Performance of Students with Visual Impairments on High-Stakes Tests: A Pennsylvania Report Card

by

Lynn A. Fox

Bachelor of Science in Social Work, University of Pittsburgh, 1994

Master of Education, University of Pittsburgh, 1998

Submitted to the Graduate Faculty of

The University of Pittsburgh in partial fulfillment

of the requirements for the degree of

Doctor of Education

University of Pittsburgh

2012

UNIVERSITY OF PITTSBURGH

SCHOOL OF EDUCATION

This dissertation was presented

by

Lynn A. Fox

It was defended on

March 19, 2012

and approved by

George J. Zimmerman, PhD, Associate Professor

Department of Instruction and Learning, University of Pittsburgh

Chris Lemons, PhD, Assistant Professor,

Department of Instruction and Learning, University of Pittsburgh

Amanda Kloo, PhD, Research Assistant Professor,

Department of Instruction and Learning, University of Pittsburgh

Kim Zebehazy, PhD, Assistant Professor,

Educational and Counselling Psychology, and Special Education, University of British Columbia

Dissertation Advisor: Naomi Zigmond, PhD, Distinguished Professor,

Department of Instruction and Learning, University of Pittsburgh

Performance of Students with Visual Impairments on High-Stakes Tests:
A Pennsylvania Report Card

Lynn A. Fox, EdD

University of Pittsburgh, 2012

Students with disabilities participate in high-stakes assessments to meet NCLB's newer proficiency standards. This study explored performance in reading and math on the Pennsylvania System of School Assessment (PSSA), Pennsylvania's grade-level assessment, to provide a foundational baseline on performance and accommodations used by students with visual impairments (VI). Analysis of an extant data set reviewed students in grades 3-8, and 11over three academic years (2005-2006, 2006-2007, and 2007-2008) to form two sample groups. The larger sample compared the total scaled scores and performance level scores for students with VI to the performance of students who are hard of hearing including Deafness (HH) and specific learning disability (LD), to all Pennsylvania students (ALL PA). The smaller sample identified students with VI with performance level scores in reading and math in three consecutive grades to form four longitudinal subgroups. Analysis of accommodations used by students with VI was conducted for both sample groups. Descriptive statistics were applied for all performance measures across and within grade-levels and academic years. One-way ANOVAs with ad hoc analyses were conducted on the mean test scores per disability group, to determine statistical significance for differences seen descriptively. Analysis of the reading and math performance measures showed that students with VI are doing well on the PSSA, generally scoring the highest of the two disability groups but lower than ALL PA. But these data do not fully describe the performance of students with VI. Surprise findings revealed that students with VI generally do better in math than reading and that a substantial percentage are not proficient and maintain the same performance level category from one grade-level to the next. Trends of accommodations used were identified but the data revealed no apparent common bundling of accommodations with a random year to year provision. To connect high-stakes performance results to instruction, researchers need to have transparent access to tests scores with accommodations used to continue analyzing the performance of students with VI. There is an immediate need for Pennsylvania IEP teams to provide the consistent provision of accommodations for each year's high-stakes assessment.

TABLE OF CONTENTS

LIST OF TABLES

PREFACE

If life can be reflected in the lyrics of a song, my soundtrack would have a wide variety of rhythms and sounds to match the 'highs and lows' and the 'quickness and slowness' of my dissertation process. Completing one's dissertation is often metaphorically called a 'journey', and I certainly traveled a road with many unpredictable side streets and detours. Road tripping blends song with the journey and my windy route encountered lyrics for inspiration and motivation. Early cautionary signs may have flashed warnings, "*…I can't get, can't get there from here…*" (REM) but perseverance propelled progress while wondering, *"…who is to say where the wind will take [me]?...*" (U2), to finally arrive and know that *"…I've come a long way, I've come a long...I've gone 500 miles today….*" (Michelle Shocked).

There are so many people to thank. My gratitude for your on-going support and encouragement runs deep – and I struggle to find the words to fully express the depth of my thankfulness. I am better, both professionally and personally, to have had the privilege to learn and grow with each of you.

To my dissertation committee: I have greatly appreciated your interest, expertise, and guidance. First, thank you Dr. Zimmerman for supporting me all these years and for entrusting me to administer the certification programs. I have grown and evolved as a teacher-educator under your guidance. Dr. Kloo, thank you for all our concept development conversations which helped to shape the topic and research questions. Thank you, Dr. Lemons, for discussing in such depth, the process to analyze the data. Your combined earlier work created this opportunity. Thank you, Dr. Zebehazy, for your consultation and friendship. Thanks for answering all of my random questions, regardless of the hour! These conversations repeatedly helped me move forward. Lastly, I have grown as a writer under the research advisement of Dr. Zigmond. Thank you for your consistent patience and guidance. I am so very grateful to have evolved into a researcher under your direction.

To my family: Jason, Dad, Lara, Matt, Kristy, Art, Indermohan, Barb, Fritz, and Jodi – thank you for your relentless words of encouragement, love, and support. Finishing couldn't have been possible without my family's "village of supporters". It is truly impossible for me to highlight all of the big and small ways your support has helped me reach this end; so let's just put 'thanks for babysitting' at the top of the list and know that I am truly grateful for all the other ways you each have supported me to accomplish this goal! I love you all so very much. One additional note of appreciation goes to my sister, Lara; thank you for the daily calls to keep me grounded and focused. I thank you for your attentive ear, unwavering support, and encouragement.

To my friends Brenda, Sheila, and Teresa: thank you for your continuous support and keen ability to read and provide me with the needed jokes to lift my spirits, the calm words for encouragement, and the occasional bag of M&M's - life is always better with a little bit of chocolate! Thank you; I cherish our friendships.

To all my friends and family not named, but who are near and dear to my heart, thank you. Thank you for all of your calls to check-in and for providing on-going words of encouragement. You believed in me, even as I struggled. Thanks for your patience and persevering right along with me.

And lastly, thank you Jason for traveling this dissertation process with me. My doctoral journey was not direct and your love and patience helped me to stay the course, for which I am hugely grateful. Now that we are on the other side, breathe deep - I think the grass is really greener!

1.0 INTRODUCTION

Vision plays a significant role in the traditional education classroom, utilized as the essential sense in the instructional delivery and student learning process (American Foundation for the Blind's (AFB) Josephine L. Taylor Leadership Institute, Education Work Group, n.d.). For students who are blind or visually impaired, knowledge others gain incidentally through observation needs to be taught systematically and explicitly. The educational program for a child who is visually impaired requires instruction in additional content, areas beyond the core academic subjects of reading, math, science, and social studies to include skills learned causally by typically seeing peers. This additional content is called the "expanded core curriculum" (ECC) and includes the following nine instructional areas: compensatory and access skills, social interaction skills, recreation and leisure skills, orientation and mobility (O&M) skills, independent living skills, assistive technology and technology skills, career education, sensory efficiency skills, and self-determination skills (Hatlen, 1996; Lohmeier, Blankenship, & Hatlen, 2009). "Although children who are visually impaired have little or no opportunity to learn such skills by observation, they have the opportunity to acquire them through sequential systematic instruction by a knowledgeable person" (Lohmeier et al., 2009, p. 104). The lack of vision may affect "how a child learns, not what a child learns" (Ferrell, 1997, p. v).

Teachers of students with visual impairments (TVIs), the professionals responsible for teaching students who are blind and visually impaired, serve their students in a variety of capacities ranging from teacher to consultant. The TVI's primary responsibilities are to adapt and modify the general education curriculum and related material (such as replacing regular print with braille) and to provide direct instruction in each of the areas of the ECC (Spungin & Ferrell, 2010). Students with no vision or limited vision need multiple encounters to accurately interpret sensory information; these encounters must be paired with concrete experiences to build concepts and environmental meaning (Bowen & Ferrell, 2003). "If accessibility to learning materials is the only problem the visual impairment presents, then educating visually impaired students can be solved by adaptation of the existing

core curriculum" (Hatlen, 1996, p. 27). However, students who are blind and visually impaired are a heterogeneous group of individuals who have complex educational needs that are compounded by multiple variables such as the age of onset, the severity of the vision loss, and their overall functioning level. So, access is not their only challenge.

Students who are blind or visually impaired qualify to receive vision services when their vision, even with correction, adversely affects their educational performance (Individuals with Disabilities Education Act (IDEA), 2004, Section 300.8(c)(13)). The population of students who receive services, then, reflects a diverse spectrum of students with a wide range of unusable to useable visual functioning. Students may be blind, with or without light perception, or have various levels of low vision. Students may be blind or visually impaired as their only disability, or may have additional disabilities as well (Huebner, 2000). "Their one common characteristic is that they are all visually impaired, that is, they have less-than-fully functional visual systems that can interfere with expected progress in general education programs unless they receive specialized instruction" (Huebner, 2000, p. 55). It is possible that two students with similar visual acuities and pathologies will function differently and will require completely different educational strategies and accommodations. Since students who are blind or visually impaired are so diverse, their educational placements cut across all instructional settings ranging from the general education classroom, resource rooms and self-contained classrooms, to approved private schools (Huebner, 2000).

For children aged 3 through 21, IDEA identifies 13 disability groups, typically grouped into two categories, high- and low-incidence disabilities. The high-incidence category includes: specific learning disability, intellectual disabilities, multiple disabilities, speech or language impairment, orthopedic impairment, emotional disturbance, and other health impairments. The low-incidence category includes: autism, traumatic brain injury, hearing impairment, deafness, visual impairment (including blindness), and deaf-blindness (National Dissemination Center for Children with Disabilities (NICHCY), 2012). Students who are blind or visually impaired are believed to make up the smallest proportion of all those identified with a disability, accounting for less than 1% of all school-aged students (American Foundation for the Blind (AFB), 2009).

There are conflicting reports as to how many students there actually are who are blind and visually impaired. The Office of Special Education Programs (OSEP) reports child counts based on the broad IDEA definition. In the 28th Annual Report to Congress, OSEP reported that in the fall of 2004, the number of students identified as blind and visually impaired as their primary disability was 29,452 (U.S. Department of Education, Office of Special Education Programs [OSEP], 2006). OSEP's numbers are misleading, however, since states only

count students based on their primary disability category. The OSEP count under-represents students who are blind and visually impaired but are reported with a primary disability in another category, such as multiple disabilities (Corn & Spungin, 2003; Huebner, 2000). In contrast, the American Printing House for the Blind (APH) (American Printing House for the Blind, 2007) maintains a child count registry based on the definition of legal blindness, a narrower definition than IDEA. APH's child count for school-aged children 3-21 years old is approximately two times as high as OSEP's (U.S. Department of Education, OSEP, 2006). For the same academic year, APH reported 50,161 students who are blind and visually impaired (APH, 2007).

Like all students receiving special education services, the academic performance of students who are visually impaired in the general education classroom is monitored annually, as required by the No Child Left Behind (NCLB) Act of 2001 and IDEA of 2004. NCLB's purpose is to hold schools accountable for student performance by ensuring "that all [italics added] children have a fair, equal, and significant opportunity to obtain a high quality education and reach, at a minimum, proficiency on challenging State academic achievement standards and State academic assessments." (No Child Left Behind Act of 2001: Statement of Purpose, p. 15). IDEA ensures students with disabilities are provided appropriate and individualized instructional programs and are fully included in standards-based accountability systems.

These two pieces of legislation have affected the entire educational system, changing the student body make-up of the general education classroom, restructuring the delivery of special education services, and shaping the core curriculum to meet state standards. Educators are to hold all students, regardless of disability, to standards for proficiency on high-stakes assessments. Students with disabilities have five options through which to be included in state assessment systems: participate in the general grade-level assessment with or without accommodations with performance based on grade-level achievement standards; participate in an alternate assessment with performance based on grade-level achievement standards; participate in an alternate assessment with performance based on modified, grade based academic achievement standards; or participate in an alternate assessment with performance based on alternate achievement standards (Altman, Thurlow, & Vang, 2010). Accessing state assessments is facilitated through the use of state approved accommodations.

1.1 FOCUS OF STUDY

Despite overall accountability efforts, little is known about the academic achievement of students with disabilities and their performance relative to grade-level standards. Even less is known about the numbers and types of accommodations used within disability groups taking accountability assessments, let alone about their appropriateness and effectiveness in measuring academic achievement of students with disabilities. This study will investigate the performance of students who are blind and visually impaired on Pennsylvania's grade-level accountability assessment (PSSA) taken with or without accommodations. Data collected will allow a descriptive reporting of performance based on test scores from an existing data set. The investigation will explore proficiency levels in reading and math over three academic years (2005-2006, 2006-2007, and 2007-2008) in grades 3-8, and 11. This will be followed by an analysis of the types of accommodations used to help students who are blind and visually impaired access the annual assessment.

1.2 RESEARCH QUESTIONS

More specifically the following research questions were investigated:

1. How do students with visual impairments perform on the PSSA? What accommodations are typically used?
2. Using the longitudinal sample of students, are there changes in student performance and use of accommodations across years, and if so, which variables change over time?

1.3 DEFINITION OF TERMS

The following are terms used throughout this paper that is critical to this research study.

1. Academic Achievement Standards: Student performance standards that are based on the academic content standards. Performance is measured by the following description levels: advanced, proficient, basic, and below basic (Pennsylvania Department of Education (PDE), 2009).

2. Accommodations: “Changes in the way a test is administered without altering the content of the test…to maximize a student’s performance so that one can obtain an accurate picture of the students’ true capabilities” (Horvath, Kampfer-Bohach, & Kearns, 2005, p. 178).

3. Academic Content Standards: The benchmark measures that define what students should know and be able to do at specified grade-levels, beginning in grade 3. In Pennsylvania’s public schools, the academic content standards are used as the basis for curriculum and instruction (PDE, n.d.(a)).

4. Differential Boost: “The effect when an accommodation increases the performance of students with disabilities more than it increases the scores of nondisabled students” (Fuchs, Fuchs, Eaton, Hamlett, Binkley, & Crouch, 2000, p. 68 as originally cited by Philips, 1994).

5. Individuals with Disabilities Education Improvement Act of 2004 (IDEA): Federal special education legislation that ensures students with disabilities are provided appropriate and individualized instructional programs but are fully included in standards accountability systems.

6. Individual Education Program (IEP): An educational plan designed to meet individual learning needs due to identification of disability and need for specially designed instruction.

7. Modifications: Alterations or changes to the test that affect the intent or level of the test question and are not allowed on high-stakes tests. There are variations among states on approved accommodations versus modifications. (Browder, Wakeman, & Flowers, 2006; Elliot, Kratochwill, & McKevitt, 2001; Koretz & Barton, 2004; Koretz & Hamilton, 2006; Thurlow, Lazarus, Thompson, & Blount Morse, 2005).

8. No Child Left Behind (NCLB) Act of 2001: A standards-based federal policy that uses high-stakes state assessments to measure student performance and school accountability.

9. Pennsylvania System of School Assessment (PSSA): A standards-based, criterion-referenced assessment based on state academic standards administered yearly from grades 3-8, and in grade 11.

10. Visual Impairment: An overall term that includes all levels of vision loss, that is, persons with low vision or who are blind (Pugh & Erin, 1999).

2.0 REVIEW OF THE LITERATURE

2.1 HISTORICAL OVERVIEW

The first federal special education law, then called the Education for all Handicapped Children Act (P.L. 94-142), was enacted in 1975. This legislation was in direct response to the Civil Rights Movement of the early 1960's (Pardini, 2002). Parent advocacy groups leveraged the 1954 Brown vs. Board of Education Supreme Court decision to lobby for the equitable educational opportunities championed for minorities and children who were economically underprivileged to be extended to students with disabilities. "Despite compulsory education laws that had been in place nationwide since 1918, many children with disabilities were routinely excluded from public schools. Their options: remain at home or be institutionalized. Even those with mild or moderate disabilities who did enroll were likely to drop out well before graduating from high school" (Pardini, 2002, para. 1). P.L. 94-142 mandated that students with disabilities have the right to: (a) Free Appropriate Public Education (FAPE), (b) due process, (c) Individualized Educational Programs (IEPs), and (d) instruction in the least restrictive environment (LRE). Although many new regulations have been authorized since 1975, these four mandates continue today as the procedural safeguards to implement and provide special education services to eligible students.

2.2 EVOLUTION OF IDEA

Subsequent reauthorizations led to renaming P.L. 94-142 to IDEA in 1990. IDEA has deep roots as an accountability system based on compliance procedures. For the first 20 years, accountability meant demonstrating that correct procedural paperwork and documentation had been maintained. "The emphasis on compliance with specific procedures, timelines, and processes is a reflection of the rights-based policy foundations of special

education designed to ensure that each individual served under the law receives a 'free and appropriate public education' or FAPE" (McLaughlin & Thurlow, 2003, p. 436). This compliance driven process originated from the need to provide families the safeguards that their children with disability could attend their neighborhood school and would be provided an appropriate education.

The federal law and subsequent state regulations guaranteed students with disabilities an appropriate education. Educational programs were based on an "accountability model that was grounded in individually referenced Individualized Education Program (IEP) goals and the school system's compliance with procedures" (McLaughlin & Thurlow, 2003, p. 432). IEPs were developed individually, for each student identified with a disability, tailored by IEP teams to meet the unique learning needs of that student.

2.3 IDEA'S RESPONSE TO GENERAL EDUCATION REFORM MOVEMENT

In the mid-to-late 1980s during the first 20-year period of implementing IDEA, a general educational reform movement began. This reform shifted statewide testing expectations of students in the general education classroom from "minimum competency to high expectations for all students" (Kortez & Hamilton, 2006, p. 534). The catalyst for this shift was the findings reported in *A Nation at Risk* (1983) by the National Commission on Excellence in Education. This document detailed the results of tests administered by the National Assessment of Educational Progress (NAEP), the Nations Report Card. Results "…showed that many students did not demonstrate even a basic level of skills and knowledge, international comparisons that showed the achievement of U.S. students trailing that of their peers in many other countries, and the sizable decline in mean scores on the SAT during the 1960s and 1970s" (p. 534). The national response to this failing report card was a surge in the development of tests to measure improvements in student performance with high-stakes attached to these scores "…to motivate improved performance on the part of teachers and administrators" (Kortez & Hamilton, 2006, p. 534).

Concurrently, special education reform efforts during the 1970s and 1980s did not result in high achievement outcomes for students with disabilities (DeFur, 2002, p. 204). Schulte, Villwock, Whichard, and Stallings (2001) summarized the concerns regarding student achievement in special education reporting "relatively poor academic outcomes for children with disabilities…and…the lack of accountability mechanisms that focus on

outcomes rather than processes" (p. 487). Many blamed the poor student performance on the accountability system that was in place. Before 1997, students with disabilities rarely participated in statewide assessments (Koretz & Barton, 2004), and accountability for students with disabilities continued to focus on the IEP through measurements based on individual student performance and paperwork compliance.

In 1997, Congress responded to the general education movement for high performance standards by including in the reauthorization of IDEA new regulations to provide students with disabilities the right and requirement to participate in state and district assessments used for high-standards accountability (Elliott, Erickson, Thurlow, & Shriner, 2000; Turnbull, 2005). Additionally, provisions to participate in these high–stakes tests included the following requirements: use of appropriate accommodations, development of alternate assessments, and reporting the performance of students with disabilities with the same frequency and detail as reported for all students (Koretz & Hamilton, 2006, p. 538; Thurlow et al., 2005, p. 232). The final regulations of IDEA 1997 also stated that "regardless of where students receive instruction, all students with disabilities should have access to, participate in, and make progress in the general curriculum" (Brower et al., 2006, p. 250). Since the reauthorization of IDEA 1997, schools have needed to pay attention to the performance and progress of all students so "educating students with disabilities becomes a shared responsibility of both general and special education teachers" (Department of Education, 2007, p.11). This has caused a cultural shift as students with disabilities moved away from receiving special and separate education in the public school system to having access to the general education curriculum. These newer regulations were strengthened when IDEA 2004 was reauthorized to be better aligned with NCLB. Inclusion in general education classrooms was to be the preferred placement for all students, where all are to learn the general education core academic curriculum and participate in statewide academic accountability assessments.

2.4 ACADEMIC ACHIEVEMENT OF STUDENTS WITH DISABILITIES

As previously stated, NCLB is a standards-based education policy with the primary goal of increasing accountability to improve educational outcomes for all children. NCLB uses assessment results from statewide high-stakes tests to determine proficiency levels of students in reading, mathematics, writing, and science in grades 3-8 and once in high school. Accountability measures document how well schools are including all students in standards-based education,

how well all students are achieving these standards, and what needs to be improved for specific groups of students (NCLB, 2001). NCLB focuses on closing achievement gaps by requiring schools to report disaggregated data for students in the following subgroups: minority students, limited-English proficiency, and students with disabilities as a group, not by disability category (NCLB, 2001). This bundling of scores makes it impossible to determine how any one disability group is faring on the state assessments and limits interpretation of the results.

2.5 ACCESSING ACCOUNTABILITY ASSESSMENTS

NCLB and IDEA provide students the following options to be included in state assessment systems:

- Participation in a general grade-level assessment with performance based on grade-level academic standards;
- Participation in a general grade-level assessment with accommodations, performance based on grade-level academic standards;
- Participation in an alternate grade-level assessment, performance based on grade-level academic standards;
- Participation in an alternate grade-level assessment, performance based on modified grade-level academic standards; or
- Participate in an alternate assessment, performance based on alternate academic achievement standards (Department of Education, 2007, p. 11).

For all students to be included in high-stakes testing, avenues for participation are developed through the use of testing accommodations. Decisions regarding which assessment is appropriate and which accommodations are needed are made by the IEP team, based on individual student needs. Students with disabilities require this mechanism to facilitate their opportunity to participate, to count. That is, selecting and using accommodations on high-stakes tests minimizes access barriers due to the disability in order to focus on what the student knows.

2.5.1 Defining accommodations

The definition of approved testing accommodations varies across states as well as across authors. Koretz and Barton (2003) refer to the American Educational Research Association, American Psychological Association, & National Council on Measurement in Education's definition from the 1999 publication titled Standards for Educational and Psychological Testing (American Educational Research Association, 1999, p. 101). Accommodations, collectively defined, "provides a change in the way a test is administered without altering the content of the test…to maximize a student's performance so that one can obtain an accurate picture of the students' true capabilities" (Horvath, et al., 2005, p. 178). In essence, accommodations are tools or techniques used to level the playing field for students with disabilities in order to provide access to the content without changing the intent of the test question. Alterations or changes to the test that affect the intent or level of the test question are considered modifications and are not allowed on high-stakes tests (Browder et al., 2006; Elliot et al., 2001; Koretz & Barton, 2003; Koretz & Hamilton, 2006; Thurlow et al., 2005). The types and numbers of accommodations that are approved on high-stakes assessments are determined by individual state policies (Christensen, Lazarus, Crone, & Thurlow, 2008; Kortez & Hamilton, 2006; Cawthon, 2007; Salvia, Yesseldyke, & Bolt, 2007; Thurlow et al., 2005;) with significant discrepancies among states.

2.5.2 Classifications of accommodations

There are five classifications of accommodations identified and analyzed in the *2007 State Policies on Assessment Participation and Accommodations for Students with Disabilities*: presentation accommodations, equipment and materials accommodations, response accommodations, scheduling/timing accommodations, and setting accommodations (Christensen, et al., 2008). The descriptive analysis provided in Christensen et al.'s 2007 report highlights the most predominate accommodations in each classification as well as whether the accommodation is allowed (with or without restrictions).

Presentation accommodations include changes that are made to the way the test is presented. The most frequently allowed presentation accommodations include: large print, braille, sign language to interpret directions, and read aloud directions (test items/questions and text is read to the student word for word without inflection (PDE,

2011)). Reading questions aloud remains the most controversial accommodation to provide with or without restrictions. It is not permissible to have the teacher read the test question aloud when the act of reading is the intention of the test item. Other presentation accommodations include: teacher highlighting, student highlighting, translating directions and/or items into student's native language, increasing space between items, providing tactile graphics, and prompting/encouraging the student. Equipment and materials accommodations include changes that "involve the introduction of certain types of tools and assistive devices" (Christensen et al., 2008, p. 23). The most frequently allowed accommodations for this category are magnification and amplification equipment, templates, and light/acoustics with the use of a calculator and math tables/number line accommodations being the most controversial. These accommodations are used with and without restrictions in all 50 states.

Response accommodations are "changes to how a student responds to elements of the assessment process" (Christensen et al., 2008, p. 27). For this area, the most frequently allowed accommodations include using a brailler, writing in test booklets, using a proctor/scribe, and using a computer/machine. "There was no general consensus…for whether many of the response accommodations should be permitted in all circumstances or only with restrictions" (p. 28). Scheduling/timing accommodations include changes to the time or scheduling of the assessment with the most frequently allowed accommodations being testing with breaks, testing at a time beneficial to the student, and extended time. Setting accommodations are changes to the test location or environment. Individual, small group, use of a carrel, and use of a separate room were the most frequently allowed setting accommodations with testing in the student's home being the most controversial response accommodation. Although "many states have developed participation and accommodations policies that reflect their ongoing commitment to including all students with disabilities in statewide assessments" (p. 39), there continues to be little consensus and research on which accommodations are appropriate as well as the effects of the accommodation(s) provided, especially for low-incidence populations such as students with visual impairments.

2.5.3 Limitations of accommodations

Accommodations are provided to increase the number of students with disability who can be included on large-scale assessments (Koretz & Barton, 2003). However, there is limited research within all disability categories, regarding the effectiveness and the appropriateness of the accommodations. While accommodations appear on the surface to

be the solution to bridge students in special education and standards based assessments, in practice there are some concerns about the effectiveness and appropriateness of accommodation selection.

A 2006 literature review conducted by Browder and colleagues identified the most commonly used accommodations to be: individual administration of the test, dictation-to-a-scribe (student providing verbal responses that are written down verbatim), and small-group administration. Additionally, Browder et al. noted that studies on the effects of testing accommodations revealed the use of think aloud (allowing the student to verbalize thought process as he/she completes assessment questions) have positive effects; whereas, there seem to be mixed results for computerized administration and extended time.

The other concern regarding the effectiveness of approved accommodations is over-providing an accommodation to students who could have taken the assessment without (Koretz & Barton, 2003; Kortez & Hamilton, 2006). Because students with disabilities are so diverse, that is, there are more inter-differences than intra-differences between disability categories, there has not been enough research done to have a clear sense of the combined effects when common accommodations are utilized.

A third area of concern is the appropriateness of these accommodations. Fuchs et al. (2000) discuss the term differential boost (as originally cited by Philips, 1994) as it applies to students with learning disabilities. "With differential boost, an accommodation increases the performance of students with disabilities more than it increases the scores of nondisabled students" (p. 68). In order for an accommodation to be both effective and appropriate, the accommodation is to compensate for the disability without providing an advantage for the student with exceptionality. With differential boost, the appropriate and effective selection of an accommodation then levels the playing field for the student with a disability by minimizing the impact of the disability without benefiting the score of a student without a disability. Extended time has been documented as an example of an effective but not appropriate accommodation. Fuchs et al. (2000) found that a differential boost for extended time was not evident for students with specific learning disability when compared to students in general education. However, their study found that the read aloud accommodation did result in a positive differential boost for students with specific learning disabilities. Therefore, reading orally instead of silently would be considered both an effective and appropriate accommodation.

A fourth concern is how accommodation selection can affect test validity. The impact of states having varying policies regarding acceptable accommodations is explored in Cawthon's 2007 study on students who are

deaf or hard of hearing (SDHH). This detailed look at assessment and accountability for this low-incidence disability group reveals that states would score students as "below proficiency" regardless of the actual score obtained when restricted accommodations were used. "Depending on where the student lived, policies for score use may result in different ways that students using the accommodations were integrated into the accountability framework" (Cawthon, 2007, p. 472). Consequently, not all accommodations identified on a student's IEP will be appropriate to include on high-stakes tests and some can actually "invalidate the score of the assessment given [such that it does] not count for accountability purposes" (Center on Education Policy, 2007, p. 5). "The kind of accommodation(s) used during testing, together with the state policy for the score reporting, affects how student scores are integrated into the accountability system" (Cawthon, 2007, p. 471). This results in a disparity between what is listed as a required accommodation(s) on the IEP for students to access the general education curriculum and the state's approved accommodations to maintain score validity on the high-stakes tests.

Ideally, the type and number of accommodations used to access the general education curriculum should match the type and number of accommodations used to access the high-stakes state tests (Browder et al., 2006; Salvia et al., 2007). However, accommodations on the IEP may or may not be appropriate because of the teacher's selection process. Teacher judgments to assign selected accommodations per student is not typically based on assessed needs but instead on global and/or general assumptions related to disability category (Fuchs et al., 2000). An example of this may be providing extra time to complete the test as a blanket accommodation, not based on actual assessed needs for additional time. "The validity of inferences about those students may either improve or deteriorate as a result of providing them with this accommodation, depending on the appropriateness of the accommodation for them" (Koretz & Barton, 2003, p. 8).

2.6 UNIVERSALLY DESIGNED ASSESSMENTS

In response to the controversies over the appropriateness, effectiveness, and use of accommodations, test developers have turned to the concepts of Universal Design for Learning (UDL) and applied them to the development and adaptation of assessment. The developmental principle of UDL originates in the field of architecture, to design environments and products from the outset to be usable by as many people as possible. This principle is now being

applied to the construction of high-stakes tests and classroom curricula. Today's classrooms contain individuals with and without disability. UDL aims to make tests meet the needs of these diverse learners based on a "set of principles for designing curriculum that provides all individuals with equal opportunities to learn" (CAST, 2010, "What is UDL", para. 1). By applying UDL principles, accommodating a variety of learning needs is not retrofitted as an afterthought but built into the construct. It serves as a 'blueprint' to develop curriculum materials and assessments that work for a wider range of students. The UDL Guidelines include considerations to provide multiple means of representation, action and expression, and engagement (CAST, 2010).

UDL principles that have been built to construct curriculum material with flexibility to meet learner needs have also been applied to high-stakes test development. "Universally designed assessments are a promising approach to providing appropriate assessment conditions for all students, giving each student a comparable opportunity to demonstrate achievement of the standards being tested" (Thompson, Johnstone, & Thurlow, 2002, p.3). The seven elements of universally designed assessments include:

1. Inclusive Assessment Population
2. Precisely Defined Constructs
3. Accessible, Non-Biased Items
4. Amenable to Accommodations
5. Simple, Clear, and Intuitive Instructions and Procedures
6. Maximum Readability and Comprehensibility
7. Maximum Legibility (CAST, 2010; Thompson et al., 2002; Thompson & Thurlow, 2002).

Universally designed assessments would reduce the difficulty states are having implementing tests that are not inclusive, and are accessed by students through a variety of unsubstantiated accommodations (Thompson et al., 2002; Thompson & Thurlow, 2002). From the ground up, attending to the combination of these listed UDL elements would result in a universally designed assessment that would "facilitate the use of appropriate accommodations and reduce threats of validity and comparability of scores" (Thompson et al., 2002, p. 13).

2.6.1 UDL for students with visual impairments

For students with visual impairment to demonstrate their content knowledge, simply converting curriculum materials and the high-stakes tests into either large print or braille does not make the materials or tests fully accessible. Specific attention needs to be paid to the item construct, to eliminate test item bias towards persons with visual impairment. An example of item bias provided by Carol Allman in Test Access, 2009, identifies questions such as “draw the results of the following” or “write a story based on the picture” as being non accessible to braille readers (p. 1). Additionally, test items that contain maps and graphs are currently being deleted or substituted when the braille, tactile graphic, large print, or audio format changes the item content (Allman, 2009). Constructing a universally designed assessment would “help prevent the introduction of pictures that contain information necessary for selection of the correct answer, but which cannot be adequately brailled, presented in large print or tactile graphics, or described in audio format” (Allman, 2009, p. 7). Creating a more equitable high-stakes test would benefit everyone, as well as better support the use of additional accommodations.

While universally designed assessments and accommodations may provide the tools and techniques to improve access to high-stakes tests for students with disabilities, there are some concerns that arbitrarily providing accommodations may actually move the student further from demonstrating academic proficiency. Very little is known about the actual academic performance levels of students with disabilities in general and of students with visual impairments or blindness in particular.

2.7 ACADEMIC ACHIEVEMENT BASED ON LOCAL MEASURES

A different perspective on investigating academic performance of students with disabilities comes from the findings presented in a nationwide study, the Special Education Elementary Longitudinal Study (SEELS), funded by the Office of Special Education Programs within the U.S. Department of Education. “SEELS is designed to provide a national perspective on how students with disabilities are faring academically….” based on an analysis of the following factors: “teacher given grades, grade retention, deviations from expected grade-level performance in reading and mathematics, and standardized test scores in reading and mathematics on the Woodcock Johnson III

(WJ III; Woodcock, MeGrew, & Mather, 2001)" (Blackorby, Chorost, Garza, & Guzman, 2005, p. 4-1). The SEELS data provides both descriptive findings as well as multivariate analyses of the 11,000 representative sample, comprised of students with disabilities, who range from six through 13 years old as of December 1999. More than 1,000 of those students identified visual impairment as their primary disability (Marder, 2006).

The learning that takes place in the classroom and the measurement of that learning is compounded by many internal and external influences. Factors considered in the SEELS data "assesses dimensions of students' performance that derive from teacher and school perceptions of the adequacy of that performance" (Blackorby et al., 2005, p. 4-2) as well as performance on a standardized assessment of reading and mathematics for the WJ III. The first factor, course grades, presents insightful information regarding perceived content mastery based on daily learning; but this is interpreted with known limitations such as variations in grading standards across teachers, within and across schools, as well as variations between grades earned in general verses special education classes. Course grades by disability group indicates that "high grades are common for students with disabilities; one-third receives As or Bs…[and]only 4% are reported to be getting Ds or below" (Blackorby et al., 2005, p. 4-4). The data indicate that students with visual impairment are achieving the highest percentage of these A and B grades at 51%. The next highest grade obtainment of A and B grades by disability category are 45% for speech impairments and 44% for hearing impairments and autism. So based on parental report, it appears as though the majority of students with disabilities are earning high passing marks and achieving academic success based on either course content or IEP goals (Blackorby et al., 2005).

The SEELS data for grade retention, however, show "that a sizable number of students with disabilities have been retained at some point in their school careers" (Blackorby et al., 2005, p. 4-5). The parent report indicates that one in four students with disabilities has been retained and the data indicates that students with learning disabilities and mental retardation are most frequently retained, 31% and 33% respectively. Twenty percent of students with visual impairment have been held back (Blackorby et al., 2005).

To compare the performance of students with disabilities to the general population, SEELS research staff individually administered the WJ III standardized assessments in reading and mathematics. The passage comprehension subtest requires students to fill in the blanks to select the correct word to complete sentences and the calculation subtest assesses basic to advanced computation skills (Marder, 2006). For the passage comprehension test, there is much variation in the overall percentage ranges across all disability categories. For example, 92% of

students with learning disabilities score at or below the 50th percentile, whereas 74% of students with visual impairments scored below this range (Blackorby et al., 2005, p. 4-6 – 4-7). Although the students with visual impairments have the highest proportion of scores above the 50th percentile when compared to the other disability groups, this percentage is misleading since "SEELS administered the WJ III only to students who met particular screening criteria, including basic literacy (for print or braille)" (Marder, 2006, p. 18). The following percentage of students with visual impairments did not meet the screening criteria: "11% of students with low vision and 34% of blind students; 7% of students without MR/DD and 63% of students with MR/DD" (Marder, 2006, p. 18). So, of the 1,000 plus students with visual impairments included in the SEELS data, only a small percentage of them were assessed with the WJ III.

For the mathematics calculation scores, the SEELS data presents similar variations in scores across disability groups. Students with visual impairments as well as students with speech/language impairment have higher scores when compared to the other categories, with 47% and 48% respectively scoring at or above the 50th percentile (Blackorby et al., 2005, p. 4-9).

In comparison, a 2006 longitudinal database from the National Longitudinal Transition Study-2 (NLTS2) is the first nationally representative data to report the academic performance of secondary-age students who receive special education services on one standard assessment, the Woodcock-Johnson III (WJ III) (Woodcock et al., 2001). Samples of students with disabilities, ages 13 through 16, were administered the research edition of the WJ III subtests in the following areas: passage comprehension, synonyms/antonyms, mathematical calculation, applied problems, science, social studies (Wagner, Newman, Cameto, & Levine, 2006). NLTS2 assessment procedures offered students to participate with the same type of accommodations identified on their IEP's for instruction and testing. However, student actual use of accommodations was overall low, "61 percent of youth received no accommodations, 28 percent received one accommodation, and 11 percent received two or more" (Wagner et al., 2006, p. 10). Of the accommodations used, the identified specific types were:

- Breaks: 8 %
- Special furniture or lighting: 5%
- An aide or assistant: 5%
- An ASL interpreter: 8%
- Braille: 6%

- Abacus or calculator: 23% (Wagner et al., 2006, p. 10).

Scores on WJ III subtests suggest that many students with disabilities do not perform as well as students without disabilities. Generally, the majority of students with disabilities scored below the mean of each subtest when compared to students without disabilities (Wagner et al., 2006, p. 16) with several exceptions within certain subtests and/or across disability groups. A summary of the performance on all subtests show:

- Youths with a disability are more likely to score above the mean on synonyms/antonyms and mathematics subtests with, 21 percent and 23 percent scoring above the mean.
- Youths with a disability are less likely to score well on the passage comprehension and applied problems subtests, with 12% and 14% scoring above the mean.
- Youths with a disability experience the greatest difficultly with passage comprehension, averaging a score of 79 on the subtest when compared to scores of other subtests (i.e.: 87 on synonyms and antonyms subtest, 85 on the science and applied problems subtest, and 84 on the social studies and mathematical calculations subtests) (Wagner et al., 2006, p. 17).

Across disability groups, academic achievement differs based on assessment subtests. In general, performance for students with visual impairments is higher, with overall standard scores ranging from 85 to 94 (Wagner et al., 2006, p. 18). Students with visual impairments performed better on the synonyms/antonyms and mathematics calculations subtests, scoring higher on these two subtests than on the passage comprehension and the applied problems subtest (Wagner et al., 2006, p. 18). The subset standard scores for students identified with learning disability average between 82 and 90. These students scored the lowest on the passage comprehension subtest as compared to their performance on the synonyms/antonyms, mathematics calculation, applied problems, and science subtests. However, use of vocabulary skills in the synonyms/antonyms subtest is stronger than their mathematics calculations (Wagner et al., 2006, p. 18). The average standard scores for students who are hard of hearing including deafness range from 75 to 92. Their scores indicate stronger mathematics calculation skills over science knowledge, passage comprehension, social studies knowledge, and applied problem solving, and synonyms/antonyms skills (Wagner et al., 2006, p. 18). Like the results previously reported for students with visual impairments and learning disability, “the use of synonyms/antonyms for students with hearing impairments is stronger than their passage comprehension skills” (Wagner et al., 2006, p. 18).

Consistent with the SEELS data, there are multiple factors that impact the academic achievement of students with disabilities. Reporting the standard scores does not reflect the individual abilities of students within a disability group due to other factors such as disability and functioning, individual and household demographics, past school experience, and the use of accommodations. NLTS2 used a multivariate analysis to better explain these factors for the scores on the reading (passage comprehension), mathematics (calculations), and content knowledge (in science) subtests. The results of the use of accommodations indicate that "using a calculator as an accommodation in testing is positively related to mathematics scores, when other accommodations relate significantly to academic achievement measures, the relationships are negative" (Wagner et al., 2006, p. 16).

2.8 ACADEMIC ACHIEVEMENT BASED ON HIGH-STAKES TEST

Since the enactment of NCLB, there has been a significant shift in the educational priorities of our schools, moving from expectations for minimal competency to high-standards outcomes. Nevertheless, few data exist to document the performance of students with disabilities on high-stakes tests with or without the use of accommodations.

Elliot and colleagues (2001) analyzed the effects of accommodations on student scores for students with and without disabilities. Their study compared the use and effects of testing accommodations educators actually used on math and science performance tasks. The study consisted of 41 students with disabilities and 59 students without disabilities. Several observations were made at the conclusion of their study. The first was that testing accommodations typically happened in "packages of changes to the testing event and conditions", with the most frequently used accommodations being extra time, assistance with directions, and reading support (Elliot, Kratochwill, & McKevitt, 2001, p. 20). Also, the testing accommodations packages provided to the students with disabilities had a "moderate to large effect on test scores earned" (Elliot et al., 2001, p. 21). In general, "individualized testing accommodations increase students' scores by ½ to 1 standard deviation or more" (Elliot et al., 2001, p. 21). The third observation was an unexpected finding that the testing accommodations had a positive effect on the test scores for the students without disabilities – raising the question of whether the assessment tasks in their un-accommodated form were unclear or if some of the students had unidentified learning disabilities. Either

way, an accommodation that does not yield a differential boost is not appropriate and suggests the need to reconstruct certain test items for all students, or to classify the accommodation as invalid.

Cawthon (2007) surveyed 392 participants to analyze the types of accommodations used across states as well as review the differing NCLB accountability policies found across states for the 2004 and 2005 school year. This study specifically addressed "accommodations rooted in language and communication" (p. 481) since they are most important for students who are deaf or hard of hearing. The survey respondents were a mixed group of teachers and administrators who work with students who are deaf or hard of hearing in a variety of settings, including neighborhood schools and residential schools for the deaf. Collectively, the survey respondents reportedly served more than 9,300 students nation-wide. The survey provided disaggregated data to identify school location or program type, student and educational setting characteristics, the number of students participating on standard or alternate assessments, as well as naming the type of accommodations used (Cawthon, 2007). "Analysis began with descriptive reports of the prevalence of student participation in standardized assessments and their use of seven accommodations: extended time, small groups or individualized administration, test direction interpreted, test items read aloud, test items interpreted, signed response by the student to a scribe, and simplified English" (p. 469). Results indicated that "teachers use a range of accommodations that reflect the…diversity of their students. State policies are, at times, at odds with local-level decisions" (Cawthon, 2007, p. 484) about which accommodations are allowable and which ones restrict how a student's scores are used on the state assessment. The author contended that providing appropriate accommodations would give students with disabilities access to the various test options, but if the accommodations invalidate the test scores and the scores are eliminated from the accountability calculations, the purpose of the assessment in undermined.

2.9 BRIDGING THE GAP

Cawthon (2007) identifies three benefits of NCLB for all students with disabilities. The first focuses on the benefit of holding educational systems accountable for student learning by shifting expectations from access to outcomes. The second benefit is the potential to improve the NCLB data-reporting framework. She suggests that states should disaggregate proficiency results by disability to better determine if student achievement is improving from NCLB.

The third recommendation is focused on establishing validity research on the effects of various types of accommodations used on the assessments. The purpose of this study was to begin to address the second of her suggestions with a focus on students with visual impairments.

3.0 RESEARCH DESIGN

3.1 STATEMENT OF THE PROBLEM

Students who are blind or visually impaired require direct instruction to learn a myriad of specialized skills that their typically seeing peers learn through observation and visual modeling. Instruction in these skills may overshadow or conflict with instruction in academic content presented in core courses and assessed on high-stakes state tests (Allman, 2009). Little is known about the academic performance of students with disabilities on high-stakes state assessments, except that accommodations provide the means for students with disabilities to better access the tests. The previous chapter focused on the research literature on the effectiveness and appropriateness of the use of accommodations for students with disabilities, across categories, as well as specifically for students who are visually impaired, to understand possible relationships between access and performance. This review encountered little research regarding the performance of students who are visually impaired on state assessments or their use of accommodations.

To know and understand how students from this low incidence disability group are performing, more research is needed to "study the effectiveness of accountability strategies on improving student achievement for student subgroups, not just students as a whole" (Cawthon, 2007, p. 486). For this information to be meaningful and useful, we need a transparent data reporting framework to know who are the students being assessed by disability category; the type of assessment taken: standard, with or without accommodations, or alternate; and what accommodations have been provided (Koretz & Barton, 2003). The global issues affecting the intersection of NCLB and IDEA, which have also impacted students who are blind and visually impaired, is the focus of this research study. Addressing the unique learning needs for this heterogeneous group of children requires descriptive research which establishes a base line regarding student performance and the conditions under which that performance was obtained (i.e., with what accommodations) and then to examine the effectiveness and appropriateness of those

accommodations. If the majority of students who are blind and visually impaired are taking the general grade-level accountability assessment, either with or without accommodations, and have access to an accommodated grade-level curriculum and a TVI for instructional support, then an outcome assumption would be that these students should score on par with their typically developing peers. This study will use multiple descriptive analyses to report the performance of students who are visually impaired on the Pennsylvania System of School Assessment (PSSA). Descriptive statistics are being used to establish an accurate narrative (Gall, Gall, & Borg, 2007) of how these Pennsylvania students performed over the three academic years under consideration. Establishing this base is necessary in order for future research to identify relationships among student performance, the effectiveness and appropriateness of the accommodations, and the instruction provided for students with this disability.

3.2 ACHEIVEMENT MEASURE

The PSSA is a standards-based, criterion-referenced assessment based on state academic standards. Pennsylvania has a long history of assessing student performance at a school level, a process that dates back to 1969. The PSSA was instituted in 1992 as a school level evaluation model that underwent a major structural change in January 1999 with the adoption of the Pennsylvania Academic Standards for Reading, Writing, Speaking and Listening, and Mathematics (Data Recognition Corporation, 2008). "The Academic Standards, which are part of *Chapter 4 Regulations on Academic Standards and Assessment*, details what students should know (knowledge) and be able to do (skills) at various grade levels" (Data Recognition Corporation, 2008, p. 2). Student performance categories are defined as Advanced, Proficient, Basic, and Below Basic (Data Recognition Corporation, 2008). After the enactment of NCLB in 2001, the Pennsylvania Department of Education (PDE) developed plans to expand and implement the standards-based assessments in stages. The reading and mathematics tests for grade 3 were administered statewide in 2003 and 2004, but the initial proficiency levels were not reported until 2005. Test development in reading and mathematics continued in 2004 for grades 4, 6, and 7. These tests were field tested in 2005 and implemented in 2006. The science field test occurred in 2007 and was fully implemented in 2008 (Data Recognition Corporation, 2008). The 2007 adoption of grade-level Assessment Anchors provides a guide for educators as to which instructional standards would be assessed on the PSSA (Data Recognition Corporation, 2008).

Based on the Academic Standards and organized by the Assessment Anchors, the PSSA mathematics assessment asks both multiple-choice and open-ended questions in the following five reporting categories:

- Numbers and Operations,
- Algebraic Concepts,
- Geometry,
- Measurement, and
- Data Analysis and Probability.

The PSSA reading assessment also uses multiple-choice and open ended test items that fall under the two categories:

- Comprehension and Reading Skills and Interpretation, and
- Analysis of Fictional and Nonfictional Text.

During test administration, students in a classroom receive a random sampling of test items by booklet, or form, to measure both student-level and school-level performance. In the 2008 test design, "all forms contain a common core of items to which all students respond and matrix items that vary by form. Both the common and the matrix sections of the 2008 PSSA used traditional multiple-choice items and open-ended performance tasks" (Data Recognition Corporation, 2008, p. 8). Administering multiple test forms allows for a wider number of items for school-level reporting, field testing of new items, and linking which creates a statistical bridge between assessment administrations of test items from the previous year to the current year (Data Recognition Corporation, 2008, p. 11-12).

Additionally the 2008 PSSA incorporate the elements of universal design of assessments to allow maximum student participation and to provide valid inferences regarding student participation. "At every stage of the item and test development process, including the 2007 field test, procedures were employed to ensure that items and subsequent tests were designed and developed using the elements of universally designed assessments developed by the National Center for Educational Outcomes (NCEO)" (Data Recognition Corporation, 2008, p. 24). Table 1 illustrates how the PSSA attends to the elements of universal design:

Table 1. Elements of Universal Designed Assessment in the 2008 PSSA

Elements of UD Assessment	2008 PSSA Considerations
Inclusive Assessment Population	The target population includes all students in the assessed grades except those who participate in accountability through alternate assessment.
Precisely Defined Constructs	The Assessment Anchors provide clear descriptions of

	the constructs to be measured at the assessed grade levels, attending to the removal of all non-construct-oriented cognitive, sensory, emotional, and physical barriers.
Accessible, Non-biased Items	The test development team conducted both internal and external item reviews to attend to and eliminate barriers due to lack of sensitivity to disability, culture, or other subgroups as well as incorporating accessibility into the test rather than adding it afterwards.
Amenable to Accommodations	Requires the test to be compatible with widely used accommodations such as adaptive equipment and assistive technology.
Simple, Clear, and Intuitive Instructions and Procedures	Directions underwent multiple reviews to be easily understood, regardless of student's experience, knowledge, language skills, or current concentration level.
Maximum Readability and Comprehensibility	Assessments underwent editing of text to produce test items in plain language, language that is straightforward and concise.
Maximum Legibility	The appearance of the test included dimensions of style consistent with universal design.

(Data Recognition Corporation, 2008, p. 24-26).

3.3 METHOD

3.3.1 Participants

The Pennsylvania Department of Education provided access to the PSSA scores in reading, and mathematics for all students with IEPs in grades 3, 4, 5, 6, 7, 8, and 11 from 2005-2006, 2006-2007, and 2007-2008 academic years for Project RAISSE (Relationships between Achievement and Instruction for Students in Special Education) (Lemons & Kloo, 2010) "to examine relationships between achievement and instruction for students in special education" (pg. 2). There are approximately 21,000 IEP students in each grade-level per academic year distributed across all disability categories. Using this existing data set, this study reports academic performance of students identified as blind or visually impaired as their primary diagnosis in the areas of reading and math, within and across each grade and academic year. In addition, to provide a context for these scores, comparisons are made to the academic performance of two other disability groups. Students who are hard of hearing or deaf have been selected for comparison because they also have a sensory loss. Although the instructional strategies and learning needs of

students' with hearing impairment are quite different, having a compromised sensory attribute is more like the students in this analysis than any other disability category. Students with specific learning disability have been selected as the second comparison group, since they represent the largest category of students receiving special education services. Students from both additional disability groups are known to have difficulties in reading at grade-level.

The process to isolate the study participants from the original data set was completed in SPSS, sorting by the following IEP Disability codes: (12) visual impairment including blindness (VI), (02) hearing impairment including Deafness (HH), and (04) specific learning disability (LD). The first step to prepare the data for analysis was to organize the participants by individual grade-levels as well as by academic year.

The total number of students identified as visually impaired is represented in Table 2 by grade-level and academic year. The collective N reflects an average of 61 students per grade-level for 2005-2006, 66 students per grade-level in 2006-2007, and 63 students per grade-level in 2007-2008.

Table 2. *N* = Students Identified as Visually Impaired as Primary Diagnosis

Grade	2005-2006	2006-2007	2007-2008
Grade 3	57	58	64
Grade 4	73	62	65
Grade 5	59	78	71
Grade 6	61	64	70
Grade 7	53	65	52
Grade 8	72	62	68
Grade 11	53	71	53
TOTAL:	428	460	443

Within the total population under analysis, students with VI with scores across all three years were identified by their Pennsylvania Secure ID number to isolate and develop subgroups for additional analyses of performance over time. Students were placed into cohort groups based on a progression over three years, allowing for a longitudinal perspective on student performance (see Table 3).

Table 3. *n* = Students Identified as Visually Impaired by Cohorts

Cohort	2005-2006	2006-2007	2007-2008	*n* cohort participants
Cohort 1	Grade 3	Grade 4	Grade 5	22
Cohort 2	Grade 4	Grade 5	Grade 6	34
Cohort 3	Grade 5	Grade 6	Grade 7	21
Cohort 4	Grade 6	Grade 7	Grade 8	22

3.3.2 Data variables

For each school year (2005-2006, 2006-2007, and 2007-2008), the original data sets consisted of a range of 141 to 184 disaggregated variables per student. From this larger group, four sets of variables [demographic, test scores, performance levels, and accommodations used] were extracted for analysis. Table 4 illustrates the specific variables sorted to answer questions based on demographic data.

Table 4. Demographic Set

Variable Label	Variable Values	Variable Considerations for Data Analysis
Grade*	3, 4, 5, 6, 7, 8, and 11	
IEP Disability*	12 = Visual Impairment including Blindness (VI) 02 = Hearing Impairment including Deafness (HH) 04 = Specific Learning Disability (LD)	
PA Secure ID*		
District Name*		
Gender	F = Female M = Male	
Race	1 = American Indian or Alaskan Native 2 = Asian or Pacific Islander 3 = Black Non-Hispanic 4 = Latino-Hispanic 5 = White Non-Hispanic 6 = Multi-Racial	Participants coded '0' for omits or multiple representation were not included in the *N* and *n* analysis.
IEP*		
Title I Eligibility		
Migratory		
English Language Learner	0 = Non-ELL 1 = ELL enrolled in a U.S. school after 3-31-06 2 = ELL enrolled in a U.S. school before 3-31-06 3 = Exited ESL/Bilingual program and in first year of monitor 4 = Exited ESL/Bilingual program and in second year of monitor 5 = Formally ELL and no longer monitored	The 2006 variable is labeled LEP, Limited English Proficient and does not use the listed variable values. Values disaggregated for 2007 and 2008 data sets. Only students identified with a '1' or '2' were counted.
Economically Disadvantaged		
Home School Student		
Student is court/agency		

*Variables used to identify longitudinal cohort subgroups

3.3.3 Achievement: scaled scores and performance levels

Two variables in the database provided information on student performance. First, the total scaled scores for reading and math for all three disability groups, VI, HH, and LD as well as the longitudinal subgroups of students with visual impairment. Second, reading and math performance levels across years for the three disability subgroups and the longitudinal subgroups of students with visual impairment.

3.3.4 Accommodations

A comprehensive list of accommodations was generated from the three year database. Because there were changes and additions to the list of available accommodations over the three years, data preparation to analyze the type and amount of accommodations used involved pairing and grouping the accommodations to gain labeling alignment. That is, the variable labels for the selected accommodations under review matched consistently for the first two years, 2005-06 and 2006-07, but the available accommodations in the third data set, 2007-08, included both renamed as well as new variables. The most notable addition to the 2008 accommodation list was the separation and distinction between the use of the accommodation for the reading and math tests. Table 5 summarizes the alignment accommodation type for 2006 and 2007 data sets and the 2008 data set. The final outcome was a frequency distribution of types of accommodations used; by grade, by year, and by test version (braille, large print or other).

Table 5. Accommodations Set

Accommodations – Paired by Variable Label Across Academic Years		
Accommodation Type	Academic Years: 2005-06 and 2006-07	Academic Year: 2007-08
Scheduling/Timing/Setting	Scheduled extended time	Scheduled extended time (Reading and Math) Changed test schedule (Reading) Changed test schedule (Math)
Scheduling/Timing/Setting	Student-requested extended time	Student-requested extended time (Reading and Math)
Scheduling/Timing/Setting	Tested in a separate room	Tested in separate setting (Reading and Math)
Scheduling/Timing/Setting	Hospital/Home testing	Hospital/Home setting (Reading and Math)
Scheduling/Timing/Setting	Multiple test sessions	Multiple test sessions (Reading and Math)
Scheduling/Timing/Setting	Small group testing	Small group testing (Reading and Math)
Presentation	Braille edition	Braille format (Reading and Math)
Presentation	Large-print edition	Large-print format (Reading and Math)
Response	Braille Writer	Brailler / Note taker* (Reading and Math)
Response	Test Administrator transcribed illegible writing (open-ended answers only)	Test administrator scribed open-ended responses at student's direction (Reading and Math) Test administrator transcribed student responses* (Reading and Math)
Response	Dictation to a test administrator	Augmentative communication device (Reading and Math) Audio recording of student responses* (Reading and Math)
Presentation	Magnification Devices	Magnification device (Reading and Math)
Presentation	Test administrator read mathematics test aloud	Test directions read aloud, signed, or recorded (Reading and Math) Test items/questions read aloud or signed (Math) Test items/questions recorded (Math)
Response	Test administrator marks test at student direction (multiple-choice only)	Test administrator marked multiple-choice responses at student's direction (Reading and Math)
Presentation and Response	Typewriter/word processor/computer (Presentation and Response)	Typewriter, word processor, or computer* (Reading and Math) Electronic screen reader (PDE must approve program and all functions), (Reading and Math) Reading windows, reading guides (Reading and Math)
Presentation	Cranmer Abacus	Manipulative (Cranmer Abacus, number line), (Math)
Presentation and Response	Other (documentation provided to PDE)	Other (as indicated in Accommodations Guidelines or approved by PDE) (Reading and Math)

Note. Accommodations for Academic Year 2007-2008 sorted by test type: Reading and/or Math;
*Accommodation provided per Accommodations Guidelines.

3.3.5 Data analysis

Descriptive statistics were applied for all variables including total scaled scores and performance levels in reading and math, across and within grade-levels and academic years. The data has been sorted to examine these performance measures for the larger sample, N, as well as on a smaller sample, n, for a longitudinal perspective. Four longitudinal sample groups were identified as those students who had performance level scores in reading and math across three academic years in three consecutive grades.

Even though the study primarily uses descriptive statistics throughout, one-way ANOVAs with ad hoc analyses were conducted on the mean test scores to determine if differences seen descriptively were statistically significant. Additionally, student performance levels by disability group were compared using chi-squared tests. These analyses were conducted to answer the following research questions:

1. How do students with visual impairments perform on the PSSA? What accommodations are typically used?
2. Using the longitudinal sample of students, are there changes in student performance and use of accommodations across years, and if so, which variables change over time?

4.0 RESULTS

The purpose of this research study was to examine the reported scores and performance levels of students with visual impairment including blindness in reading and math across grades 3 through 8 and 11 over three academic years. Specifically, descriptive statistics were applied to report the scores, performance levels, and accommodations used.

4.1 DESCRIPTION OF THE STUDENTS IN THE DATA SET

Before analyzing performance, it is important to describe as fully as possible the population of students represented in the data. To accomplish this, the demographics are reported for the three different disability categories: students with visual impairment including blindness and the longitudinal sample, students who are hearing impaired including Deafness, and students with specific learning disability.

The demographic data presented in this section reports the following student attributes:

- total number of participants by disability category;
- gender;
- race subgroups; and
- socioeconomic attributes such as: Title I; migratory child; English Language Learner; classified as economically disadvantaged; home school student; and court/agency.

4.1.1 Participant Data

An initial analysis of the data set was conducted to understand the demographic make-up the student population whose achievement data were being reviewed: students who are visually impaired including blindness (VI), students who are hearing impaired including Deafness (HH), and students with specific learning disability (LD). The *N* represents the total number of student records reviewed by academic year and the percentage of the total data set this number represents.

Table 6. PSSA Total Number of Students Reviewed by Disability Categories by Academic Year

Year	VI	HH	LD
2006	428	1,284	83,714
	0.5%	1.5%	98.0%
2007	460	1,390	84,783
	0.5%	1.6%	97.9%
2008	452	1,216	82,783
	0.5%	1.4%	98.0%
N	1,340	3,890	251,280
	0.5%	1.5%	98.0%

Note. VI=Visual Impairment including Blindness; HH = Hearing Impaired including Deafness; LD = Specific Learning Disability.

As expected, students with LD represent the largest group of students, consisting of 98% of the total number of student records reviewed in these three academic years. Visual impairment represents less than 1% of the total participants under analysis of this study. Pennsylvania participant data are consistent with the national averages; "learning disabilities (LD) are a group of disorders that involve more than half the children in special education programs" (National Research Council, 2002, p. 243) and students with VI account for less than one percent of all school-aged students (AFB, 2009).

4.1.2 Gender Data

Table 7 examines gender distribution, reported by N as well as the percentage within each disability category.

Table 7. PSSA Total Number of Students Reviewed by Disability Categories by Gender

Gender	2006			2007			2008		
	VI	HH	LD	VI	HH	LD	VI	HH	LD
Female	178	612	30,557	179	686	31,435	186	598	31,381
	41.6%	47.7%	36.5%	38.9%	49.3%	37.1%	41.2%	49.3%	37.9%
Male	250	671	53,128	281	705	53,344	265	615	51,386
	58.4%	52.3%	63.5%	61.1%	50.7%	62.9%	58.8%	50.7%	62.1%
Total	428	1,283	83,685	460	1,391	84,779	451	1,213	82,767

Note. Adjusted total *N* reflects missing data cases.

There are more males than females within each disability group over the three academic years. This comparison is consistent with the national data reported in the 2002 National Research Council's *Minority Students in Special and Gifted Education*, that "for most disabilities, greater proportions of males are identified than females" (National Research Council, 2002, pg. 72). As the gender data indicate, regardless of the fluctuation in the actual student counts by disability group, the participants maintain a consistent proportion within each disability group across the three academic years.

4.1.3 Race Data

Table 8 provides the race distribution across the three disability groups. N is, again, represented as the total by disability group by year and as a percentage within each race category.

Table 8. PSSA Total Number of Students Reviewed by Disability Categories by Race

	2006			2007			2008		
Race	VI	HH	LD	VI	HH	LD	VI	HH	LD
American Indian or Alaskan Native	3 0.7%	4 0.3%	140 0.2%	2 0.4%	5 0.4%	158 0.2%	2 0.4%	2 0.2%	163 0.2%
Asian or Pacific Islander	9 2.1%	16 1.2%	695 0.8%	11 2.4%	37 2.7%	720 0.8%	12 2.7%	38 3.1%	750 0.9%
Black Non-Hispanic	67 15.7%	200 15.6%	14,442 17.3%	71 15.4%	203 14.6%	14,832 17.5%	77 17.1%	159 13.1%	14,663 17.7%
Latino-Hispanic	29 6.8%	101 7.9%	6,190 7.4%	30 6.5%	117 8.4%	6,854 8.1%	33 7.3%	97 8.0%	7,469 9.0%
White Non-Hispanic	315 73.8%	957 74.5%	61,822 73.9%	340 73.9%	1,014 72.9%	61,779 72.9%	322 71.4%	908 75.0%	59,237 71.6%
Multi-Racial	4 0.9%	6 0.5%	376 0.4%	6 1.3%	14 1.0%	431 0.5%	5 1.1%	7 0.6%	469 0.6%
Total	427	1,284	83,665	460	1,390	84,774	451	1,211	82,751

Across academic years and within disability categories, 73%-74% of all students reviewed in this dataset are identified as white, non-Hispanic. The data indicate a consistent ranking by race, with students identified as black, non-Hispanic constituting the second largest percentage of students, averaging 16% of students in each disability group, and Latino-Hispanics making up 6.8%-7.9% of students in each disability group.

4.1.4 Socioeconomic Attribute Data

Table 9 presents the prevalence of the identified socioeconomic attributes, indicating the number of participants who receive additional services based on need and identification within the state public school system.

Table 9. PSSA Total Number of Students Reviewed by Disability Categories by Socioeconomic Attributes

Socioeconomic Attributes	2006			2007			2008		
	VI	HH	LD	VI	HH	LD	VI	HH	LD
Total N	428	1,284	83713	460	1,391	84,783	452	1,216	82783
Title I	119	282	20300	113	308	21,769	123	313	21692
	27.8%	22.0%	24.2%	24.6%	22.1%	25.7%	27.2%	25.7%	26.2%
ELL	14	20	1661	22	47	3,063	19	55	673
	3.3%	1.6%	2.0%	4.8%	3.4%	3.6%	4.2%	4.5%	4.0%
Migratory Child	0	5	226	0	2	215	0	1	74
	0.0%	0.4%	0.3%	0.0%	0.1%	0.3%	0.0%	0.1%	0.1%
Econ Disadv	184	528	39158	160	573	40,406	177	468	41096
	43.0%	41.1%	46.8%	34.8%	41.2%	46.7%	39.2%	38.5%	49.6%
Home School	1	0	11	0	0	10	0	0	7
	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Court	0	51	206	0	2	97	0	0	114
	0.0%	0.4%	0.2%	0.0%	0.1%	0.1%	0.0%	0.0%	0.1%

As indicated in Table 9, each year there are only minor differences among the three disability groups on these attributes with being economically disadvantaged showing the widest percentage range between disability categories, particular between VI and LD in years 2007 and 2008.

Additionally, the state-level demographic data for students identified as visually impaired is proportional to the national demographic comparisons reported in the SEELS data, comparing students with VI, ages 8-15 years old, to the general student population. Like the gender data reported for students within Pennsylvania, the SEELS data reported more boys identified as visually impaired, 58%, than boys from the general population, 51% (Marder, 2006, p. 3). Although the SEELS data reports higher overall percentages of students across the race categories, the categorical ranking matches those found in the Pennsylvania data. Sixty-four percent of the students with VI identified in the SEELS data were white, matching the same percentage found in the general population (Marder, 2006, p. 3). The SEELS data reported a slightly highly percentage of African-American students with VI than identified the general student population, 17% to 15% respectively, and an even 16% split between of those students with VI to the general student population identified as Hispanic (Marder, 2006, p. 3). Comparing Pennsylvania student participants and demographic data to the SEELS demographic data establishes a baseline that the state-level participants of this study are proportionally represented to the national population.

4.1.5 Combined Demographics of the Longitudinal Sample by Cohort

Within the total number of students who are visually impaired identified in the larger sample, a subgroup of students with three years of reading and math scores were identified to provide a longitudinal perspective on achievement. Four cohorts of students over three consecutive years, beginning with third grade, were sorted by their PA Secure ID number to form this representative sample. Table 10 details a combined demographic analysis of the longitudinal sample n to examine whether the cohorts were substantially different from each other and whether the small sample n was substantially different from the larger sample N.

Table 10. Demographic Information from Longitudinal Sample

		Cohort 1 Grade 3, 4, 5	Cohort 2 Grade 4, 5, 6	Cohort 3 Grade 5, 6, 7	Cohort 4 Grade 6, 7, 8
Sample Participants		22	34	21	22
Gender	Female	45.0%	44.0%	52.0%	50.0%
	Male	55.0%	56.0%	48.0%	50.0%
Race	Asian/Pacific Islander	4.5%	3.0%	5.0%	4.0%
	Black Non-Hispanic	9.0%	18.0%	24.0%	9.0%
	Latino Hispanic	4.5%	9.0%	9.0%	14.0%
	White Non-Hispanic	82.0%	70.0%	62.0%	73.0%
Socioeconomic Attribute	Title 1*	5	11	8	6
	ELL*	2	2	3	1
	Econ Disadv*	8	16	10	9

Note. The count for the (*) items are averaged across the three grade-levels.

Although Cohort 2 has a somewhat larger number of students, there is a consistent proportional balance of students by gender across cohorts, which matches the gender representation of the larger sample. The youngest group, Cohort 1, has the greatest number of students identified as white and the smallest percentage of students identified as non-white. Cohorts 2 and 3 have a higher percentage of black non-Hispanic students. Cohort 4, the oldest group, appears to have more students identified as white, non-Hispanic and more Latino Hispanic students

than the other cohorts. Like the larger sample, there are only minor differences across the cohort samples on the socioeconomic attributes.

4.2 QUESTION ONE: HOW DO STUDENTS WITH VISUAL IMPAIRMENTS PERFORM ON THE PSSA?

Three steps were taken to answer Question one. The first step examined PSSA total scaled reading and math scores by disability group, across each academic year, to report the mean, standard deviation, and the minimum and maximum score range. The second step examined the performance levels by disability group. These data were also compared to the performance of all Pennsylvania students. The third step examined the use of accommodations, represented by frequency.

4.2.1 Performance by Total Scaled Scores

The total scaled scores in reading and math for the students from the three disability groups, VI, HH, and LD, are presented in Tables 11 through 16 by grade-level across the three academic years. Additionally, the total scaled scores for all students of Pennsylvania are also reported to provide an additional perspective on performance. The first three tables, Tables 11, 12, and 13, report performance in reading by academic year. Tables 14, 15, and 16 provide similar data for math performance. For each grade-level and year, a one-way ANOVA with post hoc analysis using Hochberg's GT2 analysis (due to different sample sizes across the three disability groups) was conducted to compare the mean score of the students with VI to the mean scores of students who are HH, and to students with LD. Using the Bonferroni correction, the level of significance was set at $p < .006$.

Table 11. 2006 PSSA Reading Performance by Total Scaled Scores by Grade

2006 Reading		Number	Mean	SD	Minimum	Maximum
Grade 3	VI	57	1,272.00	252.8	789	1,831
	HH	171	1,161.30[1]	266.8	718	1,897
	LD	7,737	1,062.40[2]	212.9	480	1,872
	All PA	12,662	1,330.00	233	471	1,999
Grade 4	VI	68	1,280.10	231.7	700	1,706
	HH	154	1,211.70[1]	238.1	737	1,912
	LD	9,932	1,104.90[2]	181.6	700	1,823
	All PA	127,680	1,340.00	217.9	700	2,303
Grade 5	VI	54	1,268.30	236.6	758	1,685
	HH	194	1,113.00[1]	267.9	700	1,841
	LD	11,912	1,059.80[2]	201	700	1,988
	All PA	131,488	1,310.00	232.9	700	2,234
Grade 6	VI	55	1,278.10	232.4	734	1,680
	HH	175	1,219.30	213.4	801	1,726
	LD	12,942	1,111.00[2]	182.5	700	1,849
	All PA	135,914	1,340.00	210.4	700	2,339
Grade 7	VI	49	1,301.10	270.9	873	1,953
	HH	166	1,226.60[1]	246.8	813	1,953
	LD	13,753	1,140.10[2]	184.2	700	2,103
	All PA	141,012	1,360.00	220.1	700	2,351
Grade 8	VI	51	1,361.00	290.9	798	1,974
	HH	194	1,224.90[1]	302.7	700	1,891
	LD	14,019	1,138.90[2]	231.3	700	2,559
	All PA	143,401	1,420.00	284.7	700	2,559
Grade 11	VI	50	1,349.00	234.5	700	1,903
	HH	167	1,163.00[1]	326.6	700	2,317
	LD	11,087	1,069.40[2]	217.2	700	2,121
	All PA	132434	1,370.00	278.5	700	2,631

Note. Mean[1] = scores of VI significantly > scores of HH; Mean[2] = scores of VI significantly > scores of LD.

Table 12. 2007 PSSA Reading Performance by Total Scaled Scores by Grade

2007 Reading		Number	Mean	SD	Minimum	Maximum
Grade 3	VI	55	1,257.50	128	1,000	1,589
	HH	175	1,240.00	165.6	1,000	1,737
	LD	7,781	1,160.90[2]	115.3	1,000	1,891
	All PA	125,344	1,330.00	149.7	1,000	1,891
Grade 4	VI	58	1,293.10	221.8	746	1,685
	HH	179	1,216.90[1]	220.9	784	1,778
	LD	10,052	1,099.30[2]	185.6	700	1,907
	All PA	125,981	1,350.00	218.7	700	2,411
Grade 5	VI	76	1,266.10	218.3	700	2,261
	HH	187	1,156.20[1]	244.9	700	2,261
	LD	11,744	1,082.30[2]	170.8	700	2,015
	All PA	129,593	1,320.00	221.9	700	2,261
Grade 6	VI	58	1,270.30	253	700	1,757
	HH	203	1,182.80[1]	223	749	1,704
	LD	13,002	1,108.80[2]	173	700	2,306
	All PA	133,399	1,340.00	223.9	700	2,306
Grade 7	VI	60	1,285.60	227.8	700	1,689
	HH	218	1,233.50	242.2	756	1,861
	LD	13,811	1,133.00[2]	172	700	2,109
	All PA	138,610	1,370.00	229.7	700	2,361
Grade 8	VI	60	1,367.90	278.7	837	2,063
	HH	190	1,262.70[1]	266.2	725	1,981
	LD	14,355	1,187.80[2]	206.9	700	2,352
	All PA	141,193	1,440.00	249.2	700	2,646
Grade 11	VI	51	1,320.10	293.4	700	2,224
	HH	177	1,112.40[1]	271.6	700	2,041
	LD	11,684	1,055.80[2]	208	700	2,224
	All PA	135,364	1,350.00	266.9	700	2,529

Note. Mean[1] = scores of VI significantly > scores of HH; Mean[2] = scores of VI significantly > scores of LD.

Table 13. 2008 PSSA Reading Performance by Total Scaled Scores by Grade

2008 Reading		Number	Mean	SD	Minimum	Maximum
Grade 3	VI	63	1,249.90	150.7	1,000	1,592
	HH	170	1,265.90	155.6	1,000	1,649
	LD	8,182	1,165.20[2]	116.3	1,000	1,742
	All PA	126,395	1,340.00	139.3	1,000	1,896
Grade 4	VI	63	1,288.00	214.6	786	1,831
	HH	188	1,249.00	251	711	1,921
	LD	10,159	1,112.40[2]	184	700	2,318
	All PA	126,280	1,370.00	225.1	700	2,318
Grade 5	VI	71	1,260.50	227.9	861	1,777
	HH	166	1,218.60	241.7	700	2,015
	LD	11,529	1,078.70[2]	187.2	700	1,867
	All PA	127,211	1,330.00	222	700	2,262
Grade 6	VI	69	1,296.60	241.4	829	1,741
	HH	181	1,237.90	235.5	800	2,290
	LD	12,635	1,122.80[2]	179.4	700	1,896
	All PA	130,706	1,360.00	221.4	700	2,290
Grade 7	VI	52	1,342.20	214.2	983	1,867
	HH	184	1,259.50[1]	254.6	758	2,114
	LD	13,562	1,152.60[2]	176.5	700	2,114
	All PA	135,669	1,390.00	234.7	700	2,366
Grade 8	VI	62	1,424.60	253.3	735	2,049
	HH	162	1,354.30	276.1	780	2,049
	LD	13,885	1,194.90[2]	219.2	700	2,157
	All PA	138,377	1,480.00	272.7	700	2,628
Grade 11	VI	57	1,241.10	321.9	700	1,939
	HH	146	1,205.00	295.6	700	2,053
	LD	11,877	1,069.70[2]	208.3	700	2,053
	All PA	135,015	1,360.00	276.2	700	2,546

Note. Mean[1] = scores of VI significantly > scores of HH; Mean[2] = scores of VI significantly > scores of LD.

Table 14. 2006 PSSA Math Performance by Total Scaled Scores by Grade

2006 Math		Number	Mean	SD	Minimum	Maximum
Grade 3	VI	57	1,315.30	273.6	758	1,835
	HH	171	1,298.80	271.6	812	1,999
	LD	7,786	1,196.80[2]	213.9	557	1,999
	All PA	125,004	1,400.00	236.4	475	1,999
Grade 4	VI	68	1,354.10	192.6	947	1,822
	HH	155	1,285.40[1]	233.5	787	2,042
	LD	9,972	1,207.60[2]	183.4	700	2,042
	All PA	127,959	1,400.00	220.6	700	2,282
Grade 5	VI	55	1,334.70	215.6	914	1,785
	HH	193	1,277.20	268.7	760	2,292
	LD	11,935	1,212.40[2]	181.6	700	2,292
	All PA	131,702	1,420.00	238.1	700	2,292
Grade 6	VI	56	1,279.70	209	827	1,695
	HH	176	1,280.20	234.3	798	1,875
	LD	12,968	1,187.30[2]	176	700	2,345
	All PA	136,186	1,400.00	227.7	700	2,345
Grade 7	VI	49	1,279.90	220.3	919	1,824
	HH	166	1,270.60	231.2	840	1,824
	LD	13,806	1,185.00[2]	166.2	700	2,104
	All PA	141,300	1,390.00	221.7	700	2,343
Grade 8	VI	50	1,273.20	234.9	937	2,225
	HH	195	1,239.70	210.8	824	1,885
	LD	14,060	1,160.10[2]	163.9	700	2,225
	All PA	143,749	1,370.00	222.5	700	2,225
Grade 11	VI	51	1,261.50	239.5	700	2,398
	HH	166	1,157.70	264.1	700	2,129
	LD	11,156	1,052.10[2]	197.1	700	2,398
	All PA	132,666	1,340.00	292.5	700	2,398

Note. Mean[1] = scores of VI significantly > scores of HH; Mean[2] = scores of VI significantly > scores of LD.

Table 15. 2007 PSSA Math Performance by Total Scaled Scores by Grade

2007 Math		Number	Mean	SD	Minimum	Maximum
Grade 3	VI	55	1,254.90	164.1	903	1,611
	HH	176	1,193.30[1]	212.1	764	1,765
	LD	7,797	1,151.10[2]	156.8	750	1,765
	All PA	125,533	1,310.00	176.6	750	1,765
Grade 4	VI	59	1,383.60	244.7	980	2,105
	HH	181	1,297.70[1]	243.1	852	1,962
	LD	10,062	1,213.80[2]	188.2	700	1,962
	All PA	126,154	1,420.00	221	700	2,348
Grade 5	VI	76	1,354.50	211.6	901	1,721
	HH	188	1,275.90[1]	242.8	796	2,216
	LD	11,768	1,214.70[2]	182.7	700	2,216
	All PA	129,781	1,430.00	226.7	700	2,476
Grade 6	VI	60	1,330.40	226.4	780	1,737
	HH	203	1,260.10[1]	244.6	811	1,828
	LD	13,030	1,193.90[2]	177.7	707	2,369
	All PA	133,610	1,420.00	233.6	700	2,369
Grade 7	VI	61	1,258.10	255.4	831	1,767
	HH	218	1,283.20	264.1	767	1,936
	LD	13,837	1,173.50[2]	185.7	700	2,002
	All PA	138,838	1,420.00	248.5	700	2,487
Grade 8	VI	60	1,310.70	220.8	907	1,779
	HH	190	1,280.70	224.2	833	2,041
	LD	14,371	1,179.00[2]	171	700	2,259
	All PA	141,451	1,390.00	222.3	700	2,259
Grade 11	VI	50	1,268.60	236.7	879	1,789
	HH	178	1,146.30[1]	232.4	751	1,789
	LD	11,730	1,077.10[2]	176.258	700	2,095
	All PA	135,632	1,330.00	253.3	700	2,349

Note. Mean[1] = scores of VI significantly > scores of HH; Mean[2] = scores of VI significantly > scores of LD.

Table 16. 2008 PSSA Math Performance by Total Scaled Scores by Grade

2008 Math		Number	Mean	SD	Minimum	Maximum
Grade 3	VI	63	1,214.90	200.2	793	1,662
	HH	171	1,254.80	203	750	1,827
	LD	8,216	1,152.10[2]	160.3	793	1,662
	All PA	126,552	1,330.00	184.7	750	1,827
Grade 4	VI	63	1,348.40	235.5	931	1,836
	HH	188	1,343.30	253.6	861	2,126
	LD	10,190	1,220.80[2]	195.2	736	2,370
	All PA	126,415	1,450.00	243	700	2,370
Grade 5	VI	70	1,385.60	258.4	936	2,098
	HH	166	1,363.90	232.2	855	1,962
	LD	11,549	1,228.50[2]	180	735	2,329
	All PA	127,324	1,450.00	234.2	735	2,329
Grade 6	VI	69	1,400.50	252	814	2,050
	HH	181	1,343.50	238.1	814	2,050
	LD	12,659	1,211.00[2]	186.2	700	2,453
	All PA	130,851	1,460.00	253.5	700	2,453
Grade 7	VI	52	1,392.20	240.4	915	2,407
	HH	186	1,322.00[1]	241.9	888	2,166
	LD	13,586	1,216.70[2]	173.9	712	2,166
	All PA	135,805	1,440.00	236.6	700	2,407
Grade 8	VI	62	1,324.90	236.4	843	2,045
	HH	162	1,323.70	238.5	843	2,045
	LD	13,924	1,190.80[2]	166.9	746	2,045
	All PA	138,580	1,410.00	221	700	2,270
Grade 11	VI	57	1,185.20	195.4	700	1,850
	HH	149	1,214.80	273.2	777	1,939
	LD	11,890	1,072.80[2]	195.4	700	2,089
	All PA	135,137	1,340.00	267.3	700	2,342

Note. Mean[1] = scores of VI significantly > scores of HH; Mean[2] = scores of VI significantly > scores of LD.

Students with VI scored, on average, significantly higher in reading than students who are HH in six of seven comparisons in 2006, six of seven comparisons in 2007, and one of seven comparisons in 2008. Students with VI scored significantly higher than students with LD at every grade-level in all three years. The difference across sensory impaired groups was not as striking in math. Significant mean differences between VI and HH students'

scores were found in one of seven comparisons in 2006, five of seven comparisons in 2007, and one of seven comparisons in 2008. On the other hand, significant differences were found in math between scores of students with VI and students with LD at every grade-level and every year.

While statistical significance could not be investigated for the differences between scores of students with VI and all students in Pennsylvania (due to not having access to the data set of all of these individual scores), an inspection of the means shows that all three disability groups performed consistently lower than the mean scores reported by grade-level, year, and subject for all the students in Pennsylvania.

4.2.2 Performance by Performance Levels

Another way to analyze student performance is by the performance level category. Total scaled scores are converted to performance levels based on the PSSA Cut Scores for each academic year. Students who are Proficient or Advanced have met the NCLB and the state's criteria of "passing" the high-stakes grade-level standard assessment. Tables 17 and 18 summarize the performance levels for reading and math, respectively. The tables also contain the percentage of all students in Pennsylvania, who performed at each level.

Table 17. PSSA Performance Levels in Reading by Student Group by Year

Reading Performance		Total	Below Basic	Basic	Proficient	Advanced
Reading 2006	VI	402	103	77	114	108
			26.0%	19.0%	28.0%	27.0%
	HH	1229	521	232	286	190
			42.0%	19.0%	23.0%	15.0%
	LD	81467	45368	18421	13978	3700
			56.0%	23.0%	17.0%	5.0%
	All PA Students	936591	300646	324997	154538	156410
			32.1%	34.7%	16.5%	16.7%
Reading 2007	VI	460	111	87	131	131
			24.0%	19.0%	28.0%	28.0%
	HH	1336	547	260	340	189
			41.0%	19.0%	25.0%	14.0%
	LD	82606	45881	19194	14303	3228
			56.0%	23.0%	17.0%	4.0%
	All PA Students	929484	152435	148718	338332	289999
			16.4%	16.0%	36.4%	31.2%
Reading 2008	VI	437	113	81	147	96
			26.0%	19.0%	34.0%	22.0%
	HH	1197	394	212	367	224
			33.0%	18.0%	31.0%	19.0%
	LD	81829	43614	19128	15384	3703
			53.0%	23.0%	19.0%	5.0%
	All PA Students	919653	137948	139787	335674	306244
			15.0%	15.2%	36.5%	33.3%

Note. Performance level scores for All PA Students taken from PDE, n.d. (b); PDE n.d. (c); and PDE n.d. (d) respectively.

Table 18. PSSA Performance Levels in Math by Student Group by Year

Math Performance		Total	Below Basic	Basic	Proficient	Advanced
Math 2006	VI	404	127	67	117	93
			31.0%	17.0%	29.0%	23.0%
	HH	1230	461	221	265	283
			37.0%	18.0%	22.0%	23.0%
	LD	81768	41639	17915	15604	6610
			51.0%	22.0%	19.0%	8.0%
	All PA Students	938566	154863	145478	267491	370734
			16.5%	15.5%	28.5%	39.5%
Math 2007	VI	433	120	75	118	120
			28.0%	17.0%	27.0%	28.0%
	HH	1342	504	235	316	287
			38.0%	18.0%	24.0%	21.0%
	LD	82770	41040	18865	16882	5983
			50.0%	23.0%	20.0%	7.0%
	All PA Students	930999	143374	143373	288610	355642
			15.4%	15.4%	31.0%	38.2%
Math 2008	VI	436	123	57	122	134
			28.0%	13.0%	28.0%	31.0%
	HH	1203	341	191	341	330
			28.0%	16.0%	28.0%	27.0%
	LD	82014	39023	18506	17652	6833
			48.0%	23.0%	22.0%	8.0%
	All PA Students	920664	128893	128893	266992	395886
			14.0%	14.0%	29.0%	43.0%

Note. Performance level scores for All PA Students taken from PDE n.d. (b); PDE n.d. (c); and PDE n.d. (d) respectively.

Inspection of the data in Tables 17 and 18 show that students with VI were more likely to have earned passing scores (i.e., Proficient and Advanced) and less likely to have earned Basic or Below Basic scores than either of the two other disability groups. However, the total sample of students in Pennsylvania was more likely to have a higher passing percentage than students with VI. One exception to this finding is the 2006 reading data, where students with VI have a higher percent of passing scores (55%) than the students in Pennsylvania as a whole (33.2%).

Chi-Squared tests were applied to determine if the distributions across performance levels for students with VI were significantly different from the distribution of scores from the comparison groups, HH, LD, and all of the students in Pennsylvania. Multiple analyses were calculated to examine each of these pairings in reading and math by year. The findings confirm that the distribution of the scores for students with VI is significantly different at $p <$ .006 than the scores for students with LD and all of the students in the state. However, there were three occasions where the distribution of these scores was not significant when compared to students who are HH. The first occurrence was found in the 2008 reading distribution of scores [Chi-Sq = 7.89, df 3, $p <$ .0483]; then again for the 2006 math scores [Chi-Sq = 10.57, df 3, $p <$ .0143]; and lastly for the 2008 math scores [Chi-Sq = 2.91, df 3, $p <$ .4057].

4.2.3 Accommodations

Accommodations used were summarized by type, (presentation, response, a combination of presentation and response, and a combination of scheduling, timing, and setting) and by year. The frequencies of accommodations used to access and respond to the reading test by students with visual impairments are presented in Table 19, with the math accommodations presented in Table 20.

Table 19. Reading Accommodations for Students with Visual Impairments

Accommodation Type	Accommodation	2006	2007	2008
Presentation	Braille	34	32	38
	Large Print	184	167	172
	Magnification Device	43	45	21
	Test directions read aloud, signed, or recorded	-	-	80
Response	Braille Writer / Note taker	25	21	25
	Test administrator transcribed illegible writing	39	63	-
	Test administrator scribed open-ended responses at student's direction	-	-	31
	Test administrator transcribed student responses	-	-	163
	Dictation to a test administrator	32	21	-
	Augmentative communication device	-	-	0
	Audio recording of student responses	-	-	0
	Test administrator marks test at student direction (multiple-choice only)	51	49	47
Presentation and Response	Typewriter, word processor, or computer	7	12	7
	Reading windows, reading guides	-	-	5
	Electronic screen reader	-	-	2
	Other	18	3	5
Scheduling/ Timing/ Setting	Scheduled extended time	126	68	86
	Changed test schedule	-	-	12
	Student requested extended time	24	22	15
	Tested in a separate room	106	102	111
	Hospital/home tested	2	1	3
	Multiple test sessions	21	17	27
	Small Group tested	104	105	132

The most frequently used accommodation across all three years involved accessing the reading exam with the large print edition; on average, 39% of students with VI used a large print test. Only about 8% used the braille format. In 2006 and 2007, an average of 10% of students with VI used a magnification device. This accommodation was used less in 2008, dropping down to just 5%. However, a new accommodation category was introduced in 2008 and 18% of the students with VI used the new option for the test directions to be read aloud, signed, or recorded.

The most utilized accommodations in the area of student response reflected the variety of transcribing options available to students with VI. Five percent of the students used a braille writer or note taker over the three years. In 2006 and 2007, 9% and 14% respectively used the accommodation option for the test administrator to transcribe illegible writing. This accommodation option increased significantly in 2008, with the addition of two new transcribing options: test administrator scribed open-ended responses at student's direction and test administrator transcribed student responses. Thirty-seven percent of the students identified with visual impairments used the latter

accommodation. No one used the other new response options (i.e., generate student responses with an augmentative communication device or audio recording of student responses). Lastly, there is little change over the three academic years in the use of the test administrator marks test at student direction (multiple-choice only) accommodation options; consistently, about 11% of students used this accommodation.

The combined accommodations identified as either a presentation or response type had a more mixed usage over the three years. The use of a typewriter, word processor, or computer was minimal, marked as used in only 2% of the PSSA records of students with VI. Reading windows or reading guides, or electronic screen readers, added as new approved accommodations in 2008, saw only modest use. And, about 1% of the students used the unspecified other category.

In the combined area of test setting changes (i.e.: including scheduling, timing, and setting), the three accommodations used the most across the three years were small group testing (used with an average of 26% of students with VI), tested in a separate room (24%), and scheduled extended time (21%).

Table 20. Math Accommodations for Students with Visual Impairments

Accommodation Type	Accommodation	2006	2007	2008
Presentation	Braille	34	32	36
	Large Print	184	167	173
	Magnification Device	43	45	27
	Cranmer Abacus	7	8	11
	Test administrator reads math test aloud	82	58	-
	Test directions read aloud, signed, or recorded	-	-	86
	Test items/questions read aloud or signed	-	-	83
	Test items/questions recorded	-	-	15
Response	Braille Writer / Note taker	25	21	21
	Test administrator transcribed illegible writing	39	63	-
	Test administrator scribed open-ended responses at student's direction	-	-	41
	Test administrator transcribed student responses	-	-	164
	Dictation to a test administrator	32	21	-
	Augmentative communication device	-	-	0
	Audio recording of student responses	-	-	0
	Test administrator marks test at student direction (multiple-choice only)	51	49	48
Presentation and Response	Typewriter, word processor, or computer	7	12	6
	Reading windows, reading guides	-	-	2
	Electronic screen reader	-	-	2
	Other	18	3	2
Scheduling/ Timing/ Setting	Scheduled extended time	126	68	81
	Changed test schedule	-	-	10
	Student requested extended time	24	22	17
	Tested in a separate room	106	102	110
	Hospital/home tested	2	1	3
	Multiple test sessions	21	17	26
	Small Group tested	104	105	133

The use of accommodations on the math test was similar in types and amounts to the reading test. In the area of test presentation, the most common accommodation used by 40% of the students with VI was large print format. Students accessed the braille edition at the same average as reading, at 8%, and used a magnification device, on average, 9% of the time over the three academic years. An additional approved math accommodation included using the Cranmer abacus by 1% of the students with VI. In 2006 and 2007, test administrator reads the math test aloud was used by an average of 17% of students. This accommodation in 2008 specified the differences between the test directions and the test items/questions being read aloud. Students used both of these new accommodations equally, at 19%. The use of test items/questions recorded was minimally used in 2008.

Like the presentation data, the frequency of the accommodations used for student responses was consistent with the reading data. A braille writer or note taker was used by an average of 5% of students over the three years , and 11% of the students utilized the option for the test administrator to mark the test at student direction (multiple-choice only). Students used the option of having the test administrator to transcribe illegible writing 12% of the time in 2006 and 2007. There was an increase in the amount of transcribing used as a new 2008 approved accommodations; 37% of the students used test administrator transcribed student options while 9% used test administrator to scribed open-ended responses at student's direction. Dictation to the test administrator was used, on average, by 7% of students in 2006 and 2007. This option was not available in 2008 and no students used augmentative communication devices and audio recordings of student responses.

Types of accommodations used with the math test that could be considered are reported together. Only 2% of students used a typewriter, word processor, or computer on their math test over the three years. There was again minimal use of the new 2008 accommodation options to use reading windows or reading guides or to use an electronic screen reader. The combined other options were also used very minimally on the math test, resulting in an average of just 2% of all students using this unspecified accommodation option.

The math accommodations used under the category of scheduling/timing/setting again mirror the reading results. About 26% of students used the small group testing accommodation. Tested in a separate room is the second most frequently used accommodation, with 24% of the students requesting this option. Eighteen percent of the students used the scheduled extended time accommodation.

4.3 QUESTION TWO: USING THE LONGITUDINAL SAMPLE OF STUDENTS, ARE THERE CHANGES IN STUDENT PERFORMANCE AND USE OF ACCOMMODATIONS ACROSS YEARS, AND IF SO, WHICH VARIABLES CHANGE OVER TIME?

To answer the second question, four cohorts of students with reading and math scores over three years were identified as a representative sample of the larger group. First the performance levels of individual students were examined across three academic years. Second, patterns of accommodations used by these students were examined for changes over time.

4.3.1 Cohort Performance

To examine the longitudinal performance of students with VI by cohorts performance levels scores were used (the PSSA Technical Manual cautions that total scaled scores cannot be compared across test type or test year). To prepare the data for analysis, performance levels were identified for each student in each cohort by grade and year of testing. Detail on individual student performance by cohort for reading is provided in Appendix F, Tables A8-A11 and for math in Appendix G, Tables A12-A15.

Changes in performance levels from one grade to the next were then summarized across cohorts. Individual students were identified as moving, in consecutive years, from (a) fail to pass, (b) pass to fail, (c) fail to fail, or (d) pass to pass. The percentages of students falling into each of these categories, by grade-level, are presented in Table 21 for reading and Table 22 for math.

Table 21. Longitudinal Performance Summary for Reading

		Reading			
Grade	*n*	F to P	P to F	F to F	P to P
3 to 4	22	1	3	7	11
4 to 5	56	3	6	22	25
5 to 6	55	2	1	13	18
6 to 7	43	2	4	16	21
7 to 8	22	6	1	3	12
All	198	14	15	61	87
		7.1%	7.6%	30.8%	43.9%

Note. F = failed (Below Basic or Basic); P = passed (Proficient or Advanced).

Nearly 75% of the students with VI maintained the same performance level (pass to pass, or fail to fail) on the reading test across grades. An equal percentage of students went from failing one year to passing the next as did the reverse. Only 8 out of the entire longitudinal sample of 99 students with VI showed substantial growth, moving from failing in 2006 to passing two years later, in 2008.

Table 22. Longitudinal Performance Summary for Math

		Math			
Grade	*n*	F to P	P to F	F to F	P to P
3 to 4	22	2	0	4	16
4 to 5	56	1	11	11	33
5 to 6	55	5	2	19	29
6 to 7	43	1	3	19	20
7 to 8	22	4	0	9	9
All	198	13	16	62	107
		6.6%	8.1%	31.3%	54.0%

Note. F = fail (Below Basic or Basic); P = pass (Proficient or Advanced).

The majority of students with VI (54%) maintained their passing status from one year to the next on the math test (pass to pass), a higher percentage than for the reading test. A substantial percentage of students (31%) failed to achieve proficiency from one year to the next. Like the reading analysis, as many students go from fail to pass as do from pass to fail. Fewer students, only 4 out of 99, demonstrated upward movement across three years moving from Basic of Below Basic in the first year (2006) to Proficient or Advanced two years later (2008).

4.3.2 Accommodations Used by Cohorts

The accommodations analysis examined trends of usage across cohorts by grade-level as well as within cohorts by individual student. The accommodations identified in this review focused on the 13 most frequently used. To look at the accommodations used by grade level, students from the longitudinal sample were regrouped to capture and yield a larger representative look. This resulted in the following adjusted total number of students by grade level:

- Third Graders isolated from Cohort 1 = 22 students;
- Fourth Graders isolated from Cohorts 1 and 2 = 36 students;
- Fifth Graders isolated from Cohorts 1, 2, and 3 = 77 students;
- Sixth Graders isolated from Cohorts 1, 2, and 3 = 77 students;
- Seventh Graders isolated from Cohorts 3 and 4 = 43 students; and
- Eighth Graders isolated from Cohort 4 = 22 students.

Tables 23 and 24 present the percent of students who used each accommodation by grade level in reading and math respectively.

Table 23. Reading Accommodations by Grade-Level within Cohort Sample

Accommodation Type	Accommodation	Grade-Level 3	4	5	6	7	8
Presentation	Braille	4.5%	16.7%	10.4%	7.8%	4.7%	0.0%
	Large Print	27.3%	94.4%	44.2%	48.1%	39.5%	31.8%
	Magnification Device	18.2%	47.2%	18.2%	13.0%	4.7%	13.6%
Response	Braille Writer / Note taker	4.5%	8.3%	7.8%	7.8%	4.7%	0.0%
	Test Administrator transcribed illegible writing (open-ended answers only)	0.0%	25.0%	16.9%	11.7%	7.0%	0.0%
	Test administrator transcribed student responses	0.0%	0.0%	6.5%	19.5%	20.9%	13.6%
	Test administrator marks test at student direction (multiple-choice only)	4.5%	30.6%	19.5%	9.1%	4.7%	4.5%
Presentation and Response	Typewriter/word processor/computer	4.5%	0.0%	14.3%	2.6%	2.3%	4.5%
	Electronic screen reader	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Other	9.1%	0.0%	0.0%	2.6%	0.0%	0.0%
Scheduling/ Timing/ Setting	Scheduled extended time	9.1%	55.6%	27.3%	23.4%	16.3%	0.0%
	Tested in a separate room	18.2%	41.7%	14.3%	16.9%	14.0%	4.5%
	Small Group tested	13.6%	50.0%	18.2%	16.9%	25.6%	9.1%

Table 24. Math Accommodations by Grade-Level within Cohort Sample

Accommodation Type	Accommodation	Grade-Level 3	4	5	6	7	8
Presentation	Braille	4.5%	16.7%	10.4%	7.8%	4.7%	0.0%
	Large Print	27.3%	94.4%	45.5%	48.1%	37.2%	31.8%
	Magnification Device	22.7%	47.2%	19.5%	15.6%	7.0%	4.5%
Response	Braille Writer / Note taker	4.5%	8.3%	7.8%	7.8%	4.7%	0.0%
	Test Administrator transcribed illegible writing (open-ended answers only)	0.0%	25.0%	16.9%	11.7%	7.0%	0.0%
	Test administrator transcribed student responses	0.0%	0.0%	9.1%	19.5%	18.6%	18.2%
	Test administrator marks test at student direction (multiple-choice only)	4.5%	30.6%	19.5%	9.1%	4.7%	9.1%
Presentation and Response	Typewriter/word processor/computer	4.5%	0.0%	13.0%	2.6%	2.3%	4.5%
	Electronic screen reader	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Other	9.1%	0.0%	0.0%	3.9%	0.0%	0.0%
Scheduling/ Timing/ Setting	Scheduled extended time	9.1%	55.6%	27.3%	22.1%	16.3%	0.0%
	Tested in a separate room	22.7%	41.7%	14.3%	15.6%	14.0%	4.5%
	Small Group tested	13.6%	50.0%	20.8%	18.2%	25.6%	9.1%

The percentage of students using accommodations on the reading and math test are comparable by grade level. Although the youngest and the oldest grade- levels have the fewest number of students in the cohort analysis, these third and eighth graders also used fewer types and numbers of accommodations overall. In general, the majority of the accommodations used lie in the middle grade-levels, fourth through seventh, with fourth graders being provided the highest percentage of accommodations by type and number used.

Like the accommodations data reported on the larger sample, most students from the cohorts in grades 4-7 used the large print format to access the reading (49.7% of students) and math (49.8% of students) tests. A magnification device was also used by, on average, 26.4% of these print readers, on the reading test and 27.4% of large print readers on the math test. The highest use of a magnification device for both reading and math grade-level percentage was by fourth graders (47.2%). About 8.5% of students in this longitudinal sample accessed both the

reading and math tests using the braille format and 6.6% utilized a braille writer or note taking device for their responses.

Within each of the grades levels, a consistent rank order to the test setting accommodations are noted for both the reading and math tests. Within the cohorts, students with VI most frequently used scheduled extended time (at an average of 24%) across the grades, followed by small group testing (used at an average of 22.5%), followed lastly by tested in a separate room (used at an average of 18.1%) of the time. This was a slightly different rank order than reported for the larger sample.

There were a few patterns of accommodations used by students with VI to access the reading or math tests. Approximately 25% of the students with VI across the four cohorts used large print either with no other accommodation or paired on at least one occasion with the option for the test administrator to transcribe the student responses or mark the test. Students who received a consistent bundling of accommodations with large print over the three years were also provided: scheduled extended time, magnification, administrator transcribed student responses, and test administrator marks test at student direction, with the occasional addition for the option to use a typewriter, word processor, or computer. On average, 18% of students with VI used this consistent grouping of accommodations, with just a few fluctuations per item, across the three grades in each cohort.

Students with VI accessing the braille format presented more consistent patterns of accommodations used, unlike the variations presented with the large print format. The braille test format was consistently paired with use of a braille writer or note taking device (except on one occasion). The braille test bundle, without fail, included: scheduled extended time, test in a separate room, and test administrator transcribed student responses and marks test at student direction across the three academic years.

Interestingly, two additional types of accommodations were used. One student among the four cohorts accessed both the reading and math test using dual media, the combination of print and braille. This student's accommodations included: scheduled extended time, tested in a separate room, small group testing, braille format, braille writer or note taking device, magnification, and test administrator transcribed student responses and marks test at student direction. The second student used magnification coupled with scheduled extended time and small group testing in their second year but no other accommodations for the first or third academic years.

Overall, however, the longitudinal analysis of accommodations used revealed a surprising finding. Across all four cohorts, there appeared to be a random provision of accommodations, resulting in very few trends in the type

and number of accommodations any student with VI would receive across the three years of the longitudinal sample. Student's seemed to get all of the available accommodations or none. These inconsistencies are reflected in accommodations used in one academic year but not used in the other two years, or replaced with a different accommodation type altogether. This "used" then "not used" or "replaced" pattern occurs unsystematically across the reading and the math tests over the three years. The following student examples are provided to illustrate this point. In the first example, five students in Cohort 3 received the same bundling of accommodations in their first year (i.e.: scheduled extended time, tested in small group, large print format, and use of a magnification device) on both the reading and math test, only to receive no accommodations in the second and third year. Then there was a student who received scheduled extra time, large print, and the use of a magnification device in the first year, was provided no accommodations in the second year, but, in the third year, was again provided scheduled extra time, this time paired with small group testing. A third example of the inconsistent provision of accommodations was the student who received no accommodations in the first year, large print in the second, and then no other accommodations again in the third year. Also noteworthy are the a small range of students, approximately two to five per cohort, who received no accommodations on either the reading or the math test over the three years.

5.0 DISCUSSION

The public school system is shaped by legislative policy. Current policy impacting instructional delivery of general and special education is based on the expectation that all students will meet grade-level academic standards, measured annually by student performance on high-stakes assessments. In Pennsylvania, that assessment is the Pennsylvania System of School Assessment (PSSA).

NCLB uses the student performance levels in reading, math, and science in grades 3-8, and 11 to (a) evaluate how well schools are including all students in a standards-based instructional system, (b) assess how all students are achieving those standards, and (c) implement measures to improve the performance of specific subgroups of students, including minority students, students with limited-English proficiency, and students with disabilities. Special education legislation, IDEA 2004, has undergone several reauthorizations since its initial passage in 1975. The original Act mandated that students with disabilities receive FAPE, due process, an IEP, and LRE. Current policy attempts to balance the historic provision of "appropriate" specially designed instruction based on the individual learning needs of the student with disabilities with the newer general requirement that all students meet standards for proficiency on the high-stakes tests. Students with disabilities access the state assessments through the use of state approved accommodations and states report the performance of the disability subgroup as a whole, without attention to how any one of the 13 disability subgroups are performing. Despite annual accountability reporting since 2006, little is known about either the academic performance of students with disabilities or the relative frequency of their use of allowable accommodations.

Students with disability are a very heterogeneous group, with a wide range of abilities and learning needs. The practice of reporting bundled high-stakes assessment results inhibits opportunities for regular and special education teachers to interpret published annual accountability results and researchers to document the impact of testing on different disability subgroups.

Of the 13 school-aged disability categories identified in IDEA, students who are blind and visually impaired constitute the smallest proportion, less than 1% of all school-aged students. Nevertheless, these students require direct instruction to learn the specialized skills that their typically seeing peers learn through observation and modeling. Their learning needs go beyond the provision of large print or braille formats. Analysis of their performance needs to also consider the types and amount of accommodations that are used to bridge the span for access and accommodations to performance opportunities. The purpose of this study was to investigate the performance of students with VI on the PSSA to provide a foundational baseline on performance and accommodations used for this disability group. Specifically, this study used an extant data set to report performance, both total scaled scores and performance levels, for students with VI on the grade-level reading and math tests, taken with or without accommodations, in grades 3 through 8 and 11 over three academic years. Performance comparisons were made with scores from two other disability groups, students with hearing impairment including Deafness (HH) and students with specific learning disability (LD), and with scores of all students tested annually in Pennsylvania (All PA). A performance analysis was also conducted for a smaller longitudinal sample consisting of students with VI for whom three years of PSSA scores and accommodations were available on the PSSA reading and math tests. Additionally, a frequency analysis of the types and numbers of accommodations used by students with VI to access the assessments was conducted with both the larger sample and longitudinal sub-sample. The aim of this research was to answer the following research questions:

1. How do students with visual impairments perform on the PSSA? What accommodations are typically used?
2. Using the longitudinal sample of students, are there changes in student performance and use of accommodations across years, and if so, which variables change over time?

5.1 FINDINGS

5.1.1 Academic Performance of Students with VI

Across the three years analyzed, students with VI scored, on average, better than the two comparison disability groups, students with HH and LD, but below the level reported for all students in PA at the equivalent grades in both

reading and math. This broad outcome was expected based on the performance of students by disability groups from the SEELS data; where students with VI received the highest percentage of A-B grades, based on parent report in Wave 1, and repeatedly scored the highest percentage in the 75 percentile on both the WJ III reading comprehension and math calculation direct assessment of students across all disability groups (Blackorby et al., 2005). Additionally, the SEELS data supports the finding that "most students with disabilities do not fare well compared with peers in the general population, and therefore may not be achieving to the degree that their high grades might suggest" (Blackorby et al., 2005, p. 4-6). The details of student performance on the grade-level PSSA presented interesting variations. Specifically, mean scores of students with VI in reading were consistently significantly higher than the mean scores of students with LD, and in 12 out of 21 comparisons, were significantly higher than the mean scores of students who are HH. Like in the reading comparison, students with VI scored significantly higher than students with LD in math across grades. However, the scores of students with VI in math were not significantly different from the scores of students with HH. Based on the standardized results reported by SEELS, this performance flip, that students with HH earned comparable mean scores in math was unexpected. An additional curious finding was that scores for VI students in reading and math both declined in 2008, despite the fact that this was the year that the PSSA vendor deliberately incorporated UDA principles into the PSSA tests. Why this happened cannot be explained by this data set.

A second analysis provided a different look at the academic performance of students with VI, as a percentage of those achieving proficient scores or better, by test type and year. Again, overall, the distribution of performance level classifications earned by students with VI was significantly different; that is, students with VI were more likely to have higher passing scores (i.e., Proficient and Advanced), in reading and math than the distribution of the scores for students with LD across all grades and years. Comparisons to students who are HH were also significantly different in 15 out of 18 analyses. The variations in significance occurred in the 2006 math as well as in both the 2008 reading and math comparisons. Again, like the mean score analysis, it is unclear why the performance for students with VI on the 2008 reading and math UDA test versions did not improve their overall passing performance as significantly as the percentage gains made by students with HH. Examination of the performance differences from 2007 to 2008 shows the variations in the percentage of students earning proficient scores in reading and math. That is, 56% of students with VI earned passing scores in reading for both 2007 and 2008, resulting in a zero percentage change in the distribution of the scores to earn proficiency levels. Students with

HH, however, increased their percentage of students achieving proficiency by 11%, moving from 37% in 2007 to 50% proficient in 2008. A similar percentage gain is made in math between the two disability groups over these two years. In 2007, 55% of students with VI earned proficient scores to then see a 4% gain, increasing the total number of students with VI achieving proficiency in 2008 to 59%. However, students with HH performance from 2007 to 2008 resulted in a 10% increase in the distribution of achieving proficiency scores; moving from 45% in 2007 to 55% in 2008. Although performance cannot be statistically analyzed from one year to the next, it is interesting to note the performance gains made by students with HH over students with VI on the 2008 UDA test version. Performance level comparisons between students with VI's to All PA results were not significantly different. Except for one occasion, on the 2006 reading test, Pennsylvania students as a whole earned a higher distribution of proficiency scores than students with VI, by grade level, test type, and year.

Within the comparison analyses of the performance levels of students across all four groups, a closer examination of only the performance of students with VI resulted in a few surprising findings. In general, students with VI were more likely to have earned passing scores and less likely to have earned non passing scores for both reading and math across all grade-levels. First, there were a consistent high percentage of students with VI earning Proficiency or Advanced scores in math, across grade levels and years. This strong math performance by students with VI is surprising and dispels a theory and misconception (Ferrell, Buettel, Sebald, & Pearson, 2006; Kapperman & Sticken, 2004) that performance in math is and has always been poor due to the visual-spatial and abstract nature of math concepts and the lack of teacher preparedness to teach advanced concepts. Although a disparity exists between the performance levels of students with VI to ALL PA students, overall performance on the PSSA math assessment for students with VI is encouraging, particularly in the advanced grade levels. The second surprise finding examines the nearly unchanged percentage of students with VI earning passing scores in reading, averaging 56% proficient, over three years. Conventional wisdom suggests that the majority of students with VI have some level of usable vision, are print or large print readers, and acquire reading skills without particular disability- related difficulties. Perhaps the print and large print readers with VI have enough vision to learn to read, but not enough to gain the necessary common background experience and knowledge to perform well on reading comprehension tasks. It may be that these students need more explicit and direct instruction in "life experiences" than they are currently receiving. Although these learners are visual, the overall impact of their visual impairment leaves them with either missed or misunderstood information about themselves and their environment so they lack the same shared

experiences that their typically seeing peers have observed without effort or consciously trying, and call upon in answering reading comprehension questions.

5.1.2 Academic Performance of Students with VI Over Time

From the larger sample, four cohorts of students with VI were identified based on having three years of scores in reading and math. Analysis of achievement data for these students was conducted to examine performance over time. Because the PSSA does not yield valid or reliable growth scores, the longitudinal analysis focused on changes in students' classification (not proficient or proficient) in adjacent years. NCLB requires all students to demonstrate proficient performance level scores as evidence of their mastery of the grade-level academic standards. But what is the likelihood of students, all students, to either maintain or have a positive improvement towards earning a passing performance score from one grade-level to the next? By analyzing the movement of individual student performance over two grade-levels based on all possible combinations of change (status stayed the same, classification moved up, or classification moved down), the data revealed that 43.9% of all students with VI earned proficient classifications two years in a row in reading. Just 8% of the remaining students made positive gains by moving from a "not passing" to "passing" performance levels over the next two grade level reviews. Interestingly, although passing rates for math were higher than reading, fewer students, only 4%, demonstrated upward gains on the math test, by earning scores that moved them from early "not passing" scores to "passing" over the three years.

What's concerning in this performance analysis based on movement of scores are the considerably high percentages of students with VI who, in both reading and math, never move to earn a passing score from one grade-level to the next. Of the students analyzed, 30.8% had scores that remained in the non-proficient range in reading over a three-year period and 31.3% in math. This identifies a concerning number of students who consistently earned not-passing scores in reading and math as they progress in grade-levels. And, these percentages of students do not include the additional number of students who moved from earning a pass to earning a fail score one year later.

Generally, students with VI are doing okay on the PSSA reading and math assessments. Although they are not doing as well as their non-disabled peers, students with VI are performing better than students with HH (students with a different sensory disability) as well as performing better than students with LD (the largest group of students

with disability). Surprisingly, across the grades and over the three years, the performance in math was better than in reading for students with VI. However, the performance levels analysis revealed that a substantial percentage of students with VI are not proficient, and stay that way. This outcome results in an overall distribution of performance by students with VI that is below the targeted performance levels for Pennsylvania. Knowing that the demographic make-up of students with VI in Pennsylvania is a representative sample of the national population, as reported in the SEELS data (Marder, 2006), this performance gap illustrates a disproportion of the population as a whole.

5.1.3 Accommodations Used by Students with VI

Analysis of the types and number of accommodations used by students with VI produced a few surprises. The initial accommodations analysis of the larger sample identified the most frequently used accommodations by students with VI. In terms of presentation accommodations, results indicated that students accessed the reading and math tests using large print the most (averaging 30%-40% of students use large print), then magnification devices, and then braille (averaging 8% of students use braille). Although these are slightly smaller percentages of large print to braille usage by students with VI as reported on the Council of Exceptional Children's website (Council of Exceptional Children, 2001), they are on par with the APH's 2011 Annual Report on student primary reading mediums for school-aged children (kindergarten – age 21). Based on the reporting codes used in the federal quota census, students with VI are primarily accessing print material visually 27.5% of the time and are accessing braille 9.0% of the time (APH, 2011). In terms of response accommodations used by students with VI, results show a high and consistent usage of all the transcription options available. This includes the selection to transcribe illegible student writing and open-ended responses, and to mark tests at student direction. This collection of response accommodations was expected due to the nature of standardized test response forms, "the bubble sheet", that require students to fully fill-in small ovals in answer to each question. As for the test setting accommodations used, a high percentage of students with VI were tested in small groups, a smaller percentage were tested in a separate room, and an even smaller percentage were provided scheduled extended time. The SEELS data provides the only other source regarding the use of academic accommodations provided to students with various degrees of VI and identified the request for more time to take teacher-made tests as the most used test setting accommodation.

In general, if access to the high-stakes assessments is facilitated through the use of accommodations, it is critical to know and understand which accommodations, or combination of accommodations, are effective and appropriate in neutralizing the impact of the disability and providing students with disabilities an equal opportunity to demonstrate their grade-level knowledge. Including an accommodations analysis in this study was not intended to make relationship statements regarding the accommodations used by students with VI and their academic performance. Rather the accommodation data were to provide a baseline level of use of the approved accommodations available. Reporting the most frequently used accommodations by type (presentation, response, and test setting changes), provides professionals working with students with VI an informed guideline for accommodation selection.

One of the most surprising findings was that across all four longitudinal cohorts, there appeared to be a random provision of accommodations from year to year. That is, there were very few trends in the type and number of accommodations each student with VI would receive across three years of testing. The inconsistent provision of accommodations by student were reflected in accommodations that were used in one academic year but not used in the other two years, or replaced with a different accommodation type altogether. This "used" then "not used" or "replaced" unsystematic pattern occurred most predominately for students with VI who accessed the regular or large print test formats. Although there were slight variations of accommodations used per student, the bundling of accommodations across the three years was more predictable per student with VI who accessed the braille test format in reading and math. It is almost as if IEP teams plan recommended accommodations without reference to their successful or unsuccessful use in the past.

5.2 CONCLUSIONS

Results from the multiple analyses on performance and accommodations used for students with VI on the grade-level PSSA provide a positive outlook for this disability group. On performance by total scaled scores, students with VI performed lower than all of the students in Pennsylvania but scored the highest of the two disability comparison groups (HH and LD) in reading and math. However, significance testing revealed that the students with VI were more like students who are HH in math. On performance by performance level scores, students with VI again

performed better than the students from the other two disabilities but not as well as the rest of Pennsylvania. On accommodations used, 8% of students with VI used braille while 39% of students used large print to access the reading and math tests. Most students with VI were provided the option to have student responses transcribed by a test administrator. Very few students with VI responded to the reading and math tests using a typewriter, word processor, or computer. On performance changes over time, 75% of students with VI maintained the same performance level category from one grade-level to the next. The yearly movement from fail to pass was about equal to those students who moved from pass to fail. Performance results indicated that students with VI generally do better in math (50% of students with passing scores) than reading (44% of students with passing scores). On accommodations used over time, the data revealed no apparent common bundling of accommodations for students with VI and a rather random assignment of accommodations year after year.

5.2.1 Limitations of the Study

There are several limitations to the interpretation of the findings of these analyses of the academic performance and use of accommodations of students with VI, from an extant PA data set. There may have been human input errors with the original data set provided by the Pennsylvania Department of Education, Data entry errors were certainly found in the demographic data suggesting that discrepancies were probably present in the test data as well. Also, the sample size of students with VI was small (even when generated at the state level). This limited the statistical analyses, such as conducting Hierarchical Linear Models (HLM) that could be conducted on the total VI sample and especially on the longitudinal sample since HLM requires larger sample sizes for adequate power.

5.2.2 Implications for Practice and Research

This study of how Pennsylvania students with VI performed on the grade-level PSSA, with and without accommodations, has provided a foundation for the vision field to address specifically performance outcomes on high-stakes testing. For there to be a meaningful connection between performance results on standards-based assessments and instruction of students with VI by general and special educators, researchers need to have more transparent access to tests scores in combination with accommodations used within each disability category.

On-going investigations need to continue, to better understand the relationships among scores earned and accommodations used. First, continued analyses of the Pennsylvania data set could reveal how the students with VI in this study performed on the 2009 PSSA reading and math assessments (i.e., in the second year of using UDA test constructs). Does their overall performance improve, become more consistent, like the results seen in 2006 and 2007, or continue to fluctuate wildly as they appeared to in the 2008 data presented here? Exploring more deeply the relationships among specific test items and overall performance would benefit educational teams in identifying and remediating critical skills and concepts in both reading and math. Second, need to study why students with VI demonstrated higher math performance than reading performance. As the students' progress by grade level, are the lower reading scores a reflection of vocabulary deficits or splintered concepts and understanding of their world knowledge, particularly since the majority of the students with VI in Pennsylvania are low vision with various amounts of usable vision. Third, immediate recommendation for educational teams to develop new IEPs while referring to the last one, in order for the more thoughtful and consistent assignment of accommodations to be provided for students with VI for each year's high stakes assessment. As IEP teams evolve and teachers change, this approach might help eliminate the seemingly haphazard provision of accommodations revealed in this data set. Then, the impact of consistent use of accommodations on academic test performance could be studied.

APPENDIX A

PSSA TOTAL PARTICIPANTS BY DISABILITY CATEGORIES WITHIN GRADE-LEVELS BY YEAR

The following tables connect to data presented in Table 6: PSSA Total Participants by Disability Categories by Academic Year:

Table A1. 2005-2006 IEP Disability

2005-2006	IEP Disability		
	VI	**HH**	**LD**
Grade 3	57	174	7,879
Grade 4	73	163	10,148
Grade 5	59	204	12,141
Grade 6	61	183	13,226
Grade 7	53	171	14,169
Grade 8	72	212	14,507
Grade 11	53	177	11,644
Total	428	1,284	83,714

Table A2. 2006-2007 IEP Disability

2006-2007	IEP Disability		
	VI	**HH**	**LD**
Grade 3	58	180	7,953
Grade 4	62	188	10,264
Grade 5	78	196	11,969
Grade 6	64	208	13,284
Grade 7	65	225	14,132
Grade 8	62	200	14,763
Grade 11	71	193	12,418
Total	460	1,390	84,783

Table A3. 2007-2008 IEP Disability

2007-2008	IEP Disability		
	VI	HH	LD
Grade 3	64	172	8,243
Grade 4	65	188	10,248
Grade 5	71	169	11,597
Grade 6	70	182	12,741
Grade 7	52	190	13,705
Grade 8	68	163	14,087
Grade 11	62	152	12,162
Total	452	1,216	82,783

APPENDIX B

2006 ACCOMMODATIONS, DETAILED BY GRADE-LEVEL

Table A4. 2006 Accommodations Detailed By Grade-Level

2006 Reading and Math Accommodations	Grade-Level							
	3	**4**	**5**	**6**	**7**	**8**	**11**	**Total**
Scheduled extended time	11	26	20	21	18	16	14	126
Student Requested extended time	2	5	1	5	2	4	5	24
Tested in a separate room	13	28	18	14	12	5	16	106
Hospital/home tested	0	0	0	1	0	1	0	2
Multiple test sessions	3	5	2	5	1	2	3	21
Small Group tested	11	25	19	10	19	11	9	104
Braille Edition	5	8	3	4	3	5	6	34
Large Print Edition	24	41	27	28	26	22	16	184
Braille Writer	2	6	2	3	2	5	5	25
Test administrator transcribed illegible writing	0	11	7	12	4	3	2	39
Dictation to a test administrator	3	8	9	6	4	1	1	32
Magnification Device	2	7	16	2	10	4	2	43
Test administrator reads math test aloud	13	25	18	15	5	4	2	82
Test administrator marks test at student direction (M-C only)	5	12	7	8	13	2	4	51
Typewriter/word processor/computer used	1	0	3	1	1	1	0	7
Cranmer Abacus	2	1	1	2	1	0	0	7
Other	2	4	3	3	2	3	1	18

APPENDIX C

2007 ACCOMODATIONS DETAILED BY GRADE-LEVEL

Table A5. 2007 Accommodations Detailed By Grade-Level

2007 Reading and Math Accommodations	Grade-Level							
	3	**4**	**5**	**6**	**7**	**8**	**11**	**Total**
Scheduled extended time	11	9	15	10	8	8	7	68
Student Requested extended time	2	3	4	3	1	2	7	22
Tested in a separate room	11	15	21	17	14	12	12	102
Hospital/home tested	0	0	0	0	0	0	1	1
Multiple test sessions	4	2	5	1	4	0	1	17
Small Group tested	15	16	22	14	13	12	13	105
Braille Edition	3	4	5	4	4	5	7	32
Large Print Edition	20	33	29	21	22	29	13	167
Braille Writer	2	2	5	3	2	4	3	21
Test administrator transcribed illegible writing	3	10	16	8	8	8	10	63
Dictation to a test administrator	2	6	2	3	2	2	4	21
Magnification Device	5	8	8	13	1	6	4	45
Test administrator reads math test aloud	13	12	12	8	7	4	2	58
Test administrator marks test at student direction (M-C only)	4	10	5	7	5	9	9	49
Typewriter/word processor/computer used	1	0	0	3	1	2	5	12
Cranmer Abacus	2	1	2	2	0	0	1	8
Other	1	1	0	0	0	1	0	3

APPENDIX D

2008 READING ACCOMMODATIONS, DETAILED BY GRADE-LEVEL

Table A6. 2008 Reading Accommodations Detailed by Grade-Level

2008 Reading Accommodations	Grade-Level							
	3	**4**	**5**	**6**	**7**	**8**	**11**	**Total**
Scheduled extended time	13	17	13	16	8	8	11	86
Student Requested extended time	3	1	3	0	1	3	4	15
Tested in a separate room	16	16	15	19	11	13	21	111
Hospital/home tested	1	0	1	1	0	0	0	3
Multiple test sessions	2	5	6	3	2	4	5	27
Small Group tested	28	21	19	16	15	14	19	132
Braille Format	4	5	6	6	3	5	9	38
Large Print format	31	23	30	29	21	22	16	172
Brailler / Note taker (per Accommodations Guidelines)	3	3	3	5	2	3	6	25
Test administrator scribed open-ended responses at student's direction	10	6	4	3	4	2	2	31
Test administrator transcribed student responses	30	22	28	24	20	20	19	163
Augmentative communication device	0	0	0	0	0	0	0	0
Audio recording of student responses (per Accommodations Guidelines)	0	0	0	0	0	0	0	0
Magnification Device	4	3	3	4	0	4	3	21
Test directions read aloud, signed, or recorded	18	19	8	14	7	5	9	80
Test administrator marked multiple-choice responses at student's direction	8	12	5	8	4	5	5	47
Typewriter, word processor, or computer (per Accommodations Guidelines)	0	0	0	0	1	2	4	7
Reading windows, reading guides	2	0	3	0	0	0	0	5
Electronic screen reader (PDE must approve program and all functions)	0	0	0	0	0	0	2	2
Other (as indicated in Accommodations Guidelines or approved by PDE)	0	0	1	1	0	0	0	2
Other (as indicated in Accommodations Guidelines or approved by PDE)	0	0	1	1	0	0	1	3
Changed test schedule	2	3	3	2	1	0	1	12

APPENDIX E

2008 MATH ACCOMMODATIONS, DETAILED BY GRADE-LEVEL

Table A7. 2008 Math Accommodations Detailed By Grade-Level

2008 Math Accommodations	Grade-Level							
	3	**4**	**5**	**6**	**7**	**8**	**11**	**Total**
Scheduled extended time	13	14	13	14	8	8	11	81
Student Requested extended time	3	1	3	1	1	4	4	17
Tested in separate setting	16	16	15	18	11	13	21	110
Hospital/Home setting	1	0	1	1	0	0	0	3
Multiple test sessions	1	5	6	3	2	4	5	26
Small group testing	28	20	19	18	15	14	19	133
Braille Format	4	4	6	5	3	5	9	36
Large Print format	32	24	29	29	21	22	16	173
Brailler / Note taker (per Accommodations Guidelines)	3	3	1	4	2	2	6	21
Test administrator scribed open-ended responses at student's direction	10	10	6	5	3	4	3	41
Test administrator transcribed student responses (per Accommodations Guidelines)	30	22	29	23	19	21	20	164
Augmentative communication device	0	0	0	0	0	0	0	0
Audio recording of student responses (per Accommodations Guidelines)	0	0	0	0	0	0	0	0
Magnification Device	4	4	4	6	2	4	3	27
Test directions read aloud, signed, or recorded	19	19	9	17	7	6	9	86
Test items/questions read aloud or signed	17	19	15	16	9	4	3	83
Test items/questions recorded	5	3	3	3	1	0	0	15
Test administrator marked multiple-choice responses at student's direction	8	12	5	8	4	6	5	48
Reading windows, reading guides	0	0	2	0	0	0	0	2
Electronic screen reader (PDE must approve program and all functions)	0	0	0	0	0	0	2	2
Typewriter, word processor, or computer (per Accommodations Guidelines)	0	0	0	0	1	2	3	6
Electronic screen reader (PDE must approve program and all functions)	0	0	0	0	0	0	2	2

Manipulative (Cranmer Abacus, number line)	4	1	3	1	2	0	0	11
Other (as indicated in Accommodations Guidelines or approved by PDE)	0	0	1	1	0	0	0	2
Changed test schedule	1	3	3	1	1	0	1	10

APPENDIX F

READING PERFORMANCE LEVELS, DETAILED BY STUDENT BY COHORT

Table A8. Cohort #1 Reading Performance Summary by Student

Reading	Grade 3	Grade 4	Grade 5
Student 6	**Adv**	**Adv**	**Adv**
Student 11	**Adv**	**Adv**	**Pro**
Student 13	**Adv**	**Adv**	**Pro**
Student 21	**Adv**	**Adv**	**Pro**
Student 14	**Adv**	**Pro**	**Pro**
Student 12	**Adv**	**Pro**	**Bas**
Student 15	**Pro**	**Adv**	**Adv**
Student 22	**Pro**	**Adv**	**Adv**
Student 1	**Pro**	**Pro**	Bas
Student 9	**Pro**	**Pro**	Bas
Student 16	**Pro**	**Pro**	Bas
Student 4	**Pro**	Bas	**Pro**
Student 8	**Pro**	Bas	Bas
Student 18	**Pro**	Bas	Bas
Student 7	Bas	**Pro**	Bas
Student 10	Bas	Bel	Bel
Student 3	Bel	Bas	Bel
Student 19	Bel	Bas	Bel
Student 2	Bel	Bel	Bel
Student 5	Bel	Bel	Bel
Student 17	Bel	Bel	Bel
Student 20	Bel	Bel	Bel

Table A9. Cohort #2 Reading Performance Summary by Student

Reading	Grade 4	Grade 5	Grade 6
Student 5	**Adv**	**Adv**	**Adv**
Student 9	**Adv**	**Adv**	**Adv**
Student 14	**Adv**	**Adv**	**Adv**
Student 23	**Adv**	**Adv**	**Adv**
Student 21	**Adv**	**Adv**	**Pro**
Student 10	**Adv**	**Pro**	**Adv**
Student 16	**Adv**	**Pro**	**Adv**
Student 17	**Adv**	**Pro**	**Adv**
Student 24	**Adv**	**Pro**	**Adv**
Student 25	**Adv**	**Pro**	**Adv**
Student 29	**Adv**	**Pro**	**Adv**
Student 34	**Adv**	**Pro**	**Adv**
Student 11	**Adv**	**Pro**	**Pro**
Student 27	**Adv**	**Pro**	**Pro**
Student 18	**Pro**	**Pro**	**Pro**
Student 33	**Pro**	**Pro**	**Pro**
Student 3	**Pro**	**Pro**	**Adv**
Student 1	**Pro**	Bas	Bas
Student 6	**Pro**	Bel	**Pro**
Student 7	Bas	**Pro**	**Pro**
Student 30	Bas	**Pro**	Bas
Student 32	Bas	Bas	Bas
Student 19	Bas	Bas	Bel
Student 8	Bas	Bel	Bas
Student 15	Bas	Bel	Bas
Student 31	Bas	Bel	Bas
Student 2	Bel	Bas	**Pro**
Student 12	Bel	Bas	Bel
Student 4	Bel	Bel	Bel
Student 13	Bel	Bel	Bel
Student 20	Bel	Bel	Bel
Student 22	Bel	Bel	Bel
Student 26	Bel	Bel	Bas
Student 28	Bel	Bel	Bel

Table A10. Cohort #3 Reading Performance Summary by Student

Reading	Grade 5	Grade 6	Grade 7
Student 6	**Adv**	**Adv**	**Adv**
Student 13	**Adv**	**Adv**	**Adv**
Student 15	**Adv**	**Adv**	**Adv**
Student 21	**Adv**	**Adv**	**Adv**
Student 18	**Adv**	**Pro**	**Pro**
Student 2	**Pro**	**Adv**	**Pro**
Student 19	**Pro**	**Adv**	Bas
Student 3	**Pro**	**Pro**	**Adv**
Student 1	**Pro**	**Pro**	**Pro**
Student 20	**Pro**	**Pro**	**Pro**
Student 12	**Pro**	Bas	Bas
Student 7	Bas	**Pro**	Bel
Student 10	Bas	Bas	**Pro**
Student 5	Bas	Bas	Bas
Student 4	Bel	Bel	Bas
Student 9	Bel	Bel	Bas
Student 14	Bel	Bel	Bas
Student 16	Bel	Bel	Bas
Student 8	Bel	Bel	Bel
Student 11	Bel	Bel	Bel
Student 17	Bel	Bel	Bel

Table A11. Cohort #4 Reading Performance Summary by Student

Reading	Grade 6	Grade 7	Grade 8
Student 1	**Adv**	**Adv**	**Adv**
Student 12	**Adv**	**Adv**	**Adv**
Student 13	**Adv**	**Adv**	**Adv**
Student 21	**Adv**	**Adv**	**Adv**
Student 19	**Adv**	**Adv**	**Pro**
Student 18	**Adv**	**Pro**	**Adv**
Student 3	**Pro**	**Adv**	**Adv**
Student 8	**Pro**	**Adv**	**Pro**
Student 4	**Pro**	**Pro**	**Adv**
Student 15	**Pro**	**Pro**	**Pro**
Student 16	**Pro**	**Pro**	**Pro**
Student 17	**Pro**	**Pro**	Bas
Student 14	**Pro**	Bas	**Pro**
Student 20	**Pro**	Bas	**Pro**
Student 2	Bas	**Pro**	**Adv**
Student 6	Bas	Bas	**Pro**
Student 9	Bas	Bas	**Pro**
Student 10	Bel	Bas	**Pro**
Student 22	Bel	Bas	**Pro**
Student 7	Bel	Bas	Bas
Student 5	Bel	Bel	Bel
Student 11	Bel	Bel	Bel

APPENDIX G

MATH PERFORMANCE LEVELS: DETAILED BY STUDENT BY COHORT

Table A12. Cohort #1 Math Performance Summary by Student

Math	Grade 3	Grade 4	Grade 5
Student 6	**Adv**	**Adv**	**Adv**
Student 11	**Adv**	**Adv**	**Adv**
Student 13	**Adv**	**Adv**	**Adv**
Student 14	**Adv**	**Adv**	**Adv**
Student 15	**Adv**	**Adv**	**Adv**
Student 21	**Adv**	**Adv**	**Adv**
Student 22	**Adv**	**Adv**	**Adv**
Student 12	**Adv**	**Adv**	**Pro**
Student 16	**Adv**	**Pro**	**Pro**
Student 2	**Adv**	**Pro**	Bas
Student 1	**Pro**	**Pro**	**Pro**
Student 8	**Pro**	**Pro**	**Pro**
Student 7	**Pro**	**Adv**	**Adv**
Student 18	**Pro**	**Adv**	**Adv**
Student 9	**Pro**	**Adv**	**Pro**
Student 4	**Pro**	**Pro**	Bas
Student 3	Bas	**Pro**	Bas
Student 10	Bas	**Pro**	Bas
Student 19	Bas	Bel	Bel
Student 20	Bel	Bel	Bas
Student 5	Bel	Bel	Bel
Student 17	Bel	Bel	Bel

Table A13. Cohort #2 Math Performance Summary by Student

Math	Grade 4	Grade 5	Grade 6
Student 1	**Adv**	**Adv**	**Adv**
Student 3	**Adv**	**Adv**	**Adv**
Student 9	**Adv**	**Adv**	**Adv**
Student 16	**Adv**	**Adv**	**Adv**
Student 21	**Adv**	**Adv**	**Adv**
Student 23	**Adv**	**Adv**	**Adv**
Student 24	**Adv**	**Adv**	**Adv**
Student 27	**Adv**	**Adv**	**Adv**
Student 29	**Adv**	**Adv**	**Adv**
Student 10	**Adv**	**Pro**	**Adv**
Student 33	**Adv**	**Pro**	**Adv**
Student 6	**Pro**	**Adv**	**Adv**
Student 14	**Pro**	**Adv**	**Adv**
Student 17	**Pro**	**Adv**	**Pro**
Student 25	**Pro**	**Pro**	**Adv**
Student 34	**Pro**	**Pro**	**Adv**
Student 11	**Pro**	**Pro**	**Pro**
Student 26	**Pro**	**Pro**	**Pro**
Student 15	**Pro**	**Pro**	Bel
Student 7	**Pro**	Bas	**Adv**
Student 2	**Pro**	Bas	**Pro**
Student 5	**Pro**	Bas	**Pro**
Student 18	**Pro**	Bas	**Pro**
Student 19	**Pro**	Bas	Bel
Student 20	**Pro**	Bas	Bel
Student 13	**Pro**	Bel	Bel
Student 32	Bas	Bas	Bel
Student 30	Bel	**Adv**	Bel
Student 8	Bel	Bas	Bas
Student 12	Bel	Bas	Bas
Student 4	Bel	Bel	Bel
Student 22	Bel	Bel	Bel
Student 28	Bel	Bel	Bel
Student 31	Bel	Bel	Bel

Table A14. Cohort #3 Math Performance Summary by Student

Math	Grade 5	Grade 6	Grade 7
Student 3	**Adv**	**Adv**	**Adv**
Student 13	**Adv**	**Adv**	**Adv**
Student 7	**Adv**	**Pro**	**Pro**
Student 18	**Adv**	**Pro**	**Pro**
Student 10	**Pro**	**Adv**	**Pro**
Student 19	**Pro**	**Adv**	**Pro**
Student 15	**Pro**	**Pro**	**Adv**
Student 1	**Pro**	**Pro**	**Pro**
Student 2	**Pro**	**Pro**	**Pro**
Student 6	**Pro**	**Pro**	**Pro**
Student 21	**Pro**	**Pro**	**Pro**
Student 16	Bas	**Pro**	Bas
Student 14	Bas	Bas	Bas
Student 12	Bas	Bel	**Pro**
Student 20	Bel	Bas	Bel
Student 17	Bel	Bel	Bas
Student 4	Bel	Bel	Bel
Student 5	Bel	Bel	Bel
Student 8	Bel	Bel	Bel
Student 9	Bel	Bel	Bel
Student 11	Bel	Bel	Bel

Table A15. Cohort #4 Math Performance Summary by Student

Math	Grade 6	Grade 7	Grade 8
Student 1	**Adv**	**Adv**	**Adv**
Student 17	**Adv**	**Adv**	**Adv**
Student 18	**Adv**	**Adv**	**Adv**
Student 14	**Adv**	**Adv**	**Pro**
Student 3	**Pro**	**Adv**	**Adv**
Student 12	**Pro**	**Adv**	**Adv**
Student 4	**Pro**	**Pro**	**Pro**
Student 13	**Pro**	**Pro**	**Pro**
Student 21	**Pro**	**Pro**	**Pro**
Student 8	**Pro**	Bas	**Pro**
Student 19	**Pro**	Bas	Bas
Student 2	Bas	Bas	**Pro**
Student 6	Bas	Bas	**Pro**
Student 16	Bas	Bas	Bel
Student 15	Bas	Bel	**Pro**
Student 11	Bas	Bel	Bel
Student 5	Bel	Bel	Bel
Student 7	Bel	Bel	Bel
Student 9	Bel	Bel	Bel
Student 10	Bel	Bel	Bel
Student 20	Bel	Bel	Bel
Student 22	Bel	Bel	Bel

BIBLIOGRAPHY

Allman, C. B. (2009). *Test Access: Making tests accessible for students with visual impairments: A guide for test publishers, test developers, and state assessment personnel.* (4th edition.) Louisville, KY: American Printing House for the Blind. Retrieved from http://www.aph.org/tests/access2/access2.pdf

Altman, J., Thurlow, M., & Vang, M. (2010). Annual performance report: 2007-2008 State assessment data. National Center on Educational Outcomes (NCEO). Retrieved from http://www.cehd.umn.edu/NCEO/OnlinePubs/APRreport2007-2008.pdf

American Educational Research Association. (1999). *Standards for educational and psychological testing.* Washington, DC: American Educational Research Association.

American Foundation for the Blind (AFB). (2009, May). Estimates of severely visually impaired children. Retrieved from http://www.afb.org/Section.asp?SectionID=3&TopicID=138&DocumentID=3350

American Foundation for the Blind's (AFB) Josephine L. Taylor Leadership Institute, Education Work Group. (n.d.) Educating students with visual impairments for the inclusion in society: A paper on the inclusion of students with visual impairments. Retrieved from http://www.afb.org/Section.asp?SectionID=44&TopicID=189&DocumentID=1344

American Printing House for the Blind (APH) (2007). 2007 Annual Report: October 1, 2006-September 30, 2007. Retrieved from http://www.aph.org/about/ar2007.pdf

American Printing House for the Blind (APH). (2011). Annual Report 2011: Distribution of eligible students based on federal quota census of January 4, 2010 (Fiscal Year 2011). Retrieved from http://www.aph.org/fedquotpgm/dist11.html

Blackorby, J., Chorost, M., Garza, N., & Guzman, A. (2005). The academic performance of elementary and middle school students with disabilities. SEELS Engagement, academics, social adjustment, and independence: The achievements of elementary and middle school students with disabilities. Retrieved from http://www.seels.net/designdocs/engagement/All_SEELS_outcomes_10-04-05.pdf

Bowen, S. K., & Ferrell, K. A. (2003). Assessment in low-incidence disabilities: The day-to-day realities. *Aural Special Education Quarterly, 22*(4), 10-19.

Browder, D. M., Wakeman, S. Y., & Flowers, C. (2006). Assessment of progress in the general curriculum for students with disabilities. *Theory into Practice, 45*(3), 249-259.

CAST (2010). Universal design guidelines version 1.0. Wakefield, MA: National Center on Universal Design for Learning. Retrieved from http://www.udlcenter.org/aboutudl/whatisudl

Cawthon, S. T., (2007). Hidden benefits and unintended consequences of No Child Left Behind

policies for students who are deaf or hard of hearing. *American Educational Research Journal 44*(3), 460-492.

Center on Education Policy. (2007, May). *NCLB's accountability provisions for students with disabilities: Center on Education Policy roundtable discussion.* Washington, DC: Author.

Christensen L. L., Lazarus, S. S., Crone, M., & Thurlow, M. L. (2008) *2007 State policies on assessment participation and accommodations for students with disabilities. (Synthesis Report 69).* Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes.

Corn, A.L. & Spungin, S.J. (2003). *Free and appropriate public education and the personnel crisis for students with visual impairments and blindness*. (COPSSE Document No. IB-1OE). Gainesville, FL: University of Florida, Center on Personnel Studies in Special Education.

Council for Exceptional Children (CEC). (2011). Blindness and visual impairment. Retrieved from: http://www.cec.sped.org/AM/Template.cfm?Section=Blindness_Visual_Impairments&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=37&ContentID=5625

Data Recognition Corporation. (2008, November). Technical report for the Pennsylvania system of school assessment: 2008 reading and mathematics, grades 3, 4, 5, 6, 7, 8, and 11. Retrieved from http://www.portal.state.pa.us/portal/server.pt/community/%20technical_analysis/7447

DeFur, S. H. (2002). Education reform, high-stakes assessment, and student with disabilities. *Remedial and Special Education, 23*(4), 203-211.

Department of Education. (2007, April). No child left behind: Modified academic achievement standards. Non-Regulatory Guidance. Washington DC: Department of Education.

Education of All Handicapped Children Act 1975, Public Law 94-142 (1975).

Elliott, J.L., Erickson, R. N., Thurlow, M. L.; & Shriner, J.G. (2000). State-level accountability for the performance of students with disabilities: Five years of change? *The Journal of Special Education, 34*(1), 39-47.

Elliot, S., Kratochwill, T. R., & McKevitt, B. C. (2001). Experimental analysis of the effects of testing accommodations on the scores of students with and without disabilities. *Journal of School Psychology, 34*(1), 3-24.

Ferrell, K. A. (1997). Preface: What is it that is different about a child with blindness or visual impairment? In P. Crane, D. Cuthbertson, K. A. Ferrell, & H. Scherb, *Equals in partnership: Basic rights for families of children with blindness or visual impairment.* Watertown, MA: Perkins School for the Blind.

Ferrell, K.A., Buettel, M., Sebald, A. M., & Pearson, R. (2006). Mathematics research analysis. National Center on Low-Incidence Disabilities, University of Northern Colorado. Retrieved from http://www.unco.edu/ncssd/research/APH%20Math%20Report%209-18-06.pdf

Fuchs, L., Fuchs, D., Eaton, S., Hamlett, C., Binkley, E., & Crouch, R. (2000). Using objective data sources to enhance teacher judgments about test accommodations. *Exceptional Children, 67*(1), 67-81.

Gall, M., Gall, J., & Borg, W. (2007). *Educational research: An introduction*. Boston, MA: Allyn and Bacon.

Hatlen, P. (1996). The core curriculum for blind and visually impaired students, including those with additional disabilities. *RE:view, 28*, 25-32.

Horvath, L. S., Kampfer-Bohach, S., & Kearns J. F. (2005). The use of accommodations among students with deafblindness in large-scale assessment systems. *Journal of Disability Policy Studies, 16*(3), 177-187.

Huebner, K. M. (2000). Visual impairment. In M. C. Holbrook & A. J. Koenig (Eds.) *Foundations of education: History and theory of teaching children and youths with visual impairments* (pp. 55-76). New York, NY: AFB Press.

Individuals with Disabilities Education Act Amendments of 1997, Pub. L. No. 105-17, 37 Stat. 111 (2004).

Kapperman, G., & Sticken, J. (2004). Barriers to achievement in mathematics. Retrieved from http://s22318.tsbvi.edu/mathproject/intro.asp#main

Koretz, D., & Barton, K. (2003). Assessing students with disabilities: Issues and evidence. *Educational Assessment, 9*(1&2), 29-60.

Koretz, D., & Hamilton, L. (2006). Test for accountability in K-12. In R.L. Brennen (Ed.), *Educational Measurement* (4th edition), (p. 531-542). Westport, CT: American Council on Education/Praeger.

Lemons, C. & Kloo, A. (2010, September). Relationships between achievement and instruction for students in special education (Project RAISSE): Final project report, 2008-2010. Harrisburg, PA: PA Department of Education.

Lohmeier, K., Blankenship, K., & Hatlen, P. (2009). Expanded core curriculum: 12 years later. *Journal of Visual Impairment & Blindness*, February, 103-112.

Marder, C. (2006). SEELS a national profile of students with visual impairments in elementary and middle schools: A special topic report from the special education elementary longitudinal study. Retrieved from http://www.seels.net/designdocs/SEELS_VI_report_final.pdf

McLaughlin, M. & Thurlow, M. L. (2003). Educational accountability and students with disabilities: Issues and challenges. *Educational Policy, 17*, 431-451.

National Dissemination Center for Children with Disabilities (NICHCY). (February 2012). Categories of disabilities under IDEA. Retrieved from http://nichcy.org/disability/categories

National Commission on Excellence in Education. (1983). *A Nation at Risk: The imperative for educational reform.* Washington DC: U.S. GPO.

National Research Council (2002). *Minority students in special and gifted education.* Committee on Minority Representation in Special Education, M. Suzanne Donovan and Christopher T. Cross, editors. Division of Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.

No Child Left Behind Act of 2001, 20 U.S.C. 6301 (2002).

Pardini, P. (2002, Spring). The history of special education. *Rethinking Schools Online, 16*(3). Retrieved from http://www.rethinkingschools.org/archive/16_03/Hist163.shtml

Pennsylvania Department of Education (PDE). (2011, Jan.). *Accommodations guidelines for students with IEP and students with 504 plans.* Retrieved from http://www.portal.state.pa.us/portal/server.pt/community/testing_accomodations___security/7448

Pennsylvania Department of Education (PDE). (2009, April). Academic achievement report 2007-2008. Retrieved from http://paayp.emetric.net/Home/About

Pennsylvania Department of Education (PDE). (n.d.(a)). State Academic Standards. Retrieved from http://pa.gov/portal/server.pt/community/state_academic_standards/19721

Pennsylvania Department of Education (PDE). (n.d.(b)). *2006 PSSA Mathematics and Reading Disaggregated (Subgroup) Performance Level Results, Grades 3-8 and 11 Statewide.* Retrieved from http://www.portal.state.pa.us/portal/server.pt/community/school_assessments/7442

Pennsylvania Department of Education (PDE). (n.d.(c)). *The 2007 PSSA Mathematics and Reading State Level Proficiency Results (by Grade and State Total).* Retrieved from http://www.portal.state.pa.us/portal/server.pt/community/school_assessments/7442

Pennsylvania Department of Education (PDE). (n.d.(d)). *The 2008 Post-AYP PSSA Mathematics and Reading State Level Proficiency Results (by Grade and State Total).* Retrieved from http://www.portal.state.pa.us/portal/server.pt/community/school_assessments/7442

Phillips, S. E. (1994). High stakes testing accommodations: Validity versus disabled rights. *Applied Measurement in Education, 7*(2), 93-120.

Pugh, G. S. & Erin, J. (Eds.). (1999). Blind and visually impaired students: Educational service guidelines. Watertown, MA: Perkins School for the Blind.

Salvia, J., Yesseldyke, J. E., & Bolt, S. (2007). *Assessment in special and inclusive education.* MA: Houghton Mifflin Co.

Schulte, A. C., Villwock, D. N., Whichard, S. M., & Stallings, C. (2001). High-stakes testing and expected progress standards for students with learning disabilities: A five-year study of one district. *School Psychology Review, 30*(4), 487-506.

Spungin, S. & Ferrell, K.A. (2010). The Role and Function of Teachers of Students with Visual Impairments. CEC-DVT positional statement. Retrieved from www.cecdvi.org/Postion%20Papers/RevisedRole&FunctionofTVI2006.doc

Thompson, S. J., Johnstone, C. J., & Thurlow, M. L. (2002). *Universal design applied to large scale assessments* (Synthesis Report 44). Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes. Retrieved from the World Wide Web: http://educaiton.umn.edu.NCEO/OnlinePubs/Synthesis44.html

Thompson, S., & Thurlow, M. (2002). *Universally designed assessments: Better tests for everyone!* (Policy Directions No. 14). Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes. Retrieved from the World Wide Web: http://educaiton.umn.edu.NCEO/OnlinePubs/Policy14.html

Thurlow, M.L., Lazarus, S., Thompson, S., & Blount Morse, A. (2005). State policies on assessment participation and accommodations for students with disabilities. *The Journal of Special Education, 38*(4), 232-240.

Turnbull, H. R. (2005). Individuals with disabilities education act reauthorization: accountability and personal responsibility. (Brief Article). *Remedial and Special Education,* 26(6), 320(7).

U.S. Department of Education, Office of Special Education Programs. (2006). Twenty-eighth

annual report to Congress on the implementation of the Individuals with Disabilities Education Act, volume 2. Washington, DC: U.S. Department of Education. Retrieved from http://www2.ed.gov/about/reports/annual/osep/2006/parts-b-c/28th-vol-2.pdf

Wagner, M., Newman, L., Cameto, R., & Levine, P. (2006). *The academic achievement and functional performance of youth with disabilities. A report from the National Longitudinal Transition Study-2 (NLTS2).* (NCSER 2006-3000). Menlo Park, CA: SRI International.

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). *Woodcock-Johnson Tests of Academic Achievement-Research edition.* Itasca, IL: Riverside.