

Teaching & Research Proposal Project

Jessica Scaggs

CEP 822

August 19, 2010

Focus and Rationale

Introduction

I am interested in conducting causal, and empirical, research on how using an intervention, such as reading a test aloud, impacts student achievement on science tests for students who do not normally have this intervention provided to them, such as one with Individual Education Plan (IEP) might.

Research Question

How will reading aloud a science test for a student who is reading below grade level improve his or her achievement on a science test that primarily requires reading and answering multiple choice questions?

Personal Significance

My interest in this topic was sparked from some empirical data I analyzed in previous coursework toward my master's degree in educational technology. I compared individual reading scores of the students in one of my 7th grade science classes to their personal achievement on four summative unit tests. The science tests I chose to use as data were ones where students had to read questions and select the correct multiple choice answer. There was a significant amount of reading on these tests compared to others with computations or diagramming. The reading scores were generated when students took a computerized adaptive reading test created by the Northwest Evaluation Association (NWEA). Students take these reading tests three times throughout the school year at the charter academy at which I teach. Students are pushed very hard by teachers, administration, and parents to do their personal best on these tests throughout the year, so I can assume the quantitative data is relatively valid with a small margin of error. I looked at each student's fall and spring reading score and compared it to the scores of four major tests given throughout the year.

Although I tried to design the tests so reading comprehension would not play a large factor in student success, I discovered an interesting correlation between reading ability and achievement on these tests. This correlation I discovered is an example of a positive relationship: the higher the reading score, the higher the science test scores. For example, of the 13 students who were at or above grade level in reading in either the fall or the spring, 77% answered 86% of the science test questions correctly on all four tests, earning a B or better. Of the nine students who scored below grade level on either one

or both of the reading tests, 55% scored 85% or below on all four science tests. This data implies there could be a connection between reading level and performance on science tests which require students to read and comprehend questions. Through analyzing this data, I also realized my tests were not written as well as I had thought. I concluded individual science test scores were not purely reflective of student's scientific knowledge, but were likely skewed by an individual's adequate reading and comprehension abilities.

This new first-hand, knowledge has prompted me to decide to change the way I administer science tests in the future. I am going to read each science test aloud to the students who are below grade level in reading comprehension. This new assessment intervention provides a perfect platform for my teaching and research proposal, in that I can plan to systematically monitor how this strategy impacts individual student achievement on the science tests. In the past, I have used this intervention strategy with those who have this specific accommodation written in their IEP. I have never thought about how others who do not have documented difficulties could also perhaps benefit from this intervention.

Practical Significance

If this intervention proves to be successful, the information could be valuable to educators everywhere, at any grade level where students are required to prove a particular kind of knowledge linked to their ability to comprehend written questions. This would also become valuable information to support how teachers of different subjects in the middle school need to communicate with each other about student's academic strengths and weaknesses. Before analyzing the data comparing reading scores to science test scores, I was of the persuasion that reading and science weren't much related. I knew I required students to read approximately 6 -8 various science articles throughout the year, but I truly thought that all students should be able to read the material and find the answers they needed. I never paid any attention to a student's reading score, let alone try to use that data to differentiate instruction, and in this case, assessment delivery. I believe there could be many teachers such as myself who are schooled in a discipline other than language arts who could benefit from knowing the connection between reading comprehension and other test scores, and how they can be better assured they are testing a student's *content knowledge* rather than reading ability of subject matter.

Literature Review

Introduction

The central question in my research is, “How will reading aloud a science test for a student who is reading below grade level improve his or her achievement on a science test that primarily requires reading and answering multiple choice questions?” In the literature I review, I would like to learn if there is any research already conducted similar to the question I am posing. If so, I am very interested in learning reading about their results prior to conducting my own first-hand research. In addition to finding research directly related to my central question, I would like to discover answers to the following eight questions:

1. Are there any studies that make a positive connection between reading level and achievement on written tests?
2. Are there any studies that do **not** find a positive connection between reading level and achievement on written tests?
3. Is there any research displaying data about the **amount** of achievement gained when students who are reading below grade level, but do not have an IEP, have their tests read aloud to them?
4. Has anyone ever proposed a teacher read all tests aloud, to either small groups, or the whole class to try and close the achievement gap between those who read at grade level and those who read below?
5. Has either strategy (read aloud to small group of those who read below grade level or reading to entire class with no differentiation based on reading ability) been proven more effective than the other?
6. What are other strategies that a non-literacy teacher could implement into his or her instruction to help students who read below grade level, besides reading text aloud?

7. Are there any alternative strategies that involve incorporating technology in place of the teacher to help students who are reading below grade level either have the test read aloud, or can increase overall reading ability?
8. What are the assessment methods other researchers have used to measure any correlation between reading ability and test scores?

Perspectives

Prior to performing my own comparative analysis of individual reading scores with performance on four classroom science tests of one of my 7th grade classes, I held the subconscious notion that “since I’m a science teacher, I don’t have to teach reading.” Yet, through my research, I learned I am not alone in my thinking; as Abell (2007) states “. . . with the promotion of hand-on science, many teachers get the message that reading may be inappropriate for science”. In holding this belief, I have not made any attempts to support struggling readers with accessing and comprehending text in my classes, specifically, in regards to understanding written test questions. In response to my own data analysis and research reviewed in this document, I will be adopting some new instructional strategies which I will implement this coming school year.

“The problem of matching reader ability and test difficulty has been a continuing concern of educators” (Hewitt, 2004). As much as I have aimed to write my tests so that language and comprehension is not a barrier, this is a very difficult task, and one version of a test cannot be deemed appropriate for all students. Knowing this, I was curious to learn the benefits of a specific, and common accommodation, reading a test aloud, based upon research findings. I discovered, “Reading aloud is one research-based practice that enhances achievement for all students, whether they are gifted or have learning disabilities” (McQuillan, 2009). In support of this, another researcher states, “People with and without disabilities tended to show improved performance; the gains were larger for people with disabilities, representing a differential boost in performance” (Fletcher, 2009). To me this means, if I choose to read science tests aloud to my entire class, everyone will benefit, but those who are struggling will benefit more than those who are good independent readers.

Along the lines of accommodations, I also learned the difference between an accommodation and a modification. “Accommodations are widely recognized in state testing guidelines as changes to

the setting, scheduling, presentation format, or response format of an assessment. Accommodations are made to increase the validity of inferences that can be made from a student's scores so that those scores can be meaningfully compared to scores of students for whom testing accommodations are not needed" (Elliot, 2010). "Modifications are changes to a test's content or item format that make a test more accessible for most students while continuing to assess grade-level content and skills at the same depth of knowledge as non-modified items" (Elliot, 2010). Prior to my research, my mind was focused solely on making accommodations to help students perform their best on my science tests; however, now I am thinking of ways I could modify my tests for students who may need additional support.

Ideas for modifications acceptable on standardized testing in some states:

1. "Removing a distractor from a multiple choice item
2. Reducing the number of items on a test
3. Simplifying language
4. Reducing the number and length of reading passages
5. Reducing the number of items per page
6. Increasing font size" (Elliot, 2010)

"Research shows that "systematic modifications can be made to a test without undermining the internal consistency of scores yielded by students from groups of various ability levels" (Elliot, 2010).

Modifications are another approach I could take to helping students perform their best on written science tests in my class, keeping in mind, at the core of any changes to the testing environment, "The purpose of both testing accommodations and modifications is to increase individuals' access to tests" (Elliot, 2010).

Pedagogy

"Teachers can help minority children close the academic achievement gap in intermediate and middle school by combining literacy instruction and content-area material" (Palumbo, 2009). "Teaching students strategies for reading for information can improve both reading comprehension and science learning" (Abell, 2007). In connection with these statements, through my literature review I have discovered several instructional strategies to improve students' reading abilities. Although my research question focuses on implementing one simple strategy, reading a test aloud for students who are reading below grade level, I am focusing the pedagogical portion of my literature review on other strategies that can be used in the classroom to increase student's independent reading abilities. As an educator, I believe part of my responsibility to my students is to help them become successful

independent readers, so in the future they will not need any special accommodations if possible. One of the questions I wanted to answer through my readings of the work of others is, “What are other strategies that a non-literacy teacher could implement into his or her instruction to help students who read below grade level, besides reading text aloud?” The following are ideas I gained through reading various scholarly articles which I have included in my literature review. This is beneficial to me as I think about supporting students in obtaining the skills they need to be at grade level in reading so they will no longer need the read-aloud test accommodation.

Scientific Reading

“Reading opportunities can be provided at different stages in the science learning cycle to help students build scientific knowledge. Thus, teachers can support reading growth by providing stimulating activities and authentic reading opportunities in science class” (Abell, 2007).

“Here are some research-based methods to make the most of reading in science: Select quality information and procedural books to coincide with your science units; ask students to read in science for specific purposes; integrate firsthand science experiences with secondhand reading experiences; in both reading and science, create cognitive conflict that will lead to conceptual understanding; and use comprehension strategies before, during, and after reading to help students make sense of text” (Abell, 2007).

Along the same vein, use scientific text to support a hands-on or visual lesson. “The role of a textbook is to support what is being taught, not to initiate it” (Lord, 2007). By teaching in a manner that is either hands-on or visual first, there is an added benefit. “When students hold off reading the material until class is over, they’re more likely to know where to focus their attention when they get to the [reading] assignment” (Lord, 2007).

Response to Intervention

Beyond the classroom, schools can establish “Response to Intervention Programs (RTI)” to support struggling learners in all areas, specifically those who struggle in reading. “RTI is an effective method for helping struggling learners in the general education environment before they fail and face special education referral and placement. Successful implementation of an RTI program can translate into fewer IEPs, reduced rates of student disengagement and failure, and increased numbers of students achieving grade-level standards in general education” (Canter, 2008).

Direct Instruction in Small Groups

RTI has three tiers. At tier 2, “Specific interventions are designed and delivered as needed, often in small-group contexts, and students’ progress is monitored frequently.” (Canter, 2008). Another small-group instructional approach, “Concept-Oriented Reading Instruction (CORI) was used in classroom. “In the CORI program for low-achieving readers, the students were taught daily in small groups of three to six students. Although the science concepts and reading strategies were identical to those taught to the whole class, teachers spent more time modeling strategies and focused on fewer concepts at one time” (Guthrie, 2009).

Reflective and Formative Assessment

“We found that teachers learn more about their students when they use a four-step formative assessment technique that draws on guided teacher reflections to inform classroom decision making. In this method, the assessments occur as part of the curriculum, and teachers need only spend 15 minutes of reflection time at the end of each science activity. This makes it easier – and less time consuming – to conduct the assessment compared with giving a quiz or some add-on activity” (Kennedy, 2009). In addition, or instead of, written tests at the end of a unit, I could choose to imbed formative assessment practices during student learning to guide my instruction and better target the areas where students are struggling closer to the time of instruction/confusion. In support of this, Oloruntegbe (2010) states, “There is a need for an on-the-spot assessment of skills demonstrated by students”.

Question-Answer Relationships

“Instructing students in using a reading comprehension strategy—the question–answer relationship (QAR)—during science instruction can increase students’ reading comprehension of science texts, leading to increased test scores in science and reading” (Kinniburgh, 2008). This is a strategy for teaching students how to obtain meaningful information from informational text. This strategy could help my students decipher my test questions better, even if no other accommodations or modifications were made for the students or with the tests.

Thinking Aloud

Another strategy for increasing students’ ability to comprehend written text in middle school is the “Think Aloud” strategy. This is the same strategy used to model writing in the elementary grades. “Thinking out loud during a shared reading of a content area passage models for students how a

proficient reader grapples with the problems of unfamiliar vocabulary, new concepts, text features, and text structures that can seem quite foreign—even after years of success with narrative reading (Lapp, 2008).

Universal Test Design

Besides instructional approaches that teach reading strategies, learning how to write good tests according to “Universal Design” could be a method I use. The idea of “Universal Design” is theoretically the need for minimal, to no accommodations. “In the future, high-quality, universally designed assessments have the potential to improve the reliability and validity of assessments for all students, including students with disabilities. Thompson, Johnstone, and Thurlow (2002) and Thurlow et al. (2006) assert that universally designed assessments should have the following characteristics: precisely defined constructs; accessible, nonbiased items; simple, clear, and intuitive instructions and procedures; maximum readability and comprehensibility; and maximum legibility” (Lazarus, 2009).

Pre-Recorded Quizzes

In thinking of incorporating technology into educational practices, I was inspired by my readings about “E-Books” and their benefits to come up with a strategy for using computers to “read” quizzes aloud for students. “The use of computer-based electronic storybooks provides the same benefits as audiotaped books, with the added advantage of technology supports and increased interactivity” (Rhodes, 2007). I am thinking that increased interactivity that the student will have with the test and the flexibility it could provide the teacher and student in administering and taking the test, could be another way to provide an accommodation for struggling readers to access science test questions. I as the teacher could pre-record quiz questions in a PowerPoint slide and the student could click through the slide and record the answers on a sheet of paper, in keeping with the format of the regular class. Questions could also be stated in different ways, and confusing words could explained through “help” buttons.

Assessment

In my literature review, I came across an assessment technique where the researchers created a set of criteria to be used as a “cut-off value” to define learning disabled in reading in order to divide their sample set of students into two groups (Meloy, 2002). This idea stuck out to me because in my original analysis of data comparing the reading test scores and science test scores of individual students, I used a “cut-off value” which was the reading score considered to be at grade level in reading

comprehension. Meloy's article supports the idea of using a "cut-off value" to define two different groups to use in performing quasi-experimental research, which is a part I would like to include in my own research design.

Also in my literature review, I read a study called the "Impacts of Comprehensive Reading Instruction on Diverse Outcomes of Low- and High-Achieving Readers", where the assessment method "was a pretest-posttest equivalent groups quasi-experimental design" (Guthrie, 2009). The study compared the effects of traditional reading strategies (undefined in reading) to the CORI strategy to see how the CORI strategy impacted the reading ability of high and low achieving students. There was a pretest and a posttest given to all students in both groups, prior to, and after the CORI intervention strategies were implemented. Reading about the set up of such a study has helped me think about using this assessment approach in my research design.

Conclusion

Through my research, I discovered there was not a lot of data to answer my central research question. This makes performing my own research on it more valuable to me. My mind is also more open to the need to incorporate reading instruction somehow into my science classes, if I want to improve students reading ability and comprehension, so ideally, they would not need any accommodations in taking a science quiz. I have also learned a few assessment strategies that will help guide my research design.

References

Abell, S. K. (2007). Reading and science. *Science and Children*, 45(3), 56-57.

This article discusses how reading and science can be integrated in order to enhance learning in both areas. The author also describes how, with the push for hands-on learning in science, the idea of reading in science is not prioritized. Interestingly though, the authors discovered that student motivation to read is significantly increased in stimulating settings where hands-on activities occur frequently; such as in a science classroom. The authors also discuss how, in science, students can read for an authentic purpose, such as reading for information to answer a question. Reading for authentic purposes increases motivation to read.

Canter, A., Klotz, M. B., & Cowan, K. (2008). Response to intervention the future for secondary schools. *Principal Leadership*, 8(6), 12.

This article describes a process known as “Response to Intervention (RTI)” which is a method for supporting struggling students in any academic area with the aim of lessening the number of students referred for special education and helping struggling students earlier, rather than later in their academic career. The article describes three main tiers, or level, in an RTI program, and also emphasizes the flexibility of these programs to match the needs of the students, resources, staff, and available time. An RTI program could support learners who are reading below grade level, on a long-term basis.

Elliott, S. N., Kettler, R. J., Bolt, D., Roach, A. T., Beddow, P. A., Kurz, A., et al. (2010). Effects of using modified items to test students with persistent academic difficulties. *Exceptional Children*, 76(4), 475-495.

This article is a description of an experimental study performed with of 8th grade students with academic difficulties in reading and math. Researchers wanted to know if modifying standardized tests would prove to allow more access to the content the test was assessing for students who were struggling, whether they qualified for “alternate assessment based on modified achievement standards (AA-MAS)” or not. What the researchers discovered, was that students in four states who would be eligible for AA-MAS based on federal policy criteria were the most likely among peer groups to benefit from the modifications made with the purpose of enhancing accessibility. This finding confirms the implicit assumption of current NCLB policy, that students for whom current grade-level assessments do not permit unfettered access may benefit from the development of more accessible tests” (Elliot, 2010, p. 493).

Fletcher, J. M., Francis, D. J., O'Malley, K., Copeland, K., Mehta, P., Caldwell, C. J., et al. (2009). Effects of a bundled accommodations package on high-stakes testing for middle school students with reading disabilities. *Exceptional Children*, 75(4), 447.

This article describes research conducted on 7th grade students in four middle schools in Texas. The goal of the experiment was to see how effective multiple accommodations were in boosting reading test scores of those students who were

average and poor readers. The test used was a version of a high-stakes standardized reading test used in the state of Texas. The test was administered after the “real” test was given. Student fatigue, and non-motivating factors to do well, could have impacted the results of this study. However, the study did report that accommodations such as reading aloud, and extended time helped both poor and average readers, with the gains being larger in students with disabilities.

Guthrie, J. T., McRae, A., Coddington, C. S., Klauda, S. L., Wigfield, A., & Barbosa, P. (2009). Impacts of comprehensive reading instruction on diverse outcomes of low- and high- achieving readers. *Journal of Learning Disabilities, 42*(3), 195 - 214.

This article describes research pursuits aimed to discover if providing explicit instruction in several areas related to reading would boost student’s reading ability more than traditional methods for students in fifth grade. The researchers used “Concept-Oriented Reading Instruction (CORI)” to teach “comprehension strategies, domain knowledge, word recognition skills, fluency, and motivation to read (p. 195). High and low achieving readers scored better on posttests after receiving CORI instruction. This led the authors to conclude that “Explicitly supporting multiple aspects of reading simultaneously appeared to benefit diverse learners on a range of reading outcomes” (p. 195).

Hewitt, M. A., & Homan, S. P. (2004). Readability level of standardized test items and student performance: the forgotten validity variable. *Reading Research and Instruction, 43*(2), 1-16.

This article discusses an issue in standardized test development that is often neglected: the readability of test questions. The author states, “The higher the item readability, the more students miss that item” (p. 1). Some tests average the readability of all the questions contained, and therefore believe they have made a good test. The authors of this article make an argument, using research, that all test questions should be written at the same readability level, to produce more consistent interpretations of results.

Kennedy, C., Long, K., & Camins, A. (2009). The reflective assessment technique. *Science and Children, December, 50-53.*

This article describes a four-step process science teachers can utilize when evaluating student work and understanding of key concepts being taught in class. The term for this process is “The Reflective Assessment Technique”. The authors claim that this takes about 15 minutes of a teacher’s time, and can have great improvement for students on posttest scores. The steps outlined are: anticipate, review, reflect, and adjust. The benefits of this type of reflection is that by reflecting after an activity in such a manner, a teacher can learn where misconceptions or non-understandings lie and intentionally prepare to teach and assess those concepts the following day, rather than waiting for some longer amount of time after already having moved onto other topics, leaving the students to carry those misconceptions or non-understandings with them.

Kinniburgh, L. H., & Shaw Jr., E. L. (2008). Using question-answer relationships to build reading comprehension in science. *Science Activities*, 45(4), 19 - 26.

The author begins this article by stating the increasing need, with No Child Left Behind science testing requirements, for students to be able to read science passages for information to answer the questions that are posed. The author then suggests an instructional approach for teaching students effective strategies for extracting this information from the text, or coming up with it on their own. This method is called, “question-answer relationship (QAR)”. After explaining the framework of QARs, the author explains how teachers can implement this strategy in his or her classroom to increase student achievement on standardized science tests.

Lapp, D., Fisher, D., & Grant, M. (2008). You can read this text - I'll show you how: interactive comprehension instruction. *Journal of Adolescent & Adult Literacy*, 51(5), 372-383.

This article describes the need for middle school and high school teachers of content areas to model various strategies for accessing the content they want students to read and learn from. One problem the author notes in the upper grades is that these subject-specific teachers are very knowledgeable about their content, but don’t always know how to help struggling students access this content. One strategy the author suggest is called “Think Alouds”, a strategy used by many elementary teachers to model the meta-cognitive thinking process successful readers go through when trying to make sense of what they are reading. The author also describes using “Think Alouds” to teach

vocabulary, comprehension, text features, and text structures.

Lazarus, S. S., Thurlow, M. L., Lail, K. E., & Christensen, L. (2009). A longitudinal analysis of state accommodations policies twelve years of change, 1993 - 2005. *The Journal of Special Education, 43*(2), 67-80.

This article takes a look at the changes that have taken place in the participation of students with special needs in the realm of large-scale standardized tests. There was a time in our nation's history when students with special needs were excluded from taking standardized tests. The pendulum has gone a full swing in the other direction, with including all students in statewide assessments. The authors of the article spend time looking at the way standardized test accommodations have changed in the past 12 years to become more inclusive and reflective of students true abilities and knowledge. There are still some areas that are "grey" in terms of what accommodations are appropriate and beneficial to interpreting the results.

Lord, T. (2007). Please don't read the text before coming to lecture. *Journal of College Science Teaching, 37*(1), 52-54.

The premise of this article is to make the case that having college science students read assigned readings before class on that subject is an ineffective teaching strategy. The author lists several reasons for this such as, most students don't do it; it is possible to read words without having a context for understanding them; many professors lecture exactly the same way the text is laid out (which the author feels is also ineffective); and textbooks contain a lot of information that is not pertinent to the core understandings of the text. Instead, the author advocates that readings should be assigned after a lecture on a topic, in order to supplement what the learner has just heard and seen. The author also believes that this strategy helps the learner know what to focus on, which actually aides in reinforcing key objectives.

McQuillan, K. (2009). Teachers reading aloud. *Principal Leadership, 9*(9), 30-31.

This article gives many examples to support the author's position that reading aloud is beneficial to students at all grade levels, even the graduate level, by stating the many benefits of reading aloud. Some of the benefits outlined in the article are: settling students down; helping to un-clutter student's minds; emphasizes the importance of reading; fuels student's desire to read; allows students to hear appropriate phrasing and

voice inflection; makes complex ideas more accessible; and exposes learners to new vocabulary and language patterns. The author goes on to explain many other reasons reading aloud to students is valuable and important.

Oloruntegbe, K. (2010). Approaches to the assessment of science process skills: a reconceptualist view and option. *Journal Of College Teaching And Learning*, 7(6), 11-18.

The author of this article thoroughly discusses various forms of assessments and their value to educators. He spends a great deal of time explaining the definitions of types of assessments in ways the average educator probably has never taken the time to differentiate. After explaining several types of assessments and their limitations, he suggests using a new kind of assessment, called “on-the-spot assessment” to evaluate individual student science skills. This form of assessment requires the teacher to think through all the skills a student will have to use in a hands-on activity and then make a rubric to check where a student falls in their acquisition of this skill as the teacher walks around and observes student performance. The author advocates that although this may take a little more work on the teacher’s behalf, the results produced will give better information about student’s science skills than any other type of assessment.

Palumbo, A., & Sanacore, J. (2009). Helping struggling middle school literacy learners achieve success. *The Clearing House*, 82(6), 275-280.

This article offers a very positive and optimistic approach to helping students who are in the minority and perhaps have learned English as a second language, the opportunity to really flourish in their reading ability in middle school. The two premises the author grounds this thought in is the fact that children’s cognitive abilities increase during adolescence, and because in the upper grades there is a shift in focus from process knowledge to content knowledge. The author advocates for teachers to integrate reading into content area to help struggling minority readers.

Rhodes, J. A., & Milby, T. M. (2007). Teacher-created electronic books: integrating technology to support readers with disabilities. *The Reading Teacher*, 61(3), 255 - 259.

The author explains how teachers and students can create “E-books” using Microsoft PowerPoint to enhance the learning experience for students with disabilities.

Students can create “E-books” for retellings, which can increase comprehension. E-books go a step further than the books read aloud to students at a listening center as “E-books” allow for more student interaction and engagement with the content.

Revised Research Design

Research Question

How will reading aloud a science test for a student who is reading below grade level improve his or her achievement on a science test that primarily requires reading and answering multiple choice questions?

Procedures

Inferences drawn about the results of my research will be based upon empirical data from several tests administered to two groups of students in each of my three 7th grade science classes. The two groups in each class will be those who are reading at or above grade level and will receive no read-aloud accommodation, and those reading below grade level and will receive a read-aloud accommodation. In order to obtain reliable and valid data, I will do my best to remove all “threats to internal validity” of the tests and program I will administer as a part of my research quasi-experimental design. My goal, in the design I have chosen and the steps I will take to conduct my research, is to ensure the data obtained best represents the independent variable, science tests being read aloud, as the cause for a difference in students’ test scores, rather than some other factor such as different instructional strategies among classes, ability to use notes on the test, extra review time, or any other variable that could impact student performance on a test.

Here are the steps I will take to collect my data:

1. Choose my sample student population. I will choose to study the test results of students in all of my 7th grade science classes. This is the largest population for which I can control the science testing environment; since I am the teacher *and* the researcher.
2. Identify variables:
 - a. *Controls* – teacher, content taught, lesson sequence, assignments, day test is given, version of test given, amount and type of assistance available during test taking, testing environment, structure and sequence of testing session,

- b. *Variables out of my control* which may also affect student performance on any given science test, or the initial reading test – student attitude toward test, student effort on test, the fact that students will take test at different times of the day, student’s physiological well-being (hunger level, alertness), student confidence toward test-taking, how well each student individually prepared/studied for test, absenteeism from class instruction, personal engagement during class sessions, completion of assignments and readings assigned
 - c. *Independent variable* – science test read aloud to students who are reading below grade level
 - d. *Dependent variable* – science test scores of those students reading below grade level
3. Administer computerized adaptive reading test produced by Northwest Educational Association.
4. Look up the minimum reading score considered to be “at grade level” for 7th grade using NWEA RIT scales. Use this number as the “cut off” value when determining which students will receive the “read-aloud” science test accommodation.
5. Access results of student reading scores.
6. Analyze reading scores and make a list of those students whose reading score is below the grade level cut-off value. Save this list and refer to it when administering science tests so the proper students in each class receive the read-aloud accommodation.
7. Use Microsoft Excel to make a spreadsheet to record reading test score and science tests scores for all students in the 7th grade. Use the following column headings: Student name, Fall Reading Score, Pretest (no read-aloud accommodations), Science Test 1, Science Test 2, Science Test 3, and Science Test 4. Science tests 1 – 4 are posttests and students whose reading score is below grade level will be receiving the read-aloud accommodation on these tests.
8. Input each 7th grade student’s reading score in Excel document and save.
9. Teach science lessons required for first science test (the pretest) as normal. Provide no additional reading ability instruction to students reading below grade level.
10. Administer science pretest with no read-aloud accommodation for any student. Try very hard to control all possible variables among all classes.
11. Correct all science tests and record scores as *percentages* in Excel spreadsheet. This score becomes a base-line score to compare the scores of future tests which will be administered with the read-aloud accommodation. It is important to record percentages because each science test

will have a different number of questions. Hopefully, the differing number of questions is not a variable which will affect the reliability of my data.

12. Show students their original test with the score written on it. Allow students to complete a self-assessment questionnaire in which they report any factors they believe contributed to the success, or lack thereof, of their performance on the test.
13. Continue to teach science content and lessons as normal for upcoming units.
14. Administer science tests 1 – 4 throughout the course of the year whenever it is time in the curriculum to assess the students on the content covered in the test.
15. After giving each test, correct all tests and record scores as percentages in the Excel spreadsheet under the appropriate column.
16. Show students each original test with the score written on it as soon as possible after administering each test. Allow students time to complete a self-assessment questionnaire for each test, in which they report any factors they believe contributed to the success, or lack thereof, of their performance on the test. This is the same self-assessment given after the pretest. These self-assessments can provide insight when later trying to interpret the data.

There were several sources that guided me in deciding this particular set of procedures.

Professional Teaching Background

As a science teacher, I have training in the “scientific method” and I spend a lot of time each year teaching my students to think about controls and variables that could affect the validity and reliability of their results when conducting an experiment. This teaching background gave me a natural inclination to focus on identifying all variables before beginning to experiment and collect data.

Web Center for Social Research Methods

From the online readings by Trochim, I was introduced to the particular quasi-experimental design of “regression-discontinuity (RD)”. It was from reading about this design I got the idea of administering a pretest and posttests and dividing each class into two groups based upon a selected cutoff value: those who are reading below grade level and will receive an accommodation and those reading at or above grade level and will not receive an accommodation. Also in learning about “threats to internal validity” from this website, I chose to incorporate student self-assessments in order to collect some data on any uncontrollable variables that may be different from person to person and effect performance on the science tests.

Literature Review

Information I learned from my literature review has also helped me decide the type of research design I would choose and the steps I would take to collect data: information such as “Reading aloud is one research-based practice that enhances achievement for all students, whether they are gifted or have learning disabilities” (McQuillan, 2009). Knowing this, I had to decide if I was going to read the test aloud to the *entire* class, or just those students who were reading below grade level. Going back to the regression-discontinuity design which calls for two groups determined by a selected cutoff value, I decided not to read the test aloud to *all* students in my data collection methods, so I could better isolate the data more closely related to answering my research question.

Also from my literature review, I gained a *deeper* understanding of the *purpose* for providing testing accommodations. “The purpose of both testing accommodations and modifications is to increase individuals’ access to tests” (Elliot, 2010). Keeping this in mind, I recalled the purpose of my science tests, which is to assess students’ scientific content knowledge. I then thought of the purpose of my research, which is to see if my proposed accommodation will indeed give students greater access to the test, in turn, revealing a more true representation of their scientific content knowledge. In essence, my literature review provided a more clear understanding of the research question I was proposing, and therefore, helped me design data collection steps that were very specific to uncovering quantitative results I desired to know.

Assessments

Computerized Adaptive Reading Test

I will use several types of assessments to gather empirical data to help answer my research question. The first assessment I will use is a computerized adaptive reading test produced by Northwestern Educational Association (NWEA). Students at my charter school take this test three times a year. The results of this test are sent to me in digital form. Knowing each student’s beginning of the year (fall) reading score will help me determine which students in each of my science classes are reading below grade level who will qualify as the group who receives the read-aloud accommodation during the administration of science tests.

Pretest

The second type of assessment I will use is what Trochim deems as a “pretest”. “The term “pretest- posttest” implies that the same measure (or perhaps alternate forms of the same measure) is administered before and after some program or treatment. In fact, the RD design does not require that the pre and post measures are the same” (Trochim). The same pretest will be administered to all students in 7th grade, regardless of their reading level with no accommodations given to any student. By having students take one test where no accommodation is given, I will have a set of data that gives me some indication of how reading ability may interfere with accessing the content of the test.

I do foresee one problem with giving only *one* pretest. Some students may do more poorly on this test, since it’s the first test I will give them of the year, and as a new teacher to them, they will not have had time to “learn my testing style”. Because of this, the pretest data could be lower. To help minimize the effects of this variable, I am considering giving two pretests, meaning that the first two end-of-the-unit tests I give would be without accommodations for all students. The only downside to this is we may be nearing the end of the first quarter before deserving students get the helpful accommodation to access the science test content.

Posttest

The third type of assessment I will use is a series of four different “posttests”. These posttests will be different science tests given at the end of various units on different topics. For each one of these tests, all students with a fall reading score below grade level will have the test read aloud to them. The procedure for doing this will be to have those students who do not need the read-aloud accommodation to move to the back of the room and those students who qualify for the accommodation will move to the front of the room. I will read each test question aloud and the answer selections. I will give students about 20 seconds to think, and then I will read the question and answers again. If students were able to answer the question after the first reading, they will be encouraged to listen to the second reading to make sure their answer makes sense. I will have students put their pencil down after they have answered the question so I will know when all students are ready to move forward, and I will then read the next test question and answer set by following the same procedure. I will try to read quiet enough as to not completely disturb those who are reading silently to themselves in the other group.

Posttest refers to tests given after the program intervention, reading science tests aloud; however, this intervention occurs *simultaneously* with the test. I am giving a series of four posttests for

several reasons related to obtaining valid and reliable data. First, due to the fact that each test is covering a different topic/unit, the difficulty of the unit may be different for each student and could have an effect on student performance. If I were to only administer one posttest, I would not have any other data to compare that score to in order to see if there is a trend in performance on science tests with the accommodation, or if this data point is an outlier.

The second reason I am administering several posttests, is that over the course of the year students will be receiving various forms of reading instruction in their language arts class. I anticipate this instruction will help students mature in their reading ability, however, they will continue to have tests read aloud to them so any increase in reading ability will not likely be a factor impacting test scores any differently than near the beginning of the year.

The final reason I am giving several posttests, is so I can average the *resulting* scores on these tests together and then compare a student's average posttest score to their pretest score to see what the average difference between the two scores is. If the average posttest score is higher than the pretest score in most cases, I can begin to answer my research question which is, "How will reading aloud a science test for a student who is reading below grade level improve his or her achievement on a science test that primarily requires reading and answering multiple choice questions?"

Connection to Literature Review

In my literature review, I came across an article entitled, "The Effect of a Read-Aloud Accommodation on Tests Scores of Students With and Without a Learning Disability in Reading" (Meloy, 2002). In this study, researchers set a certain criteria to define learning disabled in reading in order to divide their sample set of students into two groups. Although the criteria for meeting the requirements for being considered learning disabled in reading had four components versus one, it is an example of setting a "cut-off value" for determining a difference among two groups being studied.

Also in my literature review, I read a study called the "Impacts of Comprehensive Reading Instruction on Diverse Outcomes of Low- and High-Achieving Readers", where the assessment method "was a pretest-posttest equivalent groups quasi-experimental design" (Guthrie, 2009). In this study, the intervention was a specific set of reading instructional strategies, identified as CORI. These strategies were used to teach both high and low achievers in reading in three classrooms. The two groups were not split by achievement level, but rather instructional strategy: three classrooms of students receiving CORI instructional methods and three different classrooms receiving traditional reading instruction. The

study compared the effects of traditional reading strategies compared to the CORI strategy to see how the CORI strategy impacted the reading ability of high and low achieving students. There was a pretest and a posttest given to all students in both groups, prior to, and after the CORI intervention strategies were implemented. Reading about such a study that used a similar research design to the one I am proposing has helped me think about appropriate steps and assessment types to use.

Design Rationale

The design that will work best to answer my research question is the particular quasi-experimental design known as “regression-discontinuity”. In this design method, a sample group is divided into two groups based upon a determined “cut-off value”. A pretest is then given to members of both groups, in the same way, to provide a baseline for comparing posttest data after an intervention or program is applied to one group and not the other. In this method, test-subjects are not randomly assigned to a group, and in most cases, this non-random assignment can be beneficial for those in the group who are receiving the intervention as the researcher is trying to discover whether a particular intervention or program will help the group thought to be in the most need. By having two different groups separated by a certain pre-determined criteria, the researcher can then analyze posttest scores to see if there is “discontinuity” between the scores of the pretest and posttest of those who received the intervention.

This research design is best for investigating my research question because the NWEA reading-score data provides a nice “cut off value” for those students reading below grade level. Since I am interested in learning *how* reading a test aloud for students who are reading below grade level can impact their achievement on a science test, it makes sense that I would choose a design where I can apply this intervention to group that was not randomly selected for reading ability, but rather fits the criteria of “reading below grade level.” Other research designs, such as the “experimental design”, would not be the best method to employ as a research path because it relies on random assignment to support internal validity. If I were to use a method such as this, I would have students who were reading below grade level, at grade level, and above grade level perhaps receiving a read-aloud accommodation, and I would be collecting some data not directly related to answering my research question.

Of the three “pretest-posttest” types of quasi-experimental research design, the “regression discontinuity” design is the only one that allows the “maximum possible pretest difference”. This knowledge is key to answering my research question, as I want to know *how much* of a difference

reading a test aloud to a student who typically reads below grade level will impact his or her science test score. By comparing the average of four posttest scores to the pretest score, I can have relatively valid and reliable data using the RD design method.