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The Person Dimension of Alternate Assessment Examined Using Achievement Results and Student Characteristics

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THE PERSON DIMENSION OF ALTERNATE ASSESSMENT EXAMINED USING ACHIEVEMENT RESULTS AND STUDENT CHARACTERISTICS

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DEDICATION

I dedicate this to my family who has been there for me throughout this process. I thank my husband and children, your love and support are the reason I am successful.

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I express my special appreciation and thanks to my advisor Professor Dr. Mitchell Yell. I would also like to thank my committee members, Professor Anthony Plotner, Professor Joe Flora, and Professor Xiaofeng S. Liu for serving as my committee members. Words cannot express how grateful I am to my colleagues: Dr. Imelda Go and M. Jill Christmus. Your support and encouragement throughout the process has been invaluable.

ABSTRACT

This study explored the Person Dimension of validity by expanding on previous work (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006, Kopriva, Thurlow, Perie, & Lazarus, 2016; Thurlow, Wu, Quenemon, Towels, 2016; and Towles-Reeves, Kearns, Kleinert, & Kleinert, 2009) using data from the Learning Characteristics Inventory, which includes data on different aspects of students' disabilities, and comparing those characteristics to level scores on state standardized assessments. There are aspects of students' disabilities that have the potential to impact the validity of an assessment. The sample under analysis includes students in grades 4-8 (ages 9-13), eligible to take alternate assessment. Students with three years of data are used (N=989), in three cohorts: grades 4-6 (N=321), 5-7 (N=342), and 6-8 (N=326). Specific student characteristics examined include vison, alternative and augmentive communication devices, expressive communication levels, and the students identified primary disability. Differences across age groups as students change forms of the test were also examined. Each group is examined using descriptive statistics and the relationship between categorical variables from the LCI and the student level score from the state alternate science assessment.

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LIST OF ABBREVIATIONS

AA-AAAS.....Alternate Assessment on Alternate Academic Achievement Standards

AAC ..... Alternative and Augmentative Communication

EAA .....Education Accountability Act

ESEA..... Elementary and Secondary Education Act

ESSA..... Every Student Succeeds Act

IDEA ..... Individuals with Disabilities Education Act

IEP..... Individualized Education Program

IASA .....Improving America's Schools Act

LCI .....Learner Characteristics Inventory

NAAC ..... National Alternate Assessment Center

NCLB.....No Child Left Behind Act

NCSC .....National Center and State Collaborative

OSEP.....Office of Special Education Programs

OSERS ..... Office of Special Education and Rehabilitative Services

SBR..... Standards-based reform

SPQ ..... Student Placement Questionnaire

CHAPTER 1

INTRODUCTION

Knowing if or how a characteristic of a student's disability affects the results of a test impacts not only the validity of the test but also its value on teaching. The Every Student Succeeds Act (ESSA) requires that every state develop or adopt grade-level academic standards and assess student's attainment of the standards for accountability purposes (Browder et al., 2007). States must also develop an Alternate Assessment on Alternate Academic Achievement Standards (AA-AAAS) for students with significant cognitive disabilities who are unable to take the regular test (Lashley, 2002; Roeber, 2002; Forte et al. 2016).

The mandate is designed to ensure only students with the most significant cognitive disabilities are assigned to take AA-AAAS (Thurlow, Lazarus, & Christensen, 2008). All students with disabilities must participate in either the general assessment or the AA-AAAS for the grade in which the student is enrolled. Students with disabilities must be provided with accommodations that are approved by the state, to measure their academic achievement. The ESSA caps the number of students who can be tested using the AA-AAAS at one percent of all students tested. If a state does not meet the one percent mandate they must apply for a waiver that includes a plan of correction demonstrating how the state will meet the mandate in the future.

The guiding framework for alternate assessment comes from "The Validity Framework for Evaluating the Technical Quality of Alternate Assessment of Alternate

Academic Achievement Standards (Marion & Pellegrino, 2006)." The expectations for technical quality for AA-AAAS have increased dramatically since the alternate assessment was mandated in 2006. The assessment triangle, as seen in figure 1.1, requires consideration of the interactions between the (1) the student population participating in AA-AAAS and students' understanding of the academic content domains, (2) the appropriateness of the observations or assessment formats used to understand what students know and can do, and (3) the interpretations and inferences made about student performance and learning of the academic content (Marion & Pellegrino, 2006).

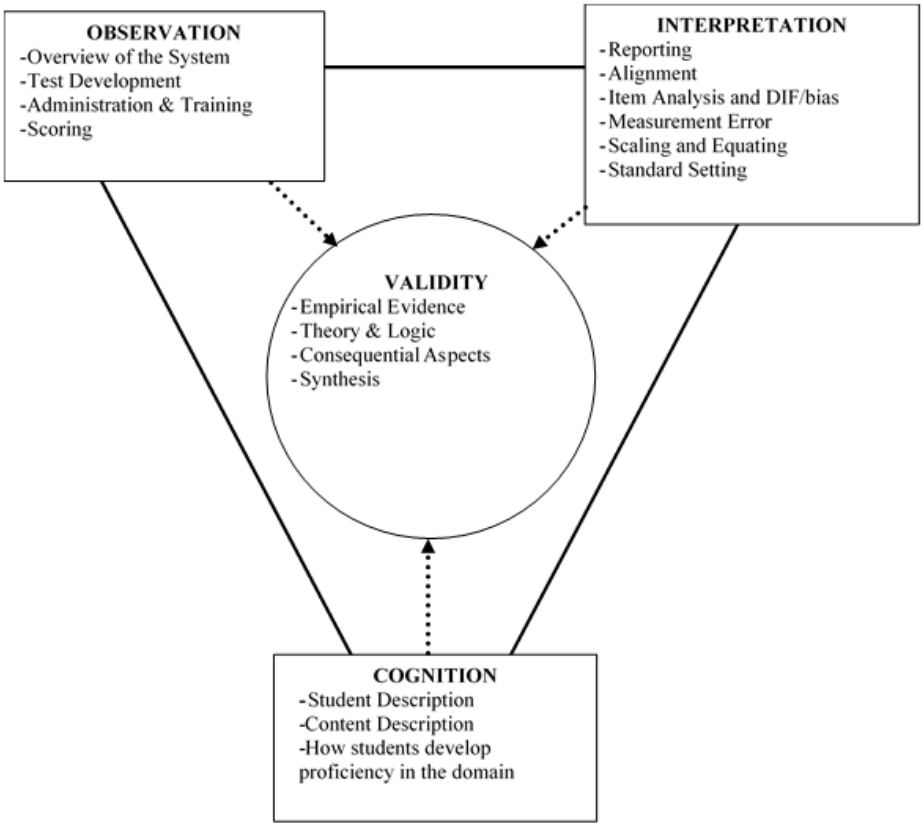

Figure 1.1 Evaluating the Technical Quality of Alternate Assessment (Marion & Pellegrino, 2006)

Any evaluation of validity should address the connections between the characteristics of the students tested and how those characteristics impact their ability to

interact with the test. An important aspect of the assessment triangle is that the three points interact with each other. The reciprocal relationships between the points is what determines the validity of the assessment (Marion & Pellegrino, 2006). The literature on validity of alternate assessments, including Marion and Pellegrino (2006), Marion and Perie (2009), and Perie and Forte (2011) all include a common thread that emphasizes designing assessments that are aligned to the essential academic content and demonstrate that assessments are implemented with fidelity. For the test to impact instruction the results must be tied to meaningful outcomes for the student.

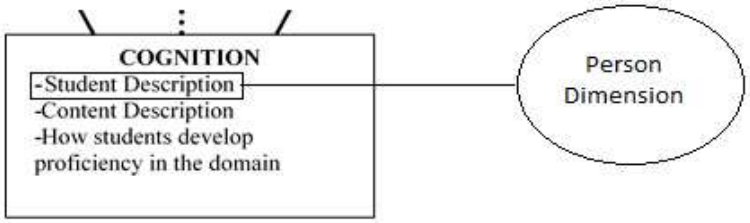

Figure 1.2 Person Dimension in Cognition

The cognition vertex of the triangle describes the empirically based theories about students and how they learn in a particular academic domain (Marion & Pellegrino, 2006). The theories of learning explain how students develop proficiency and the standards provide the content description. The cognition portion of the validity framework includes consideration of the description of the student (Marion & Pellegrino, 2006). Figure 1.2 demonstrates where the Person Dimension could be incorporated into the validity framework. The Person Dimension (Kopriva et al., 2016) takes the student description to the next level and considers a student's abilities and disability

characteristics. This is similar to the student description as currently accepted but more inclusive and with greater detail. The Person Dimension has the potential to have a wider impact than what is currently considered. For AA-AAAS the Person Dimension has not been widely explored. This research provides data in consideration of the Person Dimension and the potential impact if it were to extend the validity argument in the assessment triangle.

In 2016, Kopriva, Thurlow, Perie, Lazarus, and Clark asserted that the student is a critical piece of the validity argument, therefore, how the results are interpreted need to make sense as it relates to the individual student. In their research they examine three specific AA-AAAS and describe how individual student characteristics are taken into consideration during development, the types of items, and how students interact with the items on the assessment. If the test is measuring a characteristic of the student's disability it is not a valid measurement of the student's content knowledge, but instead a measurement of the impact of their disability (Ferrara, 2009). Kopriva et al. (2016) propose expanding measurement theory to include distinct characteristics that influence test scores and how test scores are used. The Person Dimension focuses on the interaction of construct-irrelevant conditions and how students are able to perform what is being asked of them. The Person Dimension is not currently applied as a standard for considering the validity of a test to the extent suggested by Kopriva et al. (2016). Theoretically, the person dimension includes identifying student characteristics as they apply to the assessment of learning, and then determining how and under what conditions those characteristics support the inferences made by the test scores.

This research examined specific types of characteristics of students with significant who take AA-AAAS and whether these characteristics influence test results. The results of the research also speak to the Person Dimension and the possible threat to the validity of the test. Three specific characteristics that may have an effect on test results are the student's vision level, alternative and augmentative communication (AAC), and expressive communication skills. These characteristics are physical obstacles to learning and test taking and require intervention of the part of the teacher or action on the part of the student to overcome during an assessment.

Statement of the Problem

Most work in the area of large-scale assessment has focused on the quality of the test and the content within the test, with little focus on the test taker (Kopriva et al., 2016). Recent research (Kopriva et al., 2016) includes a Person Dimension in validity arguments. Assessments need to be developed with consideration of student characteristics to ensure universal design and accessibility for the greatest number of students (Bolt & Quenemon, 2006). Student characteristics should determine the accessibility features and drive the development of test items (Kopriva et al., 2016).

In order for a test to be a valid measure of what a student knows and can do the test needs to accommodate student characteristics and not measure the effects or extent of the student's disability (Koprovia et al., 2016). For example, if a student does not use verbal communication the test needs to ensure a reliable way for the student to communicate their answers. An allowable accommodation in this situation would be to allow the student to point or use physical gestures to indicate their answer. However, if a student is not able to communicate reliably with gestures, is the test measuring the

student's content knowledge, or the student's ability to communicate the answer? If the test is measuring student characteristics and not academic knowledge the test is not providing information that informs instruction.

Purpose of the Study

Students with significant cognitive disabilities are a heterogeneous group (Lowery et al., 2007). This group of students have a convergence of multiple needs across multiple areas, and do not learn at the same pace as a typically developing student (Lowery et al., 2007). Students with significant cognitive disabilities are still expected to have access to rigorous grade level standards that increase in difficulty each year. Researchers are finding that students with significant cognitive disabilities can learn challenging academic content at higher levels than thought possible (Browder et al. 2008; Browder et al. 2009). However, does this growth show over time on state standardized tests that are based on content aligned to the general education standards?

The understanding of some of the basic characteristics of the most prevalent categories of students who take the alternate assessment is important. There are two primary disabilities that make up the majority of students who take AA-AAAS. These disabilities are Autism and Intellectual Disabilities. The identification of a specific disability or certain label alone is not enough to distinguish individual student characteristics (Kopriva & Lara, 2009), but will help to understand the population under consideration. In the state of South Carolina students with Autism make up approximately 27% of the students taking the South Carolina AA-AAAS (South Carolina Department of Education, 2012). The percentage of students with Autism with IQ's below 70 nationally is in the range of 30% (Kurth & Mastergeorge, 2010). Students with

Intellectual Disabilities make up approximately 27% (mild), 21% (moderate), and 5% (severe) of students taking alternate assessment in South Carolina. Basic characteristics of these disabilities will be defined and discussed in the literature review.

One characteristic that has the potential to impact test results is the student's vision level. Students with visual impairments have distinctive educational needs (Huebner, Merk-Adam, Stryker, & Wolfe, 2004). Most knowledge is received and processed through the sense of sight. Impaired vision explicitly affects the ability to understand the relationships between the functions of objects and ideas (Huebner et al., 2004). Students with low or no vision often experience delayed access to instruction which leads to a delay demonstrating knowledge and skills (Thurlow, Wu, Quenemoen, & Towles, 2016). A student with low or no vision may not be able to access the content of the test in a way that allows them to demonstrate what they know or can do. Combine vision challenges with cognitive disabilities and how do students with low or no vision compare to their peers?

Another characteristic that may impact test results is the type of communication the student uses. All students express themselves, whether through oral speech or other methods of communication (Kearns, Kleinert, Kleinert, Page, Thurlow & Quenemoen, 2015). Many students with significant cognitive disabilities use natural speech to some degree, but others need AAC to express themselves (Calculator, 2009). Augmentative and alternative communication is the term used for all communication that is not oral speech. A student can use AAC to enhance or to replace verbal speech. This includes a combination of methods such as gestures, eye movement, vocalizations, pointing to symbols, up to high tech voice output devices (Calculator, 2009). A student with limited

means of communication may not be able to express what they know in a way that is compatible with a traditional test. In South Carolina approximately 20% of students taking the AA-AAAS use AAC.

An AAC device is the mode or means the student uses to communicate, expressive communication is the depth of communication the student is able to use. Expressive communication is the ability to convey messages and meaning. Expressive communication level is essential to assessment. In order for students to demonstrate what they have learned they need a level of communication that allows them to demonstrate a deeper level of understanding (Kearns et al., 2005). There are many methods of classifying expressive communication, this study categorizes students in one of three different areas of expressive language: symbolic (level A), early symbolic (level B), and pre-symbolic (level C). In South Carolina approximately 66% of the students taking the alternate assessment communicate at a symbolic level. If the test does not account for the level of the student's expressive language ability, it may not be a true representation of what a student at lower communication levels know and can do.

There is little research on the empirical results of large-scale assessment of students with significant cognitive disabilities.

The purpose of this study is to answer the following research questions:

1. Are the changes in level scores for students with low or no vision different from students with normal or corrected normal vision on the SC-ALT?
2. Are the changes in level scores for students who use an AAC device different from students with the same expressive communication level who do not use an AAC device on the SC-ALT?

3. Do students with higher rated expressive communication levels demonstrate increases in level scores more frequently on the SC-ALT?
4. Do the cohorts of students, when grouped by grade level, demonstrate differences in level scores longitudinally when comparing year 1-2, years 2-3, and years 1-3?
5. In the 2015-16 through 2017-18 school years, are there similarities in distributions of the variable of primary disability within the samples of students whose level score increased, decreased, or stayed the same?

Based on the literature review, the following hypotheses were formed:

1. Students with lower vision levels will show less change in level scores.
2. Students who use AAC devices will demonstrate a greater increase in level scores.
3. If communication is a factor that influences results, students with higher communication levels will demonstrate a larger increase in level scores than those with lower levels of communication.
4. Since by definition students with significant cognitive disabilities have a speed of learning that is much slower than typically developing students, the years 1-3 should show the greatest level of growth for all groups.
5. If the test is measuring students' content knowledge and not characteristics of their disability, there should be no differences in distributions of the analyzed variables.

This study retrospectively examines data of students with significant cognitive disabilities who took the grades 4-8 SC-Alt Science assessment in the 2014-15, 2015-16,

and 2016-17 school years. Student's results were compared to their own level score on the science test over the three year period. Students without three years of data were dropped from the sample. Only students with three years of data were used (N=989). Specific student characteristics examined include vision, AAC use, expressive communication levels and the students identified primary disability.

For research question four the sample under analysis was divided into three cohort groups. The three cohorts were: grades 4-6 (N=321), 5-7 (N=342), and 6-8 (N=326). Differences across age groups as they change forms of the test were examined. For question five students were divided into sub-groups and examined to determine whether there was a significant relationship between categorical variables. The sub-groups were students who showed (a) increases in the level scores (N=200), (b) no change in level scores (N=583), and (c) decreases in level scores (N=206). Each group was examined, including frequency counts by variable, percentages and when appropriate, cross-tabulations. The null hypothesis was that all variables of the student's vision level, AAC use, expressive communication, and primary disability were distributed equally at all levels. The statistical hypotheses testing involves nonparametric tests that make no distributional assumptions regarding the data. The nonparametric tests include the Pearson Chi-Square tests in lieu of using parametric independent-samples t-tests or one-way ANOVA tests.

The measurement of student academic achievement levels were from the SC-Alt Science test. Achievement results had four levels or categories, of performance from one to four, with four being the highest level a student can score. The SC-Alt consists of a series of performance tasks. The tasks are scripted activities, and each task contains four

to eight related questions. Unlike the assessment process for general assessments, alternate assessments involve continuous interactions between the student and the teacher or test administrator (South Carolina Department of Education, 2016). The test is administered to one student at a time. There are two different forms, or versions, of the assessment. There is an elementary version for third and fourth grade and a middle school version for sixth through eighth grade. Research question four was intended to ensure that any difference in achievement levels over a three year period were not related to the change in forms during that period.

Content validity of the SC-Alt was examined by the South Carolina Department of Education through two independent alignment studies. Both convergent and discriminant validity examined and were based on student start-stop times, number of tasks and items the student was administered, and the overall achievement scale score of students by start point (South Carolina Department of Education, 2016). This study expands on that previous work by using data from the Learner Characteristics Inventory (LCI) and compares those characteristics to student's SC-Alt level scores.

Definition of Terms

Alternate Assessment on Alternate Academic Achievement Standards (AA-AAAS): Alternate achievement standards are an expectation of performance that differs in complexity from grade-level achievement standards (Browder, Spooner, Algozzine, Ahlgrim-Delzell, Flowers, & Karvonen, 2003). Alternate achievement standards must be aligned with the state's academic content standards, promote access to the general curriculum, and reflect professional judgment of the highest achievement standards

possible. The state's assessment system must include all students by participating in the state assessment with or without accommodations (Yell, Drasgow, & Lowery, 2005).

Learner Characteristic Inventory (LCI): The LCI was developed by the National Alternate Assessment Center (NAAC) to investigate learning characteristics of students participating in AA-AAAS (Kearns, Kleinert, Kleinert, and Towles-Reeves, 2006). The LCI was designed to ensure the test was created with students with significant cognitive disabilities in mind and the expected population is participating in the test (Kearns, 2006). The LCI is designed to provide additional data to consider the validity of AA-AAAS (Kearns et al., 2006).

Low or No Vision: See Vision Impairment

Student Placement Questionnaire (SPQ): Is a brief rating instrument that represents the range of communication levels and cognitive-academic functioning found in the population taking the alternate assessment (South Carolina Alternate Assessment Technical Manual, 2016). American Institute for Research developed the SPQ for the SC-Alt program. The SPQ provides a numerical scale score that is used to match student ability with the difficulty of the tasks and items on the test (South Carolina Alternate Assessment Technical Manual, 2016). The SPQ is used to determine the student's starting point on the test.

Students with Significant Cognitive Disabilities: The eligibility criteria to as taken form the *Guidance for IEP Teams on Determining Participation in South Carolina Alternate Assessment* can be seen in Table 2.1

Vision Impairment: According to the *South Carolina Standards for Evaluation and Eligibility Determination Guide* (2011) for the student to qualify as having vision

impairment they must have one of the following; (a) visual acuity with correction is 20/70 or worse in the better eye, (b) a diagnosed progressive loss of vision, (c) visual field of 40 degrees or less, (d) visual acuity is unable to be determined by a licensed optometrist or, (e) cortical visual impairment.

CHAPTER 2

LITERATURE REVIEW

Education is a fundamental right for all children included in the Constitutions of every state in the United States (Yell, Katsiyannas, & Shiner, 2006). The Elementary and Secondary Education Act (ESEA), No Child Left Behind Act (NCLB), Individuals with Disabilities Education Act (IDEA) and Every Student Succeeds Act (ESSA), the law that replaced NCLB, ensure equal access to grade level academic standards for all students, regardless of disability (Browder et al., 2007; Towles-Reeves, Kleinert, Mohomba, 2009). The ESSA requires that every state develop or adopt grade-level academic standards. The standards are educational targets outlining the expectations for all students at each grade level (Browder et al., 2007). The grade level standards apply to all students, including students with disabilities, regardless of the severity of their disability.

The state-level assessments are required by the South Carolina Education Accountability Act of 1998 (EAA) as amended in 2014 and are aligned with the state's academic standards for each subject and grade level. The EAA establishes a performance-based accountability system in South Carolina that includes all students and was created to support high expectations and improve academic education (Quick Facts in South Carolina, 2016). The purpose of the state's alternate assessment is to evaluate performance of students with significant cognitive disabilities in order to improve instruction by promoting appropriately high expectations and include all students in the state accountability system (South Carolina Department of Education, 2012).

This literature review discusses the legislative background, the history and challenges of assessing students with significant cognitive disabilities, validity of alternate assessment and student characteristics that could affect validity, focusing specifically on vision, AAC use, and expressive communication. Descriptions and definitions of the two major disability categories of alternate test takers are presented. Research using the Learner Characteristics Inventory (LCI) and how it is used to define and quantify characteristics of students with significant cognitive disabilities and the current alternate testing program in the state of South Carolina are also discussed.

Legislative Statutes Underlying High Stakes Testing

In 1994 the Elementary and Secondary Education Act (ESEA) was reauthorized and amended in Improving America's Schools Act (IASA). The 1994 amendments brought Title I of the IASA into alignment with standards-based reform (SBR) movement. Standards-based reform has been the primary driving force behind education reform in the United States since the 1980s and requires states to define the academic standards for what students should know and be able to do (Browder, Wakeman, & Flowers, 2009). When the ESEA was reauthorized in the No Child Left Behind (NCLB) and the Every Student Succeeds Act (ESSA), SBR continued. The Individuals with Disabilities Education Act (IDEA) is the second major statute that addressed statewide assessment after ESEA. The IDEA is specific to students with disabilities.

As mandated, the purpose of the test is to hold schools accountable for teaching students and measure what the student knows and can do. Assessments are created as an accountability measure, to inform stakeholders outside the classroom, such as policy makers (Chudowsky & Pellegrino, 2003) about the progress of students. The ESEA

permits States to develop alternate academic achievement standards for students with the most significant disabilities. The federal government mandates that only one percent of students can take the AA-AAAS to ensure only those with the most significant cognitive disabilities take the assessment (Thurlow, Lazarus, & Christensen, 2008).

Testing Students with Significant Cognitive Disabilities

For many years students with significant cognitive disabilities were often excluded from the large-scale assessment (Browder et al., 2014). Since 1997, IDEA has required all students to be included in accountability (Lashley, 2002; Roeber, 2002). In the 2012-2013 school year, the National Center for Education Statistics reported 6,429,000 students with disabilities were receiving services under IDEA (National Center for Education Statistics, 2016). The number of students with disabilities varies by state, but the 1% cap across the total student population equates to approximately 9% of all students with disabilities (Yell & Drasgow, 2005). In the 2012-13 school year that would have been approximately 578,610 students taking an AA-AAAS across the nation.

The students who take an alternate assessment varies significantly from state to state (McLaughlin & Thurlow, 2003; Thurlow et al., 2005). According to the National Center on Educational Outcomes (NCEO) brief (2017) states range from 0.6% to over 2.0% of students taking the alternate assessment. South Carolina's ranges yearly from approximately 0.63% to 0.76% of students taking alternate assessment (South Carolina Department of Education, 2016). Each state determines the eligibility criteria and chooses its own Alternate Assessment, making achievement comparisons across states difficult (Thurlow et al., 2005; Towles-Reeves, Kearns, Kleinert, & Kleinert, 2009

In South Carolina Individualized Education Program (IEP) teams determine if students should take the regular assessment or an alternate assessment (South Carolina Department of Education, 2016). The State Department of Education provides specific guidance stating students must meet the criteria in table 2.1 to qualify to take alternate assessment in South Carolina.

Table 2.1
Alternate Assessment Eligibility Criteria Requirements

Alternate Assessment Eligibility Criteria Requirements
• Demonstrate a significant cognitive disability and adaptive skill deficits, which result in performance that is substantially below grade-level achievement expectations even with the use of accommodations and modifications; • Access the state approved curriculum standards at less complicated levels and with extensively modified instruction; • Possess current adaptive skills requiring extensive direct instruction and practice in multiple settings to accomplish the application and transfer of skills necessary for application in school, work, home, and community environments; • Be unable to apply or use academic skills across natural settings when instructed solely or primarily through classroom instruction; • The inability to achieve the state grade-level achievement expectations is not the result of excessive or extended absences or social, cultural, or economic differences. (South Carolina Department of Education, 2012 p. 3)

Over several decades there have been shifts in focus for students with significant cognitive disabilities (Browder et al., 2004). The current focus is on aligning assessments with the general education curriculum (Browder et al., 2007). Prior to this shift, students with significant cognitive disabilities were not introduced to grade level content (Lashley, 2002; Roeber, 2002).

Validity and Alternate Assessment

Validity is the degree to which evidence and theory support the interpretations of the test scores (ARA et al., 1999). Testing validity is often discussed in three ways (a) content evidence, (b) construct evidence, and (c) criterion evidence. Content evidence is how well the content of the test measures the academic standards. The guiding framework for alternate assessment comes from "The Validity Framework for Evaluating the Technical Quality of Alternate Assessment of Alternate Academic Achievement Standards (Marion & Pellegrino, 2006)." The expectations for technical quality for AA-AAAS have increased dramatically since the alternate assessment was mandated in 2006. The assessment triangle, as seen in figure 1.1, requires consideration of the interactions between the (1) the student population participating in AA-AAAS and students' understanding of the academic content domains, (2) the appropriateness of the observations or assessment formats used to understand what students know and can do, and (3) the interpretations and inferences made about student performance and learning of the academic content (Marion & Pellegrino, 2006).

Content evidence provides an overall level of the student's skill in the area tested (Marion & Perie, 2009). State-developed content standards in subject areas are the basis for content validity (Behuniak, 2009). A test has content validity when the majority of test items based on the academic content of a large sample of students are correct (Marion & Perie, 2009). Content evidence does not "lend [itself] to use with alternate assessment in the same way that they do with general assessments (Behuniak, 2009, p. 319)." Content evidence for alternate assessment is difficult for two reasons, the variation in abilities, and characteristics of test takers and the small size of the group taking the test

(Behuniak, 2009). Testing one percent of the population makes gathering enough evidence to have convincing data on test items difficult. Additionally there is significant variation in the aptitude and abilities of students who take the alternate test. This makes the data gathered on individual test items less reliable and difficult to project future performance (Karvonen & Huynh, 2007). Having reliable data that shows content evidence is a challenge for alternate assessment (Goldstein & Behuniak, 2012).

Construct validity is concerned with what the score means (Marion & Perie, 2009). Content standards define the construct, then the construct evidence can be inferred based on test-responding behavior (Ferrara, 2009). Giving the correct response to a test item is not necessarily evidence that the student knows and understands the content (Ferrara, 2009). Students may be responding to different things within the question itself and not the content. For example: if science is the content being tested and the questions are about electricity. If the test questions are phrased in long and complex reading passages there is the possibility reading skills are inadvertently being measured instead of the student's knowledge of electricity. This is what is meant by construct validity.

Criterion evidence is how the assessment correlates to or predicts another desired outcome and its relationship to the test's intended and unintended consequences. Behuniak (2009) proposed that focusing on the consequences of alternate assessments will help understand the impact of testing. The intended consequences of SBR and alternate assessment include that students with significant cognitive disabilities will gain access to grade-level academic content. One possible method to determine if students are getting access to content is to measure if students' scores on AA-AAAS are improving on grade level aligned tests over time.

This study is intended to see if there is an increase in student achievement and if there is differential achievement for students with specific disability characteristics. In the theory of action for AA-AAAS the interpretive use argument includes improved outcomes for students with significant cognitive disabilities (Forte et al., 2016). Kopriva et al. (2016) suggest an evaluation of whether or not students' achievement is increasing over time is necessary to demonstrate validity of the test. Are observed changes in test scores over time because of a change in academic knowledge or due to other possible causes such as characteristics of the student's disability?

The Person Dimension of Assessments

Kopriva et al. (2016), proposed the Person Dimension as the interaction of construct-irrelevant conditions and how the test taker receives, processes, and produces information. They propose identifying individual test taker profiles and understanding how those individual characteristics impact the testing process. Only by knowing the extent of the student's individual disability characteristics (or other exceptionalities) and how those characteristics may impact the test, can the results be determined to be valid and meaningful. The Person Dimension is important if the impact includes an interaction with construct irrelevant elements of the assessment and the aspects of the student's disability. For example if the student is nonverbal and uses pictures to communicate: if the pictures in the answer items are not familiar to the student they may not be able to answer the question correctly. That would make the results based on an aspect of their disability and not their knowledge of the content.

Student Characteristics

Siegel-Causey and Bashinski (1997) provide general characteristics of students with significant cognitive disabilities as needing extensive and ongoing support to be able to participate in home, school, and community activities. Further they state this group of students (a) take extended periods to learn, (b) need direct instruction, (c) often do not demonstrate skills without prompting, and (d) do not generalize skills to new contexts (Siegel-Causey & Bashinski, 1997). These students have concurrent disabilities which causes a multitude of different characteristics (Karvonen & Huynh, 2007). It is important to understand the specific learner characteristics and how they could impact assessment and assessment results. One tool that measures student characteristics is the Learner Characteristics Inventory (LCI).

The LCI was developed by the National Alternate Assessment Center (NAAC) (Kearns et al., 2006). To create the LCI, Towles-Reeves et al. (2009) analyzed learning characteristics of students taking AA-AAAS. Ten experts across multiple areas including occupational and physical therapists, speech-language pathologists, and experts in the area of deaf-blindness, reading, mathematics, and special education developed the initial list of characteristics. The inventory was vetted by groups of teachers spanning all grade levels and improved using their feedback until each item in the inventory had 95% interrater reliability. Participants in this process included teachers who completed the inventory for 3,182 students across three states.

The LCI was created as a tool to use before assessment to ensure test items are developed with student characteristics in mind and after the test to ensure that the expected students are taking the test (Kearns et al., 2006). The LCI also provides

additional data when determining the validity of AA-AAAS by providing a measure of external validity of the assessment (Kearns et al., 2006). There are two items on the LCI about math and reading that can be compared to test results in those content areas. Further, the LCI data can be used to identify unusual patterns that might suggest that the eligibility criteria was not applied appropriately, (Thurlow et al., 2016).

The LCI is completed by the teacher with the most knowledge of the student and includes ten questions on a continuum of skills including expressive communication, receptive communication, vision, hearing, motor skills, engagement, health issues and attendance, reading and mathematics (Towles-Reeves et al., 2009). Each ordinal variable has a value that goes from low to high with high representing more complex abilities (Towles-Reeves et al., 2009). The last question is a dichotomous question about whether the student uses AAC. The LCI also includes demographic information such as age, grade, gender, and primary disability. A copy of the LCI can be found in Appendix A. The LCI is appropriate to get a quick snapshot of student characteristics to understand the tested population and not intended to be used to develop an IEP. The LCI is not a measure of performance, it is a measure of student characteristics.

The National Center and State Collaborative (NCSC) was a multi-state, multi-organizational consortium that was awarded a General Supervision Enhancement Grant in late 2010 by the Office of Special Education Programs (OSEP) in the U.S. Department of Education. The NCSC developed an alternate assessment system to assess the English Language Arts and mathematics achievement of students with significant cognitive disabilities (Kleinert et al., 2015). The NCSC used the LCI as a tool to determine the characteristics of the students who participated in its AA-AAAS. In 2015, the NCSC

collaborative administered the LCI to nearly 50,000 students to gather information on the student characteristics to its test population. The NCSC Brief (2016) reported the following student characteristics from that sample: 79% of students use symbolic expressive communication, 13% of students used AAC, and 94% of students do not have substantial vision impairments.

The LCI was administered in South Carolina in the 2016-17 school year to students taking the SC-Alt Science test. The LCI was filled out in the 2016-17 school year as part of the assessment for each student in the tested population.

Table 2.2
NCSC and SC-Alt Characteristics Comparison

	NCSC Collaborative	SC-Alt	Difference
Communication Level A	79.0%	65.8%	13.2% fewer students in SC at this level
Communication Level B	10%	22.9%	12.9% more students in SC at this level
Communication Level C	11.0%	11.3%	0.3% more students in SC as this level
AAC			4.5% more students in SC with AAC
Low or No Vision Level C and D	13%	17.5%	
	6.0%	7.4%	1.4% more students in SC at these levels

A comparison of the NCSC collaborative in 2015 with 50,000 students (Thurlow et al., 2016) and the LCI data from 2016 for South Carolina (South Carolina Department of Education, 2016) is shown in Table 2.2. Relative to other NCSC states South Carolina

has a smaller percentage of students who communicate at a symbolic (level A) and higher percentage of students who communicate at pre-symbolic (level B) (12.9%), higher percentage of students who use AAC (4.5%), and slightly higher percentage of students with low or no vision (1.4%). These differences may be explained by the overall percentage of students assessed. South Carolina assesses less than the 1% federal cap, whereas state in the NCSC sample ranged from just below 1% to over 2%.

Vision

As seen in table 2.2, in South Carolina 7.4% of students who take the AA-AAAS have low to no vision. According to the *South Carolina Standards for Evaluation and Eligibility Determination* (2011) guide, in order for the student to qualify as having a vision impairment they must meet the definition in chapter 1 including: The visual acuity with correction is 20/70 or worse, progressive loss of vision, functional vision loss, or evidence of cortical visual impairment that adversely affects the student's educational and functional performance (South Carolina Department of Education, 2011).
The LCI puts vision into the categories seen in Table 2.3 (Kearns et al., 2006). Students meeting South Carolina's eligibility requirements as a student with a vision impairment would be in level C and D on the LCI.

Visually impaired students have distinctive educational needs (Huebner, Merk-Adam, Stryker, & Wolfe, 2004). Most knowledge is received and processed through the sense of sight and students who are visually impaired need accommodations that address the differences (Huebner et al., 2004). Tactile, or three-dimensional symbols, are the most often used accommodations for students with vision needs (Lund & Troha, 2007).

Table 2.3
LCI Vision Descriptors

LCI Domain	Level A	Level B	Level C	Level D
Vision	Vision within normal limits.	Corrected vision within normal limits.	Low vision; uses vision for some activities of daily living.	No functional use of vision for activities of daily living, or unable to determine functional use of vision.

Assessments must be adapted to reflect the student with a vision impairment's visual, auditory and tactile capabilities (Lund & Troha, 2007). A student with low or no vision can only experience what is within arm's reach, can be safely touched, and what can be heard (Huebner et al., 2004). Measures to ensure meaningful appropriate assessment are necessary. Examples of accommodations that would make assessment meaningful for students with low or no vision include tactile graphics, physical manipulatives, large print, and when appropriate the actual item under investigation (Hueber et al., 2004; Lund & Troha, 2007).

Alternative and Augmentative Communication

Alternative and Augmentative Communication (AAC) refers to communication systems for students who are not able to use verbal speech as an effective or primary means for communication (Calculator, 2009). AAC involves multiple means to communicate including speech, vocalizations, signs, gestures, writing, pictures, and voice output devices (Sennott, Light, & McNaughton, 2016). AAC is an important way to meet the needs of students who lack verbal abilities (Thurlow et al., 2016). Most students with

significant cognitive disabilities use natural speech to some degree, but use AAC to express themselves clearly (Calculator, 2009; Kearns et al., 2015). As seen in table 2.2, 17.5% of student with significant cognitive disabilities in South Carolina use AAC.

There are multiple theories of language acquisition (Calculator, 2009). Rowland and Schweigert (2003) demonstrated that there is a correlation between cognition and language, but not a causal relationship. Calculator (1997) proposed an inverse relationship arguing that AAC can enhance a student's cognitive skills. Conversely, Sennott et al (2016) found that students with significant language needs, who use AAC, are at risk of increasing language delays because these students are (a) frequently talked to less, (b) have to rely on others to develop and grow their AAC system, (c) the amount of language the student receives is not equal to the amount of language they express and (d) difficulties with graphic symbol interpretations. Goldstein and Behuniak (2011) found that students with low scores on alternate assessment were more likely to use AAC during instruction and scored lower on alternate assessment. Kleinert et al. (2015) found a negative correlation between AAC use and increasingly inclusive classroom settings in a study across 15 states. They found that AAC use correlated to the student being more likely to be in a restrictive setting with only other students with disabilities.

Assessments given to students who uses AAC need to be compatible with their mode or means of communication. Students must be able to use their AAC during an assessment or they will struggle to communicate what they know (Beukelman & Mirend, 2013). Ways to accommodate AAC on an assessment would include allowing the use of switches, students answering with voice output devices, allowing students to point at picture symbols, or using eye gaze technology so students can indicate with their eyes

(McNaughton & Light, 2013). Prior to the test students using AAC would need exposure to the format of the assessment so they are able to practice using their AAC in the assessment, or so their teacher can adapt their AAC so the student can interact with the assessment.

Expressive Communication

Students' symbolic level of speech has been used for education as early as the 1950's and Piaget (Browder et al., 2008). Rowland and Schweigert (1990) defined three levels of communication for students with severe disabilities as pre-symbolic, concrete symbolic, and abstract symbolic. These three levels resemble closely the three levels described in the LCI. As shown in Table 2.4, the LCI classifies students into three categories of expressive language (Towles-Reeves et al., 2009). Students at all three levels could be nonverbal or use AAC (Browder, Flowers, & Wakeman, 2008).

A 2009 study using LCI data from three states showed that higher functional reading and math skills were strongly correlated with higher levels of expressive communication (Towles-Reeves, Kearns, Kleinert & Kleinert, 2009). Browder et al., (2008), worked with 95 teachers of students with a variety of disabilities who take the AA-AAAS. The study used teacher ratings of student performance. They found that students with symbolic communication have more access to the general curriculum than students with lower communication levels. Kleinert et al. (2015) when researching 15 states using almost 40,000 students found that 13 states has a statistically significant positive correlation between expressive communication and increasingly inclusive instruction with non-disabled peers. Goldstein and Behuniak (2012) found students who take alternate assessment who had higher rated communication skills were able to engage

more with academic content. In all these studies higher levels of communication was related to greater academic achievement.

Table 2.4
LCI Expressive Communication Descriptors

LCI Domain	Level A	Level B	Level C
Expressive Communication	Uses symbolic language to communicate: Student uses verbal or written words, signs, Braille, or language-based augmentative systems to request, initiate, and respond to questions, describe things or events, and express refusal.	Uses intentional communication, but not at a symbolic language level: Student uses understandable communication through such modes as gestures, pictures, objects/ textures, points, etc., to clearly express a variety of intentions.	Student communicates primarily through cries, facial expressions, change in muscle tone, etc., but no clear use of objects/textures, regularized gestures, pictures, signs, etc., to communicate.

Without taking into account a student's level of communication alternate assessment may be biased towards students who are able to use abstract symbols (Browder et al., 2008). In order to access the assessment students at different levels of expressive communication will need different features built into the test to accommodate their communication.

A student who is able to communicate at level A needs the assessment to be appropriately challenging. They benefit from the use of less pictures and more text with a

read aloud feature. When there are associated pictures or symbols they need to be used to help the student to access prior knowledge (Browder et al., 2008; Kearns et al., 2015). A science assessment example includes using a picture of a food web when asking about relationships between predator and prey to activate prior knowledge.

A student who is able to communicate at level B who has concrete-symbolic language may use gestures (e.g., pointing), signs, pictures, eye-gaze, or AAC Kearns et al., 2015). A student who communicates at the pre-symbolic level benefits from pictures and symbols, simplified language and explicit, clear instructions (Kearns et al., 2015). A science assessment example would include using three pictures of animals and asking the student to point at or use eye gaze to indicate the predator using pictures instead of text.

Students who communicate as a level C have different needs than those on level A and B. Approximately 10% of students who take AA-AAAS communicate through cries, facial expressions, or change in muscle tone, and do not yet have clear use of objects/textures, regularized gestures, pictures, or signs (Kearns et al., 2015). Assessment is the most challenging for students at this level of communication. Students with the most significant cognitive disabilities frequently require the highest level of support from their teachers (Calculator, 2009). Teachers need to be able to provide the support and encouragement as needed instead of having to follow a standardized script. Teachers working with students at this communication level need to have an option available if the student does not respond.

All students communicate to express themselves in some way, whether through oral speech or other methods of communication (Kearns et al., 2015; Siegel-Causey & Bashinski, 1997). Expressive communication is vital to assessment. For a student to

demonstrate what they have learned they need to be able to communicate information about the content and answers to test questions (Goldstein & Behuniak, 2012b). Students need to learn to use symbols, objects, photographs, and printed words (Calculator, 2009) in order to interact meaningfully with test. The symbols used on the test must be readily understood by a broad range of students.

Primary Disability

The identification of a specific disability or certain label is not enough to distinguish individual student characteristics (Kopriva & Lara, 2009). Goldstein and Behuniak (2012) found certain disability categories are associated with low scores on AA-AAAS, but state it is only suggestive of a relationship and further research is needed. An understanding of some of the basic characteristics of the most prevalent categories of students who take the alternate assessment is important. The two most prevalent disability categories are Autism and Intellectual Disabilities. The category of Intellectual Disability has three subcategories. The percentage of students with Autism with IQ's below 70 is in the range of 30% (Kurth & Mastergeorge, 2010). In the state of South Carolina students with Autism make up approximately 27% of the students taking the SC-Alt (South Carolina Department of Education, 2012). Students with Intellectual Disabilities make up approximately 27% (mild), 21% (moderate), and 5% (severe).

Autism

Autism includes Asperger's Disorder and Pervasive Developmental Disorder – and includes the following characteristics: Impairments in social interaction, including nonverbal behaviors that include the inability to adjust eye-to-eye gaze, facial expressions, body postures, and gestures in social interaction (South Carolina Department

of Education, 2011). Students with Autism often have restricted repetitive and stereotyped patterns of behavior, interests, and activities (Kurth & Mastergeorge, 2010). There are also impairments in communication, such as a delays in the development of spoken language (Wei, Christiano, Yu, Wagner, & Spiker 2015). There is often an inability to initiate or sustain a conversation with others, stereotyped and repetitive use of language or idiosyncratic language. Students with autism cover the full spectrum of academic and cognitive ability levels.

Wei et al. (2015) studied the growth trajectory of 130 students with Autism between the ages of six and nine and found that the average scores in the area of reading, math, and social skills was about one standard deviation below the national average when compared to regular education students and that nearly one-third of students with autism were considered low achievers academically. Wei et al. (2015) did not differentiate students that were eligible for AA-AAAS, however study helps to define some characteristics of the students with autism. Stevens et al., (2000) found "lower-functioning" students with autism often remained stable and even decline in language and social skills over time. The challenges in assessment include managing the idiosyncratic behavior during the assessment and encouraging engagement with the assessment.

Intellectual Disabilities

Students with intellectual disabilities demonstrate significant limitations in intellectual functioning evidenced by scores on both verbal and nonverbal scales that are at least two standard deviations below the mean on intelligence tests (South Carolina Department of Education, 2011). Students with this disability label also have significant deficits in adaptive behavior and educational performance when compared to same aged

peers (Bouck & Satsangi, 2015). Table 2.5 shows the South Carolina Department of Education's (2011) IQ requirements to be categorized as a student with an Intellectual Disability. There are three sub categories of intellectual disabilities as shown in table 2.5. Characteristics of students with mild intellectual disabilities specifically, include limited attention span, difficultly generalizing and recalling information, and delays in developing foundational language (Bouck & Satsangi, 2010). Students in the moderate and severe categories demonstrate even greater difficulties than students in the mild category (Bouck & Satsangi, 2010).

Table 2.5
Intellectual Disability IQ Scores

Label Descriptor	IQ Standard Range*	% of Population in SC taking the AA-AAAS
Mild	48–70±	27
Moderate	25–48±	21
Severe	0–25±	5

*assumes mean of 100 and standard deviation of 15

The challenges in assessment include overcoming the limited attention span so the student can complete the test and the student's ability to recall information as it comes up on the test.

Alternate Assessment in South Carolina

The principles of SC-Alt follow an SBR model. The test is designed on the idea that (a) all students can learn, (b) state standards are the foundation for all students, and (c) results of the assessment must be used to improve planning, instruction, and learning (South Carolina Department of Education, 2016). One of the challenges of alternate

assessment is that the test must be directly related to the larger assessment system (Behuniak, 2009). In South Carolina special education is an extension and adaptation of the general education program. General education standards are extended and prioritized to create the SC-Alt Extended Standards .The extended standards are linked to the South Carolina academic content standards and all test questions are created based on these standards (South Carolina Alternate Assessment Technical Manual, 2016). Extended standards are aligned to grade level standards and expectations are often the prerequisite skills necessary to meet the grade level standards (Browder et al., 2008).

The SC-Alt consists of a series of performance tasks that are administered and scored by the teacher. The tasks are scripted activities, and each task contains four to eight related questions. When a student does not respond correctly on the first attempt the incorrect answer choice is removed to scaffold the difficulty level of items. Unlike the assessment process for general assessments, alternate assessments involve continuous interactions between the student and the teacher (South Carolina Department of Education, 2016). The test is administered to one student at a time. The SC-Alt Science test is given on two different forms or versions; an elementary form for third and fourth grade and a middle school form for sixth through eighth grade. There are four levels of performance based on the extended standards on the Science SC-Alt as seen in Table 2.6. Students receive both a level score and a scale score. Level scores are the measure that is used for accountability purposes in South Carolina to report on progress as required by the ESSA and the EAA.

Validity for the SC-Alt has been measured in multiple ways. The first being content validity. To measure content validity the SC-Alt is aligned to grade level

standards in two independent alignment studies completed by the University of North Carolina at Charlotte and the South Carolina Education Oversight Committee. The results of the alignment study for the science assessment indicates that the South Carolina science alternate assessment content was aligned 96-98% to the general academic science standards (South Carolina Department of Education, 2016). It was determined that the SC-Alt links to the grade level content, providing evidence of content validity.

Table 2.6
Science SC-Alt Performance Level Descriptors

Level	Performance Level Descriptors
4	Students performing at a Level 4 demonstrate and apply academic skills and competencies in science. (Exceeds Proficiency)
3	Students performing at Level 3 demonstrate increasing academic skills and competencies in science. (Meets Proficiency)
2	Students performing at Level 2 demonstrate foundational academic skills and competencies in science. (Approaches Proficiency)
1	Students performing at Level 1 may demonstrate emerging skills and competencies in science. (Well Below Proficiency)

The SC-Alt was examined for convergent and discriminant validity using a multitrait-multimethod matrix (South Carolina Department of Education, 2016). The SC-Alt scale score and the Student Placement Questionnaire (SPQ) which has an indicator of the student's performance in each science and social studies were compared and were determined to fall into an acceptable range (South Carolina Department of Education, 2016). An example of the Elementary School Science SPQ can be found in Appendix B.

For alternate assessment, test takers are as important a part of determining the validity of the test score. Student characteristics can affect the validity of test results.

Siegel-Causey and Bashinski (1997) provide general characteristics of students with significant cognitive disabilities to include a need for extensive and ongoing support to be able to participate in home, school, and community activities. According to Siegel-Causey and Bashinski (1997), this group of students also takes longer periods to learn, need direct instruction, often do not demonstrate skills without prompting, and do not generalize skills to new contexts.

This study will expand on previous work by using data from the LCI, which includes data on different aspects of the students' disability, including expressive communication levels, primary disability, and vision levels, and comparing those aspects to students' level score on the SC-Alt Science assessment. Previous studies focused bias reviews on individual items on the assessment by disability, gender, or ethnicity, not the overall post operational review of results for the entire population that took the assessment by characteristic.

CHAPTER 3

METHODS

There is little research on results of large scale assessment on students with significant cognitive disabilities. The purpose of this study was to answer the following research questions:

1. Are the change in level scores for students with low or no vision different from students with normal or corrected normal vision on the SC-ALT?
2. Are the change in level scores for students who use an AAC device different from students with the same expressive communication level who do not use an ACC device on the SC-ALT?
3. Do students with higher rated expressive communication levels demonstrate increases in level scores more frequently on the SC-ALT?
4. Do the cohorts of students, when grouped by grade level, demonstrate differences in level scores longitudinally when comparing year 1-2, years 2-3, and years 1-3?
5. In the 2014-15 through 2016-17 school years, are there similarities in distributions of the variable of primary disability within the samples of students whose level score increased, decreased, or stayed the same?

Sample

According to the South Carolina Alternate Assessment Technical Manual (2016) a total of 3,038 students from 80 school districts and 596 schools were tested with the

SC-Alt in spring 2016. The total number of tested students was 1,073 elementary, 1,575 middle school, and 390 high school.

Students in grades 4-8 who took the science assessment were examined. Students with three years of data were used (N=989). Students without three years of data were dropped from the sample.

Table 3.1
Student Primary Disability by grade band

	Elementary School		Middle School	
Primary Disability	N	%	N	%
Autism	299	27.87	432	27.43
Developmental Delay	50	4.66	2	0.13
Mild Intellectual Disability	290	27.03	480	30.48
Other Health Impairment	54	5.03	77	4.89
Severe Intellectual Disability	59	5.50	105	6.67
Moderate Intellectual Disability	231	21.53	388	24.63
Visual Impairment	13	1.21	5	0.32
9 Other*	77	7.18	86	5.54
TOTAL	1073	100.00	1575	100.00

* Other includes Deaf-Blindness, Emotional Disability, Deaf/Hard of Hearing, Learning Disability, Multiple Disabilities, Orthopedic Impairment, Speech/Language Impairment, and Traumatic Brain Injury.

The group included three cohorts: grades 4-6 (N=321), 5-7 (N=342), and 6-8 (N=326). For the SC-Alt students with the primary disabilities under the categories of intellectual disability (mild, moderate, and severe), and autism made up 81% to 90% of the students,

depending on the grade band, as demonstrated in Table 3.1. Three primary disabilities were prominent: autism (27%-28% of each cohort), mild mental disability (27%-31%), and moderate mental disability (21%-25%). Table 3.2 describes the demographic characteristics of the three distinct cohorts and the combined cohorts. Approximately a third of each cohort is female. The majority of each cohort consists of African American students (47%-49%) followed by white students (42%-44%).

Table 3.2
Demographic Characteristics of Three Student Cohorts Gender/Ethnicity

	Percent of Students			
Category	Cohort 4-5-6 (N = 321)	Cohort 5-6-7 (N = 342)	Cohort 6-7-8 (N = 326)	Combined Cohorts (N = 989)
Gender				
Female	36.45	32.46	31.29	33.37
Male	63.55	67.54	68.71	66.63
Race/Ethnicity				
Asian	0.62	1.17	1.53	1.11
Black or African-American	48.29	47.08	47.85	47.72
Hispanic or Latino	6.54	3.80	5.83	5.36
American Indian or Alaska Native	---	0.88	---	0.30
Two or More Races	2.49	3.51	2.15	2.73
White	42.06	43.57	42.64	42.77
Pacific Islander	---	---	---	---

Instrumentation:

SC-Alt

The South Carolina Alternate Assessment scores are the accountability tests used for state and federal reporting for students with significant cognitive disabilities in South Carolina. The SC-Alt is aligned to the South Carolina's Extended Content Standards. Scores for the SC-Alt are reported in two ways; a scale score and a level score. The level score is used for accountability and school report card for ESSA. This study used the level scores because these are the scores used for accountability. The overall performance level scores for the science alternate assessment for each of the three school years were reported as 1, 2, 3, or 4. Table 2.6 shows the performance level descriptors for each performance level.

The extended standards are linked explicitly to the South Carolina academic standards for grades 3–8 and high school. The SC-Alt standards are at a less complex or prerequisite level. The SC-Alt consists of a series of performance tasks. The test is stage adaptive, in order to do this the teacher completes a Student Placement Questionnaire (SPQ) to determine at what point in the test the student will begin. Item scoring is scaffolded for students to earn partial scores. Scaffolded means that if the student gets the answer incorrect, the incorrect answer option is removed and the question is re-administered, reducing the answer options. A student is awarded two points if they answer correctly on the first attempt and one point if they answer correct on the second attempt.

In the 2007 to 2016 school years, students in South Carolina were administered the science alternate assessments in grade bands. The tests were created so that fourth and

fifth grade students would take the elementary form of the test and sixth through eighth grade students would take middle school form of the test. The tests covered the all content from all the grades within the grade band (e.g. a student in the sixth grade would be tested on the same content in seventh grade and eighth grade). Greater detail on the SC-Alt can be found in Chapter 2.

The South Carolina alternate assessment uses a vertical scale that allows the measurement of student progress on the state content standards over time (South Carolina Alternate Assessment Technical Manual, 2016). The Science test was selected for two reasons. First, the science assessments are part of the federal testing mandate in ESSA. Second, both the math and ELA assessments changed during this time period because the standards changed. Therefore the math and ELA assessments would not correlate with previous year's performance and could not be compared year to year.

Table 3.3 shows difference of the level scores between two school years. The research questions are in the context of the differences shown in this table. South Carolina's accountability system rewards schools for their students who show gains in their overall performance level from year to year.

Learner Characteristics Inventory

The LCI (Kearns, Kleinert, Kleinert, and Towles-Reeves, 2006) was developed by the National Alternate Assessment Center (NAAC) in order to investigate learning characteristics of students participating in alternate assessment. The LCI was intended to verify validity questions to ensure that (a) the test is designed for the intended population; and (b) the intended population is participating in the test (Kearns, 2006). A discussion of the research specific to the LCI was provided in Chapter 2.

Table 3.3
Difference in Overall Performance Levels between School Years

Starting Performance Level	Finishing Performance Level	Difference in Performance Level (Finishing - minus Starting)	Description	Group
4	1	-3	Decrease by 3 performance levels	Decreased
3	1	-2	Decrease by 2 performance levels	
4	2	-2		
2	1	-1	Decrease by 1 performance level	
3	2	-1		
4	3	-1		
1	1	0	No change in performance levels	No Change
2	2	0		
3	3	0		
4	4	0		
1	2	1	Increase by 1 performance level	Increase
2	3	1		
3	4	1		
1	3	2	Increase by 2 performance levels	
2	4	2		
1	4	3	Increase by 3 performance levels	

The LCI is completed by the teacher with the most knowledge of the student and includes sixteen questions on a continuum of skills (Towles-Reeves et al. 2009). The LCI can be found in appendix A. For the purposes of this study a student's vision, AAC use, expressive communication, and primary disability were analyzed. Each item within each variable has a value that goes from low to high with high representing more complex abilities (Towles-Reeves et al. 2009). The LCI is not a measure of achievement but a measure of student characteristics and is being used to group students by characteristic to compare their achievement on the assessment. Vision, AAC use, and expressive communication are variables on an ordinal scale. Teachers receive state sponsored training on administering the LCI and the SC-Alt each year. Additionally district sponsored training is provided to address any district specific administration requirements.

In South Carolina the LCI was administered in the 2016-17 school year, which was the final year under investigation in this study. The teacher of record is the teacher who completed both the LCI concurrently with the SC-Alt science test. The LCI was filled out in the 2016-17 school year as part of the assessment for each student in the sample.

Procedures

The researcher obtained archival test data from the South Carolina Department of Education Office of Assessment and aggregated three years of test results. The results were matched by student and LCI results. Descriptive statistics were generated looking for significant relationships between categorical variables. Student ID and birthdays were then used to match students across forms and to ensure the integrity of the data. Students

without test results for all three years or without LCI results were dropped from the sample.

Students were divided into sub-groups and examined to determine whether there was a significant relationship between categorical variables. The sub-groups consisted of students who showed (a) increases in the level scores, (b) no change in level scores, and (c) decreases in level scores as seen in Table 3.3. Each group was examined using descriptive statistics and the relationship between categorical variables from the LCI for the areas of vision, AAC device use, expressive communication, and primary disability. The null hypothesis was that all variables are distributed equally at all levels. The cohort sample sizes are listed in Table 3.4.

Descriptive statistics including frequency counts and percentages, and when appropriate, cross-tabulations were examined. The statistical hypotheses testing used involved nonparametric tests that make no distributional assumptions regarding the data. The nonparametric tests included the Pearson Chi-Square tests in lieu of using parametric independent-samples t-tests or one-way ANOVA tests.

In order to investigate each question, the following was done:

Research Question 1

For vision levels teachers were instructed to select the description that best describes their student (see Table 2.3). For comparisons during the study two dichotomous sub-groups were created. Level A and B were grouped together as students with vision within normal limits (whether corrected or not) and Level C and D were grouped together as students with vision that affected daily living (i.e. low or no vision). The descriptors for vision on the LCI are listed in table 2.3. A chi square test of

independence was completed to analyze if there was a relationship between vision levels and the change in achievement scores. Distribution and frequency tables were created, including the change in level scores and the overall end performance level score.

Research Question 2

The LCI question on AAC is answered yes if the student uses AAC or no if the student does not use AAC. The question about AAC asks only "Does your student use an augmentative communication system in addition to or in place of oral speech?" It does not measure the student's proficiency with the AAC, the fidelity of the use in the classroom setting, or if the AAC is compatible with the assessment. A chi square test of independence was completed to analyze if there was a relationship between AAC use and the change in achievement scores. Distribution and frequency tables and overall end level score were created.

Research Question 3

In the LCI measure of expressive communication, teachers were instructed to select the description that best described their student. The options are found in Table 2.4. A chi square test of independence was used to analyze if there is a relationship between expressive communication ability levels and the change in achievement scores. Distribution and frequency tables and overall end level score are created.

Research Question 4

As described in Chapter 2 there was a change in forms that occurs from elementary school to middle school. The intent of question four was to examine if there was a change in score distributions as the students changed forms.

Table 3.4
Data Sources for Three Student Cohorts

Cohort	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Number of Students
4-5-6	2014-15 El Form	2015-16 El Form	2016-17 MS Form			321
5-6-7		2014-15 El Form	2015- MS Form	2016-17 MS Form		342
6-7-8			2014-15 MS Form	2015-16 MS Form	2016-17 MS Form	326

El=elementary MS=middle school

Table 3.5
Cohort Sample Size

	Number of Students			
Cohort	Total	Level Increased	Same Level	Level Decreased
Cohort 1 Ages 9, 10, 11 Grades 4-5-7	321	38	183	100
Cohort 2 Ages 10, 11, 12 Grades 5-6-7	342	36	210	96
Cohort 3 Ages 11, 12, 13 Grades 6-7-8	326	67	192	63
Total	989	141	585	259

Table 3.4 shows the data sources and the form for the three cohorts of students and shows when each cohort of students change forms. Table 3.5 shows the sample size in each cohort and the level changes. Distribution tables for each cohort were analyzed.

Research Question 5

Question five focuses on the most frequently reported primary disabilities from Table 3.1. The way students change (or do not change) over the three year period was examined by disability category. Distributions and frequency tables showing those changes were created.

CHAPTER 4

RESULTS

This chapter presents the analyses and results used to answer the research questions. Whenever applicable, descriptive statistics are provided and then followed by the statistical hypothesis testing. The descriptive statistics include frequency counts, percentages, and cross-tabulations. The statistical hypotheses testing involved the nonparametric Pearson Chi-Square tests, which make no distributional assumptions regarding the data.

The first part of this chapter provides descriptive statistics on the final sample of students included in the study. Preparing the statewide data files for the alternate assessments science from three school years (i.e., 2014-15, 2015-16, and 2016-17) produced three cohorts of students each having three years of SC-Alt assessment results (Table 4.1).

Results indicated that 37% to 40% of each cohort scored on level 4 all years and did not exhibit a change in performance levels. Table 4.2 shows the distribution of the difference in level scores regardless of the student's cohort. From 59% to 66% of the students in each cohort had no change in performance levels, 20% to 27% of students showed a decrease in performance levels, and 15% of students showed an increase in performance levels.

Table 4.1
Demographic Characteristics of Three Student Cohorts Variables

Category	Percentage of Students			
	Cohort 4-5-6	Cohort 5-6-7	Cohort 6-7-8	Combined Cohorts
LCI: Expressive Communication				
Level A	66.36	65.79	62.88	65.02
Level B	21.81	23.39	22.39	22.55
Level C	11.84	10.82	14.72	12.44
LCI: Vision				
Level A	74.77	74.56	76.38	74.23
Level B	19.31	19.88	16.56	18.60
Level C	2.80	2.63	4.29	3.24
Level D	3.12	2.92	2.76	2.93
Augmentive Communication System				
Uses AAC	22.74	19.88	19.02	20.53
Does not use AAC	77.26	80.12	80.98	79.47

Table 4.2
Distribution of Change in Performance Levels

Change in Performance Levels	Percentage of Students (N = 989)		
	Change from Year 1 to Year 3	Change from Year 1 to Year 2	Change from Year 2 to Year 3
Decrease	26.69	19.21	23.05
No Change	59.15	66.53	61.38
Increase	14.16	14.26	15.57

Research Question 1

Table 4.3 and 4.4 summarize the change in performance levels by vision status group (normal or corrected normal vision vs. low or no vision). A total 94% of the students in this group had normal or corrected normal vision. Results should be interpreted while taking this into consideration.

Approximately 25% of the students in each group decreased in performance levels and approximately 60% had no change in performance levels (Table 4.3). The majority of students decreased or had no change in performance levels. Less than15% of students in each group had an increase in performance levels.

The Chi-square test of independence did not show evidence at the α Type I error rate of 0.05 that the distribution of the change in performance levels differed by vision status, $\chi^2(2, N=989) = 0.2662$, $p = 0.8754$.

Table 4.3
Distribution of Change in Performance Levels by Vision

	Percentage of Students	
Change in Performance Levels	Normal or Corrected Vision (Levels A & B) (N = 928)	Low or No Vision (Levels C & D) (N = 61)
Decrease	26.83	24.59
No Change	58.94	62.30
Increase	14.22	13.11

Though there was no statistical evidence of a relationship between the change in levels and vision, when the group of students who did not change levels was examined (Table

4.4), students with low or no vision consistently performed at lower levels more often than students with normal or corrected normal vision.

Table 4.4
Distribution of No Change in Performance Levels by Vision

			Percentage of Students	
Year 1 Performance Level	Year 3 Performance Level	Change in Performance Levels	Normal or Corrected Vision (Levels A & B) (N = 928)	Low or No Vision (Levels C & D) (N = 61)
1	1	0	2.91	44.26
2	2	0	6.03	9.84
3	3	0	9.59	3.28
4	4	0	40.41	4.92

In the group of students with no change in performance levels, 44.26% of the students with low or no vision started at the lowest level (1) and remained at the lowest level (1) of achievement after three years. When compared to the percent of students with normal or corrected normal vision who start and end at the highest level (4) who make up 40.41% there is an inverse relationship in the overall end performance. Figure 4.1 demonstrates the relationship between the group of students who remained unchanged at level 1 and those who remained unchanged at level 4. The percentage of students with low or no vision at level 1 is notably similar to the students with normal or corrected normal at level 4.

Figure 4.2 shows that when the students who do not change levels is combined with the number of students with low or no vision that decreased over time, 68.85% of students with low or no vision stayed at the lowest level or decreased in level scores over

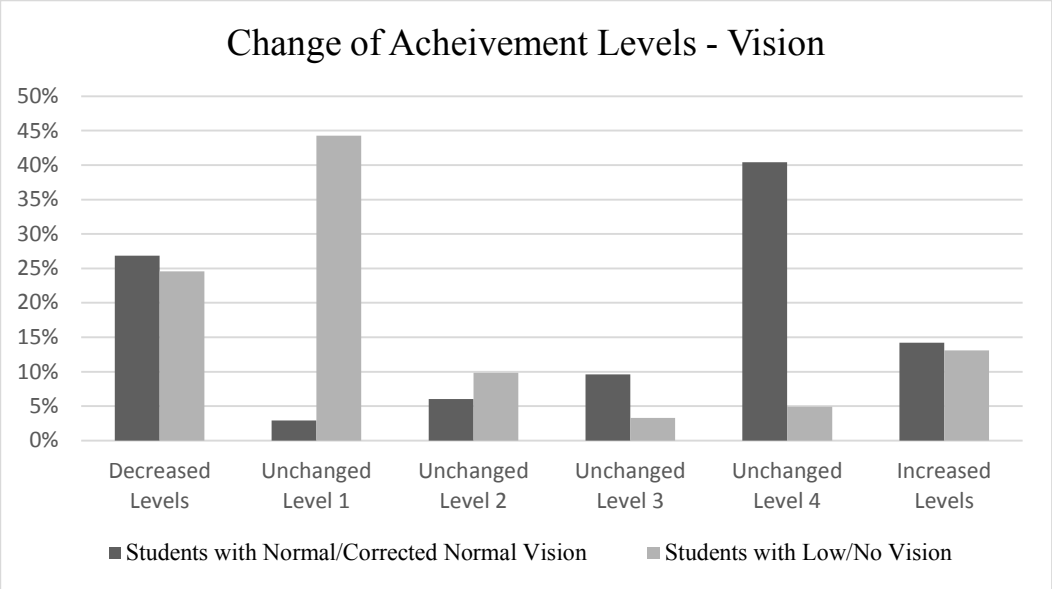

Figure 4.1 - Change of Achievement Levels - Vision

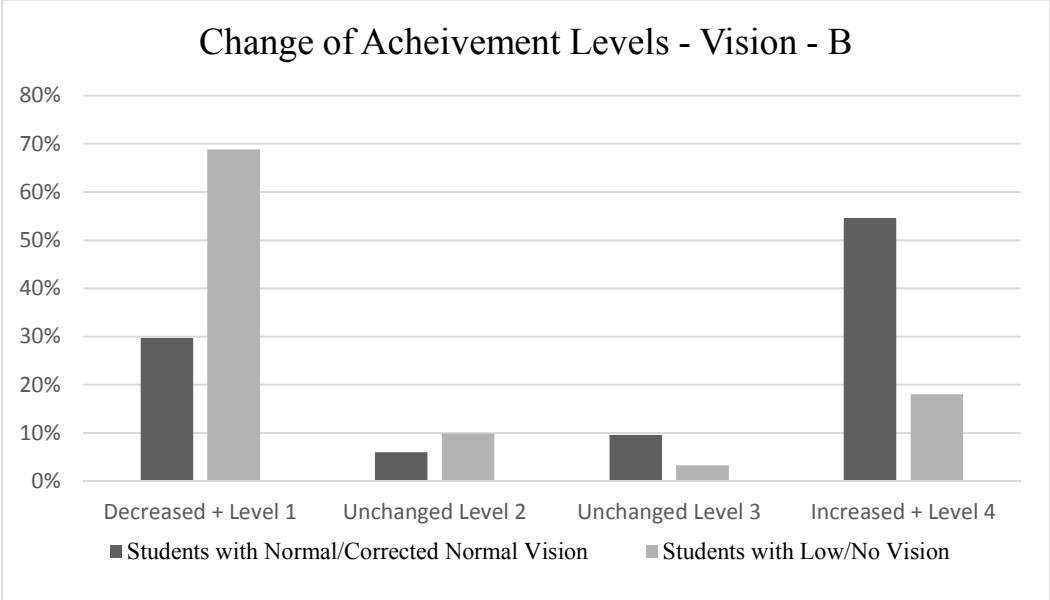

Figure 4.2 - Change of Achievement Levels – Vision – B

time. The figure compares this to students with normal or corrected normal vision who decreased (26.83%) or stayed at the lowest level of achievement (2.91%). For students with normal or corrected normal vision, only 29.76% were are the lowest level or decreased over time. Students with low or no vision who decreased or stayed at the

lowest level was more than double that of students with normal vision (68.85% vs. 29.76%).

Research Question 2

Table 4.5 and 4.6 summarize the change in performance levels based on use or non-use of AAC devices. In South Carolina approximately 20% of the students used an AAC device. No information on the students' proficiency with AAC, the fidelity of the use of AAC device in the classroom setting, or if the AAC device was compatible with the assessment was available. At least 25% of the students in each group decreased in performance levels and approximately 40% to 50% had no change in performance levels (Table 4.5). Approximately 25% of the students who used AAC devices had an increase in performance levels, while 10% had an increase when they did not use AAC devices.

The Chi-square test of independence showed evidence at the α Type I error rate of 0.05 that the change in performance levels differed by use of ACC $\chi^2(2, N=989) = 18.2398$, $p = 0.0001$. In particular, more students did not change in performance levels if they did not use AAC and fewer students increased in performance levels if they did not use ACC. The results of the chi square showed the variables of AAC use and *change* in level performance were not independent, the null hypothesis was rejected.

The results of the chi square do not determine the nature of the relationship, only that there is one. Table 4.6 suggests that students who use AAC devices may have a greater opportunity of increasing their performance than students who do not use AAC devices. Only 16.9% of students who did not use AAC had the opportunity to increase their scores but did not. Compared to 36.45% of students who use AAC had the opportunity to increase their scores but did not. Percentages of students who use AAC

devices and increased their score was nearly double that of the students who do not use AAC.

Table 4.5
Distribution of Change in Performance Levels by AAC Device Status

Change in Performance Levels	Percentage of Students	
	Uses ACC (Level A) (N = 203)	Does Not Use ACC (Level B) (N =786)
Decrease	30.05	25.83
No Change	47.78	62.09
Increase	22.17	12.09

Table 4.6
Distribution of No Change in Performance Levels by AAC Device Status

Year 1 Performance Level	Year 3 Performance Level	Change in Performance Levels	Percentage of Students	
			Uses ACC (Level A) (N = 203)	Does Not Use ACC (Level B) (N =786)
1	1	0	13.79	3.31
2	2	0	11.33	4.96
3	3	0	11.33	8.65
4	4	0	11.33	45.17

When the overall performance is examined (Table 4.7), students who used AAC performed at lower levels more often than students who did not use AAC. This shows that students who use AAC have greater opportunity to increase their level score than

students who do not use AAC. Examining ending performance 78.82% of students who used AAC scored in the levels 1, 2, or 3 versus 47.71% who did not use AAC. There were more students that had the opportunity to improve their score who did not use AAC.

Table 4.7
Distribution of Ending Performance Levels by AAC Device Status

	Percentage of Students	
Year 3 Performance Ending Level	Uses ACC (N = 203)	Does Not Use ACC (N =786)
1	21.18	7.76
2	35.47	17.94
3	22.17	22.01
4	21.18	52.29

Students who did not change levels and stayed in the 3-4 categories is double for students who do not use AAC. Students who did not change and stayed in 1-2 categories was double for students who use AAC (Figure 4.3). Even though the chi square results showed that students who use AAC is related to increased scores over time, Figure 4.3 suggests that may be because students who use AAC devices are also finishing in the lowest levels after that three year period and have more opportunity to demonstrate growth on this specific assessment. Since students who use AAC score in the lower levels more often, they have more opportunity to show growth over time as there are more students who do not use AAC. However it does show that slowly, over time, students with significant cognitive disabilities who use AAC are able to increase their academic achievement from the lowest levels and show improvement.

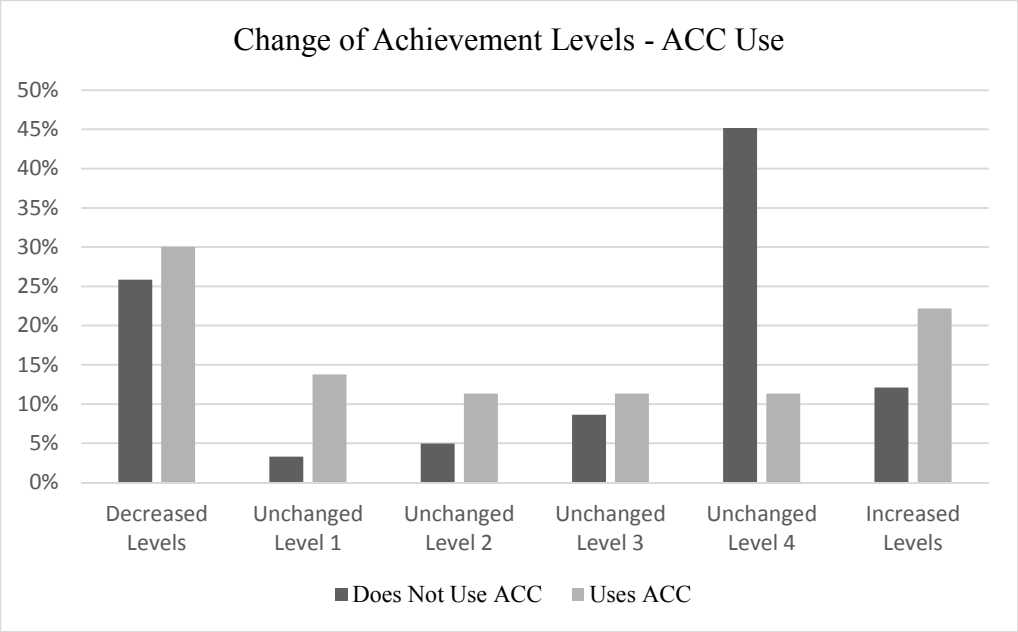

Figure 4.3 - Change of Achievement Levels – AAC Use

Research Question 3

The Chi-square test of independence showed evidence at the α Type I error rate of 0.05 that the change in performance levels differed by expressive communication ability $\chi^2(2, N=989) = 47.2294$, $p < 0.0001$. Specifically, more students with lower expressive communication ability decreased in performance levels more often than those at higher levels. Table 4.8 and 4.9 summarize the change in performance levels based on expressive communication ability.

Approximately 66% of the students had higher expressive communication ability (Table 4.8). Approximately 20% of the students with higher communication ability had a decrease in performance levels, while 36% of the lower ability group also had a decrease. Approximately 67% of the higher ability group had the same performance level, while approximately 45% of the lower ability group had the same performance level. When

comparing students who stayed at the same performance level over 55% of the students in the higher communication ability group started at the highest level and

Table 4.8
Distribution of Change in Performance Levels by Expressive Communication

Change in Performance Levels	Percentage of Students	
	Higher Expressive Communication Ability (Level A) (N = 643)	Lower Expressive Communication Ability (Levels B & C) (N = 346)
Decrease	21.62	36.13
No Change	67.03	44.51
Increase	11.35	19.36

Table 4.9
Distribution of No Change in Performance Levels by Expressive Communication

Year 1 Performance Level	Year 3 Performance Level	Change in Performance Levels	Percentage of Students	
			Higher Expressive Communication Ability (Level A) (N = 643)	Lower Expressive Communication Ability (Levels B & C) (N = 346)
1	1	0	0.31	15.03
2	2	0	1.87	14.45
3	3	0	9.64	8.38
4	4	0	55.21	6.65

remained at the highest (4) level, less than 7% in the lower communication ability group started and remained in at the highest (4) level (Table 4.9).

The results show that the change in performance level differed by expressive communication levels, in particular students with lower communication levels decreased in performance more often. Further when examining only the students whose score did not change in Table 4.9; students at level A, or symbolic communication make up 55.21% of the students begin at the highest level (4) and stay there. Students at level B & C, often begin at the lower levels (1 & 2) of achievement and stay there.

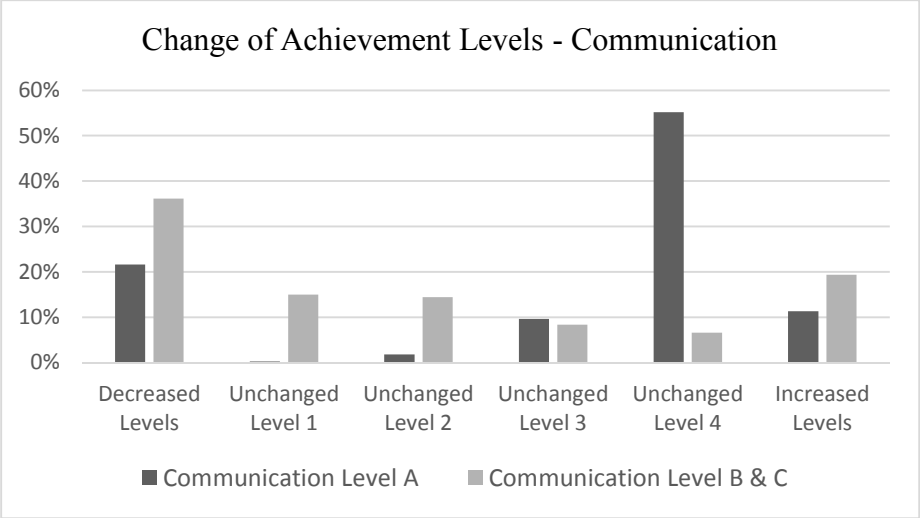

Figure 4.4 - Change of Achievement Levels – Communication

As seen in Figure 4.4, students at level A who were at the highest level (55.21%) or who increase over time (11.35%) totals 66.52%, students at the highest level of communication were increasing or staying at the highest level of achievement. Students who communicate at levels B & C, were decreasing (36.13%) or staying unchanged at the lowest level (15.03%), was a total of 51.16% of students with the low levels of communication were decreasing in performance or were staying at the lowest level of performance.

If you combine the percentage of students with lower levels of communication ability who are at levels 1 (15.03%) and level 2 (14.45%) there are a total of 29.48% of students with the lowest communication levels staying stagnant the in the lowest two levels of achievement compared to just 2.18% for students with the highest communication abilities staying the same at levels one and two. This appears to imply a relationship between communication and demonstrating growth on AA-AAAS (Figure 4.5).

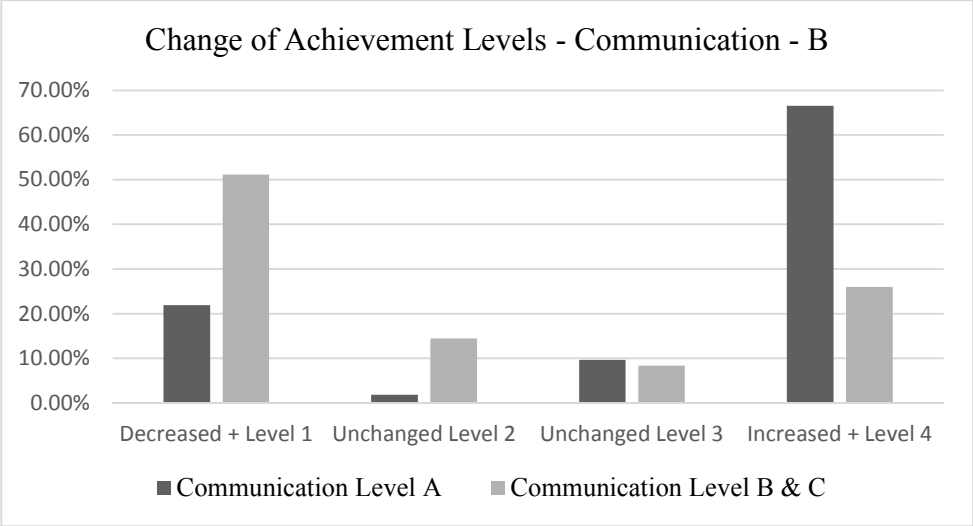

Figure 4.5 - Change of Achievement Levels – Communication - B

Research Question 4

Tables 4.10 summarizes the changes in performance levels for each of the three cohorts. In all cases, the majority of students had no change in their performance levels. The percentage of students who had an increase varied from 9% to 33%. The percentage of students who had a decrease varied from 7% to 24%. As seen Table 4.10, in the grade six column (the form year change from elementary to middle school) the distributions were similar, and the grade seven column the distributions are similar. The change in form did not appear to have an impact on overall change in level scores.

Table 4.10
Data Sources for Three Student Cohorts with Distribution of Performance Levels

Cohort	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Number of Students
4-5-6	2014-15 El Form	2015-16 El Form	2016-17 MS Form			321
		Y1-2	Y 2-3			
	Decrease	9.35	33.02			
	No Change	71.96	59.81			
	Increase	18.69	7.17			
5-6-7		2014-15 El Form	2015-MS Form	2016-17 MS Form		342
			Y1-2	Y 2-3		
		Decrease	33.33	16.08		
		No Change	59.94	60.23		
		Increase	6.73	23.68		
6-7-8			2014-15 MS Form	2015-16 MS Form	2016-17 MS Form	326
				Y1-2	Y2-3	
			Decrease	14.11	20.55	
			No Change	68.10	64.11	
			Increase	17.79	15.34	

In the 4-5-6 cohort, the change from year 2 to year 3 showed the change of form, 5-6-7 cohort years 1 to year 2 showed the change of form, and cohort 6-7-8 had no change of form. When comparing all three cohorts year 1-3 changes cohorts changes were similar across the percentages of students who decrease, do not change, or increase scores. Cohort 6-7-8 had the highest percentage of students who show an increase from year 1-3 and smallest percentage of students who show a decrease. Cohort 4-5-6 shows an increase in students who decreased their scores from the year they change the form to the following year. The evidence appears to support the idea that the forms were developed in a valid and reliable manner and matched across forms.

Research Question 5

Tables 4.11 through 4.14 summarize the distributions of the variables per cohort based on their three-year change in performance levels.

Table 4.11
Distribution of End Performance Levels by Primary Disability

	Percentage of Students		
Ending Performance Levels	Autism	Mild Mental Disability	Moderate Mental Disability
1	7.94	----	7.32
2	27.81	6.05	32.52
3	25.50	17.75	28.46
4	38.74	76.21	31.71

As seen in Table 4.11, examining the overall end performance by primary disability, students with autism and students with moderate mental disabilities had similar

distributions. Students with mild mental disabilities scored at the highest level of ability at nearly double the rate of the other two disability categories.

Table 4.12
Distribution of Change in Performance for Students with Autism

Change in Performance Levels	Percentage of Students (N = 302)		
	Change from Year 1 to Year 3	Change from Year 1 to Year 2	Change from Year 2 to Year 3
-3	0.66	0.33	0.99
-2	6.95	3.97	5.30
-1	25.50	22.85	18.54
0	50.33	57.95	55.30
1	14.24	12.25	16.23
2	1.66	2.32	2.98
3	0.66	0.33	0.66

When examining the types of changes in Table 4.11, over half of students with Autism had no change in their level scores over three years. This occurred even though sixty percent scored below the highest category and had the opportunity to demonstrate growth, as seen in Table 4.12. Over the three year period 25.50% of students with Autism decreased a level. There were a few outliers of students who had dramatic increases or decreases of three levels. This group of students showed the least amount of predictability from start to end with testing behavior and academic achievement, however not enough of a difference to be statistically significant.

As seen in Table 4.13, over three quarters of students with Mild Mental Disability scored in the highest level and three quarters experience no change. There were no

Table 4.13
Distribution of Change in Performance for Students with Mild Intellectual Disability

Change in Performance Levels	Percentage of Students (N = 248)		
	Change from Year 1 to Year 3	Change from Year 1 to Year 2	Change from Year 2 to Year 3
-3	---	---	---
-2	1.21	2.02	2.02
-1	14.92	6.05	14.52
0	77.42	83.87	75.81
1	5.65	6.45	6.45
2	0.81	1.61	1.21
3	---	---	---

students in this group that experienced dramatic or outlier performance of increases or decreases of three levels, and very few with changes of two levels. This is suggestive of consistent testing behavior and academic achievement. There appears to be a ceiling effect for this group of students.

Table 4.14 shows the distribution of change in performance for students with Moderate Intellectual Disabilities. In order to be have a Moderate Intellectual Disability this group has an IQ well below the range to qualify for eligibility to take alternate assessment. This group of student distributions is remarkably similar to the students with Autism distributions, with the noted exception of the outlier students with three increase or decreases in performance. This group of students' performance was predictable from year to year with consistent testing behavior and academic achievement.

Table 4.14
Distribution of Change in Performance for Students with Moderate Intellectual Disability

Change in Performance Levels	Percentage of Students (N = 246)		
	Change from Year 1 to Year 3	Change from Year 1 to Year 2	Change from Year 2 to Year 3
-3	---	---	---
-2	5.69	2.85	5.69
-1	29.67	17.89	25.20
0	45.53	60.98	51.22
1	19.11	17.48	16.67
2	---	0.81	1.22
3	---	---	---

CHAPTER 5

DISCUSSION

This study examined the Person Dimension of validity by expanding on previous work (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006, Kopriva, Thurlow, Perie, & Lazarus, 2016; Thurlow, Wu, Quenemon, Towels, 2016; and Towles-Reeves, Kearns, Kleinert, & Kleinert, 2009) using data from the Learning Characteristics Inventory, which includes data on different aspects of students' disabilities, and comparing those characteristics to level scores on state standardized alternate assessments. The following research questions were posed:

1. Are the change in level scores for students with low or no vision different from students with normal or corrected normal vision on the SC-ALT?
2. Are the change in level scores for students who use an AAC device different from students with the same expressive communication level who do not use an ACC device on the SC-ALT?
3. Do students with higher rated expressive communication levels demonstrate increases in level scores more frequently on the SC-ALT?
4. Do the cohorts of students, when grouped by grade level, demonstrate differences in level scores longitudinally when comparing year 1-2, years 2-3, and years 1-3?
5. In the 2014-15 through 2016-17 school years, are there similarities in distributions of the variable of primary disability within the samples of students whose level score increased, decreased, or stayed the same?

The conclusions are relevant to the test administration process and to future policy and development of alternate assessments. Given the small size of the group of students allowed to take AA-AAAS there is a shortage of research about this population of students as it relates specifically to standardized testing. This study provides additional evidence and adds to the body of knowledge on the topic of alternate assessment.

Summary of Research and Discussion of Findings

Overall there was little change in achievement levels over time for students who take the SC-Alt. Research shows that students with significant cognitive disabilities can and do grow academically, however these it is not demonstrated overwhelmingly on this AA-AAAS. The findings were predominately confirmatory of the literature in regards to specific student characteristics. When disaggregating groups by the student's vision level, AAC use, or expressive communication levels there is a divide between those who score at the highest levels of achievement (4) and those at the lowest level (1) with few students in between.

Vision

The literature reports delays in access to standards for students with vision impairments. Most knowledge is received and processed through the sense of sight (Huebner et al., 2004). Since most teachers have little experience with making materials and curriculum accessible for students with low or no vision, students often experience delayed access to instruction which leads to a delay demonstrating knowledge and skills (Thurlow, Wu, Quenemoen, & Towles, 2016). The data here showed students with vision impairments were starting and ending at the lowest level of achievement more frequently than students without vision impairments. Almost 44% of the students with low or no vision started and finished at the lowest level (1) of achievement after three years of

instruction and assessment. Almost half of the students with vision impairments did not show a change in level scores over a three year period. Which could be perceived as a possible delay in access to the standards related to their vision impairment.

This research was not designed to determine the reason for the lack of growth. However there are some potential factors that could cause the scores to remain the same which include (1) the accommodations on the test, (2) the instructional methods and vision support during regular instruction, or (3) the confluence of disabilities for this group of students. Vision cannot be isolated as the sole characteristic impacting a student taking AA-AAAS. The literature focused primarily on students whose sole disability was a vision impairment. The students in this sample have multiple disabilities, a minimum of a cognitive impairment and a vision impairment. The combination of disability characteristics could be influencing student outcomes.

Augmentive and Alternate Communication

The literature on AAC showed multiple theories of language acquisition (Calculator, 2009). Rowland and Schweigert (2003) demonstrated a correlation between cognition and language, but not a causal relationship. This study found that approximately 25% of the students who used AAC devices had an increase in performance levels compared to only a 10% for students who did not use AAC devices. These findings should not be interpreted to mean that the AAC device caused students to increase achievement levels. Calculator (1997) proposed an inverse relationship arguing that AAC can enhance a student's cognitive skills, these findings did not specifically support this. The chi square results did show fewer students increased in performance levels if they did not use ACC but once again these results do not determine that AAC

increased the scores (or cognition) of the student. When examining the results of the students who use AAC in the lowest achievement levels it appears that they may benefit from a focus on communication versus grade level aligned academics.

Any conclusions are complicated by the ceiling effect for students not using AAC, combined with the number of students who use AAC that started in lower levels, where they could show growth. The idea that AAC helps students increase their cognition should not be determined using these data. The data does provide evidence of need for further investigation with measurement instruments that do not have the same ceiling effect as the SC-Alt. The data from the LCI does not define the student's level of proficiency with their AAC, so this study can draw no conclusions regarding how AAC affects the achievement only that more students who use an AAC device were able to demonstrate growth when compared to students who do not use AAC.

Goldstein and Behuniak (2011) found that students with low scores on alternate assessment were more likely to use AAC during instruction. In this study, when looking at the changes over time, students who used AAC and whose scores stayed the same or scored at the lowest level (1) on alternate assessment happened at a rate of approximately 14%, compared to under 4% for students who do not use AAC. When considering only the achievement results at the end of the three years instead of growth over time, students who use AAC and finish in the lowest level (1) is 21.18% compared to 7.76% of student who do not use AAC. This appears to support Goldstein and Behuniak's 2011 findings that students who use AAC during instruction also score lower on AA-AAAS.

Expressive Communication

The results showed that a greater percentage of students with lower expressive communication ability decreased in performance levels, 36%, more often than those at higher levels, approximately 20%. Students who communicate at levels B & C are decreasing or staying unchanged at the lowest level at a rate of 51%. The results appear to demonstrate that communication is a factor when it comes to achievement. Measuring academic achievement of students who have not yet found a way to communicate basic needs may be an inefficient way to determine growth or success. Should the test be assessing the achievement of students who are lacking the basic tools to communicate wants and needs? SBR was intended to create high expectations and drive instruction (South Carolina Department of Education, 2012), is standards aligned instruction in the student's best interest? Would it benefit the student, who struggles to communicate, more if the academic focus was communication? Once higher levels of communication are obtained than academic assessment and accurate measurement of achievement could begin. This however would create the same delay in instruction as described in the literature for students with vision impairments.

For students with a high level of communication (A) there is very little change over time or movement between achievement levels as 55% of these students start and finish at the highest level. The students at the highest levels may benefit from greater access to the general curriculum. The questions become (a) do some of students taking the alternate assessment need to take the regular education assessment? Or (b) Do states need to make a more challenging alternate assessment? If the student no longer takes the alternate assessment, does this lead to greater access to the curriculum? Or if the alternate

assessment becomes more challenging, does the test become inappropriately difficult for other students?

Primary Disability

For students with the mild mental disability group, table 4.15 showed a ceiling effect for these students with 76.21% of this group ending at level 4. This is the same group, who according to table 2.5, have an IQ range of 48-70±. The current eligibility criteria has the full scale IQ criteria to take AA-AAAS as 63. Though South Carolina is under the 1% federally mandated cap it may be worth examining the criteria and determining if the IQ requirements should be lowered. That has the potential to move students from taking AA-AAAS to the regular assessment, but does that lead to greater access to the curriculum. Examining SBR theory of action, moving that group of students off the alternate assessment should allow them greater access to the standards.

Significance of the Study

SBR emphasizes educational outcomes and systems that align standards, assessment, and accountability raise student performance. SBR and FAPE collectively attempt to ensure students have the greatest access possible to the general curriculum given their abilities (Elliot, 2009). The changes in IDEA in the reauthorization of 1997 were meant to ensure that the general curriculum is the preferred program for all students with disabilities, including those with significant cognitive disabilities. The premise of SBR is that by setting high standards teachers will change their teaching to meet the standards.

The purpose of the state's alternate assessment is to evaluate performance of students with significant cognitive disabilities in order to improve instruction by promoting appropriately high expectations and include all students in the state

accountability system (South Carolina Department of Education, 2012). The theory of action behind including students with disabilities is that: participation of students with disabilities in statewide assessment ensures that schools are held accountable for learning, which will raise expectations for students with disabilities (Hamilton et al. 2008; Forte, Qunemon & Thurlow, 2016). Higher expectations for students with disabilities leads to more significant participation, increased individualized accommodations, and better instruction, which in turn leads to improved student performance (Ysseldyke et al., 2004; Yell et al., 2005; Forte et al., 2016).

When SBR began large portions of students with cognitive disabilities were not being challenged and simply passing time in school with low expectations. We now have a greater understanding of the population. Would a change for the most significantly disabled students be harmful? Can we change the focus but still keep high expectations? Findings in this study demonstrate a bimodal effect even within the students with significant cognitive disabilities population. If we were to examine both extremes of the sample, there was a group of students needing more of a challenge and a group of students at the lower end of achievement, possibly with different needs.

Students in need of a greater challenge

Sixty percent of the students taking the test started and finished at the highest level. The ceiling effect for students with Mild Mental Disabilities generates multiple considerations. It is important to examine the extent to which cognitive theories of learning and knowing might be applied to students with significant cognitive disabilities (Marion & Pellegrino, 2006). It is possible that these students can attain levels of knowledge and understanding that are consistent with grade level expectations. Students

could and should be assessed on grade level content and to not do so is a disservice to them (Marion & Pellegrino, 2006). Part of the concern is that students with significant cognitive disabilities have seldom been given the access the type of instruction that is consistent with grade level expectations. One of the benefits of having AA-AAAs aligned to regular education standards is that it provides access to instruction and assessment that have been part of typical expectations for students with significant cognitive disabilities (Marion & Pellegrino, 2006).

If such a large portion of students are performing at the highest level it has to be determined if the test is difficult enough. Do the expectations of AA-AAAS need to be raised? Once the issue of "is the test is hard enough" has been investigated and resolved, there is another consideration for this group of students: Should the eligibility criteria be examined? This is an especially salient issue given the 1% mandated cap on students who many take the alternate assessment. South Carolina is under the 1% and the data shows a ceiling effect for a huge portion of students. What would this look like for states that are assessing up to 2% of students? If the assessment is the reason for high expectations, does that mean that states that assess more than 1% do not have high expectations for students? Or should these students be taking an AA-AAAS at all?

Students with the most significant cognitive disabilities

The group of students at the lowest end of achievement may benefit from a different focus. Is this a safe conclusion? SBR states that the assessment is the means by which high expectations are created. Without the assessment access to the standards are limited. The suggestion of a different focus is not a proposal of less access to the standards, but a more focused attention on the student's needs. There are students who

communicate at a level C (on the LCI) who communicate through cries or facial expression. Would a focus on communication benefit the student more than a focus on grade level aligned standards? More information is needed to determine how students with the most significant cognitive disabilities demonstrate learning of complex content. How can the field ensure that the expectations remain high in order to offset the tendency in the field to reduce the expectations for these same students (Lazarus, Thurlow, Ysseldyke, & Edwards, 2015) but still give a test with meaningful results? How can the field have the same interpretations of test results for students with the most significant cognitive disabilities?

The interactions of the characteristics of students' disabilities, especially in the case of expressive communication, are problematic on many levels. The focus should first be on understanding if portions of the assessment are construct irrelevant. The difference between (1) a student knowing the content but not being able to communicate the answer or (2) simply not knowing the answer are subtle and open to subjective teacher observation. Without evidence of instruction on the standards and external validation of what the students knows and can do, changes to the design of the assessment, or other types of accommodations are premature. Identifying student characteristics using the LCI, outlining needs and strengths, understanding which parts are effecting testing, and how the characteristics interact with the testing process is necessary.

Significance of the Person Dimension

The interaction of the Person Dimension with the other aspects of validity should be an essential component of validating score meaning for students (Kopriva, et al.,

2016). Particularly for students with significant cognitive disabilities the Person Dimension becomes critical when evaluating assessment. In this study there was a potential bias toward students with symbolic language. The challenge becomes, how much weight do you apply to the Person Dimension? A peer reviewed and validated assessment is a federally mandated requirement for the 1% population. Given the needs and convergent multiple disabilities, can an assessment be applied to the entire group? Can flags generated when examining the Person Dimension mean that the assessment is valid for one student but not another? How does that business rule look when applied to AA-AAAS?

Kopriva et al. (2016) suggest that an assessment that does not show achievement should be a catalyst for assessment change. This research clearly demonstrates a ceiling effect for a large percentage of the students taking the test and that should be a catalyst for change. Two types of change, it could mean the test needs to be more difficult, but it could also mean the eligibility criteria needs to be changed. The solution to the first part will affect the solution to the second part. The test would need to be examined from the perspective of the student who is at the pre-requisite levels of academics and the test many not need to be changed in regards to difficulty of the content but instead viewed from the perspective of access and accommodations to the test. The one size fits all approach of standardized assessment does not fit a group with such divergent needs and abilities. However the cost of two assessments may far exceed the benefit. The benefit of a change (results that give a better picture of what the student knows) has the potential to be lost if the change decreases expectations for the students with the most significant cognitive disabilities.

The literature review demonstrated there is significant variation in the aptitude and abilities of students who take the alternate test, and the bimodal results of the SC-Alt support the literature. This spectrum of abilities make the assessment less reliable and difficult to measure actual academic achievement (Karvonen & Huynh, 2007). Studies using LCI data showed that higher academic abilities were strongly correlated with higher levels of expressive communication (Towles-Reeves et al., 2009). Browder et al., (2008) found that students with symbolic communication have more access to the general curriculum than students with lower communication levels. Kleinert et al. (2015) found a statistically significant positive correlation between expressive communication and increasingly inclusive instruction with non-disabled peers. It can then be inferred that greater access to general curriculum (i.e. in a class with non-disabled peers) would in turn lead to better performance on the AA-AAAS as instruction with non-disabled peers is directly aligned to the general curriculum. The results of this study demonstrated that students with symbolic communication performed consistently at the highest level of academic achievement, which is supportive of previous research. To take it a step further, Goldstein and Behuniak (2012) found students who take AA-AAAS who had higher rated communication skills were able to engage more with academic content. Taken together these studies showed higher levels of communication was related to greater academic achievement.

Though the results indicate a potential bias toward students with symbolic communication skills on the SC-Alt, the risk of using the Person Dimension is that, with the current information there is no way to know for certain if there is a bias in the test or

if students with symbolic communication have a greater likelihood of academic achievement.

Recommendations for Further Research

Prior to changing the assessment for students with the greatest challenges investigation into their instruction is important. Research is necessary to analyze if proposed outcomes of SBR are happening, specifically has instruction changed? Evidence may include a match between district or school level curriculum and material, classroom instructional practices, classroom assessments, and professional development offerings to teachers (Goldstein & Behuniak, 2012b). Has assessment increased students' access to grade-level academic content?

There are many variables to consider when discussing the lack of growth for students with the most significant cognitive disabilities. More research is needed to know if the lack of growth for students at the lowest achievement levels is related to the type of services and academic instruction the student is receiving. If SBR theory is followed the next step is that the assessment changes instruction. The guiding document for services and instruction is the student's IEP. The IEP does not include every aspect of instruction but it does guide the priorities of the teacher. An examination of IEPs and services are essential to see if students are receiving instruction on grade level aligned standards.

For students with vision impairments, vision services can be difficult to find, or difficult to implement. Vision teachers provide advice and expertise to the other teachers working with the student. A student with low or no vision can only experience what is within arm's reach, can be safely touched, and what can be heard (Huebner et al., 2004). What do those services look like? Are they framed in a way that the teacher can use them to increase access to instruction? What is the focus of the teacher and the services of

visually impaired students with significant cognitive disabilities? Since this group of students does not have a single disability related need, does vision take a back seat to other needs? If a student has a vision impairment and low communication abilities, what does their communication look like? How do teachers support them?

Speech-language services are essential as students develop language and learn to use AAC so their language skills can grow (Kearns et al., 2015; ASHA Communication Bill of Rights, 2016). Speech-language services are essential as these students develop language (Kearns et al., 2015; ASHA Communication Bill of Rights, 2016). How are students with communication difficulties supported and instructed? IEP teams do not always select appropriate language supports (Rowland, 2011). Are students receiving the appropriate services to grow their language to express the content they do understand? Is the acquisition of language a priority among IEP teams? Further research is needed.

Communication can grow only as fast as the student adapts, students with significant cognitive disabilities must learn the content but also the language to discuss the content. Further research is needed to see how student's communication and changes (or lack of changes) to AAC devices are related to academic achievement. Of the students who grew over time what was the speech language services they were receiving, what do progress reports show as progress toward goal achievement and how did their AAC change with them?

This research concluded that students with higher communication levels scored higher on the SC-Alt science test. These results seem to agree with research. Without taking into account a student's level of communication AA-AAAS may be biased towards students who are able to use abstract symbols (Browder et al., 2008). It is

possible that the test is biased toward students with high communication abilities. In regards to testing, this has the potential to be a threat to construct evidence (Ferrara, 2009; Marion & Perie, 2009). It is possible that the test question requires a level of communication complexity that the student does not have. Test development and cognitive labs using different modes of communication that test the same materials could help to determine if the problem lies in the construction of the test questions themselves. Further research would be necessary to determine if that is the case.

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APPENDIX A

LCI

Learner Characteristics Inventory for Alternate Assessments Based on Alternate Achievement Standards

Questions:

1. Student's grade: _____

2. Student's age in years: _____

3. Is your student's primary language a language other than English?
   - Yes
   - No

4. If yes, what is your student's primary language (the dominant language spoken in the student's home)? _____

5. What is the student's primary classroom setting?
   - Special school
   - Primarily self-contained, some special inclusive (students go to art, music, PE but return to their special education class for most of school day).
   - Primarily self-contained, some academic inclusive (students go to some general education academic classes (reading, math, science) but return to special education 80% or more of school day).
   - Primarily resource room (students come for services and then go back to their general education classrooms for at least 50% of the school day)
   - Primarily inclusive/collaborative (students based in general education classes, special education services are primarily delivered in the general education classes (at least 80% of the school day in general education classes).

6. Expressive Communication (check the best description)
   - Uses symbolic language to communicate: Student uses verbal or written words, signs, Braille, or language-based augmentative systems to request, initiate, and respond to questions, describe things or events, and express refusal.
   - Uses intentional communication, but not at a symbolic language level: Student uses understandable communication through such modes as gestures, pictures, objects/textures, points, etc., to clearly express a variety of intentions.

- Student communicates primarily through cries, facial expressions, change in muscle tone, etc., but no clear use of objects/textures, regularized gestures, pictures, signs, etc., to communicate.

7. Does your student use an augmentative communication system in addition to or in place of oral speech?
   - Yes
   - No

8. Receptive Language (check the best description)
   - Independently follows 1-2 step directions presented through words (e.g. word may be spoken, signed, printed, or any combination) and does NOT need additional cues.
   - Requires additional cues (e.g., gestures, pictures, objects, or demonstrations/models) to follow 1-2 step directions.
   - Alerts to sensory input from another person (auditory, visual, touch, movement) BUT requires actual physical assistance to follow simple directions.
   - Uncertain response to sensory stimuli (e.g., sound/voice; sight/gesture; touch; movement; smell).

9. Vision (check the best description)
   - Vision within normal limits.
   - Corrected vision within normal limits.
   - Low vision; uses vision for some activities of daily living.
   - No functional use of vision for activities of daily living, or unable to determine functional use of vision.

10. Hearing (check the best description)
   - Hearing within normal limits.
   - Corrected hearing loss within normal limits.
   - Hearing loss aided, but still with a significant loss.
   - Profound loss, even with aids.
   - Unable to determine functional use of hearing.

11. Motor (check the best description)
   - No significant motor dysfunction that requires adaptations.
   - Requires adaptations to support motor functioning (e.g., walker, adapted utensils, and/or keyboard).
   - Uses wheelchair, positioning equipment, and/or assistive devices for most activities.
   - Needs personal assistance for most/all motor activities.

12. Engagement (check the best description)
   - Initiates and sustains social interactions.
   - Responds with social interaction, but does not initiate or sustain social interactions.

- Alerts to others.
- Does not alert to others.

13. Health Issues/Attendance (check the best description)
    - Attends at least 90% of school days.
    - Attends approximately 75% of school days; absences primarily due to health issues.
    - Attends approximately 50% or less of school days; absences primarily due to health issues.
    - Receives Homebound Instruction due to health issues.
    - Highly irregular attendance or homebound instruction due to issues other than health.

14. Reading (check the best description)
    - Reads fluently with critical understanding in print or Braille (e.g., to differentiate fact/opinion, point of view, emotional response, etc.).
    - Reads fluently with basic (literal) understanding from paragraphs/short passages with narrative/informational texts in print or Braille.
    - Reads basic sight words, simple sentences, directions, bullets, and/or lists in print or Braille.
    - Aware of text/Braille, follows directionality, makes letter distinctions, or tells a story from the pictures that are not linked to the text.
    - No observable awareness of print or Braille.

15. Mathematics (check the best description)
    - Applies computational procedures to solve real-life or routine word problems from a variety of contexts.
    - Does computational procedures with or without a calculator.
    - Counts with 1:1 correspondence to at least 10, and/or makes numbered sets of items.
    - Counts by rote to 5.
    - No observable awareness or use of numbers.

16. Writing (check the best description)
    - Conveys thoughts in complete sentences using correct spelling, grammar, and writing mechanics.
    - Writes words or sentences from a model or uses word cards or sentence strips to compose a complete sentence.
    - Uses pictorial representations to convey thoughts; writes alphabet letters on demand; writes name.
    - Locates print; understands that print has a purpose; recognizes name in print.
    - No observable awareness or use of print.

APPENDIX B

SPQ

Follow steps 1-4 to complete the SPQ and identify the starting task. **(1) Please darken the bubble ( ) that corresponds to the most appropriate response for this student. Mark only one response for each item. Please mark a response for all items below.** **Use a No. 2 pencil only.**	No, she/he cannot do this	With physical prompting/hand-over-hand	With verbal/gestural prompting	Independently
In the domain of scientific inquiry, can this student:				
1. Use senses to identify objects and events?				
2. Understand and communicate simple data through drawings, tables, graphs, and/or explanations?				
In the domain of organisms, habitats, and life cycles, can this student:				
3. Differentiate between living and nonliving?				
4. Identify structures that help plants or animals survive in their environment?				
In the domain of weather, can this student:				
5. Identify the appropriate clothes to wear and/or safety precautions to take during severe weather?				
6. Retrieve weather information from weather maps, charts, or tools?				
In the domain of Earth and space science, can this student:				
7. Recognize the sun, moon, or Earth?				
8. Relate the sun and Earth to the patterns of day and night and seasons?				
In the domain of Earth materials and change, can this student:				
9. Describe water by observable properties (e.g., feels wet, flows downhill, pours)?				
10. Classify rocks, sand, and soil by physical appearance and properties?				
In the domain of matter and energy, can this student:				
11. Describe or identify materials as solids, liquids, and gases?				
12. Describe how materials can change with heating, cooling, cutting, and bending?				

In the domain of <u>force and motion</u>, can this student:				
13. Distinguish position as high or low, near or far, and above or below?				
14. Describe motion of an object in terms of speed and direction?	__	__	__	__