

RUNNING HEAD: Criterion Validity of *A+nyWhere Learning System*®

**Criterion Validity of *A+nyWhere Learning System*®
Reading Assessment**

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INTRODUCTION

The *A+nyWhere Learning System*® (*A+LS*) is a network-installed computer program that delivers core curriculum instruction to students ranging from kindergarten through adult learners. This educational software features integrated assessment and automated reporting tools that are aligned to all state and national academic standards and includes extensive management capabilities. The system provides diagnostic assessments to determine a student's mastery level of instructional objectives and prescribes lessons to provide instruction in the objectives that have not been mastered. Due to the No Child Left Behind Act, one important aspect to scientifically establish is that the *A+LS* assessments are valid assessments of their specific academic content areas. In addition there is a need to demonstrate that *A+LS* assessments are valid for specific demographic student groupings such as those based on ethnic backgrounds and gender. The method used in this paper is to investigate the magnitude of agreement (criterion validity) between a standard *A+LS* reading assessment and the reading portion of the Oklahoma Performance Index (OPI).

Criterion validity (or concurrent validity) describes the correlation between an instrument of interest and established standard measures. This means that investigations of criterion validity attempt to demonstrate that a new assessment for a given content area aligns both in direction and magnitude with well established measures of that same

concept area. In this paper, the correlations between the reading portions of the OPI and a specific *A+LS* reading assessment for seventh grade students of different ethnic backgrounds from two different Oklahoma middle schools are investigated to provide evidence that the *A+LS* reading assessment is valid.

Description of the Oklahoma Performance Index

The Oklahoma Performance Index (OPI) is a set of scaled scores that are derived from the Oklahoma Core Curriculum Tests (OCCT). There is a direct one-to-one relationship between the OCCT number-correct score and the OPI: the students with higher number-correct scores receive higher OPIs. The OPI scores are based on percent correct scores but are reported on a scale of 400 to 990. This allows for OPI comparisons across school years.

The Grade 7 OCCT in Reading consists of 50 multiple-choice test items. These items are drawn from various genres including classic and contemporary literature, poetry, magazines, newspapers, reference materials, and online information. Students are asked to respond to a variety of items written to the standards of Vocabulary, Comprehension and Critical Literacy, Literature, and Research and Information. Each standard requires students to use a number of different reading skills. This assessment takes about 85 minutes; however, additional time is supplied as needed as this is not a timed test.

Description of *A+LS* software and assessments

The *A+nyWhere Learning System*® is a network-installed computer program with extensive management capabilities. The system provides diagnostic assessments to determine a student's mastery level of instructional objectives and prescribes lessons to provide instruction in the objectives that have not been mastered.

Each lesson is presented with a consistent methodology. In essence, it is a computer-delivered lesson based on the principles of mastery learning. Throughout *A+LS*, illustrations are used to provide context and amplification of the concepts presented in print. However, graphics are not used to create a “game-like” experience. *A+LS* is designed so that it is clear to students that they are in a learning environment. In each lesson, a study guide that consists of a series of pages presents the concept being taught. The study guide is followed with a series of practice exercises in which students receive immediate feedback regarding the accuracy of their answers. Then, there is a mastery test. The management system provides ongoing feedback to students regarding their overall progress.

A key component of *A+LS* is its ability to assess students against specific standards and prescribe individual lesson plans for students based on their specific needs. This component has been developed with an emphasis on three areas: focusing assessments to specific learning objectives, whether they be national, state, district, or local; automating prescriptions to include all resources that the school or district has at its

disposal; and integrating administrative, staff, faculty, and student databases (including performance records) with existing databases.

The *A+nyWhere Learning System*® courseware will prescribe activities that may include any content or resources available to the educator. These activities can include computer-based content, Internet material, and non-computer material such as textbook lessons, group work, field trip, projects, etc. Capability to grade and identify mastery of these activities is also provided.

Hypothesis

Seventh grade student performance on the *A+LS Reading Assessment 7 (Form A)* is predicted to significantly correlate with his or her performance on the reading portion of the Oklahoma Performance Index (OPI). Additionally, the strength of the correlations between the reading portion of the OPI and the *A+LS Reading Assessment 7 (Form A)* is predicted not to be significantly different due to the student's middle school, ethnic background, or gender.

METHODOLOGY

Participants: Sample Characteristics

The entire sample of 247 children was drawn from two separate Oklahoma middle schools. The characteristics of the students drawn from each school are separately described.

Western Oaks Middle School. This charter middle school was sampled during the course of the 2005-2006 school year and the number of participants who took both assessments consisted of 180 seventh-grade students. Western Oaks Middle School serves 6-8th grade students and is located in Oklahoma City, Oklahoma. Of these students, 78 were female (43.3%) and 102 were male (56.7%). The ethnic background of these students was mostly Caucasian (101 or 56.1%) with minority students composing the rest of the sample: African American (34 or 18.9%), Hispanic (19 or 10.6%), Native American (16 or 8.9%) or other (10 or 5.6%).

Independence Middle School. This charter middle school was sampled during the course of the 2005-2006 school year and the number of participants who took both assessments consisted of 67 seventh-grade students. Independence Middle School serves 6-8th grade students and is located in Oklahoma City, Oklahoma. Of these students, 40 were female (59.7%) and 27 were male (40.3%). The ethnic background of these students was mostly Caucasian (47 or 70.1%) with minority students composing the rest of the sample: African Americans (10 or 14.9%), Hispanics (6 or 9%), and Other or unknown (4 or 6%).

Procedure

For this observational study, all 247 seventh graders took the *A+LS* assessment and the OPI in 2006. For purposes of this report, the OPI scaled scores were used. These OPI scores were correlated with student performance on *A+LS*

Reading Assessment VII (Form A) for the entire sample, for each of the schools separately, and by ethnic backgrounds. In addition, a regression line was calculated and included with each of the scatter plots to better illustrate the relationship between the OPI scaled score and the *A+LS* reading assessment.

RESULTS

Results are reported first by utilizing all the students and then by specific demographic groupings of school, ethnic background, and gender. Potential significant differences in the magnitude of the correlations between groupings were tested to determine if criterion validity for specific demographic groupings could be assessed by collapsing across other variables. For example, to assess potentially significant Pearson coefficient magnitude differences between males and females, inferential testing of significant differences between the two schools and each of the ethnic backgrounds were investigated.

This was done by calculating the standard error of difference between the two relevant correlations, converting the Pearson correlation coefficients into z-scores, and then dividing the difference between the two z-scores by the calculated standard error. If the resulting observed z-score was greater than 1.96 then the differences between the magnitudes of the Pearson correlation coefficients were not significant at the .05 level. There were no significant differences between any of the major demographic groupings of Middle School ($z = 0.63, p > .05$); Ethnic Background

comparisons of African American and Caucasian ($z = 1.31, p > .05$), Hispanic and Caucasian ($z = 0.32, p > .05$), or Native American and Caucasian ($z = 0.07, p > .05$); and Gender ($z = 1.09, p > .05$).

Overall

Utilizing all the students, a Pearson correlation coefficient was calculated for the *A+LS* Reading Assessment 7 (Form A) with the Oklahoma Performance Index for reading. The correlation coefficient was highly significant: $r(247) = 0.73, p < .001$. Please see Figure 1 for a scatter plot with regression line. This result means that about 53% of the variance in the OPI scores was explained and predicted by the students' *A+LS* assessment average.

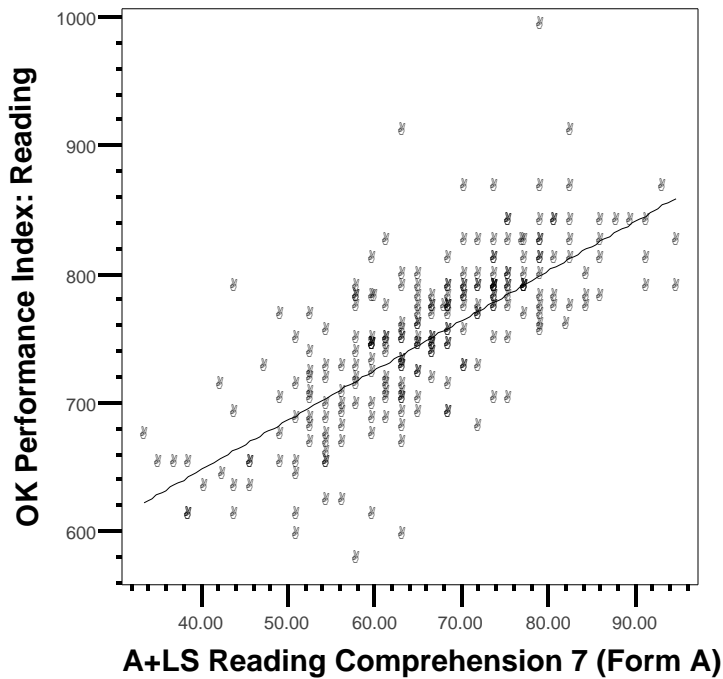


Figure 1. Scatterplot of Oklahoma Performance Index for Reading and the *A+LS* Reading Comprehension Assessment 7 (Form A) scores for all 7th graders.

By Middle School

Independence Middle School. Utilizing only students from the Independence Middle School, a Pearson correlation coefficient was calculated for the A+LS Reading Assessment 7 (Form A) with the Oklahoma Performance Index for reading. The correlation coefficient was highly significant: $r(67) = 0.758, p < .001$. Please see Figure 2 for a scatter plot with regression line. This result means that about 58% of the variance in the OPI scores was explained and predicted by the students' A+LS assessment average.

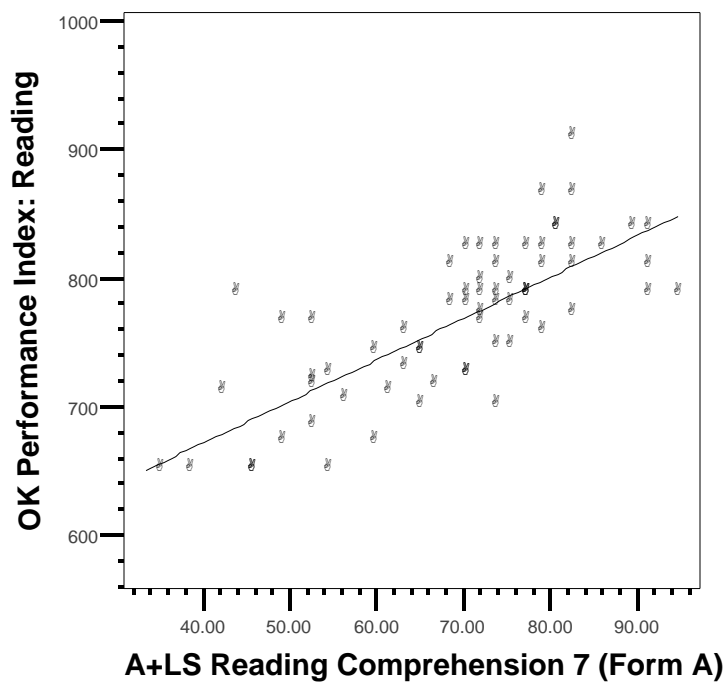


Figure 2. Scatterplot of Oklahoma Performance Index for Reading and the A+LS Reading Comprehension Assessment 7 (Form A) scores for Independence 7th graders.

Western Oaks Middle School. Utilizing only students from Western Oaks Middle School, a Pearson correlation coefficient was calculated for the A+LS

Reading Assessment 7 (Form A) with the Oklahoma Performance Index for reading. For the OPI Reading Score the correlation coefficient was highly significant: $r(180) = 0.718, p < .001$. Please see Figure 3 for a scatter plot with regression line. This result means that about 52% of the variance in the OPI scores was explained and predicted by the students' *A+LS* assessment average.

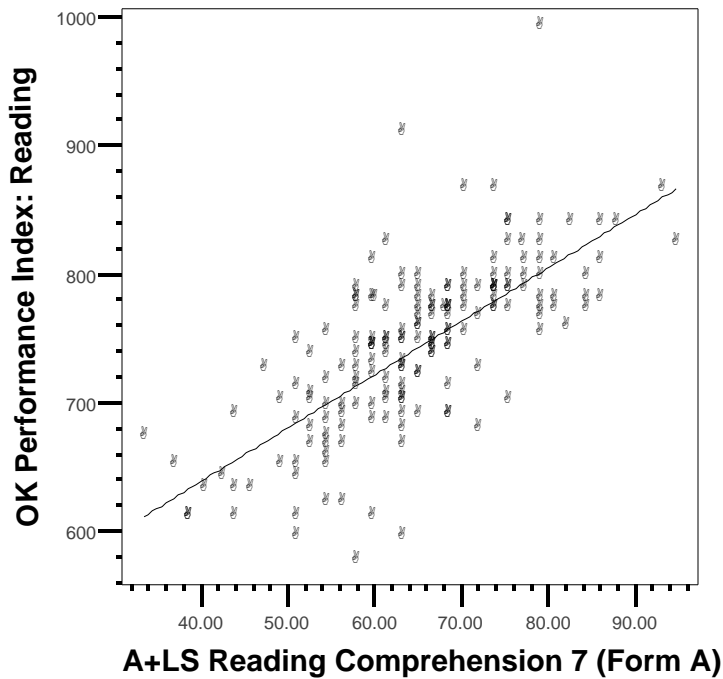


Figure 3. Scatterplot of Oklahoma Performance Index for Reading and the *A+LS* Reading Comprehension Assessment 7 (Form A) scores for Western Oaks 7th graders.

By Ethnic Background

African Americans. Utilizing only African American students, a Pearson correlation coefficient was calculated for the *A+LS* Reading Assessment 7 (Form A)

with the Oklahoma Performance Index for reading. For the OPI Reading Score the correlation coefficient was highly significant: $r(44) = 0.781, p < .001$. Please see Figure 4 for a scatter plot with regression line. This result means that about 61% of the variance in the OPI scores was explained and predicted by the students' *A+LS* assessment average.

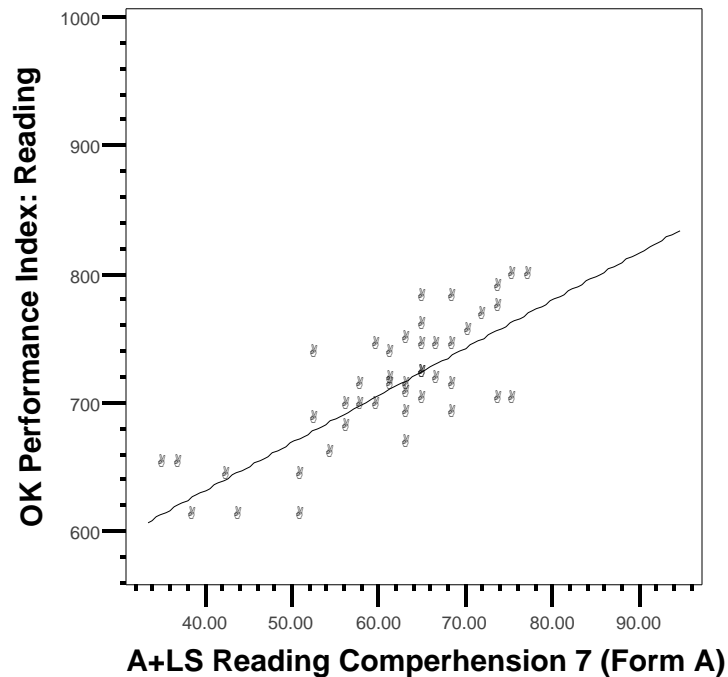


Figure 4. Scatterplot of Oklahoma Performance Index for Reading and the *A+LS* Reading Comprehension Assessment 7 (Form A) scores for African American 7th graders.

Caucasians. Utilizing only Caucasian students, a Pearson correlation coefficient was calculated for the *A+LS* Reading Assessment 7 (Form A) with the Oklahoma Performance Index for reading. For the OPI Reading Score the correlation

coefficient was highly significant: $r(148) = 0.676, p < .001$. Please see Figure 5 for a scatter plot with regression line. This result means that about 46% of the variance in the OPI scores was explained and predicted by the students' A+LS assessment average.

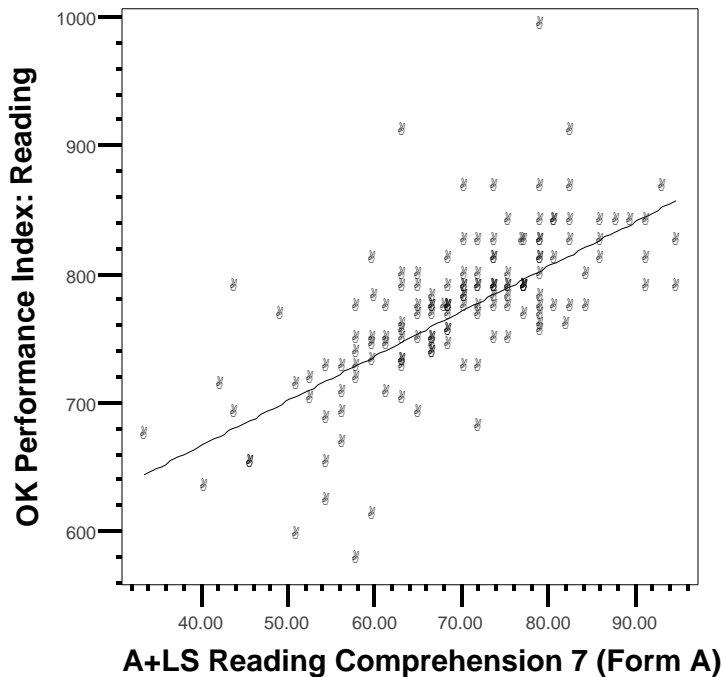


Figure 5. Scatterplot of Oklahoma Performance Index for Reading and the A+LS Reading Comprehension Assessment 7 (Form A) scores for Caucasian 7th graders.

Hispanic. Utilizing only Hispanic students, a Pearson correlation coefficient was calculated for the A+LS Reading Assessment 7 (Form A) with the Oklahoma Performance Index for reading. For the OPI Reading Score the correlation coefficient was highly significant: $r(25) = 0.630, p < .001$. Please see Figure 6 for a scatter plot

with regression line. This result means that about 40% of the variance in the OPI scores was explained and predicted by the students' *A+LS* assessment average.

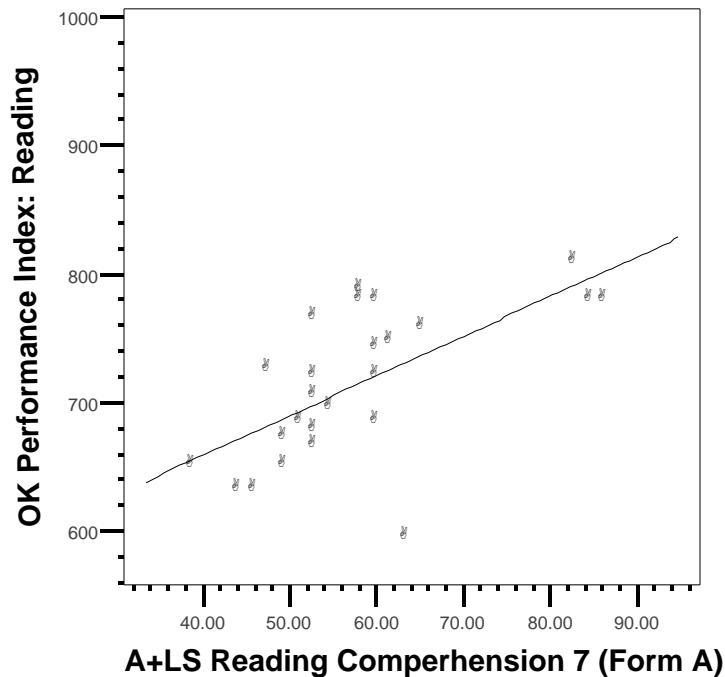


Figure 6. Scatterplot of Oklahoma Performance Index for Reading and the *A+LS* Reading Comperhension Assessment 7 (Form A) scores for Hispanic 7th graders.

Native American. Utilizing only Native American students, a Pearson correlation coefficient was calculated for the *A+LS* Reading Assessment 7 (Form A) with the Oklahoma Performance Index for reading. For the OPI Reading Score the correlation coefficient was highly significant: $r(16) = 0.660, p < .001$. Please see Figure 7 for a scatter plot with regression line. This result means that about 44% of the variance in the OPI scores was explained and predicted by the students' *A+LS* assessment average.

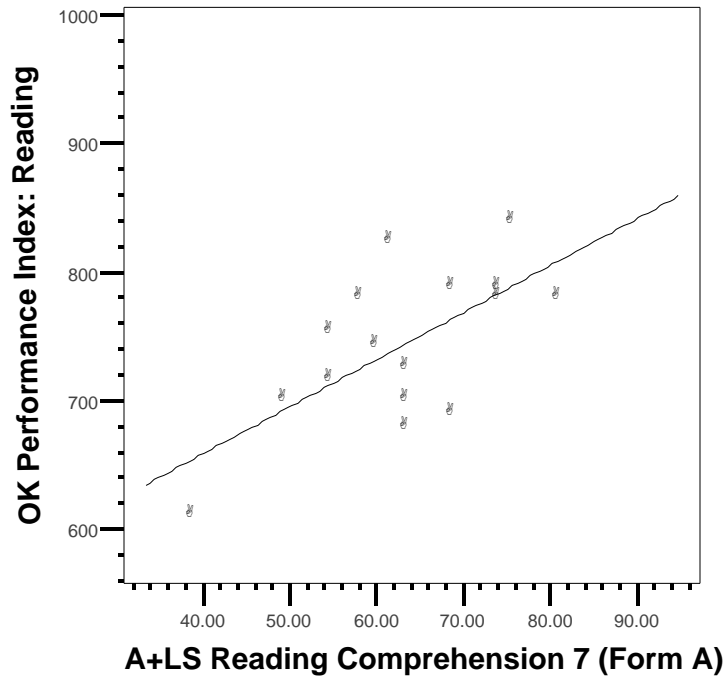


Figure 7. Scatterplot of Oklahoma Performance Index for Reading and the *A+LS* Reading Comprehension Assessment 7 (Form A) scores for Native American 7th graders.

By Gender

Females. Utilizing only female students, a Pearson correlation coefficient was calculated for the *A+LS* Reading Assessment 7 (Form A) with the Oklahoma Performance Index for reading. For the OPI Reading Score the correlation coefficient was highly significant: $r(118) = 0.628, p < .001$. Please see Figure 8 for a scatter plot

with regression line. This result means that about 39% of the variance in the OPI scores was explained and predicted by the students' *A+LS* assessment average.

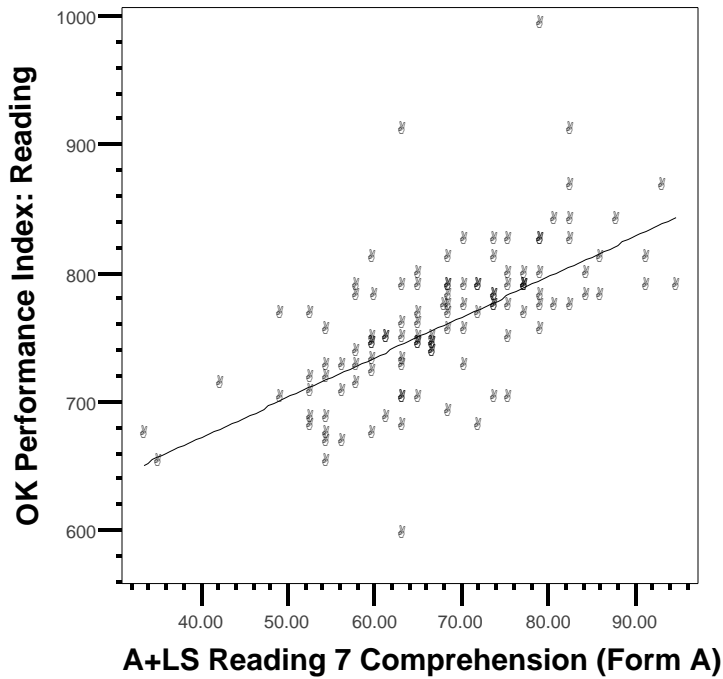


Figure 8. Scatterplot of Oklahoma Performance Index for Reading and the *A+LS* Reading Comprehension Assessment 7 (Form A) scores for female 7th graders.

Males. Utilizing only male students, a Pearson correlation coefficient was calculated for the *A+LS* Reading Assessment 7 (Form A) with the Oklahoma Performance Index for reading. For the OPI Reading Score the correlation coefficient was highly significant: $r(129) = 0.794, p < .001$. Please see Figure 9 for a scatter plot with regression line. This result means that about 63% of the variance in the OPI scores was explained and predicted by the students' *A+LS* assessment average.

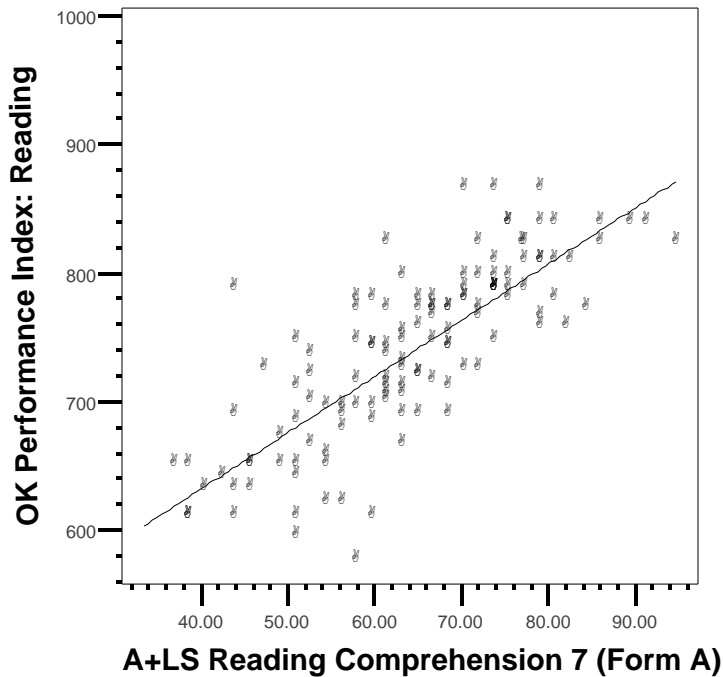


Figure 9. Scatterplot of Oklahoma Performance Index for Reading and the *A+LS* Reading Comprehension Assessment 7 (Form A) scores for male 7th graders.

DISCUSSION

The results indicate that the *A+LS* assessment tests have value for educators beyond their prescriptive function. *A+LS* assessments allow educators to identify students who are poor performers in advance of their state-mandated assessments and, more importantly, with enough time to direct limited resources to helping those students in need. The usefulness of this predictive power is further enhanced by the reporting of the significant correlation between the *A+LS* assessment to the OPI. Specifically, this ability to predict a large percentage of a student's performance on the Oklahoma standardized assessment enables educators to efficiently allocate scarce resources such as

available tutors, additional time with computer-assisted learning, peer-to-peer interactions, or other educational interventions. This should translate into more efficient instruction of students prior to state-mandated assessments and increase the chances that schools make adequate yearly progress.

Although there appeared to be modest differences in the strength of the correlations among the various demographic groupings, these differences were found to be not significant. This non-result is encouraging as it strongly suggests that this 7th grade reading assessment is valid across both genders and a diverse set of ethnic backgrounds. However, due to a low number of participants, caution is urged in applying these results as additional data is needed to support the lack of differences in the ethnic groupings of Hispanic and Native American.

Two obvious limitations of this observational validation study are the use of only one version of the seventh grade reading assessment and the use of the scaled scores from the Oklahoma Performance Index. Additional assessments and data are needed to enhance the robustness of these results. These outcomes will need to be combined with additional data relating student performance on multiple *A+LS* assessments to OPI assessments (and other assessments) to allow the development of tables based on regression equations that will serve as a useful guide for educators responsible for effectively distributing limited educational resources. Thus, future data gathering will need to accumulate enough data for each specific state's mandated assessments for students of differing grades, ethnic groups, socioeconomic status, gender, and other

demographic variables. This will not be a task with a discrete endpoint but rather an ongoing one as states continue to refine their own educational assessments. However, as increasing amounts of data become available on the correlations between those state assessments and older established performance assessments, increasingly precise conclusions can be made about how each of the *A+LS* assessments predicts the performance of specific student demographic clusters. But this challenge does not change the fact that computer-based assessments are another tool in the educators' toolbox, and the results from this observation support the efficacy of this specific tool, an *A+LS 7 Reading Assessment (Form A)*, as predicting student's performance on the Oklahoma Performance Index.