.

Information technology students less modifiable: YEAR (CRT) 0.190, n=27, p=0.341; YEAR (LPT1) 0.136, N=27, P=0.497; YEAR (LPT2) 0.106, N=27, P=0.596; YEAR (SR) 0.529*, N=24*, P=0.008*; YEAR (RCT) -0.062, N=27, P=0.758; EXAM (CRT) 0.087, =27, P=0.666; EXAM (LPT1) 0.124, N=27, P=0.536; EXAM (LPT2) 0.126, N=27, P=0.529, EXAM (SR) 0.505*,N=24*, P=0.012*; EXAM (RCT) -0.078, N=27, P=0.696; FINAL (CRT) 0.096, N=27, P=0.634 FINAL (LPT1) 0.137, N=27, P=0.494; FINAL (LPT2) 0.130, N=27, P=0.516; FINAL (SR) 0.534*, N=24*, P=0.007*; FINAL (RCT) -0.072, N=27, P=0.720; CREDIT (CRT) 0.011, N=27, P=0.955; CREDIT (LPT1) 0.147, N=27, P=0.464, CREDIT (LPT2) 0.145, N=27, P=0.468; CREDIT (SR) 0.461*, N=24*, P=0.023*; CREDIT (RCT) 0.077, N=27, P=0.701.

More modifiable electrical engineering students: YEAR (SR) 0.360, N=16, P=0.170; YEAR (CRT) 0.590*, N=16*, P=0.016*, YEAR (LPT1) 0.646*, N=16*, P=0.007*, YEAR (LPT2)0.492, N=16, P=0.053, YEAR (RCT) 0.228, N=16, P=0.395; YEAR (EAT) 0.019, N=16, P=0.943; FINAL (SR) 0.356, N=16, P=0.175; FINAL (CRT)0.590*, N=16*, P=0.016*, FINAL (LPT1) 0.638*, N=16*, P=0.008*; FINAL (LPT2) 0.481, N=16, P=0.059; FINAL (RCT) 0.204, N=16, P=0.447; FINAL (EAT) -0.013, N=16, P=0.959; CREDIT (SR) 0.312, N=16, P=0.239; CREDIT (CRT) 0.569*. N=16*, P=0.021*, CREDIT (LPT1) 0.768*, N=16*, P=0.001*; CREDIT (LPT2) 0.625*, N=16*, P=0.01*, CREDIT (RCT) 0.195, N=16, P=0.467; CREDIT (EAT) -0.080, N=16, P=0.766.

Less modifiable electrical engineering students: YEAR (SR) 0.530*, N=20*, P=0.16*; YEAR (CRT) -0.26, N=20, P=0.267, YEAR (LPT1) 0.136, N=20, P=0.566, YEAR (LPT2) 0.101, N=20, P=0.669, YEAR (RCT) 0.200, N=20, P=0.396; YEAR (EAT) 0.186, N=20, P=0.431; FINAL (SR) 0.549*, N=20*, P=0.012*, FINAL (CRT) -0.268, N=20, P=0.252, FINAL (LPT1) 0.110, N=20, P=0.643; FINAL (LPT2) 0.078, N=20, P=0.741; FINAL (RCT) 0.184, N=20, P=0.435; FINAL (EAT) 0.182, N=20, P=0.441; CREDIT (SR) 0.386, N=20, P=0.093; CREDIT (CRT) -0.106, N=20, P=0.656, CREDIT (LPT1) 0.275, N=20, P=0.240; CREDIT (LPT2) 0.238, N=20, P=0.311, CREDIT (RCT) 0.242, N=20, P=0.304; CREDIT (EAT) 0.276, N=20, P=0.237 For the less modifiable group the SR correlations evidenced better results and for the more modifiable group the CRT evidenced better correlations. Significant difference between both groups (p=0.02 for final marks and 0.045 for CREDITS).

Sample was further divided into low achieving but more modifiable groups (information technology and electrical engineering).

Information technology group: YEAR (CRT) 0.099, N=16, P=0.714; YEAR (LPT1) 0.221, N=16; P=0.410; YEAR (LPT2) 0.247, N=16, P=0.356; YEAR (SR) 0.204, N=15, P=0.465; YEAR (RCT) 0.056, N=16, P=0.834. EXAM (CRT) 0.024, N=16, P=0.929; EXAM (LPT1) 0.234, N=16, P=0.382; EXAM (LPT2) 0.363, N=16, P=0.166, EXAM (SR) 0.121, N=15, P=0.666, EXAM (RCT) 0.051, N=16, P=0.851; FINAL (CRT) 0.050, N=16, P=0.854, FINAL (LPT1) 0.252, N=16, P=0.345, FINAL (LPT2) 0.349, N=16, P=0.184. FINAL (SR) 0.160, N=15, P=0.569, FINAL (RCT) 0.059, N=16, P=0.827. CRED (CRT) -0.024, N=16, P=0.939, CREDIT (LPT1) 0.375, N=16, P=0.152, CRED (LPT2) 0.418, N=16, P=0.107, CRED (SR) 0.141, N=15, P=0.614, CRED (RCT) 0.034, N=16, P=0.898.

Electrical engineering group: YEAR (SR) 0.253, N=11, P=0.452, YEAR (CRT) 0.568, N=11, P=0.038, YEAR (LPT1) 0.561, N=11, P=0.072, YEAR (LPT2) 0.325, N=11, P=0.329, YEAR (RCT) 0.236, N=11, P=0.483, YEAR (EAT) 0.032, N=11, P=0.925; FINAL (SR) 0.259, N=11, P=0.441, FINAL (CRT) 0.587, N=11, P=0.057, FINAL (LPT1) 0.588, N=11, P=0.057, FINAL (LPT2) 0.348, N=11, P=0.294; FINAL (RCT) 0.226, N=11, P=0.503, FINAL 9EAT) 0.004, N=11, P=0.990, CREDIT (SR) 0.280, N=11, P=0.404, CREDIT (CRT) 0.610*, N=11*, P=0.046*, CREDIT (LPT1) 0.851*, N=11*, P=0.001*, CREDIT (LPT2) 0.639*, N=11, P=0.034*, CREDIT (RCT) 0.175, N=0.175, N=11, P=0.605, CREDIT (EAT) -0.176, N=11, P=0.603. For the total information technology and electrical engineering groups, the SR scores were better correlated, however when the groups were divided into low achieving but more modifiable, there were stronger correlations between LPT and CRT tests. Thus, SR scores do not seem to be a good predictor for the group of students who are lower achieving but who are able to benefit from mediation.

Study no 4: comparisons between some groups

Difference between DET (n=6)and Non DET(n=90) groups: (t test for independent samples at 0.05 (two tailed) significant difference found between the two groups on RCT and CRT: RCT DET MEAN 2.83 (sd=1.32) and RCT Non DET mean 6.98 (sd=2.93), t=-3.430, df=94, p=0.001. CRT DET MEAN 14.50 (sd3.14), CRT Non DET mean 19.48 (5.07), t=-2.368, df=94, p=0.019.

Study no 5:

High (n=19) and low (n=19) SES groups: significant difference between the two groups on LPT1, low SES mean 14.31(sd= 5.706) high SES mean 18.05 (sd 4.938). t=-2.158, df=36 p=0.037.

More (n=37) and less (n=35) successful students: significant difference between two groups on LPT2, more successful mean 21.91 (sd3.311),less successful mean 19.82 (sd 5.321) t= 02.012 df=70, p=0.047. Therefore mediated lesson played an important role in improving LPT scores for the more successful students.

(21) The weight of the evidence in the study indicates that it is possible to find alternative measures to matriculation and static tests in selecting disadvantaged students by making use of the zone of proximal development. For less modifiable students, the best predictors of academic success are the conventional manner of testing, namely matriculation examination results. For more modifiable students, the results indicate that alternative predictors are more helpful. Hypothesis 1 is supported, hypothesis 2 is partially supported and hypothesis 3 is generally supported
(22) Criterion variables included four measures used for academic performance, namely year mark, exam mark, grade point average and number of credits obtained. The Swedish Rating (SR) score was also used for previous academic achievement. Static tests included the RCT, EAT and MA and the dynamic tests included the LPT, CRT (all five being cognitive tests). The SPQ and MSLQ were regarded as non-cognitive tests

(23) Small sample sizes were used in the various studies and the dynamic assessment procedures were of short duration with not enough attention given to transfer issues.

(1)Gaydon, V.P.

(2) 1988
(3) Predictors of performance of disadvantaged adolescents on the Soweto/Alexandra gifted child programme
(4) University of the Witwatersrand
(5) Unpublished Masters dissertation
(6) Johannesburg
(7) The study aimed to determine the relative effectiveness of both conventional and dynamic assessment techniques in predicting performance of culturally and socio-economically disadvantaged students on the Soweto gifted child programme, with the further aim of developing more effective selection procedures for the programme. This sample had been used during the Hoffenberg (1988) study
(8) 99
(9) 2
(10) Between subjects, experimental and control groups
(11) Black high school pupils who were chosen for the gifted programme
(12) 13-18.8 (ranged from std6-std10 (grade 8 - grade 12)). Mean age 14.8.
(13) LPAD (3 subtests: organiser [organiser b used for transfer], set variations [Ravens progressive matrices used as transfer] , verbal analogies [similarities subtests from the WAIS-R and WISC-R used as transfer]), the New South African group test, School performance (1987 mid year aggregate marks in maths, English, science and home language); the Khatena-Torrance creative perception Inventory; The Piers Harris Children's self concept scale and scores on the gifted child programme
(14) Feedback as described by Feuerstein.
(15) Solomon four group design. Pretested experimental group n=24; Pretested control group n=23; unpretested experimental group n=28 and unpretested control group n=25
(16) Pre-selected black high school pupils who were chosen for the gifted programme offered by the Department of Education and Training
(17) One week before and one week after the LPAD tasks were administered, the transfer tasks were administered
(18) No formal hypothesis given: the aim was to determine whether some dynamic tasks could help identify gifted children for a specific education programme. If stated: H0 Dynamic assessment tools will aid in selecting gifted children for an educational programme.
(19) As described by Feuerstein. LPAD was conducted in three session of three hours each spanning two weeks
(20) Modifiability index determined by subtracting a pre-index from a post-index scores. Statistical analyses for three groups performed on the whole sample, pretested sample and unpretested sample. Pearson's correlations conducted for LPAD tasks and transfer measures (other correlations were conducted but were not useful for the purposes of this meta-analytic study. The following significant results were obtained from the LPAD tasks and their transfer equivalents in addition to school results and the New South African group test (p=0.0001 accepted as significant).

Key: VAT - Verbal analogies test; ravens - Raven's Progressive matrices, simtot - Similarities Total score, NSAGT - New South African Group Test

Whole sample (n=99) LPAD organizer-science r=0.468, p=0.0001, n=99; organizer-aggregate r=0.485, p0.0001, n=99; VAT-English r=0.477, p=0.0001, n=95, VAT-science, 0.55045, p=0.0001, n=99, VAT-aggregate r=0.5528, p=0.0001, n=99. transfer measures: organiser b-science, r=0.556, p=0.0001, n=99; organizer b-aggregate, r=0.523, p=0.0001, n=99; ravens-science r=0.479, p=0.0001, n=99; ravens-aggregate, r=0.475, p=0.0001, n=99; simtot-English r=0.454, p=0.0001, n=95; simtot-science r=0.449, p=0.0001, n=99, simtot-aggregate r=0.514, p=0.0001, n=99. Static measures: NSAGT-science r=0.50, p=0.0001, n=94, NSAGT- aggregate r=0.50, p=0.0001, n=94

A stepwise regression was performed with those variables that correlated significantly in order to determine the relative contributions of each measure to variations in the criterion measure. Four variables accounted for 49.43% of variation in criterion: VAT LPAD 31.14%, school performance 9.66%, organiser b 5.32% and simtot 3.31%

Pretested sample (n=47): VAT-science r=0.53, p=0.0001, n=47; VAT-aggregate r=0.59, p=0.0001, n=47; transfer measures: ravens-science r=0.58, p=0.0001 n=47. Stepwise regression conducted to account for variance (46.66%): VAT LPAD 35.19%, simtot 6.45% ravens 5.02%, results of the unpretested sample (n=53): LPAD tasks: organizer-science r=0.592, p=0.0001, n=52; organizer-aggregate r=0.59, p=0.0001, n=52, VAT-science, r=0.57, p=.0001,n=52; VAT-aggregate r=0.51, p=0.0001, n=52; transfer tasks: organizer b - science r=0.64, p=0.0001, n=52, organizer b - aggregate r=0.64, p=0.0001, n=52, simtot-english, r=0.58, p=0.0001, n=50, simtot-science, r=0.50, p=0.0001, n=52; simtot-aggregate r=0.56, p=0.0001, n=52. static measures: NSAGT-science r=0.59, p=0.0001, n=50; NSAGT-aggregate r=0.59, p=0.0001, n=50. Stepwise regression conducted: of which two variables account for 53.89% of variance - science marks (40.96) and organizer b (12.93%).

(21) In the case of the whole sample, the VAT LPAD task, overall school performance, Organizer posttest and similarities accounted for 49.43% of variance in the criterion measure. For the pretested sample, Raven's posttest contributed to the variation in the criterion measure. For both the whole sample and unpretested sample, the VAT of the LPAD was a significant contributor to variance
(22) Baseline measures: New South African group test, school performance, Khatena-Torrance, Piers Harris children's self concept, teacher temperament questionnaire, progressive matrices, LPAD tasks (all three plus their transfer measures). Criterion measures included: performance on the gifted child programme, as measured by English, maths, science and aggregate marks
(23) Organizer pretest and Organizer posttest were similar in form and the group who were pretested and posttested on the task actually performed less well compared to the group who received no mediation. This was reasoned to be due to tedium and fatigue. In conclusion these LPAD tests along with the static tests would help in identifying gifted children for the Soweto Programme. Whether or not mediation itself was effective cannot be conclusively stated, as correlations between modifiability and performance on the programme were poor (no significant correlations were evidenced between the modifiability index and programme). The mediation offered may not have been effectively administered.

(1)Gewer, A.**

(2) 1998
(3) Uncovering potential: dynamic assessment of non-verbal reasoning ability in educationally disadvantaged children
(4)University of the Witwatersrand
(5) Unpublished Masters dissertation
(6) Johannesburg
(7) The study investigated the application of dynamic assessment to a sample of black children within a South African township clinic setting
(8) 72
(9) 2 but further subdivided into 4

(10)Between subjects, experimental and control groups
(11) Black children who were referred to the clinic with learning difficulties
(12) Ranged between 9-15 (mean 10.96)
(13) Raven's Coloured Progressive Matrices (RCPM), Rey-Osterrieth Complex Figure Test (ROCFT), LPAD (set variations I), Lurie and Kozulin's qualitative analysis of matrices
(14) As described by Feuerstein
(15) Solomon four group design. Matched groups (pretest-mediation-posttest). Experimental group n=48 and control group = 24. The RCPM was completed by both groups, with the experimental group receiving mediation on the LPAD set variations. Mediation was given either on the same day or later than the pretest (for this reason, the sample was split accordingly for both experimental and control groups). The ROCFT equivalent measure was a drawing from the LPAD. The LPAD was group administered
(16) Black children who were referred to the child clinic for psychoeducational assessment
(17) All testing took place on the same day for one half of both groups and on separate days for the other half of both groups - this was done to investigate whether there would be any difference between those who received the pretesting on the same day and those who did not
(18) H01 - children who perform below average on the RCPM will improve their performance significantly once they have undergone a brief process of mediation, utilising the teaching tasks provided in the LPAD, when compared with a group who receives no such intervention. H02 - children who perform below average on the ROCFT, a test of perceptual organisation and visual memory, will improve their performance significantly once they have undergone a brief process of mediation as outlined in the LPAD, when compared with a group which receives no such intervention. H03 - The quality of responses provided by the children who received mediation will improve significantly on both tasks, in comparison with the children who received no such mediation (as measured by the Lurie and Kozulin scoring method). H04 - the children who receive mediation on the ROCFT will be able to transfer the skills acquired to a similar figure. This transfer will be reflected in the quality of their performance on the similar figure, when compared to that of the group that receives no mediation.
(19) Initial mediation with the set variations is guided by the subjects' level of functioning, and goals are to define the problem, focus on the task, set rules, regulate behaviour and identify the sequence required to perform on a task. Actual mediation lasted three to four hours
(20) RCPM results: these results are divided according to the day they were completed - experimental same day, experimental different day; control group same day, control group different day. Two way ANCOVA (using pretest as co-variate), pre test scores are partialled out and the mean adjusted. The ANCOVA included posttest scores, pretest scores, experimental and control groups as well as days on which testing took place as variables. Statistical tests were conducted to see whether mediation had an effect on experimental group as well as to investigate the degree to which pretesting had any effect (even if negative) if written on the same day.

Means and standard deviations for all four groups (n=72): exp group same day pretest 16.71 (sd 4.23), posttest 22.21 (8.85); control group same day pretest 15.75 (sd 5.15), posttest 20.00 (sd 5.82) experimental group different day pretest 19.71 (sd 5.37), posttest 24.25 (sd8.48); control group different day pretest 17.92 (sd 4.58) posttest 18.58 (sd 5.26). No significant results evidenced for mediation (F1 & 67 = 2.92, P=0.919). Pretest day did not make a difference either even though the number of responses on the posttest increased for the experimental group.

Further analyses on some of the RCPM responses (n=72): experimental group same day pretest 0.08 (sd 0.28), posttest 1.75 (1.96); control group same day pretest 0.42 (sd 0.67), posttest 1.00 (sd 1.48) experimental group different day pre test 1.00 (sd 1.47), posttest 2.21 (sd 1.98); control group different day pretest 0.67 (sd 0.98) posttest 0.42 (sd 1.16). There was a significant result for the intervention in favour of the experimental group (F1 & 67=8.56, P<0.01).

ROCFT results: one way analysis of covariance with pretest as covariate, used to explore mediation on the copying and memory tasks of the ROCFT. All subjects pretested on the same day (n=72): experimental group (copy) pretest 18.17 (sd 9.45), posttest 26.25 (8.36); experimental group (memory) pretest 11.76 (sd 6.80), posttest 23.00 (sd 9.00);control group (copy) pretest 15.85 (sd 7.83), posttest 17.00 (sd 8.09) control group (memory) pretest 9.25 (sd 12.50) posttest 4.59(sd 6.69). A one way ANCOVA conducted on posttests of copying and memory tasks, pretest as covariate. Significant result for copying task (F1 & 69) = 30.46, P<0.0001) and MEMORY (F1& 69)=31.96, p<0.0001 in favour of the experimental group.Qualitative measures were not included as they do not lend themselves as accurate measures (even though kappa was calculated)
(21) The experimental group was able to benefit from mediation and was able to transfer what they had learned to similar tasks
(22) Criterion variable: only results on the posttest compared with results on the pretest
(23) Due to the fact that the RCPM was administered to the groups on the same day as the mediation, the control group's performance may have negatively impacted on the overall results. Limited use of the LPAD and the use of more subtests might have been valuable

(1)Tayler, J.

(2) 1996
(3) Assessment of the predictive validity of the learning ability battery
(4) University of the Witwatersrand
(5) Unpublished Masters dissertation
(6) Johannesburg
(7) The aim of the study is to assess the predictive validity of a currently widely used, commercially marketed instrument: the Learning Ability Battery (LAB)
(8) 132
(9) 2
(10) Between subjects design as the sample was further sub-divided into both literate and illiterate groups and tested on the LAB making use of pre and post testing to determine whether training and intervention made a significant difference
(11) Volunteer respondents from four South African and one Angolan organisation (three local government organisations and two organisations representing industry). Educational levels ranged from totally illiterate to matriculated
(12) Age ranged between 20-65
(13) The Learning Ability Battery (LAB)
(14) A training session which included aiding subjects with practice examples
(15) The entire LAB was first used to group the individuals for various language courses and on completion of the courses the word recognition subscale of the LAB was again administered, this time to evaluate the accuracy of the instrument's original groupings. The LAB is divided into verbal and non verbal components. Non-verbal measures included: hand-eye coordination; visual memory short term; visual memory long term; visual perception; visual insight; quantitative perception and seeing the whole picture. Scores range from 0-94 and subjects were divided into three groups based on their performance scores: 0-35; 36-65 and 66-100 (slow, average and fast pace of learning). Each subtest was preceded by coaching (training) in the form of practice examples. The verbal measures included: word recognition test which was available in seven languages consisting of fifty sentences graded into eight levels (std 1- std 8 (grade 3 - grade 10)) and testees had to select the correct word for the sentence. One mark was awarded for every correct answer (range 0-50) and scores were then used to group people into groups
(16) Urbanised black men and women employed by five participating organisations
(17) The test-train-test method took place over a period of five to seven months

(18) No hypothesis stated: the study attempted to ascertain the predictive validity of the LAB
(19) During the coaching or training phase the administrator reads the instructions aloud from the test manual and demonstrates each example, individuals are corrected when and where necessary but they move on as a group.There is NO test-train-test method as such is used within this study however a component of pretest teaching and familiarisation is carried out
(20) Taylor's study was a predictive validity study and as such various factor analysis results will not be included in this section as it does not pertain to the assessment of dynamic assessment. However, in order to determine the significance between pre and posttest for both literate and illiterate groups (the sample was divided into these two groups so as to compare the results), a paired comparison using student's two tailed t tests was computed on the means of the differences between the two scores and results are: illiterate group (n=51), t = 13.38 (p<0.0001) df=50 (t crit +_3.496), literate group (n=67), t = 11.88 (p<0.0001) df = 66, (t crit = +_3.460), therefore groups performed significantly better on the posttest compared to the pretest. Also, the higher the education the higher the scores on the posttest: (r=0.67, p<0.0001) which is interesting from the point of view of dynamic assessment theory which tends to advocate the opposite occurring
(21) The LAB was found to be both reliable and valid as a predictor of optimal groupings for the purpose of development of lower educated employees. High internal reliabilities are based on moderately well defined and interpretable factors
(22) The criterion was the objective rating after initial LAB testing and a second score was also obtained for each subject on the word recognition subtest. The subjective criterion included: trainers' subjective ratings of subjects' learning
(23) Only volunteers were used, hence leading to a biased sample and also no comparisons were made with any other objective instrument.

(1)Nel, A.

(2) 1997
(3) Die voorspelling Van akademiese sukses binne die konteks Van 'n alternatiewe universiteitstoelatingsbeleid (The prediction of academic success within the context of an alternative university admissions policy)
(4) Rand Afrikaans University
(5) Unpublished Masters dissertation
(6) Johannesburg
(7) The study attempted to assess whether the psychometric test battery which the university uses within the framework of an academic support programme can be viewed as valid in predicting future academic performance of these students. For the purpose of this study only information pertaining to the dynamic assessment instrument, the Ability and Processing of Information and Learning Test Battery (APIL) and how it functions will be discussed
(8) 171 (for those who wrote the APIL) and 476 for the multiple regression analysis which included subjects other than those who wrote the APIL
(9) 1
(10) This study was a comparison exercise and sought to determine the best battery of predictors for academic success and as part of a suite of tests, the APIL was included
(11) First year university students who proceeded through a programme which admitted students based on alternative policies
(12) Not stated but an approximation of eighteen can be estimated
(13) The General Scholastic Aptitude Test, (GSAT), APIL and a language assessment tool made up of a reading comprehension test as well as Matriculation (M) scores were also used
(14) During the administration of the APIL four familiarisation sessions are included which enable the subjects to understand what is expected of them
(15) Students were assessed on a number of instruments including static and dynamic assessments. There was no experimental nor control groups as scores were entered into regression models to find variables which proved predictive of university success
(16) New entrants into university who had gained admission via and alternative route
(17) The APIL takes a few hours to administer
(18) General hypothesis: H0 - learning potential, intelligence and language competency as measured by the university battery for admissions is a valid predictor of academic performance of students who are admitted via the alternative policy. Specific hypotheses: H01: no statistically significant relationship exists between students results on the learning potential test and academic achievement. HA1 there is a significant relationship between the two. H02: no statistically significant relationship exists between students results on their M scores and academic achievement. HA2 there is a significant relationship between the two. H03: no statistically significant relationship exists between students' combined results (learning potential test, M scores, reading comprehension and GSAT) and academic achievement. HA3: there is a significant relationship between the combined results and academic achievement. H04: there is no significantly statistical way in which the GSAT, APIL and reading comprehension test can differentiate between those who will pass and those who will fail in their subjects and those who will not gain admission to exams. HA4: this can be shown to be proven true. H05: there is no significantly statistical way in which the GSAT, APIL, reading comprehension test can differentiate between those who are successful and those who are unsuccessful. HA5: this can eb shown to be proven true
(19) Mediation as prescribed by Tayler the developer of the APIL which is considered a learning potential test. Four sessions each included familiarisation with the task at hand
(20) Correlations between the following and academic achievement (n=171): APIL: r=0.279 significant at p=0.0001; GSAT: r=0.291 significant at p=0.0001; reading comprehension Afrikaans: r=0.412 significant at p=0.0001; reading comprehension English: r=0.309 significant at p=0.0001and M score: r=0.241 significant at p=0.0001, hence null hypotheses rejected.

For regression analyses (all variables entered at once) (n=476): all three (APIL, M score and GSAT) delivered a significant contribution to the regression (p<0.05) with t values of 2.073 for APIL; 2.1496 for M score and 2.125 for GSAT. b values for APIL, GSAT and M score: b for APIL = 0.009 (significant at 0.0001) and b for APIL = 0.125; b for GSAT = 0.009 (significant at 0.0001) and b for GSAT = 0.143; b for M score = 0.032 (significant at 0.0001) and b for M score = 0.126. r squared = 0.107 and standard error = 0.919.

Correlations: APIL and achievement = 0.275; GSAT and achievement = 0.292 and M score and achievement = 0.248, so although M score correlated the least in comparison to GSAT and APIL it still contributed more to the regression model. Hence, null hypothesis rejected. There is a significant relationship between results on the APIL, GSAT and M scores combined and their academic performance.

Hierarchical regression: step one: M score r = 0.248, r squared = 0.061 standard error 0.940, step two: GSAT r = 0.315, r squared = 0.099 standard error 0.922, step three: APIL r = 0.327, r squared = 0.107 standard error 0.919. The second hierarchical regression: step one: M score r = 0.248, r squared = 0.061 standard error 0.940, step two: APIL r = 0.312, r squared = 0.098 standard error 0.923, step three: GSAT r = 0.327, r squared = 0.107 standard error 0.919.

Intercorrelations between different tests: APIL-GSAT = 0.684 (n=488); APIL-M score= 0.416 (n=488); APIL-reading comprehension (Afrikaans) =0.667 (n=83), APIL reading comp (English) 0.594
(n=190).

Discriminant analysis (predictors are APIL, GSAT and M score) correctly placed 50% of students into the three groups namely: no admission to exam, failed and passed. Closer inspection yielded that GSAT correctly placed 50.82% of cases, (and the level of chance = 38%), M scores correctly placed 50.20% and APIL correctly placed 49.20%. When the three classification levels are reduced to two, namely, failed or successful the total percentage correctly classified is 64.29%.
(21) GSAT and APIL correlated to the same extent with academic performance and the relationship between the two instruments was also relatively high which implies that the two probably measure the same construct (evidencing a correlation is 0.684). When used in combination, the M score, APIL and GSAT explain more of the variance in academic performance than any of the factors individually. GSAT and APIL are equally good predictors
(22) Criterion is achievement or academic success, predictor variables include the GSAT, APIL and reading comprehension test as well as M scores
(23) Different testers were used and not all testing took place on the same day, also the APIL is meant for a small scale testing situation not a large scale one and it is also quite a long test.

(1)Hoffenberg, S.R.**

(2) 1988
(3) Effectiveness of the learning potential assessment device with high achieving adolescents from a disadvantaged community
(4) University of the Witwatersrand
(5) Unpublished Master's dissertation
(6) Johannesburg
(7) The study aimed to assess the effectiveness of dynamic assessment among a group of academically superior individuals from a disadvantaged black community in South Africa. This sample had been used for other statistical analysis purposes in the study by Gaydon (1988)
(8) 100
(9) 4
(10) Solomon four group design (experimental and control group divided on the basis of pretesting)
(11) Adolescents who were achieving in the top of their academic classes. As determined by the New South African group test, the average IQ for the sample was 90.7 (ranged between 74 - 116). 46% male and 54% female
(12) Age ranged between 12-19 mean age 14.8 sd = 1.65
(13) LPAD: organiser (a) verbal analogies (VAT) and set variations I and II. Transfer measures included the organiser (b), similarities subtests from the WISC-R and WAIS-R and Raven's standard progressive matrices (RSPM)
(14) As outlined by Feuerstein
(15) A Solomon four group design was used to ensure that pretesting did not have a practice effect on the control group.The experimental group was exposed to dynamic testing (mediated learning experience (MLE) and its resultant effects) and control group not exposed to MLE. The two groups were compared on their scores on the LPAD tasks and on transfer tasks comparable to the LPAD. The pretested experimental group 1 n=24; pretested control group 2 n= 23; unpretested experimental group 3 n=28 and unpretested control group 4 n=25. The group administered pretesting was conducted by post graduate students in groups of 35-45 subjects. The LPAD was administered in smaller groups of nine subjects and both the experimental and control groups were divided into smaller groups for purposes of mediation
(16) Pre-selected group of high school top achievers in their respective classes who attended the gifted child programme
(17) The transfer tasks were administered one week before and one week after the LPAD tasks and in total the testing took four weeks. Administration of the LPAD took two weeks
(18) H01: following mediation, the performance of the experimental group will be significantly better than that of the control group on certain LPAD tasks, namely the Organiser (A), verbal analogies and set variations 1 & 2. H02: Following mediation on the LPAD, the performance of the experimental group will be significantly better than the control group on the transfer measures, namely the Organiser (B), similarities subtests of the WISC-R and the WAIS-R and the Raven's standard Progressive Matrices
(19) As prescribed by Feuerstein
(20) ANOVA and chi square tests revealed no differences between all four groups of the Solomon design on SES, gender, academic achievement nor IQ. ANCOVA conducted on pretested groups to determine the effects of mediation on LPAD and transfer tasks taking pretests into account and ANOVA on the unpretested groups to determine mediation on LPAD and transfer measures and ANOVA on whole sample experimental vs control groups.

Means and sd's of LPAD results for pretested and unpretested groups:

PRETESTED GROUP (n=47)

experimental group (n=24) organiser mean 9.54 (sd 4.37); VAT mean 14.96 (sd 3.64) set variations I mean 25.88 (sd 3.52) set variations II mean 38.75 (sd7.41) control group (n=23) organiser mean 8.39 (sd 4.29); VAT mean 13.13 (sd 3.05) set variations I mean 23.96 (sd 4.22) set variations II mean 33.78 (sd 8.22)

UNPRETESTED GROUP (n=53)

experimental group (n=28) mean 7.86 (sd 3.76); VAT mean 15.14 (sd 3.67) set variations I mean 24.68 (sd 4.13) set variations II mean 39.32 (sd 13.36) control group (n=25) mean 9.00 (sd 5.47); VAT mean 15.16 (sd 4.30) set variations I mean 23.28 (sd 4.97) set variations II mean 34.12 (sd 11.72).

Means and sd's of LPAD results by group (combined pretested and unpretested):

EXPERIMENTAL GROUP (n=52): organiser (a) mean 8.63 (Sd 4.10), VAT mean 15.06 (sd 3.62) set variations I mean 25.23 (sd3.87) set variations II mean 39.06 (Sd 10.92)

CONTROL GROUP (n=48) organiser (a) 8.71 (sd4.90) VAT mean 14.19 (sd 3.85), set variations I mean 23.60 (sd 4.59), set variations II mean 33.96 (sd10.09). For the whole group (experimental and control groups) set variations yielded a significant difference between groups, f (df=1 &98) = 5.85 at $p<0.05$ otherwise both groups not significant on any other task.

Means and sd's of transfer measures posttest results for pre and unpretested groups:

f score results for difference between experimental and control groups on transfer measures pretests:
N=47, organiser (b) 0.002; similarities 0.426 and RSPM 0.240.

Results on LPAD by group (experimental vs control groups):

PRETESTED GROUP (N=47)
experimental vs control group: organiser (a) ANCOVA 1.560, ANOVA 0.827; VAT ANCOVA 3.868, ANOVA 3.465. set variations I ANCOVA 3.228, ANOVA 2.879; set variations II ANCOVA 5.560* ($p<0.05$) ANOVA 4.741* ($p<0.05$)
unpretested group exp vs control group: ANOVA: organiser (a) 0.800; VAT 0.000, set variations I 1.251 Set variations II 2.247.

f scores for results on the postest transfer measures (exp vs con group)

PRETESTED experimental vs control Organiser (b) ancova 2.117 ANOVA 1.274; similarities ancova 0.380 ANOVA 0.006 RSPM ancova 1.540 ANOVA 1.440.
UNPRETESTED experimental vs control ANOVA: organiser (b) 3.247. similarities 1.475 RSPM 0.543.

f scores for results on posttest transfer measures (pretested vs unpretested)

EXPERIMENTAL pretested vs unpretested: ANOVA - organiser 1.328, similarities (WISC-r) 2.866 and WAIS - 2.592 and Raven's 0.008;
CONTROL pretested vs unpretested: ANOVA - organiser 3.062, similarities (WISC-r) 0.232, WAIS 0.092 and Raven's 0.172.

f scores for results on LPAD by group (pretested and unpretested groups) n=100

EXPERIMENTAL (pretested vs unpretested) ancova organiser (a) 2.232 vat 0.033, set variations I 1.242, variations II 0.035
CONTROL (pretested and unpretested) ANOVA organiser (a) 0.182, vat 3.503, set variations I 0.256 set variations II 0.013

means and sd's of transfer measures posttest results for pretested and unpretested groups:

PRETESTED experimental group (n=24), organiser (b) 10.17 (sd 4.69), similarities (WAIS and WISC averaged) 9.21 (sd 2.48), RSPM (percentile ranks) 76.46 (sd 22.91). Control group (n=23), organiser (b) 8.61 (sd 4.77), similarities (WAIS and WISC averaged) 9.18 9sd 3.72), RSPM (percentile) 72.61 (sd 27.55).
UNPRETESTED experimental group (n=28), organiser (b) 8.57 (sd 5.21), similarities (WAIS and WISC averaged) 8.36 (sd 3.52), RSPM (percentile) 77.14 (sd 26.61), control group (n=25), organiser (b) 11.24 (sd5.57), similarities (WAIS and WISC averaged) 8.94 (sd3.46) RSPM (percentiles) 72.20 (sd 24.37). No significant differences between groups.. Groups were then combined to form only experimental and control groups.

Means and sd's of transfer measures posttest results by group:

EXPERIMENTAL (n=52): organiser (b) 9.31 9sd 4.99), similarities (WAIS and WISC averaged) 8.75 (sd 3.17), RSPM (percentiles) 76.83 (24.73).
CONTROL (n=48), organiser (b) 9.98 (sd 5.32), similarities (WISC) 9.05 (sd 3.56) RSPM (percentile) 72.92 (sd 25.45): hence no significant diff between experimental and control groups.

Means and sd's of pre and posttest transfer measures:

EXPERIMENTAL (n=24) organiser (b) pretest 6 (sd 3.79), organiser (b) posttest 10.17 (sd 4.69), similarities (WAIS) pretest 8.69 (sd2.76), posttest 9.21 (2.48), RSPM (percentiles) pretest 62.71 (sd 27.58) posttest 76.46 (22.91)
CONTROL (n=23): organiser (b) pretest 5.96 (sd 3.34), posttest 8.61 (4.77), similarities (WAIS) pretest 8.56 (3.55), posttest 9.18 (3.72), RSPM (percentiles) pretest 56.96 (sd 25.71) posttest 73.70 (27.10). Hence mediation on the LPAD did not appear to have a significant effect on the posttest transfer measure scores

(21) Only on one of the LPAD tasks, set variations II, was the performance of the experimental group significantly better than the control group.Trends in the expected direction were observed in the remaining tasks, but no significant differences were observed on the comparable measures. The first hypothesis was only partially supported while the second hypothesis did not receive any support
(22) No predictor variables as such; two groups were compared on findings of scores on LPAD and transfer measures
(23) The mediation offered was inadequate. Also a ceiling effect may have resulted in experimental subjects' scores not improving as much as expected.

(1)Zolezzi, S.A.

(2) 1995
(3) The effectiveness of dynamic assessment as an alternative aptitude testing strategy
(4) University of South Africa
(5) Unpublished doctoral thesis
(6) Pretoria
(7) The study sets out to evaluate the effectiveness of a dynamic approach to aptitude testing. It is believed that an alternative testing format could be facilitated by using a test-train-test procedure within a learning potential paradigm by making use of a "Newtest" battery (which consists of two tests given in both traditional and dynamic format) which will be able to identify students (particularly disadvantaged) who have the potential to succeed at university
(8) 50
(9) 2
(10) Mixed design incorporating both within and between-subject designs
(11) Students who were completing their Matriculation and who were prospective first year university students. n=28 female and n=22 male
(12) Age ranged between 16-20 median = 17-18
(13) Dynamic instruments included the Deductive reasoning test (including traditional and dynamic modes of assessments) (DRT/E) and the Pattern relations test (including traditional and dynamic modes of assessments) (PRT/E). Learning potential is operationalised as the differences between pre and post test results on both instruments (LR). Traditional tests included the High level battery (B/75) subtests, Mental Alertness test (MAT), Reading Comprehension (RC), Standard level arithmetic reasoning test (a/131) (AR) and the Raven's matrices (RM). Matriculation results also included as variable (MAT)
(14) As indicated by Feuerstein
(15) Two groups of students: 1992 group (n=18) who were assessed traditionally and the 1993 group (n=32)who were assessed dynamically. Both groups will be compared according to different predictor variables. EXPERIMENTAL group (n=18) 1992, advantaged (n=12) and disadvantaged groups (n=6), predictor variables MAT, MA, RC, AR, RM, DT/T and PR/T. Criterion variables: 1993 BSc marks, BCom and BA. DYNAMIC group (n=32), advantaged (n=22) disadvantaged (n=10), Predictor variables included the DR/E and PR/E, 1994 BSc, BCom and BA

marks. Group administered in groups of 7-8 students throughout the year but actual testing sessions at any one time lasted approximately 2 hours and 10 minutes for the traditional group.Smaller groups of 5-6 students were used for the dynamic sessions.
(16) Matriculation students who were prospective first year students for the 1992 and 1993 intake
(17) For the traditional group the entire testing session took 2-3 hours. For the dynamic group 15-20 minutes were used for mediation but the total testing lasted 3 hours and 45 minutes. Pretesting was followed by a short break then followed by mediation and then posttest
(18) HA1: it can be expected that prediction of university success will be significantly enhanced through a dynamic testing situation as operationalised for the purpose of the present study. HA2: Advantaged and disadvantaged students will have different predictors correlating significantly with the criterion of university success. HA3: no significant relationship exists between current ability and learning potential
(19) Although the procedure was standardised, interaction with subject did occur
(20) Hypothesis HA1:

Means and sd's of traditional test and November exam for the traditional 1992 group include: Matric mean 65.2 (sd11.6), MA mean 27.3 (sd 6.1), RC mean 12 (sd 3.6), AR mean 16.2 (sd 8.7), RM mean 33.1 (sd 3.2), November exam mean 58.1 (sd 8.9), BA mean 55.7 (sd9.9), BCom mean 54.4 (sd 3.9) BSc mean 64 (8.8).

The following traditional predictors and November exam correlations for the traditional group (1992) include : matric and November = 0.70* (sig at p <0.05), MA and November = 0.26, RC and November = 0.41, AR November = -0.20 and RM and November = 0.09.

The following traditional and dynamic measures and November exam correlations for the dynamic group (1993) include: MAT and November = 0.69* (sig at p <0.05), DR/T and November = 0.16, PR/T and November = 0.06, DR/E and November 0.36, PR/E and November 0.14, LP/DR and November 0.21 and LP/PR and November = 0.04.

Means and sd's of dynamic and traditional measures and November results for the dynamic group (1993) include: MAT mean 69.25 (sd 9.8), DR/T mean 22.9 (sd 5.1), PR/T mean 15.6 (sd 5.3), DR/E mean 25.8 (sd5.5), PR/E 22.7 (sd 2.9), LP/DR mean 2.9 (sd5.4), LP/PR mean 7.1 (sd 3.4), November exam mean 64 (sd 8.9), BA mean 64.7 (sd 6.9), B Com mean 58 (sd9) BSc mean 67 (sd 8.9).

LP score for dynamic group (Deductive reasoning enriched minus traditional score) for advantaged students include: mean 1.3 (sd 5.4) and disadvantaged group mean 6.3 (sd 3.8). Pattern relations enriched minus traditional score for advantaged students mean: 7 (sd 3.7) and disadvantaged students mean 7.3 (sd 2.9). However, even though predictability of the traditional test formats are enhanced through dynamic tests it is not significant. Deductive reasoning increases from 0.16-0.36 and pattern relations from 0.06-0.14.

Following are results for each faculty separately:

1992 traditional group BA - correlations between traditional measures and November: MAT- November = 0.76* (sig p<0.05) , MA - November = -0.01, RC-NOV-0.21, AR-NOV = -0.13, RM-NOV 0.09. Correlations between dynamic and traditional measures for the dynamic group 1993: MAT- November 0.48* (sig p<0.05), DR/T-NOV -0.16, PR/T-NOV -0.23, DR/E-NOV -0.19, PR/E-NOV -0.32, LP/DR NOV -0.01 LP/PR NOV -0.15. No correlations were conducted for the traditional group of 1992 for faculties of science and commerce as the groups were too small.

The dynamic group of both the commerce and science students (1993) (for the November exams): MAT -BSc 0.88 and BCom 0.7, DR/T -BSc 0.18 and BCom -0.03, PR/T-BSc -0.02 and BCom 0.12, DR/E - BSc 0.43 and BCom 0.26, PR/E -BSc 0.14 and BCom 0.32, LP/DR-BSc 0.26 and BCom 0.24, LP/PR BSc 0.26 and BCom 0.09. There was a sig increase for the DR/E measure for the BSc group (from 0.18 - 0.43 on the DR/T - DR/E).

Regarding HA2:
The following results will be assessed in terms of two groupings: advantaged and disadvantaged students:

Advantaged: traditional group correlations - MAT-NOV 0.47* (sig p<0.05), MA-NOV 0.21 RC-NOV 0.33 AR-NOV -0.34 RM-NOV 0.29. Dynamic group correlations: MAT-NOV 0.64* (sig p<0.05) , DR/T 0.09 PR/T -0.06, DR/E-NOV 0.27, PR/E -NOV -0.04, LP/DR-NOV 0.21 LP/PR-NOV 0.04. Only the matriculation result was significant for the advantaged group.

Disadvantaged group: traditional group: MAT-NOV 0.76* (sig p<0.05), MA-NOV 0.24, RC-NOV 0.39 AR-NOV -0.64 RM-NOV -0.15. Dynamic group: MAT-NOV 0.86* (sig p<0.05) DR/T -NOV 0.50 PR/T-NOV 0.38, DR/E-NOV 0.66* (sig p<0.05) PR/E-NOV 0.61* (p<0.05) LP/DR-NOV 0.23 LP/PR-NOV 0.04. Only the matriculation result was significant for the traditional group but although matric is still significant for dynamic group so too is DR/E and PR/E for the disadvantaged group.

Means and sd's for the disadvantaged and advantaged groups in the dynamic group 1993:

Advantaged group: DR/E mean 25 (sd 5.9) PR/E mean 22.2 (sd 3.6) LP/DR mean 1.3 (sd 5.4) LP/PR mean 7 (sd 3.7).

Disadvantaged group: DR/E mean 27.7 (sd 4) PR/E mean 23.9 (sd 3.3) LP/DR mean 6.3 (sd 3.8) LP/PR mean 7.3 (sd 2.9). Scores were higher for the disadvantaged group both on enriched and LP measures.

Correlations between traditional and dynamic measures for the advantaged students 1993:

MAT-BA 0.52 & BSc 0.86, DR/T -BA -0.26 & BSc 0.13, PR/T - BA -0.25 & BSc -0.38DR/E - BA -0.21 & BSc 0.33, PR/E-BA -0.27 & BSc -0.08, LP/DR-BA 0.09 & BSc 0.22 LP/PR - BA 0.19 & BSc 0.54.

Correlations between dynamic and November measures for the disadvantaged group 1993:

DR/E-NOV 0.75, PR/E-NOV 0.66, LP/DR-NOV 0.22 LP/PR-NOV -0.11, hence the dynamic measures provide a better prediction of academic success for the disadvantaged students than the traditional tests.

Final grouping of sample into high and low learning potential:

The mean score for the learning potential in the DR/E =1.3 and the PR/E = 7. Those who score above these are high learning potential students and those who score below are low potential students.

(i)Correlations between the dynamic measures and November exams of high learning potential students in the 1993 group:

DR/E-NOV 0.58 PR/E-NOV 0.54 LP/DR-NOV 0.13 LP/PR-NOV -0.65.

(ii)Correlations between the dynamic measures and November exams of low learning potential students in the 1993 group:

DR/E-NOV 0.22 PR/E-NOV -0.01 LP/DR-NOV 0.22 LP/PR-NOV 0.30. Results indicate that that the dynamic tests do distinguish between high and low potential students and that there is a significant correlation between university success for the high learning potential group.

(iii)Correlations between learning potential measure and the traditional ability measures for the full group 1993:

LP/DR-DR/T = -0.46, LP/PR-PR/T = -0.75, this hypothesis is confirmed as there is a negative relationship with LP and current ability.

(21) Traditional measures of aptitude were found to be invalid predictors of university success and matric results showed a relationship with academic success for both groups. The Newtest battery measures enhanced the prediction of academic success for both advantaged and disadvantaged groups. The deductive reasoning dynamic measure was found to be a valid predictor of university success for the disadvantaged students. HA1: correlations between predictor and criteria measures for the whole study MAT(1992 group)-NOV 0.70, MAT (1993 group) -NOV 0.69, DR/E-BSc exams 0.43, DR/E(DR/T 0.16) NOVEMBER 0.36, PR/E (PR/T 0.06)-NOV 0.14, hence there is an improvement but not at a significant level. HA2: advantaged group MAT (1992) - NOVEMBER 0.47, MAT (1993)-NOV 0.64, Disadvantaged students MAT (1992)-NOV 0.76, MAT (1993)-NOV 0.86, DR/E-NOV 0.66 AND BSc 0.75, PR/E-NOV 0.61 and BSC 0.66 thus HA2 confirmed although matric still best predictor for both groups. HA3: DR/T-LP/DR= -0.46 and PR/T-LP/DR = -0.75, hence a negative correlation thus HA3 is confirmed.
(22) The criterion measure included academic success based on the end of first year university success in the faculties of arts (BA), commerce (BCom) and science (BSc). Subject variables included level of educational disadvantage (advantaged and disadvantaged) and predictor variables included (i) traditional instruments such as the High level battery (B/75) subtests such as mental alertness (MA), reading comprehension (RC), arithmetic reasoning test (AR) (a/131) and the Raven's matrices (RM) an school results (MAT), deductive reasoning traditional (DR/T) and pattern relations traditional (PR/T) and (ii) dynamic instruments including the deductive reasoning test enriched (DR/E) and pattern relations enriched test (PR/E)
(23) 85% of the sample were volunteer students that were chosen for the study and is therefore biased in terms of the type of student represented (i.e. in terms of motivation and skill). Sample sizes were small thus limiting the generality of any findings.

(1)Van Aswegen, M.

(2) 1997
(3) The standardisation of a learning potential battery for the selection of poorly qualified employees
(4)University of Pretoria
(5) Unpublished Masters dissertation
(6) Pretoria
(7) The purpose of this study is to evaluate the validity and effectiveness of the Transfer, Automatisation, memory and understanding learning potential battery (TRAM-1) to predict future performance of poorly qualified employees on an accelerated adult development programme (a technical college programme)
(8) 101
(9) 1
(10) Within groups study design
(11) Black males employed by a consolidated mining organisation. Educational levels ranged from std two-std nine (grade four-grade eleven), median std 5 (grade 7). Sample chosen were those who were already on an accelerated programme and were chosen by supervisors based on work quality and performance on the Raven's progressive matrices as well as in-house maths and English tests and lastly performance on a structured interview
(12) Mean age 35.4 (sd 3.99)
(13) The TRAM-1 (nonverbal paper and pencil test) consists of the following: phase A test booklet, phase A dictionary, phase B test booklet, phase B dictionary and memory and understanding test booklet. Dimensions tested include speed of learning, accuracy of learning, transfer of learning, automatisation of learning, memory and understanding as well as a composite test score
(14) As per Tayler's TRAM-1 instructions which advocate standardised group interaction including a test-teach-test format
(15) A non-experimental, predictive validity design to evaluate the criterion related validity of the TRAM-1. Nonprobablity sample (purposive sampling) was used i.e. those subjects already involved in an accelerated programme within the mining company
(16) Disadvantaged black males in the process of improving their academic qualifications within an enriched environment
(17) The complete procedure took one year. The TRAM-1 was administered at the start of developmental programme which lasted for a year. During the administration of the TRAM-1 which takes one hour and 35 minutes, a test-teach-test approach is used
(18) The hypothesis is as follows: The TRAM-1 is a valid predictor of future performance on a development programme aimed at the advanced development of poorly educated employees in the mining industry environment
(19) Standardised group administration making use of a test-teach-test format within testing
(20) Univariate statistics of predictor and criterion variables were conducted. Order of variables: name, mean and sd in brackets, followed by minimum and maximum scores:

PREDICTORS: speed 121.41 (12.99) range 93.8-143.55; accuracy 62.97 (15.91) range 16.46-100; automatisation 99.99 (20.36) range 21.09-151.30; transfer 99.99 (10.62) range 67.57-120.93; composite 50 (9.99) range 27.69-65.25.

CRITERIA (criterion tests were those standardised tests used during in-house evaluations within the mining company): English 63.08 (17.23), range 20-90; mathematics 60.63 (19.05) range 9-98; basic mining 58.43 (19.03) range 21-98; ventilation 58.16 (18.33) range 17-97

IN-HOUSE total scores 60.08 (15.33) range 30-95.75; mining 56.96 (20.62) range 17-99; communication 57.36 (17.52) range 17-90; ventilation 54.92 (20.69) range 30-99; mathematics 51.65 (17.46) range 12-93

COLLEGE TOTAL SCORE 55.18 (15.65) range 23.25-92; maths 56.14 (16.64) range 25-95.5; English/communication 60.22 (15.69), range 24.5-89; mining 57.69 (18.58) range 20-98.5; ventilation 56.54 (17.37) range16.5-98

OVERALL SCORE: 57.63 (14.98) range 26.63-93.68. according to Van Aswegen the TRAM-1 subtests have the following reliabilities: speed of learning 0.81; accuracy of learning 0.83; automatisation 0.78; transfer 0.86 and memory and understanding 0.94 with automatisation being the only one below the Kuder-Richardson reliability of 0.80, and it was also the poorest predictor variable in the study.

Pearson correlations between dependent (in-house and college exams) and independent (TRAM1)variables (0.25* and above is significant at p = 0.05)). In-house MATHS-speed 0.39*; - accuracy 0.46*; - auto 0.19; transfer 0.25*, memory 0.41*; composite scores 0.46*. In-house ENGLISH- speed 0.39*; - accuracy 0.23; - auto 0.06; transfer 0.27*, memory 0.31*; composite scores 0.35*. In-house VENTILATION- speed 0.33*; - accuracy 0.19; - auto 0.08; transfer 0.10, memory 0.33*; composite scores 0.30*. In-house BASIC MINING-speed 0.51*; - accuracy

0.27*; - auto 0.13; transfer 0.29*, memory 0.40*; composite scores 0.44*. In-house TOTAL-speed 0.49*; - accuracy 0.35*; - auto 0.14; transfer 0.27*, memory 0.44*; composite scores 0.47*. COLLEGE MATHS-speed 0.39*; - accuracy 0.43*; - auto 0.18; transfer 0.19, memory 0.45*; composite scores 0.46*. COLLEGE COMMUNICATION-speed 0.42*; - accuracy 0.24; - auto 0.16; transfer 0.34*, memory 0.31*; composite scores 0.39*. COLLEGE VENTILATION -speed 0.36*; - accuracy 0.23; - auto 0.09; transfer 0.26*, memory 0.27*; composite scores 0.33*. COLLEGE MINING-speed 0.36*; - accuracy 0.21; - auto 0.02; transfer 0.30*, memory 0.31*; composite scores 0.33*. COLLEGE TOTAL - speed 0.46*; - accuracy 0.33*; - auto 0.13; transfer 0.33*, memory 0.40*; composite scores 0.45*. COMBINED MATHS TOTAL- speed 0.43*; - accuracy 0.49*; - auto 0.20; transfer 0.25*, memory 0.47*; composite scores 0.51*. COMBINED ENGLISH/COMMNICATION TOTAL-speed 0.45*; - accuracy 0.26*; - auto 0.12; transfer 0.34*, memory 0.34*; composite scores 0.41*. COMBINED VENTILATION-speed 0.39*; - accuracy 0.24; - auto 0.09; transfer 0.21, memory 0.34*; composite scores 0.35*. COMBINED MINING TOTAL-speed 0.46*; - accuracy 0.25*; - auto 0.07; transfer 0.31*, memory 0.38*; composite scores 0.41*. OVERALL CRITERION SCORE-speed 0.49*; - accuracy 0.35*; - auto 0.14; transfer 0.31*, memory 0.43*; composite scores 0.48*. The lack of a significant correlation for automatisation may be due to the nature of automatisation's rote learning as opposed to the other subjects learning for understanding. The composite scores emerged as the factor that correlates the highest with all criterion variables. In sum, the following relationships were identified between predictor variables (TRAM-1) and the total criterion score: speed of learning 0.49; accuracy 0.35, transfer 0.33, memory and understanding 0.43, TRAM-1 composite score 0.45. Evaluation of power of TRAM-1 for predicting performance: only the significant results are given -

Predictive power of speed of learning (percentages indicate variance explained followed by f ratio and p values): in house TOTAL 24.1%, F 31.39, P 0.002; college TOTAL 21.4%, F 26.93, P 0.034, OVERALL CRITERION SCORE 24.2% F 31.69 P 0.036

Predictive power of accuracy of learning: IN HOUSE MATHS 20.8%, F 26.04, P 0.001, COLLEGE AMTHS 20.9%, F 26.23, P 0.004, IN HOUSE TOTAL 14.3%, F 16.55, P 0.001, COLLEGE TOTAL 14.7%, F 17.09, P 0.001, OVERALL CRITERION SCORE 15.5%, F 18.15, P 0.001

Predictive power of automatisation of learning: IN HOUSE VENTILATION 5.8%, F 0.58, P 0.048, COLLEGE VENTILATION 8%, F 0.798, P 0.037

Predictive power of transfer of learning COLLEGE COMMUNICATION 11.6% F 12.95, P 0.005, COLLEGE TOTAL 11.1%, F 12.302, P 0.007, OVERALL CRITERION SCORE 9.8%, F 10.799, P 0.001
Predictive power of memory and understanding IN HOUSE MATHS 16.4% F 19.434, P 0.001 COLLEGE MATHS 20.33% F 25.27, P 0.001, IN HOUSE TOTAL 19.29% F 23.66 P 0.0013, COLLEGE TOTAL 16.22, F 19.166, P 0.0053, OVERALL CRITERION SCORE 18.9%, F 23.08, P 0.0018

Predictive power of TRAM-1 composite score IN HOUSE MATHS 21.57%, F 27.238, P 0.0001, IN HOUSE MINING 19.55%, F 24.061, P 0.0004, COLLEGE MATHS 21.3% F 26.806, P 0.0001, COLLEGE MINING 19.79%, F 12.209, P= 0.0007, IN HOUSE TOTAL 22.06%, F 28.03, P 0.0008, COLLEGE TOTAL 20.69%, F 25.841, P 0.007, OVERALL CRITERION SCORE 22.8%, F 29.276, P 0.0016

Intercorrelations with the TRAM-1 (multicolinearity): speed-accuracy 0.33, speed-auto 0.34, speed-transfer 0.45, speed-memory 0.65, speed-composite 0.76; accuracy-auto 0.25, accuracy-transfer 0.18, accuracy-memory 0.58, accuracy-composite 0.65; auto-transfer 0.36, auto-memory 0.45, auto- composite 0.63; transfer-memory 0.49, transfer-composite 0.66, memory-composite 0.92. Only the memory and TRAM-1 composite were correlated above 0.80. The observed low interrelationships between the independent predictor variables are encouraging as this gives assurance that no two predictors measure the same construct.

Influence of moderating variables:

INFLUENCE OF AGE: relationship between age and dependent and independent variables: only significant (0.25 and above p 0.05) correlations are included. Age and speed of learning -0.26*; age and college maths -0.26*, ventilation and age -0.26*, college total and age -0.26*. All observed correlations were negative

INFLUENCE OF EDUCATION: no significant correlations were found. Regarding the influence of the company there was a difference in scores between those based in city areas vs those in rural areas.
(21) Five of the six TRAM-1 dimensions have high correlations with the employees' performance on the accelerated development course. TRAM-1 is an effective predictor of learning performance of poorly qualified employees. Based on the results, the TRAM-1 is a valid predictor of academic performance on the advanced development course. Order of best predictors: speed of learning, TRAM-1 composite score, memory and understanding, accuracy of learning, transfer of learning, automatisation (which was the poorest), TRAM-1 is also a valid predictor for the in-house course
(22) Independent predictor variable: TRAM1 (speed, accuracy, automatisation, transfer and composite score) (non-verbal paper and pencil test). Dependent validation (criterion) variables: (1) technical college results such as: Maths, English, communication and basic mining (and an average of these four results) (2) in-house results: maths, English, mining ventilation and basic mining, (3) composites on the English and communication results from both the college results and in-house scores and (4) composite overall score combined scores (which was the combination of the in-house and technical college results)
(23) The study could have included additional independent predictor variables as well as increased of sample size and inclusion of females into sample

(1)Engelbrecht, M.

(2) 1999
(3) Leerpotensiaal as voorspeller Van akademiese sukses Van universiteitstudente (Learning potential as predictor of academic success of university students)
(4) Potchefstroom University
(5) Unpublished doctoral thesis
(6) Potchefstroom
(7) The aims of the investigation were to determine whether The Ability, Processing of Information and Learning Battery (APIL) is a good predictor of academic success of first year students; whether the APIL battery is a better predictor of the academic success of first year students than the General Scholastic Aptitude Test Senior (GSAT), and/or the Senior Aptitude Test (SAT), and to determine whether the APIL is a learning potential prediction instrument that provides fair assessment of the potential of learners from different cultures

(8) Two samples were drawn from two different universities: Potchefstroom (Potch) n=656 and Rand Afrikaans University (RAU)[1] n=1200, Total N=1856
(9) Successful (passed and partially passed) and unsuccessful groups
(10) Within-groups designs (i.e. within each group from both universities)
(11) First year university students from a variety of faculties
(12) Not stated thus approximately 18 years
(13) APIL, GSAT and SAT
(14) As per the APIL manual (see Nel, 1997)
(15) A one shot cross sectional design of first year students at two universities
(16) All first year students at Potch and RAU, thus an availability sample
(17) Immediate
(18) Hypotheses as such not stated but rather in the form of questions: is the APIL as a learning potential test a good predictor of academic success for first year students? Is the APIL a better predictor of academic success than the GSAT and SAT? Finally, is the APIL a culturally fair assessment instrument?
(19) As delineated within the APIL manual
(20) For the Potch group no GSAT was used but the following is given for dispersion of marks for the total number of first year students. Order of variables: mark, number, sd, average - mark 1 n=683, sd 13.5 and average 59.56; mark2 n=658, sd 14.38 and average 58.08; mark 3 n=685, sd 14.11 and average 58.12; SAT 1 n=685, sd 4.34 and average 19.37; SAT 2 n=685, sd 6.005 and average 18.13; SAT 3 n=685, sd 6.748 and average 19.641; SAT 4 n=685, sd 3.819 and average 19.998; SAT 5 n=685, sd 6.026 and average 18.441; SAT 6 n=685, sd 6.025 and average 19.34; SAT 7 n=685, sd 6.380 and average 21.45; SAT 8 n=685, sd 5.951 and average 19.85; SAT 9 n=685, sd 4.403 and average 13.272; SAT 10 n=685, sd 6.149 and average 24.75; APIL (CFT) n=668, sd 4.969 and average 21.4; APIL (cl1) n=668, sd 10.831 and average 42.59; APIL (cl2) n=668, sd 21.78 and average 65.714; APIL (cl3) n=667, sd 31.94 and average 86.782; APIL (cl4) n=660, sd 39.884 and average 108.96; APIL (memory) n=668, sd 4.488 and average 17.617.

For the RAU group the GSAT was used and the following is given for dispersion of marks for the total number of first year students. Order of variables, mark, number, sd, average - mark 1 n=1200, sd 13.186 and average 56.45; mark2 n=1198, sd 13.71 and average 56.255; mark 3 n=1215, sd 13.18 and average 55.84; SAT 1 n=1217, sd 3.907 and average 18.871; SAT 2 n=1217, sd 6.739 and average 18.752; SAT 3 n=1217, sd 5.513 and average 19.075; SAT 4 n=1217, sd 4.450 and average 22.692; SAT 5 n=1217, sd 5.939 and average 20.512; SAT 6 n=1217, sd 5.866 and average 20.09; sat 7 n=1217, sd 6.713 and average 18.48; SAT 8 n=1217, sd 5.698 and average 19.453; SAT 9 n=1195, sd 3.765 and average 13.437; SAT 10 n=1195, sd 4.365 and average 26.036; APIL (CFT) n=1217, sd 5.012 and average 22.855; APIL (cl1) n=1217, sd 10.312 and average 47.439; APIL (cl2) n=1217, sd 21.558 and average 72.901; APIL (cl3) n=1217, sd 31.124 and average 96.873; APIL (cl4) n=1217, sd 38.473 and average 118.632; APIL (memory) n=1217, sd 3.941 and average 18.525. GSAT 1 n=1217, sd 2.949 and average 21.0417; GSAT 2 n=1217, sd 3.596 and average 20.259; GSAT 3 n=1217, sd 3.293 and average 20.526; GSAT 4 n=1217, sd 3.074 and average 19.979; GSAT 5 n=1217, sd 2.916 and average 21.691; GSAT 6 n=1217, sd 3.419 and average 19.632; non verbal IQ n=1217, sd 13.698 and average 112.163; verbal IQ n=1217, sd 12.350 and average 110.715; total IQ n=1217, sd 12.905 and average 112.410.

Correlations between the predictor variables and the variety of criterion variables (*=average correlation; ** substantial) (different faculties) for the Potch group:

BA and BA languages n=111for sat and 107 for APIL industrial communication n=53 for SAT and 52 for APIL; BCom and BCom law n=214 for SAT and 211 for APIL; BSc n=46 for SAT and 44 for APIL; BSc biology n= 85; BSc maths n=32; engineering n=63 and HED n=81. Order of variables: BA/BA languages; b industrial, b com/b com law, BSc, BSc biology, BSc maths, b engineering and HED: SAT 1: 0.133, 0.37, 0.169. 0.0059, SAT 2: 0.079, 0.079, 0.211. 0.108, SAT 3: 0.102, 0.230, 0.119, 0.243, SAT 4: 0.150, 0.138, 0.201. -0.155, SAT 5: 0.159, 0.065, 0.249, -0.225, SAT 6: 0.121, 0.133, 0.269, -0.114, SAT 7: -0.019, -0.094, 0.018, -0.120, SAT 8: -0.026, 0.022, 0.077, -0.221, SAT 9: 0.105, 0.285, 0.193, 0.105; SAT 10: -0.012, 0.135, 0.18, 0.023, APIL (CFT), 0.154, 0.011, 0.267, -0.024, APIL (cl1) 0.175, 0.135, 0.154, 0.002, APIL (cl2) 0.146, 0.199, 0.228, -0.116, APIL (cl3) 0.179, 0.143, 0.237, -0.096, APIL (cl4) 0.096, 0.032, 0.23, -0.060, APIL (memory) -0.000, 0.0003, 0.084, -0.055. continuation: BSc biology n=85 for SAT and 84 for APIL, BSc maths n=32 for SAT and 31 for APIL, b engineering n=63 for SAT and n=62 for APIL, HED n=81 for SAT and 77 for APIL

order of variables: BSc biology, BSc maths, b engineering and HED: SAT 1 0.327, 0.573*, 0.382, 0.422*, SAT 2: 0.300, 0.319, 0.325, 0.116, SAT 3: 0.354, 0.452*, 0.298, 0.261, SAT 4: 0.178, 0.357, 0.525*, 0.419*, SAT 5: 0.177, 0.156, 0.348, 0.285, SAT 6: 0.149, 0.332, 0.463*, 0.353, SAT 7: 0.218, 0.179, 0.398, 0.226, SAT 8: 0.133, 0.224, 0.268, 0.159, SAT 9: 0.286, 0.425*, 0.256, 0.487*, SAT 10: 0.248, 0.372, 0.152, 0.333; APIL (cft) 0.214, 0.082, 0.290, 0.337, APIL (cl1) 0.147, -0.048, 0.490*, 0.371, APIL (cl2) 0.360, 0.193, 0.425*, 0.255, APIL (cl3) 0.383, 0.186, 0.477*, 0.232, APIL (cl4) 0.325, 0.247, 0.490*, 0.179, APIL (memory) 0.182, 0.273, 0.389, 0.136

correlations for the total RAU group per faculty order of variables: ba/ba lang n=259 for SAT and 259 for APIL and 259 for GSAT, law n=81 for SAT, 81 for APIL and 81 for GSAT, b com/b com law n=525 for SAT, 525 for APIL and 525 for GSAT, optometry n=38 for SAT, n=38 for APIL and n=38 for GSAT, BSc biology n=45 for SAT, n=45 for APIL and n=45 for GSAT order of variables: ba/ba lang, law, b com/b com law, optometry , BSc biology: SAT 1 0.243, .0288, 0.191, 0.364, 0.212, SAT 2: 0.215, 0.064, 0.145, -0.225, 0.027, SAT 3 0.306, 0.133, 0.134, 0.221, 0.168, SAT 4: 0.165, 0.080, 0.077, -0.059, 0.462*, SAT 5: 0.164, -0.123, 0.145, 0.456*, 0.292, SAT 6: 0.148, 0.030, 0.104, 0.172, 0.161, SAT 7 0.059, -0.066, 0.028, -0.110, 0.138, SAT 8: 0.170, -0.029, -0.017, 0.003, 0.001, SAT 8: 0.170, -0.029, -0.017, 0.003, 0.001 SAT 9: 0.192, 0.085, 0.049, 0.552*, 0.220, SAT 10: 0.215, 0.222, 0.112, 0.465*, 0.331, SAT 10: 0.215, 0.222, 0.112, 0.465*, 0.331, APIL (cft) 0.137, 0.034, 0.149, 0.221, 0.433*, APIL (cl1) 0.156, 0.150, 0.108, 0.104, 0.320, APIL (cl2) 0.134, 0.136, 0.134, 0.282, 0.276, APIL (cl3) 0.136, 0.129, 0.140, 0.164, 0.223 APIL (cl4) 0.178, 0.079, 0.198, 0.256, 0.373, APIL (memory) 0.233, 0.022, 0.153, 0.515*, 0.453* GSAT 1 0.258, 0.052, 0.175, 0.524*, 0.142, GSAT 2: 0.246, 0.154, .0170, 0.314, 0.272, GSAT 3: 0.229, 0.227, 0.257, 0.560*, 0.216, GSAT 4: 0.189, 0.008, 0.132, 0.006, 0.256, GSAT 5: 0.325, 0.114, 0.202, 0.458*, 0.138, GSAT 6: 0.238, 0.006, 0.129, 0.180, 0.121, non verbal IQ: 0.220, 0.026, 0.162, 0.152, 0.387, verbal IQ: 0.315, 0.195, 0.293, 0.581*, 0.374, total IQ: 0.293, 0.122, 0.252, 0.370, 0.416*. BSc maths n=105 for sat, n=106 for APIL n=106 for GSAT, b engineering n=119 for SAT, n=119 for APIL and n=119 for GSAT, nursing n=22 for SAT, n=22 for APIL and n=22 for GSAT, social work n=23 for sat, n=23 for APIL and n=23 for GSAT. order of variables BSc maths, b engineering, nursing, social work: SAT 1 -0.058, 0.068, 0.665**, 0.623** SAT2: 0.138, 0.097, 0.284, 0.632**, SAT 3: 0.045, 0.208, 0.190, 0.474*, SAT 4: 0.301, 0.007, 0.139, 0.542* SAT 5: 0.093, 0.179, 0.184, 0.552*, SAT 6: 0.018, 0.3, 0.4*, 0.677** SAT 7: -0.012, 0.09, 0.194, 0.734**, SAT 8: 0.128, 0.254, 0.419*, 0.580*, SAT 9: -0.031, 0.184, 0.635**, 0.372, SAT 10: 0.00, 0.214, 0.020, 0.451*, APIL (cft) 0.121, 0.277, 0.337, 0.448* APIL (cl1) 0.136, 0.005, 0.249, 0.513* APIL (cl2) 0.009, 0.218, 0.168, 0.405* APIL (cl3) -0.025, 0.205, 0.151, 0.304, APIL (cl4) -0.012, 0.161, 0.115, 0.434*, APIL (memory) -0.033, 0.116, 0.259, 0.385 GSAT 1 0.136, 0.146, 0.323, 0.774** GSAT 2: 0.106, 0.102, 0.603**, 0.678**, GSAT 3: 0.055, 0.139, 0.408*,

[1] This university is now known formally as The University of Johannesburg but was at the time of this primary study known as RAU.

0.694**, GSAT 4: -0.023, 0.099, 0.346, 0.624**, GSAT 5: 0.106, 0.106, 0.450*, 0.652** GSAT 6: -0.021, 0.316, 0.484*, 0.703*, non verbal IQ: 0.034, 0.213, 0.490*, 0.701**, verbal IQ: 0.154, 0.171, 0.339, 0.721**, total IQ: 0.0699, 0.239, 0.450*, 0.728**

Only significant results for a variety of regression analyses will be given:

POTCH sample: r squared = 0.15 delivered by APIL (cft) for the black/Coloured group and the combination between the APIL and SAT delivered the following accounted for variance: 25.4% for the black/Coloured group, 17% b com, 21% BSc maths, 56% engineering, and 34.2% HED

RAU sample: the cft (APIL) r squared 0.054 explained variance for the b engineering. combined variance explained by APIL, SAT and GSAT for ba/ba languages 13.6%, b com/b com law 14.4%, BSc biology 49.9%, b sc maths 14% b eng 21% optometry 58.3%. There are many and varied statistics conducted within Engelbrecht's primary study, many of which are not pertinent to dynamic assessment per se. Only the above have to do with the predictive validity of the APIL

(21) The results of the investigation indicate that the various subtests of the APIL do not contribute significantly to the declared variance in the academic achievement of first year students. There is so much unexplained variance that the combination of these variables should only be used with great circumspection in predicting the academic achievement of first year students at Potch and RAU. Furthermore, the APIL cannot be considered as a fair assessment of potential of learners from different cultures. On the basis of the results of the regressions, there are no significant tendencies in terms of prediction of academic success of the two universities. In sum the combined APIL, SAT and GSAT account for 17% of variance for the Potch BCom, 56.2% for the Potch BSc maths, and 13.6% RAU BA/BA languages and 58.3% optometry
(22) Criterion variable: first year university results and predictors: GSAT, APIL and SAT
(23) Only cognitive tools were made use of whereas non-cognitive assessment may have added more comprehensive findings to the study

(1)Van Eeden, R., De Beer, M. & Coetzee, C.H.

(2) 2001
(3) Cognitive ability, learning potential and personality traits as predictors of academic achievement by engineering and other science and technology students
(4) South African Journal of Higher Education (University of South Africa)
(5) VOL 15 (1), 171-179
(6) Pretoria
(7) The aim of the study was to evaluate a battery of tests to be used as part of the process of selecting first year disadvantaged students for engineering and other science and technology courses at a Technikon in Natal and included in this battery is a dynamic assessment tool
(8) 224
(9) 1
(10) Within groups design
(11) First year students at a Technikon; majority were black and/or Indian with 58% male and 42% female
(12) Average age = 20
(13)The Learning Potential Computerised Adaptive Test (LPCAT), General Scholastic Aptitude Test Senior (GSAT), Senior Aptitude Test (SAT), Sixteen Personality Factor Questionnaire (16PF)
(14) As per the LPCAT manual. A computerised form of mediation (no human mediation)
(15) One sample group, as this study was merely evaluating certain tests for the selection of students
(16) First year Technikon students
(17) Immediate
(18) No hypothesis as such; merely establishing whether a set of tests will predict academic success
(19) LPCAT mediation: computerised adaptive testing using item response theory (IRT)
(20) Correlations between predictor variables with first year performance (**= sig 0.01& *=sig 0.05): LPCAT pretest and first year results (n=119) = 0.18; LPCAT posttest and first year results (n=119) = 0.13; GSAT verbal and first year results (n=119) = 0.30**; GSAT nonverbal and first year results (n=119) = 0.14; GSAT full and first year results (n=119) = 0.24**; SAT calculations and first year results (n=145) = 0.21*; SAT spatial 3D and first year results (n=151) = 0.18*; SAT mechanical insight and first year results (n=153) = 0.10; maths and first year results (n=144) = 0.25**; science and first year results (n=140) = 0.28**;English and first year results (n=149) = 0.33**.
(21) The posttest scores of the LPCAT did not seem to predict academic success; school achievement was the best cognitive predictor of average first year performance
(22) Predictor variables included school marks for science, English and maths as well as SAT , GSAT and LPCAT scores. Criterion variables included: Technikon year marks and exam results of students
(23) Possible restriction of range due to the nature of volunteer students

(1)Lloyd, F. & Pidgeon, D.A**.

(2) 1961
(3) An investigation into the effects of coaching on non-verbal test material with European, Indian and African children
(4) British Journal of Educational Psychology
(5) VOL 31(2), 145-151
(6) Conducted in South Africa - Natal
(7) To compare the performance of children from different cultural groups on non-verbal tests, half the children were coached and the other half were not
(8) 900 (300 each for Indian, black and white)
(9) 2
(10) Mixed design, both within and between-groups design
(11) Primary school children - heterogeneous mix
(12) Age ranged between 10.6 - 12.6
(13) Non-verbal tests 1 and 2 of the National Foundation for Educational Research
(14) Coaching was used to make sure the children understood what was expected of them
(15) Pretest, mediation and posttest design. As two non-verbal tests were used, the experimental and control groups were themselves divided into two groups in order to ensure that the order of tests did not make a significant difference
(16) School children. The authors claim that both the Indian and European groups were fairly representative of a good cross-section of the socio-economic spectrum whereas the African group was more homogenous in terms of this spread
(17) Two sessions of coaching were included: one week between writing the pretest and then coaching (coaching lasted 30 minutes) and then a week later a second session of coaching before the posttest

(18) No hypothesis was stated but the emphasis was placed on investigating the differences between three groupings of children from different backgrounds
(19) Coaching sessions of 30 minutes to see if what was asked was understood
(20) It must be kept in mind that this study was conducted in 1961 and as such complete reporting of figures is not always satisfactorily delineated. Note also that group labels are those used by the authors in the primary paper

Means and sd's of initial and final test scores for experimental and control groups:

EUROPEANS - experimental group: (n=143) pretest 105.06(sd 10.45) and posttest 115.66(sd 12.85) control group: (n=133) pretest 101.34 (Sd 12) and posttest 108.73 (sd 12.6), experimental minus control group pretest = 3.72 and experimental minus control group posttest = 6.93

AFRICANS - experimental group: (n=136) pretest 88.75 (sd 8.15) and posttest 103.30 (sd 9.65) control group: (n=139) pretest 84.75 (Sd 6.80) and posttest 91.70 (sd 9.9), experimental minus control group pretest = 4 and experimental minus control group posttest = 11.6

INDIANS - experimental group: (n=133) pretest 86.40 (sd 7.45) and posttest 92.5 (sd 11.45) control group: (n=133) pretest 87.3 (Sd 10.7) and posttest 92.95 (sd 11.15), experimental minus control group pretest = -0.9 and experimental minus control group posttest = -0.45.

Gains made by the different groups:

EUROPEAN: experimental gain of 10.60 and control gain of 7.39 net gain (experimental - control) = 3.21*(sig p=0.05)

AFRICAN: experimental gain of 14.55 and control gain of 6.95 net gain (experimental - control) = 7.60* (sig p=0.05)

INDIAN: experimental gain of 6.10 and control gain of 5.65 net gain (experimental - control) = 0.45.
(21) Practice effect was similar in all experimental groups, but coaching differs significantly for each group.The superiority of the African children over the Europeans in responding to coaching together with the inability of the Indians to gain any benefit at all demonstrates clearly that the non verbal tests are far from being culture free
(22) Independent variable: performance on the pretest, dependent variable: performance on the posttest
(23) In some instances no reporting of t-test values for significant findings

(1)Skuy, M., Zolezzi, S., Mentis, M., Fridjhon, P.& Cockroft, K.

(2) 1996
(3) Selection of advantaged and disadvantaged South African students for university admission
(4) South African Journal of Higher Education (University of the Witwatersrand)
(5) VOL 10(1), 110-118
(6) Johannesburg
(7) This study aimed to explore the relative value of various predictors for advantaged and disadvantaged students
(8) 26
(9) One
(10) Within groups design
(11) Students enrolled in the pre-university bursary scheme (PBS) at the University of the Witwatersrand in 1991 within the faculty of Commerce. 54% male and 46% female. Advantaged students = 8 and disadvantaged students = 18
(12) Age ranged between 17-25 mean 21.9
(13) Static measures included the Biographical questionnaire (BQ), Interview measure (IM), mental alertness test (MAT), pattern relations test - traditional (PRT/T) and matriculation marks (MATRIC). Dynamic measures included the Pattern relations test-enriched (PRT/E), learning process measure (LSP), study process questionnaire (SPQ) and the learning and studies strategies inventory (LASSI). Criterion measures included the results of the mid-year university exams in accounting, maths, stats and business
(14) Feuersteinian mediated learning experience (MLE)
(15) Group administered
(16) First year university students both advantaged and disadvantaged
(17) Immediate (but the whole testing scenario took two days)
(18) None as such - exploring the value of new potential predictors
(19) Interaction between tester and testee and subject/learner which revolves around the meaning, applications and cognitive strategies underlying the tasks and carried out in terms of the principles of MLE
(20) Correlations of predictors and criterion variables for whole sample

(* P<0.05; ** P<0.005) and N=26: LSP-Maths 0.56**; LSP - JUNE 0.40*; LASSI-STATS 0.45*, SPQ (4) - BUSINESS STUDIES 0.42*, SPQ (b8) - business studies 0.43*, PRT/T - accounting 0.38*.

Correlations between predictors and criterion variables for the advantaged students only

(* p<0.01, ** p<0.01(??) ***p<0.005, **** p<0.0001) n=8, : IQ (MAT- BUSINESS 0.92****; LSP- maths 0.90***; MAT (Surface approach b7) - stats 0.95****;MAT (surface approach b7) - June average 0.88***; MAT (surface motive b1) -business studies 0.86***, IQ (Mat) -June average 0.75*; BQ - stats 0.75*, LSP- June average 0.72*; MAT (attitude 1) -business studies 0.81**, MAT (attitude 1) - accounting 0.76*; MAT (attitude 1) - June average 0.80**, MAT (surface approach b7) -accounting 0.82**; MAT (surface approach b7) - business studies 0.76* . The only significant correlation for the disadvantaged students was one subscale of the SPQ

(21) As expected the matric results did not predict for either the advantaged nor disadvantaged students, process measures also did not predict well (there was no correlation between PRT/E and criterion variables)
(22) Predictor variables (independent) static and dynamic tests - static: biographical questionnaire (BQ), Interview measure (IM), mental alertness test (MAT), pattern relations test - traditional (PRT/T) and matriculations marks (MATRIC). Dynamic measures - Pattern relations test - enriched (PRT/E), learning process measure (LSP), study process questionnaire (SPQ) and the learning and studies strategies inventory (LASSI) criterion variables: results of the mid-year university exams in accounting, maths, stats and business
(23) Small sample size restricted any generalisability of the results

(1)Lopes, A. , Roodt, G. & Mauer, R.
(2) 2001
(3) The predictive validity of the APIL-B in a financial institution
(4) Journal of industrial psychology

(5) VOL 27(1), 61-69
(6) Pretoria
(7) The purpose of this study was to assess the predictive validity of the APIL test battery in a financial institution
(8) 235
(9) 1 (but further sub-divided into four)
(10) One sample group
(11) Job applicants' education ranged from standard seven (grade nine) - postgraduate
(12) Age ranged between 16-58
(13) The Ability, Processing of Information and Learning Battery (APIL-B)
(14) Within the test as prescribed by the AIPL-B manual. The authors do not explicitly state the type and manner of mediation used in their study but it is assumed that mediation takes place as this is a dynamic assessment instrument which used the posttest and pretest scores as indications of learning potential. Repeated exposure and instruction formed part of the administration of the dynamic sub-tests within the APIL-B, namely the Curve of Learning total (COL TOT) and Curve of Learning Difference (COL DIFF) and Memory (MEM)
(15) Group administered
(16) Successful job applicants at a large insurance company. 72 male and 162 female
(17) Immediate
(18) The APIL-B should be able to provide a more fair and accurate prediction of success on the job
(19) Repeated exposure and instruction
(20) Raw data from the six subtests of the APIL-B were available for a final sample of 235 subjects. The standard deviation and means of these raw scores were calculated and converted to z scores to facilitate comparisons. Subtests used within the APIL-B: curve of learning score (COL) is divided into two scores namely COL tot and COL diff and they are assigned half a weight, CFT (concept formation task), speed, accuracy and flexibility are static scores whilst COL and memory and knowledge transfer (KTT) are dynamic scores.

Means and sd's for ethnic groups on predictor scores (using z scores):

AFRICAN: CFT mean -0.88 (sd0.92), speed -1.13(sd0.84), accuracy -0.41 (sd0.37), flexibility -0.93(0.67), COL tot -0.52(0.32), COL diff -0.43 (0.29), memory -1.06(0.89)

INDIAN: CFT mean -0.05 (sd0.96), speed 0.09(sd0.81), accuracy 0.04 (sd0.38), flex -0.02(0.78), COL tot -0.03(0.38), COL diff -0.01 (0.45), memory (20)0.11(0.86)

COLOURED: CFT mean -0.33 (sd0.80), speed -0.3(sd0.78), accuracy -0.11 (sd0.28), flexibility -0.39(0.73), COL tot -0.16(0.34), COL diff -0.16 (0.37), memory -0.15(0.77)

WHITE: CFT mean 0.45 (sd0.82), speed 0.53(sd0.75), accuracy 0.19 (sd0.33), flexibility 0.52(0.93), COL tot 0.28(0.45), COL diff 0.23 (0.49), memory 0.44(0.82)

The predictive validity of the test was assessed by using a canonical discriminant analysis procedure and tests of equality of group means, however only the classification results are included here:

Original rating count (1-5) and predicted group membership, ratings 1-3 referred to as ''poor to average'' and ratings 4-5 referred to as ''good to excellent''. 66.7% of sample correctly classified in rating 1; 36.4% correctly classified in rating 2; 21.2% correctly classified in rating 3; 39.1% correctly classified in rating 4 and 62.9% correctly classified in rating 5. in sum, 36.6% of cases were correctly classified

(21) Although the APIL-B minimises any role that cultural variables play, the black group still scored lower in comparison to other groups. What has been shown is that despite concerns relating to the reliability of the criterion, the APIL-B is able to predict performance of employees in a financial institution
(22) Criterion variable included the manager ratings on a five point scale; the predictor variable: APIL-B
(23) If white and black testees were matched for language skill differences on the cognitive test may have disappeared

(1)Nunns, C. & Ortlepp, K.

(2) 1994
(3) Exploring predictors of academic success in psychology 1 at WITS university as an important component of fair student selection
(4) South African journal of psychology
(5) VOL 24 (4), 201-208
(6) Johannesburg
(7) The aim of the study is to explore empirical predictors of students' performance in the psychology 1 course at the university of the Witwatersrand and is comprised of two studies: (1) an archival study and (2) a predictive validity study involving the Arts faculty rating programme
(8) Sample size for first archival study = 1101 of whom advantaged n= 1048 and disadvantaged n=53. For second study: N=133 of whom advantaged n = 107 and disadvantaged students n=26
(9) 2 groups each in both studies
(10) Between groups design
(11) First year university students who came from educationally advantaged as well as educationally disadvantaged schooling backgrounds
(12) For first study not stated therefore approximately 18. For second study, the advantaged students average age 18.25 and disadvantaged students average age 23.6.
(13) In the second predictive study: the Conceptual reasoning test (CRT); mental alertness test (MA), reading comprehension (RC) was used
(14) Incorporated within the CRT but the learning potential measure used within the test if not explicitly stated in the primary study
(15) Two separate studies: (1) an archival study in which information is gathered on first year arts faculty students registered for psychology 1 over five years (from the university records), this period was chosen to attempt to establish whether past academic performance would predict subsequent academic performance and (2) predictive study assessing the validity of the arts faculty ratings as well as various psychometric instruments
(16) First year advantaged and disadvantaged students
(17) Immediate
(18) Investigating new predictors of academic success making use of a dynamic assessment instrument
(19) The CRT is said to assess potential which is presumably incorporated into the test
(20) Archival study:

The arts faculty rating, English, Afrikaans, biology, science, history and accounting correlated significantly (at the 0.01 level) with psychology 1 across all five years. But for the disadvantaged group, only the arts faculty ratings programme was significant (also at 0.01)

Predictive study: correlations were conducted for the faculty ratings and other test scores with psychology 1 scores. For the advantaged group the arts faculty rating correlated (r=0.58 at p<0.0001 with psychology1. The CRT also sig 0.44 at p< 0.0001, also MA 0.37 at p< 0.000; RC 0.31 at p< 0.001. However for the disadvantaged group: only the CRT was sig at 0.48 p< 0.01

(21) The CRT at least predicts for the disadvantaged group in terms of psychology 1 performance and is significant as the test assesses potential and this measure is also independent of matric results. The more traditional marks (matric and university marks) predict for the advantaged group
(22) For this archival study data comprised biographical information, matric results, matric average and university academic record
(23) Small sample sizes used for the disadvantaged group

(1)Shochet, I.M.

(2) 1994
(3) The moderator effect of cognitive modifiability on a traditional undergraduate admissions test for disadvantaged black students in South Africa
(4) South African journal of psychology
(5) VOL 24(4), 208-215
(6) Johannesburg
(7) In this study, a measure of students' cognitive modifiability, assessed by means of an interactive assessment model was added as a moderator of the traditional intellectual assessment in predicting first year university success
(8) 52
(9) 1 (further subdivided into two)
(10) Both within and between-groups design
(11) First year university students
(12) Not stated approximately 18 years
(13) The traditional intellectual predictor: Deductive reasoning test used in static and dynamic form (DRT); moderator variable - cognitive modifiability (CM): to assess modifiability students were administered two conventional cognitive measures which yielded their baseline functioning, after which coaching was given followed by another test. Gain scores made after the mediation were added together to yield a cumulative gain score known as cognitive modifiability. Pattern relations tests (PRT) used in traditional and dynamic form
(14) Coaching on tasks which mediated the necessary cognitive strategies needed to complete the tasks
(15) Group administered
(16) First year university students
(17) 20 minute break between baseline measure and mediation on both the DRT and PRT
(18) Learning potential tests will yield better predictors of academic success for disadvantaged students
(19) As prescribed by Feuerstein
(20) t test for paired differences for dependent samples used to compare the difference in scores between the traditional and dynamic administrations for both the DRT and the PRT. The DRT had a gain of 4.23 (t=6.62) and PRT 5.19 (t=7.78), thus the mean cognitive modifiability scores was 9.42.

Hierarchical moderated multiple regression to determine if cognitive modifiability (CM) moderates DRT for disadvantaged students (N=49). Step 1: criteria are credits: predictor variable entered is DRT: beta 0.25, t 1.77, sig t 0.0820, multiple r 0.25, f= 2.02 sig f 0.0820; and average: predictor entered is DRT: beta 0.26, t 1.85, sig t 0.0702, multiple r 0.26, f= 3.43 sig f 0.0702. step 2: adding CM: criteria are credits: predictor variable entered is DRT: beta 0.28, t 1.93 sig t 0.0594, cm: beat -0.16, t -1.13, sig t 0.2653 multiple r 0.30, f= 2.22 sig f 0.1197; f change step 1 to step 2 = 1.27 sig f change 0.2653. average: predictor DRT: beta 0.29, t 2.07sig t 0.0402* (P<0.05), cm: beta -0.20, t -1.43, sig t 0.1600 multiple r 0.33, f= 2.77 sig f 0.0729; f change step 1 to step 2 = 2.04 sig f change 0.1600. step 3: adding CM X DRT: criteria are credits: predictor variable entered is DRT: beta 0.77, t 3.34 sig t 0.0017* cm: beta 0.70, t 1.98, sig t 0.0539 CM X DRT beta -1.10, t -2.63, sig t 0.0115* multiple r 0.46, f= 3.99 sig f 0.0133*; f change step 2 to step 3 = 6.93 sig f change 0.0115*. average: predictor DRT: beta 0.62, t 2.65sig t 0.0112* (P<0.05), cm: beta 0.38, t 1.05, sig t 0.2981; CM X DRT beta -0.75, t -1.74, sig t 0.0889 multiple r 0.40, f= 2.94 sig f 0.0432*; f change step 2 to step 3 = 3.02 sig f change 0.0889.

Correlations between DRT and the criteria for the more and less modifiable disadvantaged students sub-grouped on the CM score: less modifiable (n=26) 0.59** (0.01) for DRT X credits and 0.61** (0.01) for DRT X average; more modifiable (n=23) 0.00 and 0.02 for the above (note less modifiable means that higher baselines were achieved)

(21) Cognitive modifiability significantly moderated the predictive validity of the traditional intellectual assessment for the sample i.e. the higher the level of modifiability, the less effective were traditional measures for predicting academic success. Modifiability serves as a moderator between the DRT and academic success for disadvantaged students. Less modifiable students (those with higher baseline scores) were shown to have significant correlations with the static tests as opposed to the more modifiable students (those with lower baseline scores)

(22) Criterion measures: end year academic results - namely (1) number of credits obtained ranging from 0-4 and average percentage achieved at the end of the first year. Predictor variables: both the static and dynamic forms of the DRT and PRT
(23) Small sample size used which limited generalisability

Appendix 2 Content analysis of returned questionnaires

1. Introduction

Appendix 2 details the content analysis of eleven completed and useable questionnaires that were originally emailed to one hundred dynamic assessment researchers and practitioners across the globe. Follow-up emails were sent via internet four months later to invite further responses as well as to invite responses from those who had initially accepted participation. The covering letter is shown followed by the questionnaire that was sent. A brief introduction to content analysis is given which fleetingly focuses on issues of reliability and validity, qualitative and quantitative content analysis as well as manifest and latent meaning within analysed text. The method of content then follows and details the coding of the content, the process involved and the coding frame utilised. The next section looks at the results of the analysis by summarising the responses and extracting themes and then coding the extracted themes followed by a brief excursion into what was not mentioned in the responses as further source of information. This appendix concludes with a discussion of the content analysis. The questionnaire which was sent to researchers and practitioners will now be discussed.

1.1 Questionnaire

One hundred questionnaires were emailed to dynamic assessment/learning potential practitioners across the globe. Contact details were obtained from published books and articles as well as web pages on the internet. Of the original one hundred respondents to whom the questionnaire was sent, thirty-one initial responses were received, of which eight practitioners kindly refrained from answering due mainly to two reasons: lack of time and unfamiliarity with the field (those who had made contributions to the field were no longer active within this area). Follow-up emails were sent to practitioners who had originally expressed interest in the study. Eleven completed questionnaires were returned and the final analysis was conducted on these eleven contributions. Of the eleven respondents two indicated their choice of anonymity. Seven respondents (over and above the eleven respondents who completed the questionnaire) indicated their interest in completing the questionnaire but these were unfortunately never received. As only eleven questionnaires were returned as well as the fact that most responses were quite short (less than five sentences on average per question) this technique was considered most suitable for a thematic analysis.

Of the hundred contacts to whom questionnaires were sent, only four were South African researchers, only one of whom initially responded to the email request for participation but failed to return a completed questionnaire. It is perhaps telling of South African dynamic assessment research then, that if this method of assessment is to find itself more firmly ensconced within the broader field of assessment, more care needs to be taken in theoretical issues surrounding the method especially within the South African context. Why is it that, during much of the research pertaining to dynamic assessment in South Africa, it is the international community which seems more interested in the goings-on in the local context or at least more willing to participate in research? A curiosity not evident from local researchers. It is conjectured that had the author formed more personal contacts with those on the list of potential contacts that a greater number of respondents would have a participated but as 96% of the contacts emanated from overseas this proved difficult.

That the content analysis of the questionnaires appears as an addendum to this study attests to the small role this section plays within this larger theoretical study and is possibly an avenue for further research. Had the sample been larger it is assumed that a more balanced view would have been expressed and as the current analysis stands it may well be one-sided and thus biased. The eleven completed questionnaires were completed and returned within just over one month which in itself is informative of the nature of the sample. Perhaps the views expressed are similar due to the similar nature of the sample. These are of course mere speculations. No major conclusions can thus be drawn from this analysis due to the sample size, although on its own, salient themes do emerge. At times the answers to some questions did not really address the question as posed but due to the nature of the lengthly questions it is understandable that some answers might not have answered what was asked. In the analysis, answers given under each question are kept as such even though it may be construed as ill-fitting to the question posed. The covering letter and questionnaire is available below as are the results of the content analysis of the returned questionnaires which is preceded by a brief exposition of content analysis.

The covering letter was as follows:

Dear Professor/Dr

My name is Raegan Murphy and I am currently exploring a number of aspects within the field of dynamic assessment for my PhD, at the University of Pretoria, South Africa. However, it would not be complete without your views on certain aspects pertaining to a few issues. I realise time is of great importance to you, but I would be greatly honoured if you would kindly consider looking at the attached document. It would be exceedingly generous of you if you were to answer the few questions as you see fit as this will greatly enhance my discussion of the topic.

If you have any queries regarding the document (MS word 2000) or if you experience any difficulty in opening it, please do not hesitate to contact me. Further details are included in the document.

I trust the questions will not take up too much of your time.

In the event that I am unsure and although unlikely at this stage I might, if necessary, email you to seek further clarification to your answers.

Many thanks in anticipation for your assistance.
Sincerely

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The questionnaire was as follows:

The theoretical underpinnings and fundamental assumptions within dynamic assessment

Good day and thank you for opening up this document! The following brief questionnaire seeks to understand more fully the underlying affinities that your particular theoretical rendition of dynamic assessment encapsulates within the broader field of intelligence and change assessment. As part of my theoretical doctoral study, philosophical underpinnings as well as a myriad other issues pertaining to this sub-field within the intelligence arena are of particular interest to me and although disagreements may be rife within certain areas in dynamic assessment, the aim of the questionnaire is not to further incite argumentation but to enlighten the field as to its current and future directions within the discipline of psychology. This undertaking is more modest than is presented here! I am not aiming to make major structural changes within the field, but to perhaps stress and highlight certain issues which in my opinion are either missing or over-emphasised.

Any and all written communication within this document will be strictly cited as personal communications as on the day of delivery and any possible error in interpretation will be attributed to me alone. I hope that you will find the questions quick and easy to answer even though such an area of investigation is inherently difficult to summarise and cognisance is taken of this. If you have any queries at all about answering these questions or feel that they should be otherwise stated, please do not hesitate to communicate this to me, Ms Raegan Murphy at: raegan@mweb.co.za , tel. +27 12 386 9298. My supervisor is Professor DJF Maree at the University of Pretoria, South Africa and Professor Maree can be contacted at david.maree@up.ac.za , tel. +27 12 420 2916. If you prefer to remain anonymous yet have your views aired, please indicate this with an X in your chosen box and your replies will be treated anonymously.

I would prefer to remain anonymous ☐

I do not mind being cited by name ☐

There are eight (8) questions in total, one per page, please scroll down for question 1. Details are given after question 8.

(a text box has been provided, if there is not enough space please merely expand the text box as you see fit and simply enter the text down as it suits you).[1]

Kindly note that each question is preceded by a statement reflecting the focus of that particular question.

Question 1 – The status of your particular view of dynamic assessment within intelligence assessment

What would you consider to be the nature of your view of dynamic assessment? Do you consider it to be a conceptual scheme, model or theory? (taking cognisance of the differences inherent within these various modes of views). Some may consider their views as merely tentative schemes whereas others may perceive their ideas to be fully-fledged theoretical stances hence moulding and structuring their practical endeavours accordingly.

Question 2 - Philosophical bent or underpinning of your theoretical take on dynamic assessment

Deeply entrenched within any idea/model/theory or simply a view on life, are allied philosophical understandings of how things ought to work. Whether tacitly supporting this notion or taking a dislike to its deterministic way of looking at the world, makes no difference for the moment. On each of the following views or issues listed below, what are your ideas concerning dynamic assessment within the broader field of intelligence assessment? For instance, based on your views concerning mind/brain, it may be that in downplaying the role of neuroscience, one concentrates on the behavioural level only, thus hypothesising that behaviour is indeed malleable at a level not synonymous with neural architecture (or at any other level). This will of course play out in your fundamental beliefs and hence theory(ies) behind your views on dynamic assessment.

- *On nature and nurture*: From nativists, empiricists to selectionists (how the brain/mind develops along purely genetic lines to environmental impingements),
- *On mind/brain*: from Cartesian dualism to succinct mind/brain identity theory,
- *On agendas*: from pragmatic to Socratic ideas as to the role of your view and the resulting influences in practice and on the 'science' of the field[2]
- *On historicity*: the direct/indirect (or total lack thereof) impact of historicity within the current understandings within intelligence assessment (how varied and indeed colourful is dynamic assessment's historical and geographical vistas!)

Question 3 – Your developmental model followed or model most adhered to within the field of child development/educational development as well as adult growth and maturation

Which developmental model within child/adult development and maturation do you most closely follow when working within dynamic assessment?

For instance, biologically driven theories of development, environmentally aligned theories of development and theories which challenge both extremes by meeting midway are offered as tentative guides as to how you might want to answer this particular question. Any well-known theory may equally be appended with the prefix of ''neo'' seeing as older theories are or will have to be continually assessed in terms of their fundamentals (neo-Piagetian, neo-Vygotskian, neo-anything you think would be appropriate here). Any inclusive model be it ethologically driven, social-learning theory driven or information-processing driven as well as any hybrid theories on the horizon can be utilised to explain your thoughts.

Question 4 - The ensconcement of your theoretical take on dynamic assessment within the broader fields of intelligence assessment

Where do you think your view/theory of dynamic assessment should be placed within the broader framework of intelligence assessment? Factors to consider when answering this question include (but is not an exhaustive list, you may add more factors which you find important):

- The intelligence models you most closely follow when placing your dynamic assessment view within it
- Your views concerning dynamic assessment and intelligence; are they divorced from any such particular intelligence model or are they firmly embedded within two or more models?
- Your views concerning dynamic assessment and your chosen model(s) of intelligence: are they linked in anyway or do you perceive them to be ill-at-ease conceptually?

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[1] The text boxes have been removed in order to conserve space in the thesis.

[2] I use 'science' here very cautiously, as I do not want to bog this particular question down in the philosophy surrounding what is and is not construed as science within the behavioural and social sciences, although this is addressed in the dissertation.

- Your views on dynamic assessment and how they fit in within the various competing views of intelligence. Where would you place your views? For instance, you might classify your views as nesting within a psychometric model itself housed within an intelligence model. The tenets inherent within a psychometric view as well as those inherent within your chosen model of intelligence will impinge on your view of dynamic assessment

Question 5 - The affinities your particular theory of dynamic assessment has with aligned fields of neuroscience, neuropsychology and computational intelligence

Current findings in the popular science and psychology literature as well as the increasing findings within academic literature (or at least the reporting of such findings) at times leads one to conclude that this new century could well be cited as the century of the ''physical'' (brain, genes, proteins etc).

Keeping this in mind, consider the following:

- How have these fields of enquiry been built into your view/model/theory of dynamic assessment within intelligence research?
- Do you think such findings should/should not play a role in further defining how your view should or should not be adapted? If yes, how do you think this should proceed?

Question 6 - The historical development of this sub-field of enquiry and its potential future within the realm of psychology (itself moving towards a more integrated field comprising natural science and behavioural sciences methodologies)

Having emanated from a natural philosophical background, allied to the natural sciences, finding favour with various movements within psychology through the century and having traversed a large field of enquiry, psychology and in particular intelligence (and dynamic assessment) is the proud bearer of a rich history, albeit a brief one.

Will dynamic assessment as a movement/model/theory simply die a death due to various factors or, will it in your opinion, forge ahead making strides unbeknownst to practitioners today?

Humans are not terribly successful in determining what will and will not make an impact, even though an impact may not be construed as such for a long time to come. On the other hand, pursuing avenues with no definitive profit in terms of theory development may hinder development in other realms with resources better spent in these other realms.

- What are your thoughts on this matter?

Question 7 - The quantitative imperative

The role of statistics within psychology has been questioned and even criticised (the APA's Task Force on Statistical Inference, 1996) and the works of Joel Michell and others give a voice to the critical philosophy of mathematics and measurement within the social sciences. Would this perhaps add fuel to the fire as far as your view on dynamic assessment within intelligence is concerned or would this add support and buffer your views in terms of how dynamic assessment and intelligence should in fact proceed?

Question 8 - The meta-theoretical solution or pie in the sky

Some regard meta-theories as too reductionistic and their practitioners as naïve in attempting to simplify too complex an area of research within intelligence research. What potential lies within such an endeavour for dynamic assessment in your opinion? Would it help to stabilise the field or merely contribute towards confusion?

Due thanks is hereby extended to you for your willingness to take the time to answer these questions! I understand the time limitations under which we all work these days. Once again, it is reiterated that any and all interpretation of your answers to my queries will be understood to be mine alone, although clarification may be sought if it is considered that such interpretations may have the potential to be misconstrued. As soon as the study is completed I will notify you via email as to the URL needed to access the document should you so wish.

Kind regards,
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Sunnyside
0132
South Africa

1.2. Brief introduction to content analysis

In order to objectively analyse the narrative content within the questionnaires, content analysis as a chosen qualitative technique was decided upon, although it typically employs quantitative techniques as well (Carney, 1972; Holsti, 1969; Lindkvist, 1981; Weber, 1986). Various definitions have been delineated throughout the nineteenth and twentieth centuries of what exactly content analysis is. Classical content analysis was already being practised by German classicists in the nineteenth century albeit in a less rigorous fashion that is current today (Carney, 1972) and was utilised on Swedish material as far back as the eighteenth century (Krippendorff, 1980; Rosengren, 1981). It has as primary roots journalistic ventures into the analyses of newspapers (Payne & Payne, 2004). Interestingly enough Carney draws an apt analogy (seeing as this study deals with dynamic assessment and intelligence) by comparing what the first World War did for intelligence assessment to that of the influence of second World War on the use and development of content analysis – pertaining here to propaganda and its requisite use in military intelligence (Andrén, 1981; Carney, 1972; Krippendorff, 1980). Sociology, anthropology, psychology and communications studies later became users of this approach to textual analyses.

An all-round definition of content analysis which suits the purposes of this study's analysis can be stated as follows: a technique for drawing objective inferences from text[3] by categorising latent and manifest themes into quantifiable sections or in this case themes (Berg, 2001; Carney, 1972; Krippendorff, 1980; Payne and Payne, 2004; Ryan & Bernard, 2000; Silverman, 2005; Weber, 1986; Whitley, 2002). Current content analysis techniques also allow for the analysis of latent themes (Graneheim & Lundman, 2004). The main rationale behind utilising content analysis for questionnaire responses, as Dumont and Frindte (2005) illustrated with their research, is to convert the raw data into categories of meaning (Henning, Van Rensburg & Smit, 2004). Latent or implicit themes may arise which necessitate inference from the analyser and as such this brief analysis will be mostly descriptive and only cursorily inferential towards the conclusion after all responses have been discussed. Graneheim and Lundman (2004) highlight the process when selecting text to code. Firstly, a unit of analysis has to be established followed by a meaning unit which is systematically condensed or attenuated so as to allow for coding. Once codes have been allocated, themes or content areas are derived from the aggregated codes. Hierarchically, sub-categories are placed in overarching main categories referring to the layering of themes (Creswell, 2002). The mode of operation will be thematic analysis as unit meaning (Carney, 1972; Marais & Bondesio, 1996), which, as Creswell (2002) states, is really just coding. Specific non-overlapping themes (dichotomised coding) were originally chosen for this study so as to make the task of counting responses easier (Ryan & Bernard, 2000; Silverman, 2000) as well as to help keep subjective inferences to a minimum (Graneheim & Lundman, 2004). The actual words used by respondents and the author's conceptualisation of the meanings may at times be given to debate as "meaning is inherently ambivalent and context dependent" (Henning, Van Rensburg & Smit, 2004, p.128; Strauss & Corbin, 1998). However, the focused nature of the questions within a niche area of research was predicated on common understandings of terms.

In addition to thematic analysis as primary meaning unit (Graneheim & Lundman, 2004), frequency counts will also be employed as secondary technique, which literally counts the number of times specific words are used. These counts serve only as descriptors of information more so than inference-bearing markers in the data and as such play less of a role in the analysis and interpretation of the findings (Berg, 2001; Holsti, 1969; Silverman, 2005; Weber, 1986). The basic assumption in content analysis is the relevancy of frequency of unit meanings as opposed to infrequent[4] units of meaning (Lindkvist, 1981) and semantic analysis will also be a procedure utilised (Andrén, 1981; Berg, 2001). Classification will be conducted on the basis of meaning, how the words relate to the "overall sentiment of the sentence" (Berg, 2001, p.247). Counting can be misleading in terms of extrapolating meaning from frequency. These counts are not employed to cast a reductionistic blanket over the themes but to offer a more rounded quantifiable description of findings which will serve only to highlight main trends. The dichotomously phrased questions and their subsequent responses are tabulated in order to illustrate the number of agreements and disagreements that were made on certain issues.

Silverman (2005) highlights a negative aspect of categorisation by stating that although quantification via such categories is useful in providing a "powerful conceptual grid" (p.123), it can often be constraining as it may deflect away from categories that remain uncategorised. However, sorting texts into categories does assist in reducing heavy loads of information (Arredondo, Rosen, Rice, Perez & Tovar-Gamero, 2005; Creswell, 1998). Table 1 details verbatim text examples of how certain sections of text were analysed and coded for both dichotomous and thematic text. The meaning units or actual responses are condensed into statements and then coded or thematicised (Graneheim & Lundman, 2004; Henning, Van Rensburg & Smit, 2004; Maree & Maree, 2005). Categories are pre-formed as the questions themselves function as categories. Respondents had to answer within the confines of the questions and as such the content to be analysed is already known in general. The aim of this

[3]Need not of course be limited to textual analysis (Lindkvist, 1981; Neuman, 1997) but for the present circumstance this definition will suffice. Semiotic structure of meaning pertains to areas as diverse as music and architecture for instance and involves the signs applicable to the inherent meanings conveyed to the recipient of the message (Cobley & Jansz, 1999; Lindkvist, 1981).
[4] Carney (1972) highlights the fact that what is missing in texts can be just as informative as what is present.

analysis, then, was not to extract exploratory ideas but to establish the degree of support for each of the views expressed within each question via thematic analysis and can thus be classified as non-formal content analysis (Carney, 1972).

Appendix 2 Table 1 Example of selective verbatim response text coding for dichotomous text (question 1, 2, nature vs. nurture debate) and thematic text (question 3)

Meaning unit / actual response	Condensed meaning unit / statement	Code / theme (partially predetermined by the questions posed)
Question 1		
▪ I consider DA to be more of a model than a theory ▪ I consider it to be a model ▪ I would consider my approach as a Paradigm ▪ It represents different paradigmatic views ▪ DA is a model ▪ It is mainly a measuring procedure	DA is a model, paradigm or measuring procedure	Model Paradigm Measuring procedure
Question 2		
▪ The environment plays an important role in the development of children. However the genes also play a role ▪ More toward nurture ▪ Nature-nurture arguments are of little interest for my work in dynamic assessment ▪ The limits of intellectual capacity are set by the "hardware" ▪ Nurture is unquestionably more important ▪ There is an interaction between nature and nurture ▪ The theory assumes a set of interactions almost genetically driven [and the] nature of that mediation is strongly influenced by linguistic and culturally based worldviews, values and interactions	Nature and nurture both play roles. The distinction is moot. Nature is overriding. Nurture is the more important of the two. There is an interaction between the two	Nature Nurture Interaction Neither is important
Question 3		
▪ I don't think that any specific theoretical model is sufficiently comprehensive ▪ Ecological view of intelligence ▪ Environmentally aligned theories of development ▪ Necessarily eclectic ▪ Bio-ecological model of Bronfenbrenner and Ceci (1994) ▪ A mixture of classical Vygotskyan theory, more modern representations of this work such as that of Kozulin, Haywood and Karpov, Grigorenko and Sternberg, information processing theory and intelligence theory ▪ Based primarily on Feuerstein's work as it informs Vygotsky's view of the zone of proximal development ▪ Barbara Rogoff's work on cultural models of development.	None in particular. Ecological, environmental, bio-ecological models. Models emphasising contextual factors. Eclectic mixes of various models are employed. Modern renditions of older classical theories and models are utilised. Vygotsky, Feuerstein and Piaget are notable researchers within this area of concern. Mentions of other researchers are made such Rogoff, Kozulin, Haywood, Karpov as well as Sternberg and Grigorenko	Eclectic mixes Contextual models Old and new models along similar lines Vygotsky Feuerstein Piaget Other

1.2.1 Reliability and validity

Issues of reliability and validity play no less a role in qualitative research (Andrén, 1981; Bryder, 1981; Silverman, 2005) and terms such as credibility, dependability and transferability have been utilised within the qualitative domain to reflect similar meanings inherent in reliability and validity, for instance, trustworthiness (Graneheim & Lundman, 2004; Henning, Van Rensburg & Smit, 2004). An aspect of concern which directly impinges on the reliability of the coding of the text is the internal consistency with which the exercise is carried out (Weber, 1986; Whitely, 2002). The below-mentioned coding process employed fewer rather than more categories, had a broad focus (although specified questions), pre-defined response units, "after the fact" coding (coding which took place upon receipt of responses) and did not infer from text resulting in higher reliability of coding (Whitley, 2002).

Three types of reliability pertain to content analysis namely, stability, reproducibility and accuracy (Krippendorff, 1980; Weber, 1985). Stability is ensured in this study as only one coder (the author) was used and coding was invariant over time. However the same cannot be said of reproducibility as no other coder coded the text and thus no conclusions can be deduced which might portray similar findings across coders, although Andrén (1981) and Krippendorff (1980) point out that such coding reproducibility is not necessarily tenable when applied to semantic content analysis. Accuracy relies heavily on category reliability (Holsti, 1969). Four types of diagnostic devices are put forward by Krippendorff (1980, p.149) as part of his discussion on reliability-enhancing strategies within content analysis and consist of the following: unit reliability (unreliability in the material), individual reliability (coders used for the exercise), single-category reliability and conditional reliability (unreliability with the recording instructions). Holsti (1969) admits it is often the case that in order to improve upon reliability within content analysis, coders and categories are the dual aspects in need of attention and are subsequently the limits of improvement achievable. No standard codings (for instance coding dictionaries) were used for this study as it was deemed too small.

Validity issues also cannot be definitely ascertained as there exists no other known measure similar to this one and hence similar substantive conclusions will be needed in order to conclude that the analyses is a true and accurate picture of what was written. Carney (1972) adds that as much of the total context as possible, including communicator, message and audience needs to be explored in order for the message contained in the text to be accurately understood. However the simpler the strategy in terms of counts the less likelihood of invalid inferences as opposed to semantic content analysis (Andrén, 1981). Andrén (1981), Holsti (1969) and Krippendorff (1980) list a typology of validity-bearing concerns pertinent to content analysis. Validity concerns itself with data-related validity and encompasses semantic and sampling validity. Pragmatic or product-oriented validity includes correlational and predictive validity as well as process-oriented validity such as construct validity. Data-related validity assesses how well the method of analysis agrees with the information contained in the content and relies upon the sensitivity given to symbolic meanings in the text as well as sampling validity which reflects the degree of bias of the sample of texts chosen for the exercise. For the purposes of this study, the sampling is indeed biased towards practitioners of dynamic assessment and moreover is a reflection of researchers who champion the basic ideals of dynamic assessment. Pragmatic validity concerns itself with how well the chosen method of analysis "works" under various circumstances (Krippendorff, 1980). Construct validity looks at the degree of consensus between the process of analysis and the context from which the data derives.

1.2.2 Qualitative vs. quantitative content analysis

This study seeks to confine itself to a less rigorous and informal analysis of content aimed at analysing thematic content as well as word usage. Notwithstanding the efficacy of these more quantitative methods of analysis, Berg (2001) and Holsti (1969) caution the researcher about the danger inherent in arbitrarily limiting the content to that which is quantifiable only and so a blend of both quantitative and qualitative techniques is offered as guidance. The growth of content analysis from crude quantitative measures to a method including qualitative methods (Payne & Payne, 2004) is indicative of the wide field to which this technique can be applied. It need not be constrained by the quantitative imperative, even though this is often viewed as the more objective of the two (Holsti, 1969). Qualitative analysis sheds light on patterns of content (less positivistic in overtone) whereas quantitative analysis sheds light on the form and duration of such patterns (more reductionistic) and each gives to the results something which the other lacks (Berg, 2001).

Casual inferential modelling may also shed light on various relationships between and within themes and specifies the relationship between latent variables and brings to light causal effects of latent and observed variables (Weber, 1986). Originally frequency counts of word occurrences (Krippendorff, 1981) construed as quantitative would suffice as measure of the importance or lack thereof of certain issues within texts, however, the more qualitative avenue of analysis comes to the fore when the meanings behind these textual counts becomes manifest (and is considered as anti-quantitative) (Payne & Payne, 2004). This extrapolation between counts and interpretation is not yet an issue entirely resolved within content analysis (Berg, 2001) but is the blend of method utilised in this small study.

It is imperative that text, theory and content analysis results be related (Lindkvist; 1981; Weber, 1986) and it is for this reason that the content analysis is located at the end of this theoretical study which aided in its analysis, especially the analysis of content that was not mentioned (Holsti, 1969). The need for analysis of both manifest and latent meanings within the responses warrants both types of quantitative (frequency counts) and qualitative (thematic identification) research methods (Payne & Payne, 2004). Rosengren (1981) conceives of the differences between quantitative and qualitative analyses as the latter ranging from impressionistic, interpretative and intuitive accounts of the data to systematic analysis carried out on the nominal scale level. The former being representative of nominal scale measures which can then be aggregated at higher scale levels. A range of techniques spanning a range of application areas is thus reflective of this multitudinous method of content analysis. There is thus, as far as this author is concerned, no reason to avoid either approach as both, inherent in their separate methodologies, are able to extract information from text in different ways and in so doing compliment each other.

1.2.3 Manifest and latent meaning

An issue often debated within the methodology of content analysis is the limit of inference that should be drawn (Berg, 2001; Graneheim & Lundman, 2004; Holsti, 1969 Payne & Payne, 2004). This issue has bearing on interpretative meanings assigned to the units of analyses. Inferential descriptions beyond manifest content must be supported and validated (Krippendorff, 1981). This has been partially solved by theory-guidance of responses (Whitley, 2002). Weber (1986) advises researchers to validate quantitative findings by revisiting the text in order to highlight hypotheses originally stated.

2. Method

The sample, procedure and analysis will now be looked at.

2.1 Sample

Respondents who indicated their willingness to participate consisted of geographically spread and internationally established authors in the field of dynamic assessment. Respondents were clinicians in private practice as well as professors and doctors within schools of psychology, counselling psychology, education, pedagogical psychology, teaching, learning and instruction, learning disabilities, biological psychology as well as psychoeducational consultation and training. Respondents currently teach and/or co-ordinate programmes within tertiary institutions in the United States, Canada, Britain, Israel and the Netherlands and are also involved in private-practice consultations.

2.2 Procedure

Whitley (2002) states four main steps along which content analysis should proceed which reflects the process of qualitative research in general (Creswell, 2002) namely, the sources of data to be utilised, the sampling of respondents, the development of a coding scheme and the measurement of the content. Electronic mail was delivered to one hundred dynamic assessment practitioners and researchers whose contact information was gleaned from accredited literature, textbooks, chapters in edited texts as well as articles. Undoubtedly there remained many practitioners and researchers whom the author did not contact. However, those chosen were most visible in terms of research output. Thirty-one individuals initially responded making their intentions clear as to possible participation in the study. Follow-up emails were sent via Internet four months later to invite responses from those who had initially accepted participation but who had not yet participated. A covering letter was also included with the questionnaire.

2.3.1 Analysis

The analysis of the responses is now delineated by discussing the coding of the content, the process as well as the development and deployment of the coding frame.

2.3.1.1Coding the content

The author followed Creswell's (1998) general and overall mode of enquiry which is viewed as a spiral of research emphasising the description, classification and interpretation of text. Once the pooled views were grouped under each question a thematic analysis was conducted in order to fully explore underlying themes within the summarised responses. Once the themes had been highlighted it was considered prudent to investigate the responses for aspects not mentioned as this is also considered of importance within content analysis. Certain issues that were not mentioned are indicative either of the irrelevance of the topic or the lack of knowledge surrounding the particular issue of concern. "The idea is to ignore what a writer says a theme means, and instead to focus on what it is that he mentions when he talks about it and exactly what he *isn't* mentioning can [then] be seen" (original emphasis) (Carney, 1972, p.162). The process and coding frame follows after which a discussion of the findings is included. Conclusions are drawn from the themes highlighted and suggestions proffered in light of these findings.

2.3.1.2 Process

Weber (1986) delineates seven steps towards creating and testing a coding scheme and this consists of defining the recoding units, defining the categories, testing of the coding on a sample of text, assessing the accuracy or reliability, revising the coding rules, returning to sample coding, coding of all the text and lastly assessing achieved reliability or accuracy. Closely allied to this scheme is the one proffered by Strauss and Corbin (1998) which has as its point of departure the conceptualisation or breaking down of the data, the defining of terms and lastly the categorisation and sub-categorisation of data.

Themes are utilised as meaning unit and the categories of the coding frame (Berg, 2001) will consist of axes of meaning which will either support an issue or not, or else will be regarded as neutral on an issues. The first three responses to each question was investigated for suitability after which the aforementioned axes were routinely applied across the questions except for question 3 which did not avail itself of such coding. The coding of the text proceeded line-by-line (Strauss& Corbin, 1998) and followed Whitley's (2002) recommendations in terms of the characteristics of coding systems. Briefly, these characteristics dealt with the nature of the coding scheme and are discussed below:

- Coding schemes can be theory-based or ad hoc. This study dealt with very specific issues which were directed at learned practitioners and academics within the field. Thus the questions were inherently theory-based at the outset. In other words the author was expecting most of the responses to fall into predetermined categories. Emerging themes from the responses were thus pre-empted by the foregoing pre-established categories. Due to possible sample bias[5] certain themes may have arisen which were not originally considered. This was not, however, the case
- The focus of the coding scheme is reflected in the breadth of scope. A broadly focused scheme was employed seeing as the study sought to extract counts of themes running through the responses. The nature of the focus of the coding scheme is dependent on the amount of information available about the responses as well as the degree of detail necessitated by the research. The main motivation for conducting the research was to determine the extent to which practitioners and academics agreed or disagreed with certain sentiments but simultaneously allowing them the scope to support their contentions as well as to add any information they sought fit to include. Unfortunately, most responses were not very detailed primarily due to the overly complex nature of the questions
- There were eight general coding categories, one for each question. Within each question a number of sub-coding categories were utilised based on the nature of the question
- Inferences from responses was kept to a minimum as the author and respondents conversed about a topic which was known to both parties. In other words the respondents' intended meaning was less likely to have been misperceived (Strauss & Corbin, 1998)

2.3.1.3 Coding frame

All eleven returned questionnaires were read for similarities and differences in viewpoints to each question. The coding frame was worked out based on the responses to the various questions and was not a fully developed framework developed before receipt of the questionnaires. However, due to the focused nature of the questions which already juxtaposed certain viewpoints, a vague coding frame had already been established. Questions 1 to 4 elicited a range of views on a number of issues whereas questions 5 to 8 were dichotomously phrased. The coding frame employed for each question follows below.

Question 1 The status of dynamic assessment as scheme, model or theory

In this question

- A tentative scheme would be considered as being least developed conceptually, while
- A model is considered more specific yet less explicit than
- A theory which would be most conceptually developed.

Question 2 Dynamic assessment regarding the following core issues:

- Nature vs. nurture
- Mind and brain vs. Mind is brain
- Pragmatic agenda vs. Socratic agenda
- Direct role of history vs. Indirect role of history

Question 3 Developmental model followed within dynamic assessment

[5]Interestingly, of the eleven completed responses which were returned, ten completed questionnaires were returned within one month of being sent. This observation may or may not indicate some information about the respondents. Whether this can be called a response bias though is debatable.

Although a few developmental theories were offered for illustrative purposes most of the respondents aligned themselves with these theories even though the question was an open-ended one. This question will be analysed in an open-ended fashion and not as categorised as the first two questions.

Question 4 Dynamic assessment within the broader field of intelligence assessment

This question was concerned with

- Intelligence models and
- Mutually inclusive and mutually exclusive views as well as theories on dynamic assessment within intelligence

Question 5 Dynamic assessment and neuroscience

This question revolved around the relevant issue of neuroscience research within an area such as dynamic assessment and sought to locate responses on the following issues:

- Findings in neuroscience have played a role in dynamic assessment vs. Findings in neuroscience have not played a role dynamic assessment
- Findings in neuroscience should play a role dynamic assessment vs. Findings in neuroscience should not play a role dynamic assessment

Question 6 The future of dynamic assessment

This question elicited views concerning the future trend of dynamic assessment given its current status.

- It will cease to exist in its current form vs. It will continue to flourish if changes are made

Question 7 The quantitative imperative

This question focused on the perennial debate of quantification within psychology and how it may or may not relate to dynamic assessment in particular.

- Measurement is a necessary part of dynamic assessment vs. Measurement has resulted in dynamic assessment moving away from its original ideals

Question 8 Meta-theory

This question only superficially probed the significance of deploying meta-theory within this field as framework for guiding further theory at its current point of development.

- Meta-theory will only serve to add confusion to the field vs. Meta-theory is a welcome addition to this field

3. Results

This section details the results of the summarised responses as well as the content analysis of identified themes as per the coding frame. Responses to each question were pooled and analysed in terms of the coding frame employed above. Themes were extracted and summarised. The results contained in this section are the author's summarised analysis of respondents' results and are not the respondents' verbatim responses to the questions. For clarity and ease of use, only the statement preceding each question will be repeated. Each question will be discussed, firstly, in terms of the summarised theme that was extracted and secondly, in terms of the coding frame, the results of which are tabulated.

Question 1 - The status of your particular view of dynamic assessment within intelligence assessment

Extracted summarised theme

Dynamic assessment is currently considered as more of a model than a fully-fledged theory and consists of hybridised approaches towards the assessment of the whole individual within varied contexts. There appears to be lack of consensus surrounding its status. It is informed from a variety of implicit assumptions about learnability, the learning experience, the potential to learn and the modifiability of individuals. Dynamic assessment undergirds the assessment of cognitive functioning and includes affective and non-cognitive aspects over and above intelligence traits. Dynamic assessment is seen as relevant in culturally diverse situations where the whole person and context is taken into account and where reality is socially constructed. It is an holistic and ethical approach towards understanding cognitive functioning. Dynamic assessment, like intelligence, is a construct and not a reified thing, it is a method of assessment.

Theory does inform dynamic assessment but there are many such theoretical underpinnings. Dynamic assessment cannot yet be truly classified as a theory but rather a conceptual scheme and model. Some practitioners prefer to house dynamic assessment under the overarching theory advocated by Feuerstein and model advocated by Vygotsky as well as the structuralist approach of Piaget. However, there are contrasting views which espouse that dynamic assessment is in fact a paradigm and is firmly entrenched in theory whereas others have indicated that dynamic assessment is a philosophical stance in which there simply is not enough research to support dynamic assessment as a theory. Clearly there is diversity in what dynamic assessment is. Some practitioners view dynamic assessment purely as a convenient measure of potential. There is difficulty in placing dynamic assessment within the larger arena of assessment as it seeks to measure things which are themselves ill-defined. There is difficulty in deriving a tool or instrument sufficient and worthy enough to measure something which in some ways defies measurement, as operationalising the concept is problematic. At this stage there are still too many questions to be answered before dynamic assessment as a tool, view, scheme, model, construct or theory can be digested into the greater realm of assessment within psychology. There is, however, empirical evidence to suggest construct validity and this is seen as a tentative beginning to its growth as a method within the scientific discipline of assessment.

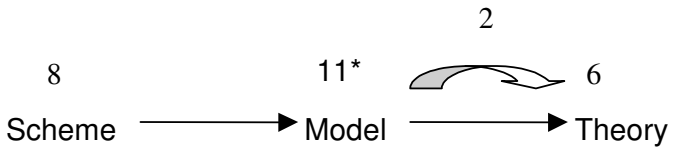
Coding analysis and tabulation of extracted themes

Analysing the results from both a mutually exclusive and mutually inclusive point of view shows a greater tendency to view dynamic assessment as a model. Seven mentions of dynamic assessment as model were counted. Dynamic assessment's nature also wavered between model and theory status with it being viewed as a scheme or sorts. Six mentions of dynamic assessment as theory were counted. Although the perception surrounding the nature of dynamic assessment varies from mentions of schemes, models and theories, it is perceived by more practitioners as a model than a theory. Table 2 illustrates these trends. Figure 1 illustrates the continuum of increasing conceptualisation and where respondents indicated dynamic assessment could be placed.

Appendix 2 Table 2 Dynamic assessment's status as scheme, model or theory

Mutually exclusive categories	Frequency count	Mutually inclusive categories	Frequency count	Opposing view	Frequency count
Model	7	Theory/model hybrid	2	Not a theory	2
Theory	6	Model with concept as subservient	3		
Assessment/procedure/approach	3	Model with theory as subservient	1		
Concept	3				
Paradigm	1				
Philosophical stance	1				

Appendix 2 Figure 1 View of dynamic assessment along a continuum of increasing conceptualisation



*when including the mutually inclusive category. Seven exclusive mentions

Question 2 - Philosophical bent or underpinning of your theoretical take on dynamic assessment

Extracted summarised theme

Dynamic assessment is firmly anchored in socio-cultural and bio-ecocultural models of a socially constructed reality. It places greater emphasis on how the environment influences change although cognisance is taken of the increasingly important role of heredity. The potentially rich field of neuroscience is acknowledged as method of potential future utility only. The processes involved in learning are socially constructed and hence many views of dynamic assessment are rooted in social constructivism. The main emphasis within dynamic assessment is placed on learning as opposed to thinking although this is not always explicit. There is a problem surrounding the notion of intelligence which is most often considered socially constructed, intelligence being

a hypothetical construct. Intelligence should always be considered within an ecological context. It is ironic that, although dynamic assessment's emphasis on culture is great, within practice the goal of enhancing cognitive functions pays little attention to culture. If there are problems concerning what intelligence is then dynamic assessment itself will face this same problem if its aim is to assess intelligence. The main aim is not to assess intelligence but rather cognitive functioning within learning. Learning as a concept should be included in the definition of intelligence. Dynamic assessment seeks to investigate the learning process and how better to make manifest potential resident within individuals and as such is not aligned with intelligence measures per se as is conventionally understood.

Genetic heritage places constraints on the limits and parameters of intelligence and this type of intelligence can be assessed to a greater extent within static assessment as opposed to dynamic assessment. Dynamic assessment is more concerned with the role of nurture and how the socio-cultural environment influences outcomes. It concerns itself with cultural communities' influence on thinking and knowledge and how mediators can facilitate the process of reaching resident potential within individuals. Knowledge is also socially constructed. Nature and nurture are considered equal role-players but there is a distinct emphasis on the role of nurture. Static and dynamic assessment are at once viewed as antithetical as well as complementary although it is recognised that the two differ in approach as well as differing in basic implicit and explicit assumptions. The two methods attend to and answer different questions. Dynamic assessment does not really sit well within psychometric approaches but is more suited to educational, counselling and clinical models and is referred to as an anomaly within the intelligence field. Brain malleability and plasticity within neural substrates and the results emanating from neuroscience are starting to play a more important role within intelligence assessment and dynamic assessment takes cognisance of this fact. Dynamic assessment has always had as its basic premise a malleable brain. Learning is itself malleable as is thinking, actions and human potential. In this manner dynamic assessment seems to have foreshadowed the role of the plastic brain in intelligence assessment, although not in neurological detail.

Dynamic assessment is also viewed as both quite an established philosophy but also as a new method. Historically, dynamic assessment is an ideology associated with Vygotsky whereas some view the beginnings of dynamic assessment with the work of Feuerstein and Rey. Dynamic assessment's history is referred to as quiet and not having "caught on" in mainstream assessment, it being simultaneously ignored, supported and discredited. In order for dynamic assessment to become accepted within mainstream intelligence assessment, if this is where it wishes to lodge itself, it needs to become standardised which is antithetical to the notion underpinning it.

Coding analysis and tabulation of extracted themes

There is a singular effort to ensure understanding of the dual role of interacting nature and nurture within dynamic assessment. Nine mentions of this interacting role were counted. Cognisance is taken of the "hardware" or genetic constraints within which the individual operates and eleven mentions of regarding this view was tabulated. There is, however, a strong and almost overriding concern with the nurturing component within dynamic assessment indicating the role this plays within the model, evidencing thirteen such mentions. That the debate is obsolete is validated by the responses given, illustrating an appreciation for both nature and nurture. Not much mention was made of the roles of mind/brain; the (in)direct role of history or the agendas behind dynamic assessment as an assessment initiative. Table 3 shows the frequency counts for the responses to this question.

Appendix 2 Table 3 Dynamic assessment philosophy

Aspect	Frequency count	Aspect	Frequency count
Nature	11	Nurture	13
Nature/nurture interaction	9		
Mind and brain	0	Mind is brain	1
Pragmatic agenda	2	Socratic agenda	0
Direct role of history	2	Indirect role of history	0

Question 3 - Your developmental model followed or model most adhered to within the field of child development/educational development as well as adult growth and maturation

Extracted summarised theme

No one particular developmental model is adhered to within dynamic assessment and of those mentioned most are ecologically aligned theories evidencing eclectic influences. Theorists such as Feuerstein, Vygotsky and Piaget are mentioned as being influential in dynamic assessment's progress since inception. Whether a narrowing in scope of chosen developmental models will occur is speculatory as best. Multiple theoretical models are utilised as no one specific model encompasses all that is necessary to explain the global functioning of the learner. Hybrid and eclectic models are preferred over-and-above any one

particular model. Cultural, bio-ecocultural, developmental and environmental models which take cognisance of community, person-in-context, biological predispositions, religious contexts, social contexts, ecological influences and individual differences are commonly espoused as the necessary models when tackling issues such as assessment. It is clear from these choices that no one specific model will do. More importantly, models which emphasise environmental influences are considered more potent in terms of explanatory power than those which are more narrowly focused on intelligence as a biological derivative only. More modern approaches are fused with older models of intelligence and information processing and thus incorporate the influencing aspects of the environment, socio-economic status of family and quality of learning environment at home and school. How these factors help in co-constructing knowledge acquisition is important in these constructivist approaches.

Coding analysis and tabulation of extracted themes

As stated above this question was analysed in an open-ended manner and no table exists for this question. There is clearly no one particular developmental model adhered to throughout the developmental life-span of individuals. Changes occur within individuals, so models are accommodated to suit these changes and dynamic assessment approaches are considered hybridised and eclectic. As biological predispositions are said to play a greater role during childhood and that of the social environment too, later on, development models with varying focuses are employed to aid in the description and explanation of change. Ecological, environmentally aligned and bio-ecocultural models are most often cited as those followed as the socio-cultural environment including home and work are emphasised as impinging upon development. Individual theorists are mentioned such as Piaget, including neo-Piagetian models, Vygotsky, including neo-Vygotskian models, Feuerstein and the Mediated Learning Environment and Structured Cognitive Modifiability theories; Ceci, Bronfenbrenner, representative of the bio-ecocultural and ecological models respectively, Kozulin, Haywood, Karpov, as modern representatives of classical Vygotskian theory; social-constructionist views on development (Gergen); Sternberg and Grigorenko as well as information processing and intelligence theories as well as Rogoff's work on cultural models of development. Greater importance is attributed to the role of the environment with all its associated models.

Question 4 - The ensconcement of your theoretical take on dynamic assessment within the broader fields of intelligence assessment

Extracted summarised theme

Dynamic assessment makes use of intelligence tests which function in a role considered complementary. Intelligence is an ill-defined notion and as such is difficult to define especially its role within dynamic assessment. Dynamic assessment sees itself as encompassing intelligence and not as intelligence encompassing it. Dynamic assessment was therefore not placed within any intelligence theory or model. Intelligence as conventionally understood and measured is not the target of dynamic assessment intervention. The focus is more on the process of cognitive functioning and how best to address these issues if improvement is to be the final goal. The emphasis is on the remediation of problems within cognitive functioning and very often these problems are a culmination of environmental, ecological, socio-cultural, community and family concerns in which the developing child is situated. Adult intervention is also of concern to dynamic assessment. Standardised intelligence assessments are used complementarily and are useful to a point within dynamic assessment interventions. They are utilised mainly as estimates of current levels of functioning, levels which are improved on through the use of dynamic assessment and often serve as the pretest during a dynamic assessment intervention. Standardised test results for individuals from different cultural contexts typically reflects a very narrow construal of what intelligence is purported to be. Also problematic is the ill-defined concept of intelligence. Some consider intelligence not to exist as it is currently accepted. Intelligence is viewed as that which an individual can do without aid from a mediator. Some view it as higher mental functioning referring to the conventional and mainstream concepts of speed of information processing for instance. Of note is the role of executive functioning as a definition of intelligence. Dynamic assessment research is related to intelligence research but cannot be equated with it.

Models of assessing intelligence are derived from the assumption of what intelligence is, namely, thought processes which are easily penetrable and easy to access en masse. Contrary to this is dynamic assessment's assumption that each individual is so unique that in order to properly address cognitive skills, knowledge of individual contextual factors is necessary. This is usually not an assumption included in mainstream standardised testing. Taking cognisance of contextual factors results in a time-consuming process in comparison to mainstream assessment. Mainstream intelligence testing is product-bound whereas dynamic assessment is process-based. Issues such as testee morale and ethical responsibility are more closely scrutinised within dynamic assessment as opposed to conventional intelligence assessment. Greater responsibility is placed on the dynamic assessment practitioner when assessment and intervention programmes are discussed. Some do view dynamic assessment as fitting in within views on intelligence but view the technique as an alternative to mainstream testing. Perhaps intelligence as a concept should be elaborated to include aspects not currently included.

Others view intelligence and dynamic assessment as distinct and not embedded as dynamic assessment does not sit comfortably within traditional models of intelligence. Intelligence, if it does exist as a unitary concept, cannot be divorced from its

non-cognitive counterparts, an aspect not dealt with adequately within mainstream intelligence testing. Intelligence as a concept can be further refined by adding that it is something that develops and represents developing expertise; it is an executor of cognitive functions; it is a metacognitive concept; or is a socially constructed concept and should encompass change as a basic premise. Problems arise with dynamic assessment in the typical intelligence assessment environment and these issues usually pervade the area of psychometrics which is the typical set of tools used to extract information from intelligence assessment. If dynamic assessment does fit into the boarder field of intelligence assessment then it has, by definition, to lend itself to psychometric scrutiny. Issues concerning test items, changeability and testee malleability come to the fore. Psychometric models do not fit very well with dynamic assessment models as the two are opposed in terms of how reliability and validity is to be supported.

Coding analysis and tabulation of extracted themes

Intelligence is understood in various ways. It is seen as measuring a single entity and providing only single scores, for instance when total IQ scores are utilised. It is viewed as fairly inconsequential and thus very rarely necessitated, utilised only as complementary in the assessment procedure. It is also seen to function as an estimate of current functioning and a control variable within the dynamic assessment process. As a construct it refers to higher mental functions (Vygotsky) and includes abstract thinking, strategic problem solving, speed of processing and retrieval ability. It is related to but not equivalent to dynamic assessment and functions as the pretest part of a dynamic assessment procedure. It is viewed as the ability a child before intervention. It is seen to fit in with dynamic assessment views but as alternative measure. It has been referred to as a notion, as something in need of elaboration (and thus being more inclusive of aspects relating to ZPD) as well as a repertoire notion which can benefit from dynamic assessment.

Simultaneously it is seen as distinct from dynamic assessment and not embedded within it; a verb and adjective more so than as a noun; as Sternberg's notion of developing expertise; of being applicable, for instance through the use of executive functions and lastly as a socially constructed notion as opposed to a definitive reality. It is also viewed as not necessarily being divorced from change-based assessments. Five mentions were made of intelligence as serving no direct purpose for the furthering of dynamic assessment in contrast to eight mentions of intelligence as an indirect adjunct to dynamic assessment. Two mentions were made as to its placement within and on the foundation of dynamic assessment. Table 4 illustrates the frequency count of the responses to this question.

Appendix 2 Table 4 The role played by intelligence within dynamic assessment procedures

Aspect	**Frequency count**
No direct use for intelligence assessment	5
Use for intelligence as an indirect adjunct	8
Intelligence assessment can be built upon by dynamic assessment	2

Question 5 - The affinities your particular theory of dynamic assessment has with aligned fields of neuroscience, neuropsychology and computational intelligence

Extracted summarised theme

There is fairly wide-spread consensus about the increasingly important role of neuroscience within dynamic assessment and how it may inform the process but this is tempered by the fact that such consilience will occur later rather than sooner. At present such findings do not play a very prominent role within dynamic assessment. Findings from neuroscience are increasingly playing a major role in psychological literature as it pertains to cognitive functioning. Practitioners are starting to take a closer look at what the neuroscience field has to offer dynamic assessment as there is a move towards greater understanding of brain functioning. Information gleaned from neuroscience is important in some areas of dynamic assessment interventions such as reading disabilities and areas of individual differences. It has been the case that theory within psychology has been validated with techniques from neuroscience and perhaps multidisciplinary research efforts will be the order of the day in the future. Neuroscience can, among other things, help in the understanding of the cognitive functions involved in learning and instruction as these neurological processes and other reciprocal processes are related to factors that are assessed during dynamic assessment although it is not necessarily a main focus for many educationalists.

To date, neuroscience-type results do not form part of results and recommendations emanating from dynamic assessment intervention programmes (nor should they as some have stated) and is often seen as futuristic in approach, even though current studies have in fact evidenced that neuroscientific findings can currently be of use. The perception still lingers that neuroscience has far to go in mapping a one-to-one relationship between behaviour and brain. Dynamic assessment is a more practically-based approach to helping individuals in their day-to-day functioning and as such neuroscience results have less of a role to play. Some view the role as alien and simply not befitting to the task assigned and taken up by dynamic assessment. There are

competing views on this topic. If neuroscience views are to be utilised within dynamic assessment interventions then they will have to be tailored to suit the approach and inherent assumptions and are seen as a means towards dynamic assessment's goals. Dynamic assessment's main focus should rather be attuned towards developing better theory and hence better practice as opposed to focusing on the integration of neuroscience in the field. There is consensus that although neuroscience is obviously a major development within psychological science, its role is not paramount to the future development of dynamic assessment as a model.

Coding analysis and tabulation of extracted themes

There is considerable support for the use of neuroscience findings within dynamic assessment and how dynamic assessment can benefit from such knowledge. Thirteen mentions were made of the prospective role that neuroscience should play within dynamic assessment. Diagnosticians should avail of themselves the time needed to understand more fully the field of neuroscience, however it is still considered an approach whose findings will be more easily incorporated into the model in the future. Neuroscience explanations of developmental functioning is not yet widely reported within dynamic assessment procedures. There is strong vocal support for the complete separation of the two distinct fields as they may "have nothing to say to each other" with six mentions made of the separation of neuroscience from dynamic assessment. In this regard neuroscience as a field is viewed as having less to say about how to help individuals learn on a behavioral level. Mention was made of one dynamic assessment approach which does in fact make use of neuroscience leanings. There is a strong sense of the weaving together of both approaches but that neuroscience as method with its results should serve only in the capacity of "consultant" in the dynamic assessment procedure and not vice versa; it should not be the main focus. Table 5 illustrates the frequency count of the responses to this question.

Appendix 2 Table 5 The role of neuroscience within dynamic assessment

Aspect	**Frequency count**
Findings in neuroscience have played a role in dynamic assessment and these findings in neuroscience should play a role in dynamic assessment	13
Findings in neuroscience have not played a role in dynamic assessment and findings in neuroscience should not play a role dynamic assessment	6

Question 6 - The historical development of this sub-field of enquiry and its potential future within the realm of psychology

Extracted summarised theme

Dynamic assessment will cease to exist in its current form if changes are not initiated at very core levels. However, it is these very core issues which currently define the manner of assessment so there seems to be a tension of sorts, which will need to be addressed if it is to remain extant although no viable solutions were offered as tentative solutions to these issues. Most practitioners fervently hope that the field of dynamic assessment remains a field of research and also wish for greater acceptance among mainstream assessment. What is perhaps the most implicitly impassioned complaint is the fundamental philosophy underlining dynamic assessment and how this will be lost if the method which it underpins ceases to be practiced. Problems with standardisation as well as issues of costs and time seem to mitigate against the further acceptance of the approach within a wider setting and it is ironic that at times those most opposed to the approach are very often psychologists. Unbeknownst to some mainstream educationalists, assessors and researchers, are the basic philosophies behind dynamic assessment. These philosophies lend themselves to current trends of "responses to treatment" and "evidenced based treatment". As is commonly lamented, cost and value are often opposed in the process of intervention.

Although the hey-day of purely qualitative dynamic assessment is over (assuming that it ever had one), what is of more concern currently is whether there is a critical mass of younger generation practitioners who wish to engage in this method of assessment. As some have stated, dynamic assessment as such will most likely die. What may be holding back the development of dynamic assessment is its need for strong theory and solid research and taken together with high costs and amount of time needed to use the method, the feasibility of the method as a whole is questionable. This is especially so as it is often perceived as an experimental technique and not an established one. Removing the persistent question of changeability and modifiability of the individual and the subsequent need to address this will be challenging. Some view the future to be less gloomy as it is stated that that there is yet enough interest in the field to sustain its future growth. The influence of tangible quantifiable results, however, mar the progress of the field especially in countries which emphasise the need for speedy and accurate predictive results. This is in stark contrast (and is in some ways ironic) to those who view the natural science model of intelligence assessment as too rigid. Collaboration with other social scientists may be one avenue of hope for this method and seeking across-the-board collaboration fits well with the holistic trends which pervade the method, in terms of assessing the whole person by considering context in all its forms.

Coding analysis and tabulation of extracted themes

There is indeed a heartfelt expressed concern that dynamic assessment as a manner of assessment should not die out and that it should continue to flourish but this is only possible if a number of core issues are solved. Issues of concern are its usurpation of time, its incompatibility with standardised psychometrics, lack of funding for expert training and its, at times, under appreciated status by psychologists, the very professionals who should be seen to be supporting it. These core issues, if not adequately addressed, will ineluctably bring this approach to its knees (where it apparently is according to some views). Only one mention was made of dynamic assessments' inevitable demise. Far more respondents were in agreement as to its future only if changes were instituted. Twelve mentions of its future existence is testament to this positive sentiment. It offers rich and tantalising assumptions which are difficult to criticise but the fact that these assumptions are not firmly expressed in terms of theory is seen as a fault in need of remedying. Certain types of dynamic assessment are considered to be in grave danger of simply dying out as there are fewer trained professionals utilising such approaches, however this is not to say that the entire suite of dynamic assessment will cease to exist. Table 6 shows that only one mention was made of a particular view on dynamic assessment's total cessation and the remaining mentions concluded that, if issues were adequately addressed, there remained hope for its continuance.

Appendix 2 Table 6 Dynamic assessment's future existence

Aspect	**Frequency count**
It will cease to exist in its current form	1
It will continue to flourish if changes are made	12

Question 7 - The quantitative imperative

Extracted summarised theme

The move away from quantification has stemmed from a backlash of criticism aimed at standardised methods of assessment which have had some unfortunate consequences for some groups of individuals. Dynamic assessment's predicate of qualitative intervention aimed specifically at change through assessment views quantification as anathema yet a necessary part of the assessment process. Historical relevance in terms of these issues was however not mentioned. As highlighted in previous questions dynamic assessment's core problem within the standardised arena is one of psychometric validity and reliability. It would seem that this issue will forever plague this approach towards assessment. It is commonly felt that unless this issue is adequately addressed (something it seems not to have been to date) dynamic assessment will remain a fringe movement. However the basics of this approach advocate a distinct turn away from the very core of what underpins mainstream assessment. Issues of great import to conventional intelligence assessment are simply not considered that important even if relevant to dynamic assessment. Adding fuel to the fire is the degree of acceptance of qualitative techniques of research which meet the standards laid down for the more quantitative methods. There is an underlying view of quantitative scores being rendered meaningless unless they inform the remediation of the person being assessed. On the other hand, it is perceived that statistical techniques will most likely be the saving grace for this movement as it might progress with the falsification of certain hypotheses. Both quantitative and qualitative are seen as necessary data analytic techniques within dynamic assessment although critical views on the topic are needed if scientific advancement is to be the next step within the field. The analogous pendulum-swing is cited as evidence of movements within educational research and practice, where, what is considered priority in one time and place, is no longer considered as such in another time and place. The need for empirical verification of educational interventions is stressed. Conversely the unquestioning use of statistics and psychometrics within dynamic assessment intervention is viewed as anathema to the further development of the field and also as prohibitive in the growth of dynamic assessment. In order to establish validity for dynamic assessment, new techniques need to be brought to the fore. This is seen as problematic by some in certain countries such as North America where the reliance on mainstream testing norms is prolific and may be damaging to those individuals who need to be assessed through alternative manners.

Coding analysis and tabulation of extracted themes

A firm stance was taken on the role of measurement within dynamic assessment and seven mentions of its necessity within dynamic assessment were made. Some advocated that there really is no role for statistics within this approach as it has in the past resulted in mismeasures, narrow-minded conclusions and social injustices and to this effect five mentions were evidenced. A middle-of-the-road view considers a place for both quantitative and qualitative research methods including the role of statistics, but only in so far as they can be used for the further remediation of the individual. Dynamic assessment's approach towards the role of assessment and the rightings of social injustices is reminiscent of a critical psychology approach and is quite evident in the responses to this question. The role of quantification in general and statistics in particular are rendered useless,

unless something positive can come from these results and aid in any future changes within the individual. Table 7 illustrates the frequency count of the responses to this question.

Appendix 2 Table 7 The role of quantification and measurement within dynamic assessment

Aspect	Frequency count
Measurement is a necessary part of dynamic assessment	2
Measurement has resulted in dynamic assessment moving away from its original ideals	5

Question 8 - The meta-theoretical solution or pie in the sky

Extracted summarised theme

Meta-theory as approach towards finding possible solutions is considered premature and perhaps even confusing for some, yet there are opinions that just such a method of analysis may well yield fruitful information, unobtainable via other means. Examples of such a technique were not highlighted. There is a complement of support for the notion of tackling the issue of meta-theory as it pertains to dynamic assessment and fervent pleading for such meta-theorising to cease as it will merely add chaos to a field already deeply entrenched in controversy. Meta-theorising, as understood to be theory about theory within intelligence and dynamic assessment may be fruitful in the long-run. More brain-storming and think-tank sessions are required to creatively grapple with cores issues that still remains unsolved. Issues such as the definition of intelligence and what it entails and the need to currently consider eclectic views within dynamic assessment are broached. Some view the entry of meta-theory within this field as a welcome addition whereas others voice their concern at the confusion that may ensue if it is introduced too early. Some consider dynamic assessment as yet too young a field theoretically-speaking and meta-theorising is often a task undertaken after established solid theorising has taken place. There is also a need to bridge or link up the various models within the broader dynamic assessment field, as its current state is still too disparate. As part of this meta-theorising initiative, thinkers from across disciplines need to be brought on board and this will help alleviate the reductionist trends now common within dynamic assessment research literature.

Coding analysis and tabulation of extracted themes

The fact that there is a call for a more integrated approach towards the assessment of the total individual from as many perspectives as possible helps make the need for a meta-theory understandable. This view is tempered with cautionary warnings about interfering too soon within the eclectic mix that is currently the situation within dynamic assessment. Most responses considered the need for meta-theory as useful but not essential to its development. Six mentions about meta-theory's confusion-causing role were voiced and indicated that the role of meta-theorising would not aid in the future development of the field. Four mentions were made in support of a meta-theory as framework for the development of dynamic assessment. There is a noted concern for the need to study the finer theories and models within the field first before heading off on grander meta-theorising. Table 8 illustrates the frequency count of the responses to this question.

Appendix 2 Table 8 The role of meta-theory within dynamic assessment

Aspect	Frequency count
Meta-theory will only serve to add confusion to the field	6
Meta-theory is a welcome addition to this field	4

4. Discussion

Qualitative research is by nature a probing exercise delving more deeply into issues than is usually the case with more quantitative research. Richness of responses as opposed to the number of responses plays a greater role in this type of research. Although only eleven completed questionnaires were analysed for this study, this in no manner detracts from the depth and richness of the results. The nature of the sample has been detailed and it is due to the cumulated expertise of respondents that the study's results can be considered as worthy contributions to the field of dynamic assessment. The author felt secure that a number of issues had been adequately addressed in terms of the patterning of responses. For instance, it was very evident that almost all responses to the nature-nurture question were unanimous in terms of agreement that both play a role in assessment. Other issues such as the quantitative imperative did not yield a similar pattern of responses and further answers from more respondents would have greatly enhanced the study's utility value. Some responses were thus more saturated than others. Specific issues which were not mentioned will now be discussed.

4.1 What was not mentioned - a further source of information

Certain issues were only fleetingly discussed and if expanded on may well have proved fruitful if taken to their logical conclusions within the discussions. Lack of considering certain points within each question may well prove insightful as these neglected areas are possible aspects that may be perceived to be either non-essential or as having already been solved.

Regarding the first question, the lack of consensus regarding the status of dynamic assessment as theory, model, conceptual scheme, philosophy or even construct brings into question the degree of explanatory power of a theory versus that of a model. Broader based conceptual schemes may encompass more variables and may be lodged within larger spectrums which are unable to explain with greater clarity, issues that are more easily explicated in more narrowly confined conceptual schemes which utilise more accurate terminology. The precision and power paradoxes may be useful in furthering this notion. It is possible for theories and models to achieve high precision in predictions without recourse to explanations as to how the predicted outcome was achieved whereas it is also likely for theories and models to achieve high explanatory power without predicting precise outcomes.[6] The need for precision and prediction as espoused by mainstream assessment often goes against the philosophy of dynamic assessment, yet the lack of these seemingly essential ingredients may prove the demise of this approach.

Of interest within the responses to the second question is the mere passing familiarity with the literature emanating from neuroscience studies. This might indicate that neuroscience as a potentially rich source of information is not necessarily the area in which dynamic assessment practitioners should focus attention. Likewise, it has not yet become feasible to more fully integrate neuroscience given the already limited resources available to practitioners, educationalists and educational psychologists. Only one respondent indicated that findings in the neuroscience field have indeed proved useful in the psychological context. It is ironic then that more practitioners have not followed the neuroscience route, if as it is maintained, dynamic assessment is predicated on a plastic and malleable brain. Perhaps this view of neuroscience smacks of intensive reductionism and there is concern that the whole person-in-context will be neglected. Although alluded to cursorily in some answers the various sub-headings in question two were glossed over most likely due to the complexities inherent within the question.

The future trajectory of dynamic assessment's developmentally aligned theories will remain eclectic for now and no new developmental models were proffered. Regarding the fourth question, it would appear from the responses that intelligence as understood at its broadest level plays a role of relegated support although of importance in the determination of current levels of functioning. The specificities that the question sought were not given, most likely due to time limitations. No particular theory of intelligence was discussed as pertaining to dynamic assessment. No models of intelligence were addressed either but reference to intelligence in its general format was made.

Responses to question five were not specified in terms of particular findings within neuroscience and no mention was made of any one specific neurocomputational model as fitting in with the assumptions inherent within dynamic assessment. As this view of assessment does not currently subsume neuroscience as methodology within the approach on a large scale, the details concerning its efficacy were not discussed. Only in its generality was it considered of future benefit. This leaves one wondering whether psychologists within this assessment arena understand the fuller implications of future neuroscience modelling but perhaps, as mentioned, this is simply not yet a feasible priority. Specificities surrounding the potential resolutions of a number of issues in question six was side-stepped. No mention was made, for instance, of the use of item responses theory as measurement theory in helping to abate the increasing flood of criticism leveled at dynamic assessment's lack of robust measurement technique.

Although not directly stated within the seventh question, no mention was made of the basic philosophy underpinning the very need to utilise quantitative measures within psychological assessment. The routes travelled by mainstream intelligence assessment (leaning heavily upon psychometrics and factor analytic statistical foundations emanating from pragmatic American psychology and British empirical psychology) and that of dynamic assessment (leaning towards open-ended change and informed more from continental European considerations of assessments) was not highlighted as playing potential roles in the quantitative debate. Perhaps if dynamic assessment's origins are contrasted to those of mainstream intelligence assessment's origins, another light may be cast upon the method of change assessment and help in arguing for or against the need for quantitative measures of inference. This might not necessarily solve any immediate pressing issues but can aid in setting the scene for debate and in so doing setting an agenda for dynamic assessment in the twenty-first century.

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[6] Cf. Fawcett & Downs, 1992.

Other than a brief reference to meta-theory in question eight no mention was made of any potential developed frameworks which could be employed in a discussion of critical analysis of the direction in which dynamic assessment is to take. No mention was made of the principles informing meta-theory and how theoretical psychology could facilitate deployment of such a framework, and no specificities were delineated beyond general statements considering the utility of such an approach.

5. Conclusion

Dynamic assessment currently finds itself at a distinct cross-roads, a juncture in its history where fateful decisions will have to be made to ensure the future survival of a method of assessment which is intuitively appealing but scientifically lacking. Such broad-brush statements are bound to incite fevered retorts and it is for this reason that questionnaires were sent to one hundred of the foremost dynamic assessment researchers and practitioners, hoping to elicit responses on these very issues. Had the sample been larger it is assumed that a more balanced view would have been expressed and as the current analysis stands it may well be one-sided and thus biased. The eleven completed questionnaires were completed and returned within just over one month. At times the answers to some questions did not really address the question as posed but due to the nature of the lengthly questions it is understandable that some answers might not have been fully explored.

Although an initial response rate of 31% seemed encouraging, a number of individuals declined for various reasons thus leaving the author to analyse content of only eleven completed and useable questionnaires. Eight questions dealing with core issues within dynamic assessment were put forward and content analysis as technique for response analysis was chosen. Issues pertinent to content analysis such as the rationale for employing the technique, reliability and validity, the quantitative and qualitative nature of content analysis as well as the manifest and latent meanings within texts were briefly highlighted as they impinged on this study. The questions were discussed and the process and coding frame to each response was delineated. The small percentage of responses and answers which were kept to a minimum may have been partially due to the complexity of the questions. The results discussed the coded responses according to the coding scheme utilised for each question. Further information pertaining to issues not discussed by the respondents was also looked at. The analysis concerned itself mainly with two modes of operation; thematic patterns which were discussed at length and tabulated frequency counts of mentions for or against certain issues. The emphasis on interpretation of themes played a greater role in this analysis as opposed to the frequency counts which were purely descriptive summaries.

Concluding remarks highlighted the main trends within responses. These trends evidenced the predominating model-like status of dynamic assessment and its primary emphasis on contextual factors as major influencing variable in the testing situation. Dynamic assessment is predicated on hybridised and eclectic development models and views intelligence assessment as complementary to its main goal of mediatory intervention strategy. The utility of neuroscience and meta-analytic approaches as intertwined with dynamic assessment methods is noted but most consider it of future value only. The method of dynamic assessment as it currently stands will cease to exist if urgent attention is not given to core issues such as standardisation and quantification.