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# Relationships Among Testing Medium, Test Performance, and Testing Time of High School Students Who Are Visually Impaired

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***Abstract:*** This study compared the test scores and time required by high school students who are blind, sighted, or have low vision to complete tests administered in written and oral formats. The quantitative results showed that the blind students performed better on multiple-choice tests in braille and needed more time while taking tests in braille. The interviews revealed inconsistent relationships between the students' preferred media and performance.

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Students who are visually impaired (that is, are blind or have low vision) often take academic tests orally; these tests may be administered by a human reader, on audiotape, or on a computer using synthesized speech. Oral administration is generally a faster way to give an examination to a student who is visually impaired, and some students prefer this method. It may also be used because the instructor did not have time to prepare the examination in the student's reading medium or to improve access, such as when the examination contains graphic materials that cannot be adequately represented tactilely.

Educators, students, and families sometimes assume that oral tests yield equivalent scores to those on print or braille tests, but there is little empirical support for this assumption. The literature on oral

testing of visually impaired students has mainly explored testing speed, but only two studies (Ghesquiere, Laurijssen, Ruijssenaars, & Onghena, 1999; Woods, 1981) could be found that explored possible differences in test performance on the basis of the medium in which the test is given.

Given the current academic emphasis on standardized testing and the application of oral administration as a testing accommodation, it is important for students who are visually impaired and their teachers to know how oral tests may affect students' performance and speed. This article describes a project that was conducted to investigate four primary questions about oral tests:

1. Are there differences in the test performances of students who are blind, those who have low vision, and those who are sighted when tests are administered orally rather than when they are administered in print or braille?

2. Are there differences in the three groups' performance on multiple-choice and short-answer items when the tests are administered orally rather than when they are administered in print or braille?

3. Are there differences in the time that the three groups need to complete tests when the tests are administered orally rather than when they are administered in print or braille?

4. What were the participants' experiences and preferences with regard to oral and written tests?

## Review of the literature

Oral administration is an approved testing accommodation for many students with disabilities, typically those with learning disabilities and visual impairments. The larger number of students with learning disabilities has made it possible to conduct empirical research on the effects of oral testing on these students' performance on tests. In an analysis of research on the effects of testing accommodations, Thompson, Blount, and Thurlow (2002) identified 10 studies that examined the effects of oral testing (called "read aloud") on the

performance of students with learning disabilities. Six studies found that oral testing had some relationship with improved performance, and one study found a slight but not significant advantage for students who were tested orally. The remaining three studies examined the comparability of items on oral and written tests, with two studies reporting that items were not comparable and one study reporting that they were comparable. For students with learning disabilities, there appears to be an advantage to oral testing and a possibility that the essence of some questions is altered by this form of administration.

Some of these studies included participants without disabilities as a way of determining whether read-aloud accommodations also provided an advantage to these students. Meloy, Deville, and Frisbie (2000) found that both students with disabilities and those without disabilities benefited from the read-aloud accommodation. This finding raises a question about whether reading a test aloud equalizes access, as accommodations should do, or gives the student with a disability an advantage over his or her peers when tests are read aloud only to students who have disabilities.

In a study of empirical support for common testing accommodations, Thurlow and Bolt (2001) summarized issues related to oral testing as an accommodation. Variations in whether students are entitled to hear the material several times, whether they should be offered a read-aloud option along with a written copy of the examination, whether group administration is viable, and whether students may receive unintentional cues through the reader's voice are all relevant when considering the validity of this option.

In contrast with the literature on students with learning disabilities, there is little empirical information on how oral testing compares to print or braille testing for students who are visually impaired. Only two studies could be found that examined the performance of students who are visually impaired on oral tests. Woods (1981) compared the reading and listening abilities of 71 visually impaired students using the Durrell Listening-Reading series and found that

students performed better when they took the test orally than when they took it in their preferred medium. These results were strongly related to verbal intelligence.

Ghesquiere et al. (1999) investigated the difference between auditory and visual learning. Their study required six sighted and six visually impaired university students to read a three-page passage from a verbal learning test. The students were then tested orally or in their reading medium (print or braille), with a counterbalanced presentation sequence within each group. All the groups improved on the second administration; on the first administration, however, students who were blind who listened to the text scored higher than did those who read it in braille, in contrast to the sighted group, in which visual readers scored higher than those who listened. These findings cannot be generalized, however, because only three students were in each of the four subgroups.

In reviewing this literature, educators need to consider the implications of variations in scores that may be associated with testing media. While many studies of students with learning disabilities have found that oral reading as an accommodation enables students to achieve better scores, the literature on students who are visually impaired is too scant to suggest a similar advantage in performance. Nevertheless, oral testing is commonly used with students who are visually impaired as a means of saving time or allowing for the oral explanation of complex materials, such as graphics. In view of the need for empirical support for current practices, this study investigated the relationship of both test scores and time to the oral and written administration of tests.

## Method

### PARTICIPANTS

The participants included 30 high school students (10 who were blind, 10 who were sighted, and 10 who had low vision) who agreed to take six tests after reading six chapters of an eighth-grade social studies textbook. They constituted a convenience sample that was

drawn from three states (Arizona, Iowa, and Tennessee). The participants were asked to select their preferred reading medium for reading text and taking tests. All 10 participants in the blind group selected braille as their written medium; 9 of the 10 participants in the low vision group chose large print (the remaining participant who selected standard print was not included in the final data analysis because of incomplete data), and all 10 participants in the sighted group selected standard print.

The participants were identified by a posted notice to teachers on the electronic bulletin board of the Arizona Association for Education and Rehabilitation of the Blind and Visually Impaired and by contacts with known professionals who served visually impaired high school students in Arizona, Iowa, and Tennessee. Each participant received $100 for participating. Four participants were students at a residential school, and the rest were public school students.

## STUDY DESIGN

Each participant was tested six times over a six-week period. Three trials each were administered in the participant's primary reading medium, and three trials were orally administered. The order of presentation of the trial medium was varied so that the participants received oral and print or braille trials in different sequences. About a week before each test was administered, the participants were given a chapter of an eighth-grade social studies text--*World Cultures: A Global Mosaic* (Ahmad, Brodsky, Crofts, & Ellis, 2004)--in their preferred reading medium. This text was chosen because it was already available in adapted formats from the American Printing House for the Blind (APH); none of the participants was familiar with the text. The participants were asked to read each chapter independently as if they were studying for a school test.

A test on each chapter was presented to each participant at about the same time each week by a graduate assistant from the university conducting the study or by a paraprofessional in the student's school district. The oral tests were audiotaped by the first author, and the participants operated portable audiotape players to hear the test at the

time of administration. The participants were able to stop and start the recorder at any time and to rewind it to review the questions as needed. Written tests were provided in standard print, large print, or braille, depending on each participant's preferred reading medium. The participants recorded their responses to both the oral and print or braille tests on paper. No time limit was established for completing the tests, but the time needed for testing was recorded for each participant.

The tests were developed by the first author and three student research assistants. Each test included 20 multiple-choice and 20 short-answer items that reflected a similar level of cognitive challenge across the six tests. Consistency in tests was addressed by regular meetings among the item writers to balance the number of factual and interpretive items in each test. The testing materials were produced in braille, standard print, and large print by APH. As was mentioned earlier, each chapter was bound separately, and a new chapter was given to the participants as soon as the previous test was completed to limit exposure to subsequent and previous chapters. Pictures and graphics were eliminated from all three versions to ensure that the participants received all information by reading.

In addition, each participant was interviewed after all the testing sessions were completed. Seven interview questions inquired about the participant's preferred medium for testing, the reason for the preference, which medium the participant believed resulted in the best test score, what medium the participant typically used in school, and the participant's testing and study habits.

## Results

### QUANTITATIVE RESULTS

Thirty students completed the tests, but data from two students (one with low vision and one who was blind) were missing or incorrectly administered. For this reason, the score of one sighted student was also eliminated to leave nine students in each group. Table 1 reports the means and standard deviations of the test scores by items correct

for the 20 multiple-choice items, for the 20 short-answer items, and for the 40 items in the total test. In addition, it reports the average time needed to complete the audiotaped and written (print or braille) tests.

### *Form of administration*

The data were analyzed to determine whether the form of administration (audiotaped or written) was related to performance, as measured by the total correct items out of 40. An analysis of variance (ANOVA) revealed no significant differences in the total scores of the three groups when their performance on the audiotaped and written tests was compared. The oral and written administration of the tests were not different. $f$ (4, 48) = 1.88. Group scores were similar for oral administration, $f$ (2, 24) = 1.84 and written administration $f$ (2, 24) = 3.06. There were no significant differences between testing scores, regardless of the methods of administering the tests (see Table 1).

### *Types of questions and form of administration*

An ANOVA was also applied to determine the relationship between the type of question (multiple choice or short answer) and the form of administration (oral or written). On the oral tests, there were no differences between the scores for the multiple-choice and short-answer questions. The mean scores for multiple choice were 12.38 for the blind group, 9.51 for the low vision group, and 10.37 for the sighted group, $F(2, 24) = 1.69$. The participants who were blind ($M$ = 9.90), had low vision ($M$ = 5.20), and were sighted ($M$ = 7.01) scored similarly on the short-answer items, $F(2, 24) = 3.27$. Although none of the differences reached significance, the participants who were blind scored at least two points higher than did those in the other two groups on the oral tests.

However, the results for the type of question were significantly different when written materials were used to administer the test. For the multiple-choice questions, there was a statistical difference between the groups, $F(2, 24) = 3.62$, $p$ = .04. The mean scores for the

multiple-choice items were 13.07 (blind group), 9.14 (low vision group), and 10.96 (sighted group). The braille-reading participants performed better on the multiple-choice items than did those with low vision and those who were sighted. In contrast, there were no differences in the test scores of the three groups on the short-answer items, $F(2, 24) = 2.12$; for these items, the mean scores were 9.92 (blind group), 5.96 (low vision group), and 7.70 (sighted group).

An analysis of the interaction of the type of question and the type of test administration showed differences among the groups. All the groups performed better on the multiple-choice questions in both the oral and written administration conditions. The main effect of type of question was statistically significant, $F(1, 24) = 114.53$, $p = .000$, and all the groups performed better on the multiple-choice questions ($M = 10.75$) than on the short-answer questions ($M = 7.37$) when the test was administered orally. Likewise, the main effect on the type of test was statistically significant, $F(1, 24) = 48.37$, $p = .000$, and the multiple-choice items ($M = 11.06$) yielded higher scores than did the short-answer items ($M = 7.86$) among the groups. In other words, all the groups performed better on the multiple-choice questions, regardless of whether the tests were administered orally or in written form.

***Length of time and form of administration***

An ANOVA was used to test for differences among the groups and the forms of administration when time to complete the test was used as the dependent variable. The participants who were blind took significantly more time to finish the written tests than the oral tests.

The main effect on the group difference was not statistically significant $F(2, 24) = 2.49$, nor was the effect of the form of administration, $F(1, 24) = 0.12$. However, the interaction between the groups and the form of administration was statistically significant $F(2, 24) = 7.53$, $p < .003$. Although there were no differences in the time it took to complete the oral tests, a Scheffe post hoc analysis revealed that the blind group took longer to finish the tests in braille. There were no statistical differences between the low vision group

and the sighted group with respect to the time needed to complete the tests. The blind students needed more time to complete the tests in braille ($M$ = 29 minutes) than the oral tests ($M$ = 24.1 minutes). The blind group took more time to finish the tests in braille than did the low vision group, who took the tests in large print, and the sighted group, who took the tests in standard print.

## QUALITATIVE RESULTS

Interviews were conducted with the participants from all three groups at the conclusion of testing. These interviews were conducted by the first author or a research assistant, either by telephone or in person. Some participants lived more than four hours from the testing university, so it was necessary to interview them by telephone because of time and cost constraints. The seven interview questions addressed the participants' preferred testing medium and testing habits.

The first two questions asked how the participants typically take tests and how they prefer to take tests, given a choice of written or oral test. Of the 27 participants (9 in each group), all the sighted participants, 8 blind participants, and 6 participants with low vision preferred to be tested in their preferred written medium, and 1 participant with low vision had no preference. When asked why they preferred written tests, most participants cited the option to control the reading process and to review material. The following were two representative comments: "I prefer braille because I can see what's in front of me and read at my own speed" and "It's easier to check things if you want; it sparks things in memory better." Two participants who preferred auditory testing cited their reasons: "I don't have to focus on putting braille words together; . . . I absorb [the information] faster" and "It takes longer when I have to read them." All the participants stated that they usually took tests in their written medium.

The 27 participants were also asked which medium they believed was faster for them. One sighted participant, 2 with low vision, and 6 who were blind believed that oral testing was faster for them. The test data

supported their belief in all cases. One other sighted participant and 1 participant who was blind were faster when tested orally, although they believed they were faster in their written medium. In total, the actual fastest reading medium was correctly predicted by 7 sighted participants, 9 participants with low vision, and 8 participants who were blind (see Table 2).

The 27 participants were also asked to identify the medium that resulted in their best test performance. The responses of the 9 participants who were blind varied; 3 stated that their best performance was in braille, 3 stated that they had better results from oral tests, and 3 did not identify a difference. Five participants with low vision and all 9 sighted participants thought that they performed better on printed than on oral tests. The actual performance data showed that 5 sighted participants, 3 participants with low vision, and 4 participants who were blind correctly predicted their highest-scoring medium (see Table 3). Most of the participants in all three groups thought that multiple-choice tests were easiest for them; 1 or 2 in each group favored short-answer tests or noted no difference.

The participants' preferred medium resulted in better test scores for 14 (54%) participants, but 12 participants (46%) scored better in their nonpreferred medium (1 participant with low vision did not state a preference). Five of the 9 blind participants (55%), 4 of the 9 participants with low vision (44%), and 6 of the 9 sighted participants (66%) scored as well or higher in their preferred medium than in their nonpreferred medium. Five of the students with low vision scored higher in their nonpreferred medium (oral for 3 students and print for 2). All 9 sighted students preferred to take their tests in print, but only 6 of these students achieved their best scores in print.

## Discussion

The overall test scores of the participants who were sighted, those who were blind, and those with low vision were not different in either medium. However, the participants who were blind scored significantly better on multiple-choice items in braille than did the

other two groups, and their scores for orally administered multiple-choice items were two points higher than those of the participants in the other two groups. Possible explanations may include greater motivation, different academic abilities, more time spent studying, or greater experience with the recall of information that may provide an advantage on multiple-choice items.

The finding that there was a difference in the total scores of the three groups suggests that oral tests in this situation did not provide an advantage over written tests. The test content, which was related to social studies information, was directed toward students whose reading level was at least at the eighth-grade level. That a visually impaired student who was tested orally and compared to a sighted student would not have experienced an advantage or a disadvantage suggests that oral testing as an accommodation in this situation established an "equal playing field" for students who were tested in both media and could not be justified on the basis of better performance on the tests.

An important outcome of the study is related to individual patterns of preference compared with performance. Although most participants in all three groups preferred their tests in a written format, this was not always their best performance medium. Most participants in all three groups correctly predicted their fastest reading medium; however, fewer participants were able to identify the medium that resulted in their best test score.

Most participants with low vision believed that they performed better on printed tests than on oral tests, but in this study, they performed similarly in the two media. Five participants with low vision scored better in their nonpreferred medium, which suggests that careful assessment is especially important with this group; the effects of duration and fatigue in test experiences for students with low vision have not been explored through research.

The results may have been affected by several factors that were beyond the control of the research. The participants were asked to read chapters at home before testing, but several testers commented

that they did not think that the participants had spent substantial time on the reading. Although all the participants could read at an eighth-grade level, many said that they found the content difficult or boring; this response may have been more influential for the sighted students because there were no pictures or graphics. The fact that the highest scores were 25 correct out of 40 suggests that the tests were exceptionally difficult or that the participants did not spend extensive time reading the chapters before the tests. On at least three occasions, the participants experienced technical problems with the tape recorders that may have slowed their testing times. Also, that the interviews were conducted by telephone for some participants and in person for others may have influenced the responses. Finally, the small sample limits the application of the results. The results compare students who varied in features, such as intellectual ability, motivation, and study habits, that were beyond the scope of the study.

In summary, the two points of significant differences among the groups were the higher scores of the participants who were blind on written multiple-choice items and the longer test times needed by these participants when taking the braille, rather than the oral, tests. The differences in scores favoring the blind participants are not consistent with the previous literature on test performance, but the slower administration time in braille for them is consistent with the findings of other studies. Given the small groups, it can only be concluded that these two areas of significant difference merit further study.

## Implications for practice

The findings have several implications for students with visual impairments and their teachers.

1. The students' preferred testing medium did not always match their best performance medium, and the students did not always accurately predict their highest-scoring testing medium. It may be useful for students and teachers to maintain data on scores on oral and written tests for a period to determine if either medium yields better results or a faster test time, even when a student has

a strong preference for oral or written tests.

2. The finding that students who were blind took longer to complete tests in braille supports the findings of earlier studies on the rates of braille reading and print reading. When time is limited, oral tests may be considered. However, the fact that the scores of the blind students on multiple-choice items in braille tests were significantly higher than the scores of the other two groups in other media supports the usefulness of braille as a testing medium. Considered together, these two findings suggest that students who are blind who are competent readers should be tested in braille whenever possible if their peers are being tested in their written medium.

3. In each group, more students preferred to be tested in print or braille than orally. The students' comments indicated that this preference was due mainly to the opportunity to review material and to the increased control of time offered by written tests. Because written tests provide a more similar testing environment to that of peers and yield no difference in performance, they are probably preferable to oral tests for school-age students.

## Conclusion

This study compared the performance of high school students who were blind, were sighted, and had low vision on oral and written tests by administering six tests on an eighth-grade social studies text to nine students in each group. The findings of few differences in test performance suggest that the medium of administration had little relationship to the students' performance on a narrative test of content without graphic elements. Superior performances were found for the blind students on multiple-choice items presented in braille, and the same students needed more time to take tests in braille than did the two groups that used print. Individual variations in preferences and test performance emphasize the need to evaluate each student's abilities and test outcomes. Regular feedback about the effectiveness of testing in both media will provide students with the information they need to make the most efficient decisions on the best testing medium for them in high school and postsecondary settings.

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