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Correlating the Developmental Test of Visual Perception-2 (DTVP-2) and the Test of Visual Perceptual Skills Revised (TVPS-R) as assessment tools for learners with learning difficulties

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ABSTRACT

Learners are often referred to occupational therapists to assess their visual perceptual functioning. It is, therefore, imperative that the occupational therapists use the best assessment tools to obtain accurate and reliable results that lead to effective intervention which will be noticeable in the classroom functioning of these learners. A study was therefore conducted which correlated the results of the Developmental Test of Visual Perception (second edition) (DTVP-2) and the Test of Visual Perceptual Skills Revised (TVPS-R) in a cohort of 173 learners from Grade 1 to Grade 4 (children aged 6 years to 11 years). The learners attended a remedial school in Kwa-Zulu Natal (South Africa).

The DTVP-2 and TVPS-R appear to be of equal value when assessing a learner for visual perceptual difficulties. However, when specific sub-tests were used as a guide to focus therapy strategies, differences appear.

Key Words: Developmental Test of Visual Perception-2, Test of Visual Perceptual Skills-Revised, Assessment of Visual Perceptual functioning

Introduction

Reid[1] found that traditional standardised methods of assessment allow improved diagnostic interpretations and subsequent interventions, if certain limits were applied, such as ensuring that qualified staff conduct and interpret the assessments. The South African Education White Paper 6[2] made a recommendation that learners should only be subjected to standardised tests which have proven useful in identifying barriers to learning. In addition, Fawcett[3] identified the need to screen young learners from 4 years old in a quick, simple and politically acceptable test which would also be thorough and cost-effective. The research described in this paper endeavours to determine which of two visual perceptual assessment tools was the most efficient one to use as part of the process of identifying visual perceptual barriers to learning.

This study was limited to Grade 1 to 4 learners, as this is the target age of the two assessments. This also links to the age/grade of the Foundation Phase and first year of the Intermediate Phase (Grades 4-6) in South African schools. These are the learners who are affected by decisions made regarding their need for educational support or inclusion in mainstream education according to the proposal in the Education White Paper 6[2]. According to the South African Schools Act, 1996 (No.27 of 1996) and the National Education Policy Act, 1996 (No. 84 of 1996), cited in the policy handbook for Educators [4] the statistical age norm per Grade is the Grade number plus 6. A learner is admitted to Grade 1 in the year in which they turn seven, and only in exceptional cases should a learner be admitted at a younger age. Children aged 5 to 6 years will have access to a Reception Year[2]. However, from the most recent official statistics obtained from the Annual School survey[5], 41% of the learners in the South African schools are at least one year older than the norm. Of these learners, 37% are three or more years older than the norm.

Research conducted over many years has led to the acceptance of the principle that visual perceptual difficulties may contribute to learning difficulties[6-8]. Edwards[9], Kephart[10], Hanneford[11], and Piaget[12] all agree that linear processing and concrete thought occur during the ages seven to eleven years. This is the level at which learners in South Africa begin to learn the skills of reading, writing and mathematics at school. Therefore it is important to ensure adequate visual perceptual development to foster academic performance at this age.

Academic performance for a Grade 1 to 4 child (aged 6 to 11 years) can be regarded as the ability to perform adequately for the age or grade of the child in the areas of reading, spelling, writing, mathematical computations and communicating. Academic or learning difficulties would refer to those pupils whose school performance fell below the level reasonably expected of a particular child in these learning areas[13]. Frostig and Horne[14] found that potential difficulty in learning and low academic achievement were often displayed in low visual perceptual test scores. This was substantiated by Kulp[15] who found a significant correlation between children's reading, math, spelling and writing ability and standardised test scores of visual analysis and fine motor integration.

In research into the predictability of later cognitive performance from early school perceptual-motor, perceptual and cognitive performances, Kulp[15] and Belka and Williams[16] found that data for kindergarten children (aged 3-6 years) was much better than that of first graders and less accurate for second graders. Poor scores in visual perceptual areas would be predictors of possible academic difficulty in the young child. They also found that cognitive performance and academic achievement for Grade 1 and Grade 2 children (age 7 to 8 years) were more accurately predicted by using more specific and closely related measures of cognitive functioning. Thus, when using a visual perceptual assessment the occupational therapist must be confident that the best scale is being used.

Standardised Assessments

Tests of visual perception, such as the Test of Visual Perceptual Skills (non-motor)[17] and tests of visuomotor or constructional abilities, such as the Developmental Test of Visual Perception-2[18] are commonly used to provide information about a child's ability to perform tasks associated with the right hemisphere[19]. These measurement tools used to determine therapy requirements are chosen for various reasons such as availability, professional bias and time constraints[20]. The critical question remaining is, whether the tools used really measure what we want them to.

Standardised tests may be used as a screening tool, in depth assessment for purposes of diagnosis, to determine developmental delays or functional deficits in conjunction with medical or educational diagnosis[21]. Furthermore standardised tests can be used to document a child's current status, progress in therapy and for prioritising treatment goals. Richardson[21], however is of the opinion that reporting performance on tests should be accompanied by a discussion of progress in other areas that may not be measured by standardised testing. Criterion-referenced standardised tests are also useful in programme planning and are extensively used in the educational setting.

Developmental Test of Visual Perception-2[18]

The Developmental Test of Visual Perception-2 (DTVP-2) is the 1993 revision of Frostig's 1966 version of The Developmental Test of Visual Perception. The DTVP-2 is standardised for children aged 4 to 10 years and measures visual perception as well as visual motor integration skills. The subtests are Eye-hand co-ordination, Copying, Position in space, Spatial Relations, Figure-ground, Visual closure, Visual-Motor Speed and Form Constancy. Eye-hand co-ordination, Copying, Spatial Relations and Visual-Motor Speed are combined to give a motor-enhanced quotient, which is a measure of visual motor perceptual abilities. The remaining subtests; Position in space, Figure-ground, Visual closure, and Form Constancy are similarly combined to give a motor reduced quotient, which is a measure of visual perception.

Hammill, Pearson and Voress[18] adopted the theory that, while visual perceptual skills can be distinguished theoretically, they are more likely to be interdependent. An example of this would be figure-ground, which can be defined as a visual perceptual aspect, but in practice is difficult to distinguish from, for example, visual discrimination, form constancy or position in space. The DTVP-2 therefore does not claim to assume that the subtest results are a pure measure of what the subtest name implies. They rather encourage the user to rely more on the composite quotient scores for visual perception (motor-reduced) and visual motor integration (motor-enhanced). The motor response of the child could therefore indicate the child's perception of a stimulus or the ability to copy it: that is, the fine motor ability.

According to the authors[18], the DTVP-2 is unbiased relative to race, gender and handedness. It was standardised in 1993 on 1 972 children from 12 states in America, aged 4 to 10 years. Children with disabilities were included and made up 3% of the sample. Normative statistics were given in terms of subtest standard scores, composite quotients, percentiles and age equivalents. The mean of 10 and the standard deviation of 3 were given for the subtests and a mean of 100 and standard deviation of 15 for composite scores. Age equivalents are to be interpreted with caution as interpolation; extrapolation and smoothing were used to create age equivalents.

Reliability in the DTVP-2 is displayed in content, internal consistency, time sampling and inter-scorer reliability. Internal consistency reliability was also measured for 49 "neurologically impaired" children with resultant sufficiently high coefficients (Eye Hand Co-ordination 0.92, Position in Space 0.89, Copying 0.94, Figure-Ground 0.77, Spatial Relationships 0.96, Visual Closure 0.88, Visual Motor Speed 0.96, Form Constancy 0.85, Motor Reduced Perceptual Quotient 0.93, Visual Motor Integration Quotient 0.96 and General Visual Perceptual Quotient 0.96) to suggest that The DTVP-2 scores are appropriate for use with this sample of handicapped children. The average reliability scores of The DTVP-2, are all above the 0.85 level.

From reports received at the remedial school where the researcher was employed, it appeared that it was common practice for diagnoses to be made on the strength of the subtest results on the DTVP-2, despite the fact that the manual makes it clear that the: "...test results are merely observations, not diagnoses…"[18] and "investigation must be made into why the person tested poorly on the test". Hammill, Pearson and Voress[18] also refer to the need to find out what the person's performance on visual and visual-motor tasks is like at home and at school, in order to make accurate diagnoses and clinical decisions.

The Test of Visual Perceptual Skills Revised (Non-Motor)[17]

The Test of Visual Perceptual Skills- Revised, (TVPS-R (Non motor)[17] is suitable for use with children aged four through twelve years, eleven months. The subtests are Visual Discrimination, Visual Memory, Visual Spatial-Relationships, Visual Form-Constancy, Visual Sequential-Memory, Visual Figure-Ground and Visual Closure. Standardised scores were developed for each subtest as well as the test as a whole. Several subtests therefore overlap with those tested in the DTVP-2, but the subtests of Visual Discrimination, Visual Memory and Visual Sequential Memory are not covered by the DTVP-2.

In the TVPS-R (Non Motor) the test designs are bold and no verbal response is required. The forms are not language related and are culture free[17]. The test can therefore be administered to children who are speech impaired, intellectually challenged, neurologically impaired, partially sighted, learning handicapped, hearing impaired or with other difficulties. Each set of plates has a built-in easel, so the child can look straight ahead, instead of down. The directions can be given in any language, by pantomime or by gesture. Any behavioural characteristics, which may affect the test results, must be noted on the response sheet. No advance training or education is required to administer this test, but professionals are expected to be familiar with psychological or educational testing.

The TVPS-R[17], was standardised on 1032 subjects aged 4 years to 12 years 11 months. Only known normal-functioning subjects in regular classes were used in the standardisation process. Forms used are as culture free as possible. Standard scores with a mean of 100 and a standard deviation of 15 were derived from testing the normative sample. A visual perceptual quotient can be derived from the sum of the scale scores of the subtests.

The internal consistency formula was used by Gardener to evaluate the reliability of the TVPS-R[17], subtests. Reliability coefficients for the total score ranged from 0.83 to 0.91. Reliability for individual subtests ranged from 0.27 to 0.80. Low reliability levels for individual subtests are said to be due to the relatively small number of dichotomous items. The TVPS-R is useful in identifying visual perceptual difficulties in children as it is sensitive to conditions within the child such as low intellectual ability, learning difficulties, behavioural problems, lack of stimulation at home, educational retardation or emotional distress. Diagnostic validity of the TVPS-R was obtained by testing a sample of 42 learning disabled subjects[17]. An average standard score of well below the mean was seen for all subtests. The mean of the sum of scaled scores was 53 for the learning disabled subjects, which is below the mean of 70 found in the non-disabled population. The test is easy to administer and quick to score, making it an attractive assessment to use for quick identification of visual perceptual difficulties. The test also provides subscale and total scores, indicating the status of visual perceptual constructs.

On the other hand there are low item-total correlations on some items, the test lacks an inbuilt motor component and the manual does not contain a rationale for the importance of assessing visual perception or how well this test can assess visual perceptual skills. Psychometrically, there is limited detail of validity and reliability studies. The content validity for the TVPS-R[17], was established by ensuring that internal consistency, lack of gender bias and varying levels of difficulty were retained. In addition, the TVPS-R has become outdated by the development of the Test of Visual Perceptual Skills (third edition)[23].

The author of the TVPS-R[17] cautions that each subtest may contain a chance fluctuation. The test may therefore be testing actual differences in ability or may be due to error of measurement. However, built into the TVPS-R, is the ability to determine diagnostic patterns, for example; intra-test functioning, selection of the same number repetitively, or specific dysfunction in a particular area of visual perception.

McFall, Deitz and Crowe[24] used a class educator questionnaire to evaluate academic performance and related this to the earlier edition of the TVPS and concluded that the test was limited in use for determining service needs and documenting progress. It could therefore be argued that a similar finding may be true for the TVPS-R. However, as this test was being used as a diagnostic tool in the school setting it was imperative to determine the usefulness and compare it to the observations of teachers in the classroom.

Methods

Aim

This research was aimed at comparing the outcome of the DTVP-2[18] and the TVPS-Rev (non-motor)[17]. A descriptive, correlative design was used. A correlative design is similar to an experimental design

in that a hypothesis is being tested, but there is no manipulation of independent variables and no cause-effect relationship can be established [25]. The relationship between the two variables was tested by calculating the Spearman's rho correlation coefficient. In addition, the DTVP-2 and TVPS-R totals were correlated to the average of the outcomes of three class tests completed by the learners, in order to establish a relationship between the visual perceptual assessments and academic outcomes.

Population

A short term remedial school in KwaZulu-Natal (South Africa), was chosen for the research as all the learners had previously been identified as having difficulties in scholastic achievement and were thus admitted to the school. This study was conducted at the School between July 2002 and August 2003. Any learner from Grade 1 to Grade 4 could be included in the research as these grades covered the age limits (6 to 11 years) as prescribed in the visual perceptual assessments used. Learners who were 11 years and older were excluded from completion of the DTVP-2 due to the age limits of the test. A saturation population was chosen where every learner in the school within this age group could be included in the research. The population therefore consisted of 206 learners. Learners were excluded if the parents did not return the consent forms and if other information was missing.

This sampling technique is related to convenience sampling, and cannot necessarily be generalised beyond learners in the remedial setting [25, 26]. However, as this research is aimed at finding the relationship between the DTVP-2 and the TVPS-R, the sampling method was purposeful and representative of the information sought for this research. This resulted in a sample of 173 (see *Table 1*).

Table 1: Sample Size

GRADE	POPULATION	INFORMATION INCOMPLETE	ACTUAL SAMPLE SIZE	MALE	FEMALE
1	47	6 (12.8%)	41 (23.7%)	28 (23.5%)	13 (24.1%)
2	45	5 (11.1%)	40 (23.1%)	27 (22.7%)	13 (24.1%)
3	70	12 (17.1%)	58 (33.5%)	40 (33.6%)	18 (33.3%)
4	44	10 (22.7%)	34 (19.7%)	24 (20.2%)	10 (18.5%)
TOTAL	206	33 (16.0%)	173 (100.0%)	119 (68.8%)	54 (31.2%)

Measurement Tools

1. The TVPS-R[17] and theDTVP-2[18] as described above and
2. Three class tests covering mathematics, spelling, dictation and comprehension.

Method

Learners were tested on the prescribed visual perceptual tests as they became due for their annual occupational therapy assessment.

Ages were considered in two categories, 6 years to 8 years 11 months and 9 years to 11 years 11 months, chosen according to the developmental phases described by Hanneford[11], in order to establish whether developmental levels were relevant in the assessment of visual perception. The standardised tests compensated for age in converting the raw scores to percentiles, and were not school related tasks, thus grade comparisons and age categories were felt to be accurate.

Reliability of assessment procedures

Regular meetings were held between the four occupational therapists involved in testing in order to ensure inter-tester reliability and accuracy of administration procedures and scoring related to the tests standardised methods. All testing was conducted between 08H00 and 12H00, during normal school time.

Statistical Analysis

The results of the visual perceptual tests were analysed using the Statistical Package for Social Sciences (SPSS 15.0) with the assistance of a statistician. The scores were plotted on a scatter graph in order to determine the correlation lines. The results were further plotted on a bar graph to determine the distribution curve. The results did not fall on a normal distribution curve and thus the Spearman rho was used. The Spearman rho is used to compare two sets of rankings for patterns of relationship [25]. The standard deviation was calculated to measure the accuracy of the assessments.

The Kruskal-Wallis Test was used as a one-way analysis of variance to determine whether there was a significant difference in the mean scores[25] of the subtests that related to both the DTVP-2 and the TVPS-R. The Wilcoxon Signed Rank Test was used as the data was nonparametric[25], on the paired scores of the DTVP-2 and the TVPS-R, to determine the significance of the difference between the two scores. T-Tests were used to compare the mean scores[25] of the DTVP-2 and the TVPS-R. The Spearman Rho correlation co-efficient was used to determine the relationship between the DTVP-2 and the TVPS-R scores and academic performance.

Ethics

Permission to conduct the research was granted by: The University of Durban Westville. Ethical clearance number: 02208A, The KwaZulu-Natal Department of Education and The Principal of the School. The parents of learners from Grade1 through 4 were sent a letter explaining the nature of the study, the anonymity and lack of interference with the general routine of therapy and class work. The parents were requested to complete and sign a consent form indicating their willingness for their child to participate. There was no obligation to allow participation in the study. At no point would the child be aware of the research, as no changes to the routine running of the programme were introduced.

Results

Of the sample of 173 subjects (*Table 1*), 68.8% were boys and 31.2% were girls. There was also a higher percentage of learners in the lower grades.

Correlation between different aspects of the two tests

The relevant subtests and totals of the DTVP-2 and TVPS-R were compared to each other. The correlation was considered significant if the Spearman rho correlation co-efficient was below the p=0.05 level and highly significant if the co-efficient was below p=0.01 (refer to *Table 2*). The Spatial Relations, Form Constancy and Figure Ground subtests of the DTVP-2 correlated significantly with the Spatial Relations, Form Constancy and Figure Ground subtests of the TVPS-R. The valid sample size was 148, with 25 subjects having data not reported in either of the two tests.

The Visual Closure subtests of the DTVP-2 and the TVPS-R did not correlate with each other. The TVPS-R scores were significantly higher than the DTVP-2 scores, suggesting that the DTVP-2 tends to display difficulties which are not found in the TVPS. This may possibly be related to the lack of linearity in the items in the Visual

Table 2: Correlations of DTVP-2 and TVPSR subtests

Standardised Test	**Category scores**		
	Correlation Coefficient	Sig. (2-tailed)	N
Figure-Ground	.306(**)	.000	148
Spatial Relations	.193(*)	.019	148
Visual Closure	.095	.227	164
Form Constancy	.465(**)	.000	148

** Correlation is significant at the .01 level (2-tailed).
* Correlation is significant at the .05 level (2-tailed).

Table 3: Correlation of Composite Scores to Academic Subjects

		Motor Reduced Visual Perception DTVP2	General Visual Perception DTVP2	Total Visual Perception TVPS-R	Visual Motor Integration Total DTVP2	Average Maths Score	Average Spelling Score	Average Dictation Score	Average Comprehension Score
Motor Reduced Visual Perception DTVP2	Correlation Coefficient	1.000	.878(**)	.745(**)	.405(**)	.105	.104	.216	.212
	Sig. (2-tailed)	-	.000	.000	.000	.423	.334	.056	.104
	N	166	166	147	166	60	88	79	60
General Visual Perception DTVP2	Correlation Coefficient	.878(**)	1.000	.653(**)	.774(**)	.158	.149	.236(*)	.196
	Sig. (2-tailed)	.000	.	.000	.000	.227	.167	.036	.132
	N	166	166	147	166	60	88	79	60
Total Visual Perception TVPS-R	Correlation Coefficient	.745(**)	.653(**)	1.000	.263(**)	.152	.016	-.033	.001
	Sig. (2-tailed)	.000	.000	.	.001	.243	.880	.767	.991
	N	147	147	154	147	61	91	82	64
Visual Motor Integration Total DTVP2	Correlation Coefficient	.405(**)	.774(**)	.263(**)	1.000	.144	.093	.141	.146
	Sig. (2-tailed)	.000	.000	.001	.	.273	.389	.216	.265
	N	166	166	147	166	60	88	79	60

** Correlation is significant at the .01 level (2-tailed).

* Correlation is significant at the .05 level (2-tailed).

Closure Subscale of the DTVP-2. It would be useful to assess the linearity of the DTVP-2 items using a Rasch Measurement Model.

Correlation between total scores

The DTVP-2 subtest scores are grouped to result in a Visual Motor Integration, Motor Reduced Visual Perception and General Visual Perception quotient. The results of the total score derived from the DTVP-2 and the TVPS-R correlate strongly with each other ($p<0.001$; $r=0.654$). The total scores of the DTVP-2 and the TVPS-R correlated for: all age groups, grades 1-4 and both genders. In total, the DTVP-2 and the TVPS-R results correlate well with each other (see *Table 3*).

Correlation to academic performance

No correlation was found between the DTVP-2 Visual Motor Integration score, the Motor Reduced Visual Perceptual score and TVPS-R Total Visual Perceptual Score for mathematics, spelling, dictation or comprehension. No correlation was seen between the DTVP-2 Total Visual Perceptual Score and mathematics, spelling or comprehension, however there was a correlation to dictation.

Summary of results

The following deductions can be made about the DTVP-2 and TVPS correlations:

- The total scores on the DTVP-2 and TVPS-R correspond as do the sub-tests of figure- ground perception, spatial relations and form constancy but there is no correlation for visual closure.
- The DTVP-2 and TVPS-R did not accurately reflect the academic level of this cohort, however a possible reason for this may be that the learners were all experiencing different learning difficulties and class tests were configured to their specific level of ability in order to demonstrate achievement of their individual goals. This means that the class tests do not reflect the expected academic level in mainstream schools.

Limitations

It is necessary to take into account the limitations of this study so as to achieve a clearer understanding of the results. The tests used in this research were standardised in the United States of America, and although representative of a large and varied group of participants, did not include standardisation for the South African population.

A large proportion of the sample (93.6%) tested for this research had received occupational therapy for visual perceptual difficulties prior to the commencement of this study. This may have confounded the results as the assessment scores may have been inflated due to the repeated assessment procedure. However, as this study was primarily aimed at comparing the two assessments, this is of less consequence.

Some bias may have been introduced by the use of a saturation sample rather than a random selection. The research was limited to one school, with all learners diagnosed with learning difficulty. While resulting in a similar sample group, using one school excluded the possibility of learners with minimal difficulty being included, and resulted in less accurate evaluation of the outcomes compared to the academic levels of the learners. Many of the learners did not have class test results, which limited the ability to adequately correlate the results with academic performance.

Discussion

Accurate, cost effective and efficient assessment has become increasingly important in the present South African Educational System, where positive and accurate results are required for early identification of learners for therapy or discharge, especially where inclusive education is the accepted method of educating learners. The individual learner must be viewed in totality, in all areas of skill and function, and barriers to learning must be identified and when possible, eliminated as early as possible, without disruption to the learning process. The use of standardised assessments has been critiqued in the educational field as the results of standardised tests do not always reflect the behaviour of the learner in class with regards to the quality of schoolwork and academic achievement.

There was a very strong correlation between the DTVP-2 and TVPS-R total scores for visual perception. The validity of these tests in assessing visual perception is confirmed by this result; however, there is a lack of evidence in this study to show the relationship between the test results and the learner's academic performance. This phenomenon may be related to the fact that all the learners in this sample were attending a remedial school where individual educational programs are set to meet each learners' needs. The test results would therefore reflect the ability of the learner to perform at his or her own level and not necessary at the grade level of a mainstream school. The result may also have been affected by the high percentage of learners for whom there were no scores for the academic subjects (mathematics: 64.8%; spelling, 47.4%; dictation, 52.7%; comprehension, 63.1%) as no class tests were written. In mathematics, dictation and comprehension more than 50% of the sample displayed missing results, as these subjects are not formally tested in Grade 1 and 2 at the remedial school. The small percentage of the sample used in these comparisons, may have skewed the results and a false lack of correlation shown. Using standardised reading, mathematics, comprehension and spelling assessments may have avoided the problem of missing scores for academic subjects, but may not have reflected actual classroom performance.

From this study, it appears that the DTVP-2 and TVPS-R are of equal value when assessing a learner for visual perceptual difficulties. However, when specific subtests are used as a guide to focus therapy strategies, there appears to be differences in the outcomes of the two assessments. The DTVP-2 visual closure score is significantly lower than the TVPS-R score, resulting in the possibility of over-identification of visual closure difficulties when using the DTVP-2. The TVPS-R visual memory and visual sequential memory subtests appear equally accurate in identifying difficulties in short-term memory skills and it may, therefore, be a duplicate assessment when using the TVPS-R for memory assessment. When related to a study performed on a larger cohort of learners and assessed using the Rasch Measurement Model, the TVPS-R displayed good subscale differentiation[27]. Thus, it is recommended that the TVPS-R subscales be used as a reliable measure of visual perceptual skills, and the DTVP-2 subscales be used with caution. This study would have been strengthened by including the Test of Visual Motor Skills Revised[28], however as this is a separate assessment and not built into the TVPS-R as a subtest, it was not available to the researcher.

It is imperative to keep in mind that there may be other influencing factors in the outcomes of this research that were not considered here, such as the influence of gross motor skills, speech and language difficulties, auditory perceptual difficulties and the emotional reaction to being assessed such as fear of failure.

The poor link shown between the outcomes of the DTVP-2 and TVPS-R with academic levels in this study is interpreted with extreme caution due to the nature of the sample population and the testing methods used in the school involved in this research. Previous researchers have shown a link between visual perceptual skills and scholastic performance in: (1) reading[15, 29-32], (2) writing[8, 19, 33-35], (3) spelling[36, 37], (4) mathematics[19, 32, 36-39] and (5) comprehension[32]. Therefore, the continued assessment of visual perceptual skills in school aged learners is important in assisting learners to achieve their potential. Correlation of the DTVP-2 and TVPS-R, and academic performance should be pursued further in research with a sample where class test results are available to compare with the standardised test results.

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