

# ASCERTAINING THE PROPER READING GRADE LEVEL FOR SUBSEQUENT TESTING

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## Abstract

*Optometrists are often called upon to determine the effects of visual dysfunctions on their patients' reading ability. In order to optimally accomplish this with children, graded material is used by some practitioners to observe the reading performance under real life conditions. However, since the child's present classroom grade level is sometimes higher than his/her actual reading level, it is important for the optometrist to be certain that the presented reading material is at or below the child's reading level. The objective of this research was to ascertain which of two commonly used reading tests more closely predicted an educationally accepted, standardized reading test.*

*The reading scores of 54 third grade students from two Cherokee County, Oklahoma schools were collected in order to investigate the validity of two reading tests, the Gates-McKillop oral reading test (GM) and The Dyslexia Screener (TDS), as compared to the Iowa Test of Basic Skills (Iowa 3). The GM and TDS were chosen since they are readily accessible to optometrists.*

*The average GM grade equivalent score (GES) was 4.58, while the average Iowa 3 GES was 3.88. There was a statistically significant difference between the scores of these two tests. The Dyslexia Screener average GES was 4.28. There was a statistically significant difference between TDS GES and the Iowa 3 GES. There was,*

*however, no statistical difference between the grade scores of the GM and TDS.*

*This study indicated that the GM and TDS could be used interchangeably for evaluation of reading level. However, it should be kept in mind that they both overestimate the GES, as compared to the Iowa 3. It is suggested that because of the shorter administration time, TDS would clinically be more advantageous to use than the GM, since no significant difference in GES was found between the two tests at least for third-grade children.*

## Key Words

*The Dyslexia Screener, Gates-McKillop Oral Reading Test, Iowa Test of Basic Skills, oculomotor, reading problems*

Parents often relate a child's lack of academic achievement, particularly in reading, to poor vision, and they subsequently consult an optometrist. Reading is clearly one of modern society's most important skills, but many individuals have difficulty acquiring this skill.<sup>1-6</sup> There are a number of identified causes of an individual not reading well. Mental capabilities, inadequate developmental experiences at the prereading level, poor teaching, poor visual and/or auditory skills and other factors can cause the child to be behind his peers in reading.

In order to optimally assess the child's reading performance, some optometrists have the child read graded text material. This often uncovers performances such as loss of place, skipping lines of print, blurred and/or double vision and visual fatigue under real life conditions. These ob-

servations can then be connected to various findings of the optometric evaluation such as uncorrected refractive conditions dysfunction of eye movements, accommodation and vergence function.

However, a potential problem exists in choosing the particular graded level of reading material. It can occur that the child's reported grade level in school does not reflect the child's actual grade level in reading. When the material is more advanced than the child's capability, the cognitive demand can effect the overall reading performance and cause errors that can be interpreted as products of diagnosed visual dysfunctions, which in reality are not. Thus, it is important for those optometrists who use graded reading material as part of their evaluations to be certain that the material is at or below the child's true reading level.

The two tests studied were the Gates-McKillop (GM)<sup>a</sup> and The Dyslexia Screener (TDS).<sup>b</sup> Both are tests which are currently available and utilized by optometrists in order to diagnose/assess the child for reading grade level. These tests were compared to ascertain which best identified the reading grade level of a child as compared to the Iowa Test of Basic Skills (Iowa).

The Iowa is a standardized, educationally administered test that evaluates reading as part of overall academic performance. The Iowa is administered yearly to school-aged children in north-eastern Oklahoma as an objective evaluation of the child's performance, as compared to national scores.

The Iowa was first published in 1935 and assesses many aspects of academic

performance, including reading skill.<sup>7</sup> Educational systems use the Iowa Test to provide results to parents and teachers. This information is then used to evaluate and improve the quality of instruction. The test is available in levels roughly corresponding to the ages of the students to whom the test is administered and it is intended for use in kindergarten through eighth grade children. The core battery is composed of sections for mathematics, listening, word analysis, vocabulary, language and reading. A grade equivalent score (GES) is the typical score for a student and is reported by grade and month of school.

The Gates-McKillop reading test was developed in 1962 by Arthur Gates and Anne McKillop.<sup>8</sup> There are more recent reading tests available, but the GM was chosen specifically in this study because of its availability to optometry. It consists of seven paragraphs, each of increasing difficulty. The first paragraph is a relatively easy reading passage for the average second grader, whereas the most difficult paragraph represents approximately an eighth grade level.<sup>8,9</sup> The GM story content is formatted based on gender. Form I is designed to be administered to males, while Form II should be administered to females. Each child is asked to read the paragraphs aloud, one at a time and is given as much time as needed to complete the test. The test is scored by recording the number of errors, including hesitations over five seconds, word substitutions, word omissions, additions of extra words not on the page and word repetitions. Paragraph errors are then totaled. To determine the oral reading level, total errors are translated into equivalent grade (year/month) and age scores based on a table of norms.

To ascertain the decoding level (reading level) of a child with the TDS, the child is asked to read a series of words. Each series consists of five words, and the words are chosen to match particular grade levels. When the child makes an error in pronouncing three of the five words at a particular level, he is considered to have reached his reading performance ceiling and the previous successfully completed level is the decoding level of this individual.

## PURPOSE

The purpose of this study was to discover which of the grade-equivalent

scores of the two optometrically utilized reading tests (GM or TDS) correlated better with the Iowa's educational reading test scores. There is clinical value in this information. If one optometric test is better correlated with the Iowa, then that test would give a greater degree of assurance that the data was not contaminated by cognitive artifacts of the child attempting to read above his decoding level. If both tests correlate equally with the Iowa Test, then the shorter administration time of TDS would make it more clinically useful than the GM. Therefore, if no significant difference between the two tests was found, then TDS should then become the standard test to assess reading grade level for optometry.

## METHODS

Sixty-six third graders of both genders attending one of two elementary schools in Cherokee County, Oklahoma, were evaluated. Each student was required to have a signed informed consent letter from a parent or guardian. The GM and TDS were administered in the standard manner as described in the respective manuals, to each of the 66 students. The Iowa reading scores from the 1997-98 school year could not be obtained for 12 of these students; therefore, statistical analysis was performed on only 54 of the 66 students. The respective teachers assigned a number to each child for recording purposes in order to insure confidentiality.

While the GM and the Iowa Tests provide grade equivalent scores identifying reading level by grade and month of school, the TDS is not month specific and identifies the student's reading level only by grade. In order to compare the three tests, we added a month grade equivalent to each subject's TDS score by using the midpoint of the subjects's decoding grade level as determined by the TDS. For example, if five months was assumed to be the midpoint based on a nine-month school year, a subject with a third grade decoding level was assigned a grade equivalent score of 3.5.

The Iowa Test grade equivalent reading scores that were available were obtained for the 1996-97 (Iowa 2) and 1997-98 (Iowa 3) school years. The GM and the Iowa test reading scores were then statistically compared by two-sample student *t* - tests. Due to artificial norms assigned to TDS, chi-square analysis was

used to statistically compare TDS to both the GM and Iowa Test reading scores. A .05 level of significance was chosen for each of the statistical comparisons.

## RESULTS

Fifty-four third grade students (30 females; 24 males) from two different schools were evaluated with the GM and TDS. They ranged in age from 8.1 years to 10.6 years. The mean age was 9.2 years.

The mean Iowa Test GES for females in 3<sup>rd</sup> grade (Iowa 3) was 3.657 and 4.163 for males ( $t=2.007$ ,  $p=0.108$ ). The mean GM GES for females was 4.400 and 4.804 for males ( $t=2.007$ ,  $p=0.161$ ). TDS mean GES for females was significantly lower than males with a score of 3.833 for females and 4.833 for males ( $t=2.007$ ,  $p=0.025$ ). There was no significant statistical difference between male and female performance on Iowa 3 and GM. Since TDS data had been interpolated to a mid-year score on each child, and the TDS was the only significant difference between genders within the three tests, the gender data was pooled.

The Iowa GES from second and third grade were compared. The mean Iowa 2 GES was 2.830. The mean Iowa 3 GES was 3.881. By reviewing the reading scores for two consecutive years, we were able to insure that the scores moved in the proper direction and amount, which verified this test's validity as a standard by which to measure reading grade level.

A comparison of the mean GES between the two schools was performed using the student *t* - test on the GM and the Iowa 3 reading scores. The TDS scores between the two schools were compared using chi-square analysis. There were no significant statistical differences found; therefore, the data of both schools were pooled. The GM and TDS were compared with the Iowa 3 reading score. The expected GES for the GM, TDS and the Iowa 3 reading score was set at 3.5 (third grade, five months).

The average GM GES was 4.580. The average Iowa 3 GES was 3.881. There was a significant statistical difference between the scores of these two tests ( $t=1.983$ ,  $p=0.001$ ). The Dyslexia Screener average GES was 4.277. There was a significant statistical difference between TDS GES and Iowa 3 GES ( $p<0.001$ ). No statistical difference was

**TABLE 1**  
**Comparison of the Mean Reading Test Scores of the**  
**GM, TDS and Iowa 3 for 3rd Graders**

	Test Score	GM	TDS	Iowa 3
Gates McKillop	4.580	—	NS	.001
The Dyslexia Screener	4.277	NS	—	<.001
The Iowa 3 Test Score	3.881	.001	<.001	—

found between the GM and TDS ( $p = 0.417$ ). Table I contains the chi-square analysis results.

### DISCUSSION

It is central to the whole concept of reading evaluation that the individual not be placed in a position that makes an overwhelming demand upon his intellectual capacity.<sup>10-13</sup> It is universally agreed that if a student is asked to read above his level, the measured oculomotor skills, as with a Visagraph,<sup>c</sup> will also be impacted. Since objective measures of oculomotor function and comprehension are becoming more standard in the optometric examination to evaluate visually related learning problems, ascertaining the level of reading skill is essential. We have found that the average Iowa Test scores relate very closely to the actual grade placement. The Iowa average for the second grade was 2.888 and the Iowa average for the third grade was 3.881. This is an agreement in scores between the average standardized test scores and the actual grade placement.

The GM and TDS both over predicted the grade placement and the Iowa Score in our sample. If a reading test to objectively record eye movements, or measure comprehension, was administered, based upon these scores, one would run the risk of contaminating the data because of a cognitive overload. Subtracting five months from the GM score would more accurately predict the child's reading level. Since we assumed TDS was at the midpoint of the grade, we revised this to assume that the TDS predicts grade level at the beginning of the grade, thus subtracting five months from the TDS grade level. Since the Visagraph II reading paragraphs are divided only by years, it would be prudent for the clinician to give a reading paragraph which is one year lower than the measured reading level of either the GM

or TDS. This would insure that the child is reading at or below his actual level and therefore would minimize the cognitive interference with the eye movements as well as have less effect upon the reading comprehension score. Due to its shorter administration time, it would be clinically more advantageous to use TDS than the GM; therefore, TDS is the more time efficient test for predicting a reading grade score in an optometric office.

What would cause both of these tests to overestimate the reading grade level relative to the Iowa? There are numerous possible factors that may cause this overestimation. The test environment may be a factor. The Iowa is administered in a group setting, whereas the GM and TDS are administered one-on-one. The group setting of the Iowa Test could present possible distractions, such as classroom noise or peer pressure. The Iowa Test has multiple sub-tests administered over several days; therefore, fatigue may be a factor in its lower GES. Due to the time limitations of the Iowa test, an additional stress factor of time management may also be attributed to the lower GES. Although the GM and TDS are not time-limited, most students were able to complete both tests over a combined period not exceeding fifteen minutes. The lack of fatigue and absence of time constraints, therefore, may have contributed to the higher GES of the GM and TDS.

### CONCLUSION

The purpose of this study was to find if one of the two reading tests (Gates McKillop or The Dyslexia Screener) was a better predictor of a standardized reading test (Iowa 3) which is well accepted by the educational community as defining true reading grade level. This information would be helpful to the optometrist in affecting his decision as to which clinical

tests to choose to investigate both the child's visual skills and visual information processing abilities. The following paragraphs summarize our conclusions from this investigation.

Both the GM and the TDS significantly overestimated reading GES as compared to the Iowa 3. No significant statistical difference was found between the GM and TDS; therefore, the GM and TDS can be used interchangeably for optometric evaluation of reading level. Due to the shorter administration time of TDS, it is clinically more advantageous to use than the GM.

This research was done with subjects whose school placement was in the third grade. We chose this group since it is at this point that the child is beginning to "read to learn," rather than "learn to read." Consequently, reading difficulties frequently are then first determined by teachers and parents, and optometric consultation is sought to evaluate whether ocular and/or visual factors are contributory. We feel confident that our results are valid for this age/grade level group. Whether the same conclusions can be drawn for other age/grade groups needs further research.

It is appropriate for the optometrist to underestimate the reading level of the child, rather than overestimate it, when assessing eye movements with the Visagraph. With this instrument the child is presented with graded reading material. Such a strategy of underestimating the reading level would insure that the subsequent reading material is at a level that errs on the side of the student. The tester can now be more confident that any sub-performance in eye movements is not the consequence of a cognitive overload. We recommend, at least for third grade students, the clinician using the TDS to ascertain a reading level should therefore subtract one year from the decoding grade score obtained when the TDS is administered.

If one wishes to predict the actual reading level of a patient, the TDS should be administered and the decoding score should be taken as the reading level at the beginning of the particular grade, not at the midpoint. Caution should be observed, however, in that these are statistical observations for third grade students only and individual patients might prove to be an exception.

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