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Technology-Assisted Formative Assessment and its Impact on Instructional Decision Making: A Mixed Methods Collective Case Study of Study Island in the Middle Grades

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Technology-Assisted Formative Assessment and its Impact on Instructional Decision
Making: A Mixed Methods Collective Case Study of Study Island in the Middle Grades

By
Kelly Cameron Taylor

A Dissertation Submitted to the
Gardner-Webb University School of Education
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

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2011

Approval Page

This dissertation was submitted by Kelly Cameron Taylor under the direction of the persons listed below. It was submitted to the Gardner-Webb University School of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Gardner-Webb University.

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Abstract

Technology-Assisted Formative Assessment and its Impact on Instructional Decision Making: A Mixed Methods Collective Case Study of Study Island in the Middle Grades. Taylor, Kelly C., 2011: Dissertation, Gardner-Webb University, School of Education. Formative Assessment/Computer-Assisted Instruction/Study Island/Instructional Decision Making/Instructional Planning/Middle Grades

The purpose of this mixed methods collective case study was to determine the use of formative assessment data generated by the web-based program Study Island in the planning and implementation of instruction. The study utilized quantitative data collected through teacher surveys then triangulated qualitative teacher focus group and individual teacher interview data in order to establish statistical themes for narrative analysis. The research focused on data generated by the Study Island program at three rural middle schools, Grades 6 through 8, located in the western region of North Carolina.

The need for data to help teachers determine the next steps for instruction drove the implementation of Study Island in the school system in which the study was being conducted. Data compiled from the National Assessment of Educational Progress and from the North Carolina end-of-grade tests showed that there were still schools that did not have all students functioning at grade level. This data, in addition to concerns expressed by the administration of the schools in the study about teacher use of the data justified the purpose of this study.

The increased focus on using data to drive instructional decision making led to the addition of several types of computer-assisted instruction, including the web-based program Study Island, in the three schools studied. The results from the study led the researcher to conclude that although teachers did not have a positive or negative perception of use of Study Island and the data generated by the Study Island program overall, they had a positive perception of use when it came to using the program with students. The researcher's recommendation was for the district to pursue training with regards to the use of the Study Island program, the use of the data generated by the Study Island program, and formative assessment.

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Chapter 1: Introduction

As the inclusion of 21st Century learning skills became more prevalent in the public school setting, determining the gaps in individual student learning became vital to helping students grow educationally. Beginning with the legislation of No Child Left Behind (NCLB) and more recently, the implementation of the Race to the Top program, the pressure for teachers to be accountable for student learning increased dramatically (NCLB, 2004; U.S. Department of Education, 2009). North Carolina introduced a new teacher evaluation instrument that requires teachers to not only use data for setting short- and long-term instructional goals, but also to “use assessment systems to inform instruction and demonstrate evidence of students’ 21st century knowledge, skills, performance, and dispositions” (North Carolina Department of Public Instruction (NCDPI), 2008, p. 10). Another requirement of the instrument was that teachers “use various types of assessment data during the school year to evaluate student progress and to make adjustments to the teaching and learning process” (NCDPI, 2008, p. 6). Because of the laws and regulations, the concept of formative assessment became popular.

With the increased focus on formative assessment, teachers and schools searched for methods of formative assessment that saved time for teachers, accurately assessed students, and provided immediate feedback that also aligned with the state’s standard course of study. Because of this need, software engineers produced an overabundance of computer-assisted instructional programs to provide user-friendly immediate assessment for students and teachers (Militello, Sireci, & Schweid, 2007). For example, North Carolina introduced a formative assessment system called North Carolina’s Formative Assessment Learning Community’s Online Network (NC FALCON). NC FALCON is an online learning community in which teachers from all across the state can access

modules that provide them with an understanding of formative assessment and the role it should take in classroom instruction (NCDPI Accountability and Curriculum Reform Effort, 2011).

This mixed methods collective case study was designed to explore how teachers used the data generated by the web-based program, Study Island, to inform, plan, and implement classroom instruction. The primary focus of this study was in language arts, math, and science in the middle grades. The researcher used a survey, teacher focus group interviews, individual teacher interviews, and the data generated by Study Island to collect the data. The researcher triangulated the data from all sources to discover themes that emerged from the study. This case study was justified by current testing showing that over a quarter of students nationally are not functioning at grade level (U.S. Department of Education, Institute of Education Sciences, 2009), the emphasis on formative assessment (NCDPI, 2008; NCLB, 2004; U.S. Department of Education, 2009), and the lack of research in the area of how teachers use formative assessment data to inform and implement instruction (Heritage, Kim, Vendlinski, & Herman, 2009; Threlfall, 2005).

The introduction begins with a discussion of the lack of proficiency of the nation's eighth graders in reading, math, and science. A comparison is drawn between the nation, the state of North Carolina, and the three schools in which this study was conducted. A discussion of formative assessment as a means to move students toward proficiency follows, along with the use of technology to aid in the collection and use of formative assessment data. Study Island is a web-based program that is created to help teachers with all types of assessment, including formative assessment. Further information is given about the schools being studied and the purpose of the study is

addressed. The researcher discusses her role in the study, research questions are posed, and important terminology is defined.

Statement of the Problem

According to The Nation's Report Card (U.S. Department of Education, Institute of Education Sciences, 2009), the percentages of eighth graders who scored at a basic level or better on the National Assessment of Educational Progress (NAEP) was 73 for math, 75 for reading, and 59 for science. Performance at a basic level means that the student has some knowledge of the concepts necessary to function at his or her grade level (U.S. Department of Education, Institute of Education Sciences, 2009). That means that 25% or more of the nation's students were functioning below grade level in math, reading, and science. In North Carolina, eighth-grade students who scored at a basic level or better were 74% for math, 70% for reading, and 55% for science. Table 1 shows the comparison of the scale scores on the NAEP for the state and the nation since 2000.

Table 1

National Assessment of Educational Progress Average Scale Scores 2000-2009

	Reading Scores	Math Scores	Science Scores
2009 National	264	282	No Data
2009 State	260	284	No Data
2007 National	263	280	No Data
2007 State	259	284	No Data
2005 National	262	278	149
2005 State	258	282	144
2003 National	263	276	No Data
2003 State	262	281	No Data
2002 National	264	No Data	No Data
2002 State	265	No Data	No Data
2000 National	No Data	274	149
2000 State	No Data	280	145

Although the state made gains since 2000, when one compares the national average to the state average, it is apparent that the state was falling behind in reading and science and was not much ahead of the nation in math. Although there is no data to compare individual school districts or individual schools within a district to the nation using the National Assessment of Educational Progress data, comparisons can be made using the North Carolina end-of-grade tests. These tests are administered in Grades 3 through 8 and measure reading comprehension, math knowledge and science knowledge (NCDPI Accountability Services Division, 2011). Looking at the data from the North Carolina Public School's Report Card by school, one can see how schools compared to

their district and the state on these tests. Table 2 shows the comparison for the schools being studied, which would remain anonymous.

Table 2

End-of-Grade Test Percentages of Proficiency 2008-2009

	Reading	Math	Science
School A	71.6	84.5	60.0
School B	78.0	93.4	86.0
School C	77.6	94.6	86.7
District	72.7	88.1	79.2
State	67.6	80.0	67.6

Based on the above data, even though students at these schools were mostly performing above the state averages, there were still gaps in the performance of students in reading, math, and science at all schools because no school had 100% proficiency. Formative assessment was one method to help teachers address these gaps. However, John Threlfall (2005), in an article published in the British Journal of Educational Studies, indicated that though the idea of formative assessment had been around since the 1970s, teachers still were not using the outcomes of the assessments to inform instruction. From Threlfall's (2005) research, he surmised that studies of the assessment practices of teachers showed that while the design of the assessments themselves were highly complex, the information gained rarely moved to future planning. "Where such pedagogical knowledge is limited, so will be the teacher's use of assessment information to inform planning" (Threlfall, 2005). More recently, Heritage et al. (2009) found that "a review of recent literature suggests that there is little or no extant research that has

investigated teachers' abilities to adapt instruction based on assessment of student knowledge and understanding" (p. 24). With so little research into actual practice, teachers have difficulty understanding best practices when it comes to the use of formative assessment data in classroom instruction.

Formative Assessment

Although definitions of formative assessment abound, for the purposes of this study, the researcher used the following definition as set forth by The Council of Chief State School Officers (CCSSO), as informed by Formative Assessment for Students and Teachers (a division of CCSSO). According to that definition, formative assessment is "a process used by teachers and students during instruction that provides feedback to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes" (McManus, 2008, p. 3). At its most basic level, formative assessment is the springboard that determines the next steps in instructional design. Ideally, teachers are continually assessing and adjusting their teaching based on the outcomes of such assessments. According to Wiliam and Thompson (2007), formative assessment consists of five key strategies:

1. Clarifying and sharing learning intentions and criteria for success;
2. Engineering effective classroom discussions and other learning tasks that elicit evidence of student understanding;
3. Providing feedback that moves learners forward;
4. Activating students as instructional resources for one another; and
5. Activating students as the owners of their own learning.

However, this was not as easy as it seemed. According to Kaftan, Buck, and Haack (2006), the fact that a student could answer a question did not mean that the

student understood the answer. In order to determine understanding, the teacher needs to be able to have insight into the child's reasoning. The students and teacher have to move from the mindset of performing for a grade to performing for mastery. Formative assessment helps teachers and students work toward mastery, and technology provides a means for both collecting formative assessment data and using that data.

Technology and Formative Assessment

Technology can help teachers overcome the obstacles inherent with collecting and using formative data. According to Christine Fox (2008), school districts in Seminole County, Florida, bought handheld devices to conduct the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) assessment for their students. This ability to provide a system of data collection, analysis, and intervention earned the county five overall "A" rankings from the Florida Department of Education. The St. Mary Parish School Board in Louisiana (as cited in Fox, 2008) had their schools use a combination of online formative assessment tools and online standards-based resources. The result was a database that helped teachers support the student's area of deficiency and helped them find resources at the student's learning level. Basically, the implementation of these new technological tools made an impact on student achievement and continued to allow for more opportunities for success through data-driven decision making (Fox, 2008).

Study Island

Study Island is one of these tools. Based on the research conducted by Magnolia Consulting (2008), Study Island is a web-based program that delivers instruction based on students' individual needs and provides specific feedback to students, teachers, and parents. The questions are aligned with the North Carolina Standard Course of Study and are content specific. The program covers kindergarten through 12th grade in language

arts, math, and science—all subjects that are tested in North Carolina. This program was created in response to the need for continual progress monitoring. Study Island provides a means to do this via a web-based mastery program that delivers both dynamic and specific instruction and provides individualized reports of progress to teachers, administrators, and parents. According to Magnolia Consulting (2008), “when educators integrate Study Island into their instructional practices, it acts as a formative, ongoing assessment tool that provides students with a platform to practice or demonstrate their knowledge of taught standards” (p. 6). The program also provides data to students, teachers, and parents. The reports produced by the program can be broken down by school, class, or individual student. Teachers can see how their students are progressing through the North Carolina Standard Course of Study because the reports are disaggregated by goal. Teachers and administrators can also compare their classes’ scores on specific tasks to other classes in their school and to other classes in the state (Magnolia Consulting, 2008).

The Schools

The schools in which this case study was conducted were traditional middle schools located in the same school district in western North Carolina. School A served 498 students in Grades 6 through 8. School B served 672 students in Grades 6 through 8. School C served 652 students in Grades 6 through 8. The demographics of the students are listed in Table 3 as percentages (NCDPI, 2010).

Table 3

Student Demographic Percentage by School

	School A	School B	School C
Caucasian	55	87	80
African American	15	2	3
Hispanic	20	4	3
Multi-Racial	7	3	4
Asian	3	4	10

Even though the schools represented a varied population, the course offerings were the same. According to the principal of School B, all three schools offered a core curriculum along with the courses outlined in the figure (Anonymous, personal communication, May 2010).

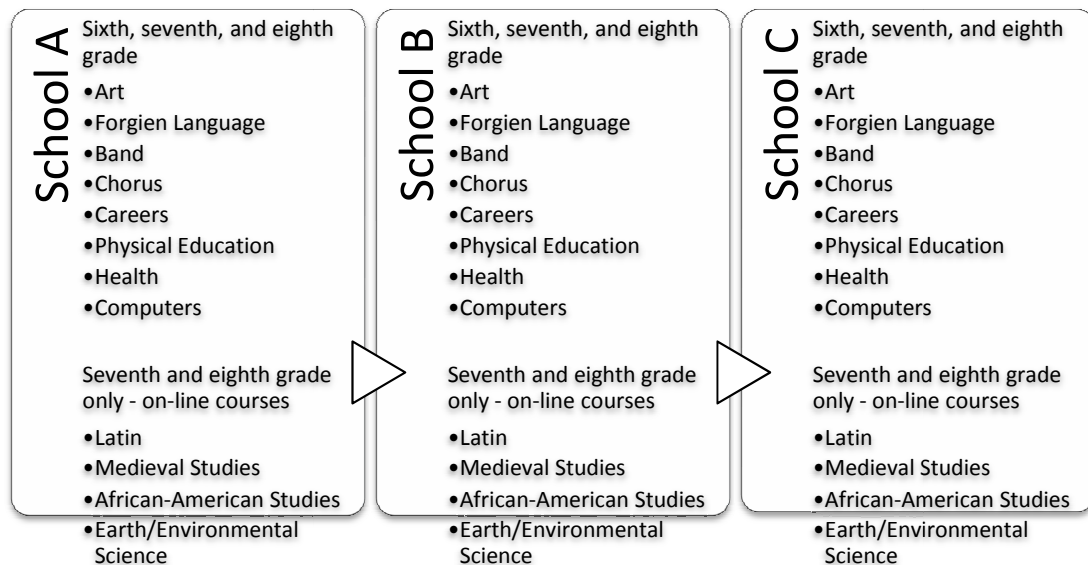


Figure. Courses Offered at the Schools in the Study in Addition to the Core.

According to the principal of School B, the problem with using computer-assisted

instruction (CAI) was not its availability. The problem was the usage of the data (Anonymous, personal communication, May 2010). The school system in which this case study was conducted recently experienced a change in leadership. By conducting a needs assessment and in order to keep abreast of current changes, district administration determined that the schools were not technologically proficient. Therefore, the administration looked at possibilities for technology acquisition and purchased equipment to help teachers incorporate more technology in the classroom. Along with the purchase of the new equipment came a mandate to use certain CAI materials, including Study Island. During the 2009-2010 school year, the county purchased Study Island for all schools in the district, and district-level administration began to monitor the use of this program by individual schools and individual teachers. However, the monitoring only extended to the usage of the program, not to how the data was being used (Anonymous, personal communication, May 2010).

Purpose of the Study

The purpose of this case study was to examine the impact of formative assessment data generated by Study Island on the informing, planning, and implementation of instruction in these particular schools. Each school's administration was the primary audience for this case study. However, the findings of this study may be beneficial to other schools implementing CAI and using that data to inform instruction.

Researcher's Role

The researcher, an instructor at a local university, had a positive relationship with the administration at all three of the schools being studied. As a former administrator in the county in which the study was conducted and at one of the schools studied, the researcher had established a relationship of mutual respect and a supportive attitude with

the faculties and administrations involved in this study.

Research Questions

Based on a review of the literature and the purpose of this case study, the following research questions were posed. Specific terms used in the questions are explained in the definition of terms.

1. How do teachers characterize their use of formative assessment data from Study Island?
2. How do teachers characterize their use of formative assessment data from Study Island with regards to the planning of instruction?
3. How do teachers characterize their use of formative assessment data from Study Island with regards to the implementation of instruction?

Definition of Terms

Case study. A type of ethnography that has the researcher examining a bonded system (Creswell, 2008).

Collective case study. A type of case study that describes multiple cases in order to analyze an issue or problem (Creswell, 2008).

Computer-assisted instruction. Any use of computers in an educational setting (Brown, 1997).

End-of-grade tests. Summative assessments given by the state of North Carolina at the end of the year for students in third through eighth grades. They are administered in reading and math every year and in science in Grades 5 and 8 (NCDPI Accountability Services Division, 2011).

Focus group interview. A small group of participants, usually four to six, who are interviewed by the researcher in a group setting (Creswell, 2008).

Formative assessment. Ongoing assessment, administered during instruction, that provides feedback and allows the teacher to adjust his or her instruction (McManus, 2008).

Implementation of instruction. For the purposes of this study, the researcher defines implementation of instruction as the act of following a plan of instruction. This includes, but is not limited to, the reteaching of areas of student weakness, feedback that is given while instruction is taking place, and making pedagogical changes such as group configuration or differentiation.

Likert scale. A measurement scale that establishes five points assumed to be at equal intervals. This scale allows participants to express the extent of their agreement or disagreement with a particular statement (Tuckman, 1999).

Mixed methods research. Procedures that have been established for conducting both quantitative and qualitative research in the same study (Creswell, 2008).

National Assessment of Educational Progress. A nationally administered assessment administered periodically in mathematics, reading, science, writing, the arts, civics, economics, geography, and U.S. history. Students are tested in Grades 4, 8, and 12 (U.S. Department of Education, Institute of Education Sciences, 2009).

No Child Left Behind. A reauthorization of the Elementary and Secondary Education Act of 1965. This legislation focused on the four areas of student accountability using research-based strategies to determine what works, increasing parent options in education and additional local control (NCLB, 2004).

Planning of instruction. For the purposes of this study, the researcher defines planning of instruction as the act of determining what to teach students in a formal manner. This includes, but is not limited to, the utilization of a scope and sequence,

planned feedback opportunities, and learning activities used to introduce and explain a concept. This can also include the act of constructing a plan to reteach any concept previously taught.

Race to the Top program. A grant program funded by the American Recovery and Reinvestment Act of 2009. Part of this act included education reform that supports innovation that could lead to increased student achievement in four areas. These four areas pertain to standards and assessments, data systems, effective teachers, and helping low-achieving schools (U.S. Department of Education, 2009).

Semi-structured interviews. A type of interview characterized by prescribed questions that allow for the flexibility of using follow-up questions if needed. This type of interview is useful when the topic being researched has already been introduced to the subjects and the researcher is seeking further information (Hoepfl, 1997).

Statistical Package for the Social Services (SPSS). A computer program marketed by IBM that provides over 50 statistical processes to analyze data (Definition of SPSS, n.d.).

Study Island. A web-based computer-assisted instruction program that assesses student learning and provides immediate feedback to students, teachers, and parents. The program is said to be aligned with the North Carolina Standard Course of Study. Teachers are able to generate reports that let them see how students are progressing individually and as a class (Magnolia Consulting, 2008).

Survey research. A research procedure in which the researcher administers a survey to participants to describe the attitudes, opinions, or characteristics of the population (Creswell, 2008).

Triangulate. The process of aligning data from different sources or methods of

data collection in order to ensure similar themes in qualitative research (Creswell, 2008).

21st Century Skills. A segment of the Framework for 21st Century Learning that focuses on 21st Century outcomes for students. The skills combine with content knowledge, expertise, and literacy to make up these outcomes. The skills are categorized into life and career skills, learning and innovation skills, and information, media, and technology skills (Partnership for 21st Century Skills, 2004).

Summary

The federal government urged state and local school systems to help all their students achieve grade-level proficiency. However, results from NAEP and end-of-grade tests (EOG) showed that, while schools and school systems were making progress, some students were still not meeting grade-level proficiency. The use of formative assessment can help move students toward proficiency; unfortunately there are obstacles to creating, collecting, and using both formative assessments and the data generated by those assessments. Computer programs, such as Study Island, have been produced to help with the creation and collection of the data. However, the use of the data in classroom instruction has not been a focus of much research. This study centered on how teachers used formative assessment data, specifically that data generated by Study Island, to inform, plan, and implement instruction.

Chapter 2: Literature Review

Overview

With the push from both the state and federal government to use data to drive instructional decisions in schools, districts purchased technology to help teachers create and manipulate data. Although computer programs were in place to help teachers utilize that data, not much research had been conducted on how teachers were actually using this data in their classrooms. The limited research conducted in this area suggested that the data being generated was not being used to the fullest. For example, teachers were reporting an increase in collaboration and knowledge of student needs, but they were not extending that knowledge into their instruction (Wayman & Stringfield, 2006). Therefore, this case study sought to determine the impact the data, specifically the formative assessment data generated by Study Island, had on the planning and implementation of instruction in these settings.

The literature review provides an overview of research related to data-driven decision making, formative assessment, computer-assisted instruction, and Study Island. Since the purpose of this study was to determine how teachers were using the data that was generated by Study Island in a formative manner in the planning and implementation of their instruction, formative assessment was examined at length. The theme of formative assessment is divided into four topics: history and definitions of formative assessment, types of formative assessment, formative assessment and classroom instruction, and teacher use of formative assessment. The theme of Study Island also includes the topic of implementation of the program and the reports of data generated by the program for teacher use.

Data-Driven Decision Making

According to the U.S. Department of Education, Office of Planning, Evaluation and Policy Development (2009), “the use of data in educational decision making is expected to span all layers of the education system—from the federal to the state, district, school and classroom levels” (p. 7). Current literature supported that data-driven decision making was indeed impacting all areas of the educational system. However, “a current central argument behind policy promoting evidence-based practice is that evidence of student learning should be used to evaluate and improve educational programs and practices” (Coburn & Talbert, 2006, p. 474). The question then became what type of evidence did one use and how should this evidence be collected and analyzed. Research suggested that teachers would utilize any data initiative when there was thorough implementation and the initiative responded to the needs of their individual students (Chen, Heritage, & Lee, 2005; Lachat & Smith, 2005). In fact, Wayman and Stringfield (2006) found that “data use often resulted in improved teaching practices such as collaboration, better knowledge of student needs, and efficiency of effort” (Abstract). Even though use of data improved teaching practice, and therefore should improve student learning, there were barriers to the usage of data of any type. Ingram, Louis, and Schroeder (2004) in *Accountability Policies and Teacher Decision Making: Barriers to the Use of Data to Improve Practice*, found seven barriers to data usage. They are:

1. Many teachers have developed their own personal metric for judging the effectiveness of their teaching and often this metric differs from the metrics of external parties (e.g., state accountability systems and school boards).
2. Many teachers and administrators base their decisions on experience, intuition and anecdotal information (professional judgment) rather than on information

that is collected systematically.

3. There is little agreement among stakeholders about which student outcomes are most important and what kinds of data are meaningful.
4. Some teachers disassociate their own performance and that of students, which leads them to overlook useful data.
5. Data that teachers want—about “really important outcomes”—are rarely available and are usually hard to measure.
6. Schools rarely provide the time needed to collect and analyze data.
7. Data have often been used politically, leading to mistrust of data and data avoidance. (Ingram et al., 2004, pp. 1281-1282)

When it comes to the use of data for political purposes, Ingram et al. (2004) explained that how much involvement teachers have with using data to make decisions is dependent on the “level of agreement and good will among the various constituents of the educational process” (p. 1282). They elaborated:

A politicized process that does not involve serious deliberation and discussion can serve to distort facts and to make power a more important ingredient of decision-making than data. Data, of course, still have a purpose. But the purpose is changed in the face of an adversarial political process. In this case, data are used to support a decision or course of action rather than to uncover problems and to objectively determine the best course of action. (Ingram et al., 2004, p. 1282)

Although these barriers are real, they are not insurmountable and the use of formative assessment overcomes many of the reasons not to use data in the decision-making process.

History and Definitions of Formative Assessment

The concept of formative assessment was first introduced in 1967 by Michael Scriven in relation to the discussion of the two roles of evaluation. First, he proposed evaluation that “may have a role in the on-going improvement of the curriculum” (Scriven, 1967, p. 41). Second, he suggested that

The evaluation process may serve to enable administrators to decide whether the entire finished curriculum, refined by the use of the evaluation process in its first role, represents a sufficiently significant advance on the available alternatives to justify the expense of adoption by a school system. (Scriven, 1967, pp. 41-42)

Scriven (1967) recommended “to use the terms ‘formative’ and ‘summative’ evaluation to qualify evaluation in these roles” (p. 43). Bloom (1969) proposed making this distinction as an application to the evaluation of student learning a mere 2 years later. According to Bloom (1969), tests had a traditional role evaluating students, however,

Quite in contrast is the use of “formative evaluation” to provide feedback and correctives at each stage in the teaching-learning process. By formative evaluation we mean evaluation by brief tests used by teachers and students as aids in the learning process. While such tests may be graded and used as part of the judging and classificatory function of evaluation, we see much more effective use of formative evaluation if it is separated from the grading process and used primarily as an aid to teaching. (p. 48)

The most important point made by both Bloom (1969) and Scriven (1967) concerning formative assessment was that the data created was used to change teaching.

Paul Black and Dylan Wiliam began an extensive report on formative assessment in the late 1990s. After examining over 250 journal entries and book chapters on the

topic, they determined that

Efforts to strengthen formative assessment produce significant learning gains as measured by comparing the average improvements in the test scores of the students involved in the innovation with the range of scores found for typical groups of students on the same tests. Effect sizes ranged between .4 and .7, with formative assessment apparently helping low-achieving students, including students with disabilities, even more than it helped other students (Black & Wiliam, 1998a, p. 52).

In a related study, Black and Wiliam (1998b) established a broad definition of assessment that basically included all information gained from classroom activities that could be used to inform and change instruction. They then described assessments as formative only when the information was used to adjust teaching and learning to meet student needs.

Paul Black and Dylan Wiliam continued to build on their early research. According to Wiliam (2006), curriculum assessment was only formative if it had impact on the curriculum's development and student assessment was formative only if it had an impact on student learning. "Assessments are formative, therefore, if and only if something is contingent on their outcome, and the information is actually used to alter what would have happened in the absence of the information" (Wiliam, 2006, p. 284). As Heritage (2007) stated, "the idea that assessment and teaching are reciprocal activities is still not firmly situated in the practice of educators" (p. 140). Based on this assertion from Heritage (2007) and the above literature, even though understandings of the purposes of formative assessment have been consistent over the decades, these purposes still are not commonplace in the classroom.

One of the difficulties in making the connection between the loop of instruction and formative assessment is the various definitions of formative assessment that have been addressed in the research over the years. From Scriven (1967) and Bloom (1969), educators gleaned the term *formative evaluation* as defined above. According to Dunn and Mulvenon (2009), this was where the problem of determining a specific definition for formative assessment began. They went on to state,

When reading formative assessment literature and focusing on the issue of solidifying a definition of the term, an interesting and problematic theme arose. Formative assessment and its various manifestations were defined not only by inherent characteristics, but also by the use of the assessment outcomes.

Formative assessment's status as an ethereal construct has been perpetuated in the literature due to the lack of an agreed upon definition. The vagueness of the definition directly contributes to the weakness found in the related research and the dearth of empirical evidence identifying best practices related to formative assessment. (Dunn & Mulvenon, 2009, p. 4)

For instance, O'Brien (2008) defined formative assessment as a conversation between teachers and students for the purpose of clarifying understanding and providing feedback. However, Black and Wiliam (1998b) defined formative assessment as "all those activities undertaken by teachers, and/or by their students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged" (p. 10). Popham (2008) saw formative assessment as a process that had been purposefully planned for teachers or students to use evidences from assessments to adjust both learning and instruction. The Council of Chief State School Officers (CCSSO), as informed by Formative Assessment for Students and Teachers (a

division of CCSSO), defined formative assessment as a process used during instruction to adjust teaching and learning for the purpose of improving student achievement (McManus, 2008). Even though the research did not agree on the origins of formative assessment, all definitions concluded that the purpose was to adjust instruction and learning.

For the purpose of this study, the researcher used the definition set forth by the CCSSO (McManus, 2008) which stated formative assessment is “a process used by teachers and students during instruction that provides feedback to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes” (p. 3).

Another area of confusion in the area of formative assessment is the delineation between types and purposes of assessment and the use of the data generated from the assessment. Black and Wiliam (1998b) suggested that formative assessments provide a wealth of data for the purposes of feedback, whether those purposes are diagnostic, predictive, or evaluative. Furthermore, Perie, Marion, and Gong (2007) asserted that defining the purpose of the assessment then clarified the type of assessment used. If the assessment was used to adjust teaching and learning, then it was formative. If the assessment was used to inform educators about student achievement levels and/or curriculum effectiveness, then it was interim. Confusion with this distinction arose when the same assessment was used for both purposes (Dunn & Mulvenon, 2009).

Perhaps most confusing in the body of literature is the demarcation between formative and summative assessment. Much of the literature focused on drawing a distinct line between summative and formative assessment. Sadler (1989) stated,

Formative assessments concerned with how judgments about the quality of

student responses (performances, pieces, or works) can be used to shape and improve the student's competence by short-circuiting the randomness and inefficiency of trial-and-error learning. Summative contrasts with formative assessment in that it is concerned with summing up or summarizing the achievement status of a student, and is geared towards reporting at that end of a course of study especially for purposes of certification. It is essentially passive and does not normally have immediate impact on learning, although it often influences decisions which may have profound educational and personal consequences for the student. The primary distinction between formative and summative assessment relates to purpose and effect, not to timing. (p. 120)

However Bell and Cowie (2000) suggested that formative assessment can be used for summative purposes and summative assessment can be used for formative purposes. Chappuis and Chappuis (2007), supporting Sadler's (1989) beliefs, stated,

Formative assessment, on the other hand, delivers information *during* the instructional process, *before* the summative assessment. Both the teacher and the student use formative assessment results to make decisions about what actions to take to promote further learning. It is an ongoing, dynamic process that involves far more than frequent testing, and measurement of student learning is just one of its components. (p. 15)

According to Dunn and Mulvenon (2009), "most literature categorizes any assessment used to assign grades as summative" (p. 2). However, "an assessment may be designed and packaged as a formative or summative assessment, it is the actual methodology, data analysis, and use of the results that determine whether an assessment is formatively or summatively evaluated" (Dunn & Mulvenon, 2009, p. 2). Wininger

(2005) provided both qualitative and quantitative feedback on the data generated from an evaluation, thereby using a summative assessment in a formative manner. Stiggins (2002) provided the clearest distinction by defining summative assessments as assessments that were designed to evaluate a student's learning after a set unit of instruction, otherwise known as assessment of learning. In a related report by Chappuis and Stiggins (2002), formative assessments were defined as those assessments that are designed to evaluate student learning during the instruction, or assessment for learning. Apparently, the literature does nothing to help clear up the confusion for teachers and researchers in search of a clear understanding of the nature of formative assessment.

Types of Formative Assessment

Perhaps another reason that the purpose of formative assessment is not common practice in classrooms is because teachers are not aware of the types of formative assessment. According to Wiliam (2006), there are three types of formative assessment as illustrated by Table 4.

Table 4

Types of Formative Assessment

Type	Focus	Length
Long-cycle	Across marking periods, semesters, years	4 weeks to 1 year or more
Medium-cycle	Within and between teaching units	1 to 4 weeks
Short-cycle	Within and between lessons	5 sec to 2 days

According to Table 4 and Wiliam (2006), the length of time did not matter in whether or not an assessment was considered formative. What mattered was how the data generated from the assessment was used.

While Wiliam (2006) categorized types of formative assessment in terms of time, Heritage (2007) delineated assessment according to “strategies for evidence gathering” (p. 141). The three types Heritage (2007) defined are:

On-the-fly assessment. On-the-fly assessment occurs spontaneously during the course of a lesson. For example, a teacher listening to group discussions hears students expressing misconceptions about the science concept she has been teaching. She then changes the direction of her lesson to provide a quick “pop-up” lesson. The pop-up lesson enables the teacher to clear up the misconceptions before proceeding with her planned instructional sequence.

Planned-for interaction. In planned-for interaction, teachers decide beforehand how they will elicit students’ thinking during the course of instruction. For example, teachers plan the questions they will ask during the course of the lesson in order to enable students to explore ideas, and these questions can elicit valuable assessment information.

Curriculum-embedded assessment. There are two kinds of curriculum-embedded assessments, those that teachers and curriculum developers embed in the ongoing curriculum to solicit feedback at key points in a learning sequence and those that are part of ongoing classroom activities. For example, student mathematical representations created during lessons can function as formative assessments, as can students’ science notebooks that are also part of students’ regular classroom activity. (p. 141)

Yet again, the purpose of all three types of assessment was to gain information to help guide future instruction and student understanding, thereby making the assessments formative in nature.

Formative Assessment and Classroom Instruction

Formative assessment use in the classroom developed in four main ways. Those ways are:

1. An enhanced attention to classroom dialogue, starting from a focus on the use of open questioning, but then broadening in scope to be enriched by a wide range of studies of such dialogue.
2. Peer and self-assessment, helping students to become independent learners by engaging in the assessment of their own and one another's work through focusing on the aims of their learning and on the criteria by which its quality can be judged.
3. Comment-only marking, or dialogue in writing, acting on the finding that marks on written work does not improve attainment, whereas formative comments do so improve.
4. The formative use of summative tests, an extension of comment-only marking, treating test answers as an occasion for formative feedback. This can also develop peer- and self-assessment activity if students either try setting test questions, which requires them to think about the purposes of the work to be tested, or mark one another's test responses, thereby focusing attention of their criteria of quality. (Black, Harrison, Lee, Marshall, & Wiliam, 2004, pp. 519-520)

Feedback based on formative assessment data is the connecting thread in all four of these practices. The use of feedback on the data generated by formative assessment moved to the forefront of classroom instruction as one continued to research. For example, early studies suggested teachers who gave feedback based on formative

assessment data helped students identify gaps in their learning and moved those students toward closing the gaps (Sadler, 1989).

Heritage (2007) shared similar findings in her research by discussing the four core elements of formative assessment. The elements she identified were “1) identifying the ‘gap,’ 2) feedback, 3) student involvement, and 4) learning progressions” (Heritage, 2007, p. 141). Heritage defined the *gap* by citing Royce Sadler’s work in 1989, which stated that the purpose of formative assessment was to determine the breakdown between the student’s learning and an educational goal. Heritage clarified that after the gap was determined, then the teacher could help move the student toward closing that gap instructionally. She shared that feedback allowed teachers to gain insight into student understanding, helped determine the next educational steps, and gave students an indication of how to move forward by being specific and descriptive. Heritage (2007) explained, “the teacher takes steps to close the gap between the students’ current learning and the goal by modifying instruction, assessing again to give further information about learning, modifying instruction again, and so on” (p. 142). Student involvement is another key piece of formative assessment. Students need to learn to assess themselves and their peers in order to understand their own learning process. Not only did the teachers need to help students assess themselves, “students must also collaborate with their teachers to determine the criteria for success for each step along the learning progression” (Heritage, 2007, p. 142). Learning progressions are the last element described by Heritage (2007). According to Heritage (2007), “learning progressions provide the big picture of what is to be learned, and they help teachers locate students’ current learning status on the continuum along which the student is expected to progress” (p. 142). Again, feedback is an essential piece of this process. In fact, Heritage (2007)

stated that “in formative assessment, learners must be able to use feedback to improve their learning” (p. 142). Without feedback, formative assessment becomes just assessment.

According to the National Council of Teachers of Mathematics (1995) assessment standards, three types of instructional decisions can be made using the data generated by formative assessment. The types of instructional decisions, long-term planning, short-term planning, and moment-by-moment decisions, are parallel to Wiliam’s (2006) types of formative assessment. Using moment-by-moment decisions, teachers could determine when misconceptions in instruction arose, when students comprehended the lesson, and when directions were unclear based on questioning and observation. With short-term planning, teachers could assess what student work collected should have been used to evaluate understanding and could ensure integration of instruction and assessment. Long-term planning allowed teachers to determine a variety of assessment practices in order to assess a larger set of curricular goals.

Shepard (2000), in her report on *The Role of Classroom Assessment in Teaching and Learning*, shared several suggestions for formative assessment, such as observation-based assessment tools, clinical interviews, portfolios, and think-alouds to determine aspects of student learning.

To assess comprehension, teachers might also use story retellings or ask specific questions about the text. Used routinely as a follow up to reading activity, such assessments provide valuable information but also convey to students the importance of thinking and talking about what they read. Brief assessments during reading time can be used to make immediate instructional decisions, such as focusing on compound words, emphasizing sense making, or changing text

level. (Shepard, 2000, p. 46)

Shepard (2000) continued to explain that in an example like this the teacher was not only gathering data but also informing instruction, thereby making assessment and instruction cohesive. Shepard (2000) advised teachers should use a variety of assessment techniques based on the concepts and skills to be measured and the type of data to be collected. In her discussion of changing assessment practices, Shepard (2000) pointed out that teachers should only change assessment practices if they were connected to curricular goals.

“Instead, particular assessment processes should be selected to model the habits of inquiry, problem-solving approaches, brainstorming ideas, modes of debate and critique, and other discourse practices associated with each discipline” (Shepard, 2000, p. 55).

William (2006) echoed this philosophy:

In science, teachers can often itemize the knowledge that they want students to acquire. This makes it relatively straightforward to move from monitoring (Is learning taking place?) to diagnosis (What is not being learned?) to action (What to do about it?). In reading, however, the cause of the problem is much less clear. (William, 2006, p. 286)

Therefore, according to Shepard (2000) and William (2006), the challenge came in determining how to generate the correct data initially in order to determine the appropriate next steps.

Two of the main purposes of formative assessment are “to improve student learning by promoting self-knowledge and the ability to self-evaluate” and “to inform and improve the teacher’s instructional decision-making process” (Colantonio, 2005, p. 24). Colantonio (2005) elaborated:

Teaching should empower students to gather, interpret, and analyze information,

and to produce meaningful connections and solutions independent of teachers.

Formative, ongoing assessment that provides students with descriptive feedback should be designed to improve students' capacity to improve themselves long after they leave the classroom. (p. 24)

Cauley and McMillan (2009) provided five key practices that supported formative assessment and that were directly related to student use. First, teachers should clarify learning targets for the students because this allows the students to set realistic, attainable learning goals. Next, teachers should offer feedback to the students that focus on developing their individual skills, understanding, and mastery because specific feedback provides hope and positive expectations for the students. Teachers should also attribute success and mastery to the direct effort students put forth so that students can see a direct relationship between effort and mastery. Teachers should promote student self-assessment. Cauley and McMillan (2009) stated that "self-assessment is a three-step process in which students judge their own work (self-monitor), identify discrepancies between current and desired performance (self-evaluation), and identify and implement further learning activities to enhance their understanding or skills" (pp. 4-5). The authors encouraged this so that students can develop autonomy in the learning process. Last, formative assessment helps students set attainable goals and develop self-efficacy (Cauley & McMillan, 2009, pp. 3-5). These five practices could lead to increased student motivation and achievement by helping students understand the learning process through use of formative assessment data.

Chappuis and Chappuis (2007), in their article *The Best Value in Formative Assessment*, shared questions that teachers can ask students to guide students in their learning. Some of those questions were:

What are my strengths relative to the standards?

What have I seen myself improve at?

Where are my areas of weakness?

Where didn't I perform as desired, and how might I make those answers better?

What do these results mean for the next steps in my learning, and how should I prepare for that improvement? (Chappuis & Chappuis, 2007, pp. 16-17)

They went on to explain that teachers could use formative assessment data to support student learning in two ways, by changing instruction based on the data and by having students use the data to modify their own learning. They also offered suggestions for teachers to figure out where they were going, where they are now, and how they can close the gap. For example, Chappuis and Chappuis (2007) recommended that teachers “give students a list of the learning targets they are responsible for mastering, written in kid friendly language” (p. 17) and “show students anonymous strong and weak examples of the kind of product or performance they are expected to create and have them use a scoring guide to determine which one is better and why” (p. 17) in order to help students understand where they were going. They also recommend that teachers

Administer a nongraded quiz partway through the learning, to help both teacher and student understand who needs to work on what, highlight phrases on a scoring guide reflecting specific strengths and areas for improvement and staple it to student work, have students identify their own strengths and areas for improvement using a scoring guide, and have students keep a list of learning targets for the course and periodically check off the ones they have mastered. (Chappuis & Chappuis, 2007, p. 17)

This recommendation is to help students determine their current level of learning. Other

suggestions for teachers to help them close the gap included “give students feedback and have them use it to set goals, have students graph or describe their progress on specific learning targets, and ask students to comment on their progress” (Chappuis & Chappuis, 2007, p. 17). A main point made by Chappuis and Chappuis (2007) is that feedback is the key to formative assessment. They explained:

Effective descriptive feedback focuses on the intended learning, identifies specific strengths, points to areas needing improvement, suggests a route of action students can take to close the gap between where they are now and where they need to be, takes into account the amount of corrective feedback the learner can act on at one time, and models the kind of thinking students will engage in when they self-assess. (Chappuis & Chappuis, 2007, pp. 17-18)

Whether the data was utilized by the teacher or the student, feedback was the necessary piece to make formative assessment effective as recommended by the research.

However, all of the above recommendations are just that, recommendations. None of these studies actually discussed how teachers were using formative assessment data in the classroom.

Teacher Use of Formative Assessment Data

While a wealth of literature that discusses how formative assessment should be used in classrooms, the researcher was not able to find much literature on how teachers were actually using formative assessment data to inform instruction. In fact, Wayman (2005) supported the findings that there was little in the way of research in this area. Common uses of formative assessment data in schools were to purposefully improve instructional practice (Coburn & Talbert, 2006; Wayman & Stringfield, 2006), to measure student learning (Coburn & Talbert, 2006), to focus on student needs for

intervention (Streifer & Shumann, 2005), to instill a sense of ownership for achievement in students (Kerr, Marsh, Ikemoto, Darilek, & Barney, 2006; Wayman & Stringfield, 2006), and to begin discussion and collaboration among educators (Brunner et al., 2005; Lachat & Smith, 2005; Wayman & Stringfield, 2006). For example, Wayman and Stringfield (2006) interviewed the faculty in three schools to determine how those schools were involving their faculties in examining student data. They found that examination of the data produced changes in practice in the schools studied. These changes were “increased sense of teacher efficiency, better response to student needs, examining practice, and increased collaboration” (Wayman & Stringfield, 2006, “Changes in Faculty Practice,” para. 1). However, they stated, “teachers in all schools expressed some difficulty in connecting the data to instruction, citing lack of preparation” (Wayman & Stringfield, 2006, “Reflecting on Practice”, para. 3). Even though the teachers expressed benefits of having access to student data, they still did not feel that the data helped them change their direct instruction.

In the study *Readiness, fit, and coherence: The implementation of formative assessment products in three Massachusetts school districts*, Militello et al. (2007) analyzed the fit of formative assessment systems in three school districts. This study included collecting data on how teachers were actually using the data from these formative assessment systems to monitor student learning and adjust instruction.

In one school, teachers used the data to adjust planning or identify areas of weakness and strength with their scope and sequence. They also used the data in curricular decision making, but were honest in their lack of ability to go back and reteach material that students did not master. “Admittedly, the teachers told us there was very little time and support to implement any of the findings in regard to re-teaching or

implementing specific pedagogical changes (e.g. differentiated instruction, re-grouping)” (Militello et al., 2007, p. 60).

In another school, teachers indicated that they looked at assessment results to identify weak areas for their classes, but “when pressed, teachers admit to not having detailed enough information to really hone in on specific areas for focus” (Militello et al., 2007, p. 65). However, many teachers assigned computer-based remediation and supplementation to students based on the results of the assessment. They also used the data in monthly departmental meetings led by the administration to discuss teaching practices.

At a different school in the same district as the one above, teachers used assessment scores to conference with their students and set individual performance goals. Even though this was not a formal process for the students, many of the teachers were able to track individual progress throughout the school year using this system.

Another school district used data to conduct debriefing sessions that “revolve around three overarching questions: (1) how well did our students perform on the assessment (as a school and individual students)? (2) why is this occurring? and (3) what can we do about it?” (Militello et al., 2007, p. 71). In these sessions, teachers learned not only about the data itself, but also about how the information informed learning as much, if not more, than performance. These conversations allowed teachers and administrators to change curriculum, interventions, and student participation. Another benefit of these sessions was that teachers used the results to modify instruction. “As one teacher explained, ‘We look at students who fell short.... We add questions based on this information’” (Militello et al., 2007, p. 72). Curriculum in this district was viewed “as malleable and as a work in progress” (Militello et al., 2007, p. 73). When it came to

differentiation,

teachers often spoke of differentiating their assignments, both homework and instruction, after looking at their class results....One teacher described, “I use the items I know I taught, and students did not get.” These questions become discussion points about pedagogy and differentiation. (Militello et al., 2007, p. 73)

The district used assessments to target intervention groups. The teachers used the data to group students based on their math ability. They then put those groups into a “math seminar” (Militello et al., 2007, p. 74) that met daily for 20 minutes. The teachers targeted student needs for each group. According to most definitions of formative assessment this is its purpose, to use the data to make adjustments to teaching and learning. However, there is very little literature to support that this is actually a daily occurrence in classrooms.

Computer-Assisted Instruction

Computer-assisted instruction (CAI) was created to help teachers define gaps in learning, prescribe a course of instruction and remediate for individual students (Magnolia Consulting, 2008). According to Brown (1997), computer-assisted learning refers to all use of computers in an educational setting. Even though there are several ways to utilize computers in an educational setting, this study focused on the computer delivery of instruction, which is considered CAI. There are four types of CAI: drill and practice, tutorials, games, and simulation. Drill and practice is one of the simplest and most common forms of CAI and is used to increase knowledge through repetition. The advantage of this type of program is the automatic feedback it provides the user; however, it is not much better than traditional methods of drill and practice. In contrast

to drill and practice, tutorials are the most common type of CAI and are used to attempt to teach new material. They offer a set of information and then a prescribed set of questions which monitor student progress. More complex tutorial programs place the student into more questions based on correct or incorrect responses and can even offer analysis of the response to a question. This one-on-one tutoring and immediate feedback is beneficial to students when it comes to improving their knowledge base; however, it does not replace a teacher when it comes to analyzing nuances of meaning (Brown, 1997). According to Dowd and Bower (n.d.), games are another type of CAI and are usually used to reinforce information that has already been learned. Games can often be categorized as simulation or drill and practice; however, the expected outcome places them in their own category. The most advantageous aspect of games is their ability to increase student motivation. The last type of CAI is simulation, which attempts to mimic real-life situations. These types of programs allow students to be able to practice problem-solving skills in a nonthreatening atmosphere and can also place emphasis on higher-order thinking skills (Dowd & Bower, n.d.). Study Island is a web-based program that has both a one-on-one tutorial and a selection of games, combining two types of CAI.

Study Island

Based on the research conducted by Magnolia Consulting (2008), Study Island is a web-based program that delivers instruction based on students' individual needs and it provides specific feedback to students, teachers, and parents. The questions are aligned with the North Carolina Standard Course of Study and are content specific. The program covers language arts, math, and science, all subjects that were tested in North Carolina. This program was created in response to the need for continual progress monitoring.

Study Island provided a means to do this via a web-based mastery program that delivered both dynamic and specific instruction and provided individualized reports of progress to teachers, administrators, and parents (Magnolia Consulting, 2008).

Implementation of Study Island

Study Island has no set guidelines for implementation. A county in eastern North Carolina had published implementation ideas provided by Study Island, Inc. to its website. Study Island recommended that teachers in this particular county begin implementation by obtaining the previous year's test scores and identifying the low areas by objective. Next the teacher was supposed to determine whether the areas identified need to be reviewed with the whole class or if the information is just needed by small groups of students. The company suggested that the program itself could be used to determine all of this information simply by using the materials from the previous grade level. They gave the teacher two suggestions for reviewing the material, either by traditional means that were not specified, or by using a data projector and the Study Island website to review the topics one problem at a time. If the teacher determined that there was a need for small group review, then Study Island, Inc. suggested following the same method to determine areas for review and then assigning topics needed to individual students (Study Island, n.d.).

Their procedure for introducing new concepts was similar to their procedure for review. However, Study Island, Inc. did state that the website did not take the place of a teacher and the teacher needed to introduce the concept in class. Then the teacher needed to review the material in a whole class setting using the grade-level objectives. Once that was complete, they suggested testing by assigning the specific objective to the student to complete via the website and then to also test via a printable worksheet if needed. The

company also recommended using their benchmark assessments at the end of each 9 weeks to determine remediation needs. Based on the results of the benchmark tests, students should be assigned review material on the website and teachers should provide the information to parents so they can support their students on the website at home. Schools should also provide time before or after school for students to access the website. The final recommendation was to continue to assess concepts cumulatively via the benchmarks and review as necessary based on those results. Even though these recommendations for implementation were created for a school system in eastern North Carolina, they are generic enough to be utilized by any other school system who subscribes to Study Island (Study Island, n.d.).

Data Generated by Study Island

The reports provided by Study Island include immediate diagnostic, formative, and summative assessment results. The diagnostic data allows teachers, administrators, and parents to have continual information about students' weaknesses, the formative data informs interested parties of an individual student's progress toward meeting an individual goal, and the summative data allows one to see the eventual mastery of a concept or topic (Magnolia Consulting, 2008). When contacted by the researcher, Study Island provided some examples of reports that can be created by the program for use in this study. The Benchmarking report (Appendix A) and the Individual Student report (Appendix B) can be used as a diagnostic, formative, or summative data. The Compare With Others report (Appendix C), which compares a student's performance on goals with other students in the school and other students in the state, can be used as formative data.

As stated in the research conducted by Magnolia Consulting (2008), these reports are also accessible to students, which allows individual students to see where they stand

at any given time in relation to all other students using Study Island and working with that particular concept. Students can monitor their own growth and progress toward mastery of individual skills and are even awarded blue ribbons for concepts when mastery is achieved. The program also adjusts levels of questioning based on individual student answers, which provides immediate differentiation. If a student is not answering questions correctly, the program provides questions that cover the concepts that must be mastered in order to be successful on the original topic. Therefore, the student is immediately remediated on skills until mastery is achieved. Then the program moves the student back into the first concept so that the student is able to attack the concept with success. This is not possible without the explanation piece of the program. Whenever a student gets a question wrong, he or she is able to view an explanation of the question, which allows the student to correct misconceptions without teacher intervention. Using this piece of the program allows a student to work at his or her own pace and allows him or her to practice difficult concepts from any computer with internet access, even his or her home computer (Magnolia Consulting, 2008). All of the data is collected and is accessible to teachers and administrators in report form.

The administrative and reporting features of the *Study Island* program allow teachers and administrators to monitor constantly how students are progressing through these personalized trajectories toward mastering the required benchmarks and standards. If students begin to fall below or exceed certain levels of achievement, teachers can prescribe additional practice at specific levels through the program and continue to monitor students' progress, or they can provide additional instruction or remediation within the classroom. Therefore, when teachers integrate *Study Island* into their curriculum, it essentially allows for

individualized, differential instruction that could otherwise be difficult for one teacher alone to provide. (Magnolia Consulting, 2008, p. 7)

With this continual progress monitoring, teachers can determine the next steps for their own instruction. Not only can teachers see how the individual students are progressing, they can monitor how their classes are doing when compared to other classes in the school, the district, and even the state. Teachers can generate reports that address the strengths and weaknesses of the class and as individuals broken down by topic aligned to state standards, allow them to view individual statistics, allow them to view a breakdown of all students in and their progress within an individual topic aligned to state standards, allow them to view missed questions, and allow them to view statistics based on state topics (Study Island Report, n.d.).

Adult Learning Theory and Professional Development

Adult learning theory, or andragogy, was first introduced by Malcolm Knowles in the early 1970s. He proposed six principles, as follows:

1. The learner's need to know
2. Self-concept of the learner
3. Prior experience of the learner
4. Readiness to learn
5. Orientation to learn
6. Motivation to learn (Knowles, Holten, & Swanson, 2005, p. 3).

He continued to explain, “andragogy works best in practice when it is adapted to fit the uniqueness of the learners and the learning situation” (Knowles et al., 2005, p. 3).

Brookfield (1988), echoing Knowles, summarized the writings of other adult learning theorists by suggesting a list of characteristics adult learners share. He proposed that

adult learners display diverse learning styles, prefer self-directed learning, would rather learning activities be problem-centered and relevant to their own life, construct connections between learning experiences and their self-concepts as learners, and bring prior experiences to learning activities (Brookfield, 1988). Based on these principles and characteristics, Leib (1991) recommended four critical elements of learning that one should consider in order to ensure learning takes place. Those elements are motivation, reinforcement, retention, and transference. In order to motivate adult learners, Lieb (1991) suggested that one “set a feeling or tone for the lesson, set an appropriate level of concern, and set an appropriate level of difficulty” (Leib, 1991, “Motivation,” para. 1). He added that learners also need feedback, reward, although the reward can be intangible, and interest in the subject. When it came to the notion of reinforcement, Leib (1991) said, “reinforcement is a very necessary part of the teaching/learning process; through it, instructors encourage correct modes of behavior and performance” (“Reinforcement,” para. 1). He added that both positive and negative reinforcement should be used if instructors want to change behaviors. As for retention, Leib (1991) stated,

The instructor’s job is not finished until they have assisted the learned in retaining the information. In order for participants to retain the information taught, they must see a meaning or purpose for that information. They must also understand and be able to interpret and apply the information. This understanding includes their ability to assign the correct degree of importance to the material.

(“Retention,” para. 1)

He continued to add to the idea of retention by suggesting that how much information the learner retains is in direct relationship to the amount of practice during the learning process. The last critical element of learning was transference. Transference, according

to Leib (1991), is the “ability to use the information taught in the course but in a new setting” (“Transference,” para. 1). Transference can be positive if the learners use the information taught. However, it can be negative if the learners abandon the information. The characteristics of adult learners as defined by adult learning theory and the critical elements of learning are vital to understanding appropriate professional development for educators.

Wayman and Cho (2008) summed up the needs of professional development when they said the following:

A comprehensive professional development plan should support elements from the entire cycle of educator decision making, from access, to interpretation, to taking action and using feedback. This lens, coupled with the knowledge that the backgrounds and needs of district educators are as varied as the educators themselves, suggests that preparation offerings should be widely varied and offered at regular, frequent intervals. (p. 96)

They were explaining how to prepare teachers to use data systems in an effective manner. Wayman, Cho, and Johnston (2007) suggested that trainings should be specific and relevant, and that there should be generous staff development in regards to whatever computer program was being implemented. Of course, these recommendations are recommendations for professional development when a district is introducing a data system; however, they are applicable to training after such a program has been implemented.

When it comes to professional development with regards to technology, Hall and Hord (1987) identified seven stages of concern for teachers as they learned to use new technology. They were awareness, informational, personal, management, consequence,

collaboration, and refocusing. Overbaugh and Lu (2008) elaborated on Hall and Hord's (1987) work by saying,

The first three stages are “self” types of concerns that focus on teachers’ internal concerns such as personal knowledge, involvement, and ability. The fourth stage is “task” oriented, as it addresses the logistics and scheduling arrangements with regard to the use of the innovation. The last three stages are “impact” kinds of concerns that deal with teachers’ external concerns about how the innovation may affect their students, colleagues, and future work. (p. 45)

Overbaugh and Lu (2008) did acknowledge that these stages of concern may be affected by various factors including age, grade level taught, and confidence with innovation. They used these stages of concern to conduct a study to determine the effectiveness of a variety of online professional development courses. Overbaugh and Lu (2008) used pre, post, and follow-up surveys along with interviews to collect data. They surveyed 377 PK-12 in-service teachers who volunteered to take the online coursework. Based on their findings, they recommended that professional development should be frequent and ongoing. They elaborated:

The results suggest that professional development can focus mostly on addressing teachers’ self-based concerns by providing information about technology-enhanced/based teaching and learning strategies and how they can incorporate those strategies into their existing curricula. Conversely, professional development efforts may not need to be overly concerned about convincing teachers that the new strategies will help their students learn, they already know that. Efforts may also not need to emphasize collaboration with others because teachers are already working with others and figuring out different ways to use

what they already have and know. (Overbaugh & Lee, 2008, p. 54)

Another recommendation that was made was that a variety of professional development should be offered, echoing the suggestions of Wayman and Cho (2008).

When considering adult learning theory and the tenets of professional development with regards to technology, the minimalist theory of John Carroll immediately comes to mind since it is a framework for designing instruction that focuses on training materials for computer users. This model suggests that learning tasks should be meaningful and independent activities, realistic projects should be given in the process, instruction should increase the number of interactive activities, there should be time to allow for mistakes and learning correction, and the training and the system should be closely tied together. It also takes into consideration that the learners are adult learners and that they have little patience for being treated as if everything is new information. Adult learners bring a wealth of prior knowledge to any task and can access that prior knowledge without being prompted (Carroll, 1990). The minimalist theory is one that can inform those planning technology training by incorporating the characteristics of adult learners and recommendations for professional development with regards to technology.

Aversion to computer use by teachers is another factor to consider when implementing CAI in any setting. According to Bohlin (n.d.),

Avoidance of computers can be a severe problem as a society becomes so highly technological, especially when teachers avoid interacting with computers. To properly integrate computers into the classroom curriculum, teachers need the proper disposition. Specifically, teachers should be motivated and not feel anxious about the use of computers. Further, they need confidence and positive

attitudes toward computers. Past experience has shown that merely making technology available does not produce appropriate use of technology. Assuming that good instruction in teacher preparation programs will always change anxiety, confidence, and attitudes is naive. These are very important variables, because attitudes and confidence are strong predictors of actual voluntary behaviors (such as decisions regarding the integration of technology into their curriculum). If computer anxiety is combined with low confidence, low motivation, or negative attitudes, individuals will strive to avoid interactions with computers. (“The Importance”)

Bohlin (n.d.) suggested several methods for helping teachers overcome this aversion to computers through planned professional development. He shared that instruction should focus on interest, relevance, satisfaction, confidence/anxiety, and attitude change.

Strategies for each of these were elaborated on in the following manner:

Interest:

Promote enthusiasm about computers.

Provide information that captures the interest and attention of the learner.

Make the subject matter seem important.

Make learners feel curious about the subject matter.

Relevance:

Show the learners how the material they learn will be useful to them.

Allow opportunities for practical application of the content.

Demonstrate to the learners how they will personally benefit from the knowledge acquired in the class.

Make sure that the difficulty level stretches the learners but doesn't create too

much stress.

Provide opportunities to work with other learners to provide for those with a high need for affiliation.

Satisfaction:

Provide learners with opportunities to set and achieve high standards of excellence.

Give learners opportunities to provide input into determining some aspects of the assignments.

Require learners to evaluate their own work and explain how their self-evaluations match the instructor's evaluation.

Give clear and thorough feedback to work.

Confidence/Anxiety:

Provide small easily managed sections with frequent opportunities for hands-on practice to reduce dependence upon memory and improve expectancy for success.

Provide early experiences that are in a low-risk environment.

Emphasize the non judgmental nature of the computer.

State clearly the requirements for successful completion.

Stress the importance of trial-and-error and learning from one's mistakes as potential methods of learning computer skills.

Provide methods for improving the learners' coping efficacy.

Attitude Change:

Use a credible source or model to present a position about computers.

Present discrepant views about computers within the latitude of acceptance; that is, provide cognitive information that is consonant with the views already held by

the audience and with the attitude to be altered, but discrepant with the attitude to be changed.

Establish wide latitudes of acceptance by using successive approximations.

Present both sides of the argument and present the most important issue or argument last.

Create dissonance by setting up decision-making instances, where the preferred decision to be made involves alternatives that are important and attractive to the audience.

Provide direct reinforcement for the desired attitude.

Make the environment where the attitude is displayed pleasant and reinforcing.

(Bohlin, Strategies, n.d.)

Using these guidelines to plan professional development in regards to CAI, along with the tenets of adult learning theory and the minimalist theory may help overcome anxiety with implementation and increase teacher buy-in.

Research Questions

Based on a review of the literature and the purpose of this case study, the following research questions were posed. Specific terms used in the questions were explained in the definition of terms.

1. How do teachers characterize their use of formative assessment data from Study Island?
2. How do teachers characterize their use of formative assessment data from Study Island with regards to the planning of instruction?
3. How do teachers characterize their use of formative assessment data from Study Island with regards to the implementation of instruction?

Summary

Data-driven decision making became increasingly prevalent in school systems because of the push by the state and federal governments. Even though educators had real concerns about the use of student data to make decisions, the practice of formative assessment can help alleviate some of those concerns. Formative assessment, first introduced by Scriven in 1967 and further elucidated by Bloom in 1969, has been the focus of many studies over the past 4 decades. While these studies attempted to explain the concept, there has been much conflict and confusion over the definition and purposes of formative assessment. In fact, the research even vacillates between whether data collected from an assessment can be used both formatively and summatively or if using it in one way automatically means it cannot be used the other way. The only point that the researchers seem to agree on is that formative assessment should be used to influence student learning. Another confusing piece of the formative assessment puzzle is the types of formative assessment. However, researchers again agree that the purpose of all types of assessment should be to help guide instruction and student understanding. Although there is much confusion over what formative assessment is, there is clear agreement on what should be done with the data that is generated. Feedback, both teacher and student initiated, seemed to be the key in utilizing formative assessment data in classroom instruction. Many researchers gave recommendations about how to use formative assessment data, including feedback; however, few researchers have delved into studying how teachers were actually using the data in their classrooms. Those few studies showed that teachers were attempting to use the data to make adjustments to teaching and learning; even so, the researcher could only find one study that showed how the use of the data was impacting day-to-day classroom planning and instruction. One of the ways

to help teachers become more effective in the use of formative assessment data was to implement CAI. Study Island is a web-based form of CAI that can help teachers and students indentify gaps in reading, math, and science. Not only does the program indentify gaps, it can help remediate by providing specific feedback targeted for both groups of students and individual students. Teachers can use the data generated by the program in a variety of ways with the intent of informing their planning and instruction to improve student learning. The purpose of this research, therefore, is to determine how the data generated by Study Island is used to inform, plan, and implement instruction in the schools studied.

Chapter 3: Methodology

Overview

The purpose of this mixed methods case study was to determine how teachers were using the formative assessment data generated by Study Island to inform, plan, and implement instruction. Data generated by Study Island, along with teacher survey data, focus group interview data, and individual interview data, were collected and analyzed in order to determine exactly how teachers were implementing this information into their day-to-day classroom instruction. This study focused on language arts, math, and eighth-grade science classes in three traditional middle schools in a rural county in western North Carolina. The results of this study were shared with the teachers and administrators in the schools targeted as well as the county administration.

Research Questions

Based on a review of the literature and the purpose of this case study, the following research questions were posed. Specific terms used in the questions were explained in the definition of terms.

1. How do teachers characterize their use of formative assessment data from Study Island?
2. How do teachers characterize their use of formative assessment data from Study Island with regards to the planning of instruction?
3. How do teachers characterize their use of formative assessment data from Study Island with regards to the implementation of instruction?

Research Design and Rationale

The methodology of this research followed a collective case study design. A collective case study is one that describes and compares several cases to understand a

problem or issue (Creswell, 2008; Stake, 1995). In a collective case study, the researcher collects several forms of data from various individuals to fully understand the problem. This researcher chose to collect survey data, focus group data, and individual interview data to gain a comprehensive understanding of how teachers used formative assessment data created by Study Island in their instruction.

Collecting quantitative data through a survey allowed the researcher to easily identify trends or differences in the data, but provided no explanation for either the trends or the differences. Therefore, the use of qualitative data by means of focus group interviews and individual interviews offset the inherent weakness of quantitative data, allowing the researcher to explore those trends and differences brought to light. Because of the need to further explore the data collected initially, the researcher chose to use a mixed methods design. Defined by Creswell (2008) as “procedures for collecting, analyzing, and mixing both quantitative and qualitative data in a single study” (p. 62), using this design allowed the researcher to gain a better understanding of the issue than simply collecting qualitative or quantitative data alone would provide. By utilizing a mixed methods design for this collective case study, the researcher was able to obtain statistical data and then follow up on any misconceptions or gain clarification through the use of focus group interviews and individual interviews.

Participants

The researcher chose to focus this study on three traditional middle schools in a rural county in western North Carolina. These three schools were chosen because they had all been using Study Island for various amounts of time and in various ways. By choosing schools that had varied lengths of use and different methods of implementation for the program, the researcher was better able to determine if exposure to the program

and implementation of the program affected use of the data. The language arts, math, and eighth-grade science teachers at these schools were the focus of this study due to the fact that those were the subject areas covered by Study Island. All teachers that use Study Island (n=56) were given a survey to collect data. Table 5 shows the number of teachers per subject per school to which the survey was sent.

Table 5

Number of Teachers per Subject per School

	Reading	Math	Science (8 th Grade Only)
School A	7	7	2
School B	9	9	2
School C	9	9	2

Once that data was collected and analyzed, teachers were randomly selected from the initial group to conduct focus group interviews in order to clear up inconsistencies from the survey. The process of random selection was utilized a second time to determine participants for individual interviews to further clarify understandings.

According to the NC Report Card website, School A served 498 students, School B served 672 students, and School C served 652 students, all in Grades 6 through 8. Table 6 illustrates the qualifications of the teachers in all three schools, as well as the teacher turnover rate in each school.

Table 6

Teacher Qualifications

	No. of Teachers	% Fully Licensed	% Holding Advanced Degrees	No. Nationally Board Certified	% Turnover Rate
School A	38	100.0	29.0	5	13.0
School B	40	98.0	33.0	8	12.0
School C	44	98.0	46.0	8	9.0

Table 7 shows the years of experience of the teachers in each school.

Table 7

Years of Experience of Teachers by Percentage

	0-3 Years	4-10 Years	10 or more Years
School A	26.0	42.0	32.0
School B	10.0	43.0	48.0
School C	14.0	25.0	61.0

Instruments

The researcher collected data using a survey, focus group interviews, and individual interviews. The purpose of a survey is to “describe the attitudes, opinions, behaviors, or characteristics of the population” (Creswell, 2008, p. 388). On the other hand, the purpose of both focus group interviews and individual interviews is to “allow investigators to measure what someone knows, what someone likes and dislikes, and what someone thinks” (Tuckman, 1999, p. 237). These collection instruments directly related to the purpose of the study being conducted as well as to the research questions

posed by the researcher.

The survey (Appendix D) was adapted from a similar research study conducted by Millitello et al. (2007) titled *Readiness, fit, and coherence: The implementation of formative assessment products in three Massachusetts school districts*. The authors gave the researcher permission, upon request, to alter the survey to fit the purposes of this study via electronic mail (Appendix E). The focus of the survey was to determine how teachers use the data generated by Study Island to inform, plan, and implement instruction. Once the survey was adapted, it was sent to the authors of the previous study for validation. It was also sent to the administrators of the schools being studied as well as a middle grades mentor employed by a local district office to further establish validity. The survey employed a Likert scale. The Likert scale is a 5-point scale with the designations as follows: a great deal, much, some, little, or none. Another set of designations used for the scale was frequently, regularly, occasionally, rarely, or never. There were four open-ended questions in the survey as well.

The researcher also used interviews to collect data in this study. The focus group questions were developed from the data collected from the surveys. Since the purpose of the focus groups was to clarify misconceptions and to further understandings from the survey and generate discussion, basing the questions on the data collected was appropriate. The questions for the focus group interviews were not developed until after the survey data were collected. Individual interview questions were developed based on themes elaborated on in the literature review and the generic reports provided by Study Island. The first question in the interview, after collecting demographic data, was designed to elicit conversation about documents the teacher may or may not be using from Study Island. The generic Study Island reports were used to initiate discussion

about how teachers were interpreting the data and using the data to plan and implement instruction. Interview protocols for each school's focus group interviews (Appendices F, G, and H) and all individual interviews (Appendix I) focused on perceptions of the data generated by Study Island and the impact of that data on classroom instruction. The themes of the interview protocol for individual interviews included contextual and demographic information, preferences for types of reports generated by Study Island, the use of those reports in informing, planning, and implementing instruction, and their perceptions of generic Study Island data. The interviews were semi-structured, which allowed for use of follow-up questions.

The researcher addressed content validity and reliability of each instrument used. Creswell (2008) defined content validity as "the extent to which the questions on the instrument and the scores from these questions are representative of all the possible questions that a researcher could ask about the content" (p. 172). Reliability means "that the scores from an instrument are stable and consistent" (Creswell, 2008, p. 169). The survey was sent to Matthew Millitello, Stephen Sireci, and Jason Schweid, the authors of the interview on which the survey was based, for feedback on both content validity and reliability. Administrators in each of the schools in the study also reviewed the survey to ensure it addressed their questions about data use as well. Lastly, it was sent to a Nationally Board Certified veteran teacher in another county who had used the program in her classroom and had helped other teachers incorporate Study Island into their instruction. The interview questions for the focus group interviews were developed from the data collected by the survey, and therefore ensured validity and reliability. The researcher ensured internal validity and reliability by having an independent researcher read through the survey data and transcripts to determine the accuracy of the identified

themes. This independent researcher was a doctoral student in the county in which the study was being conducted as well as a Nationally Board Certified teacher and had previously used this program in her classroom.

Procedures

To begin the data collection process, the superintendent of the school system studied gave permission to proceed. Then the principal at each school agreed for the data to be collected in their schools. Lastly, the teachers involved in the study gave their permission to participate. The researcher acquired all required permissions through letters to the parties involved (Appendices J, K, and L). These letters addressed how the instruments were to be administered and the assurance of the confidentiality of both the participants and the schools involved. The researcher was able to administer the surveys in an electronic format in mid-March, allowing the teachers involved 2 weeks to respond. The data collected was entered into SPSS to collect frequency data. This data was analyzed to determine statistical themes and enabled the researcher to establish questions for the focus group.

Through simple random sampling, as explained in Creswell (2008), the researcher assigned numbers to all teachers who were eligible to participate in the survey in each school. Each focus group consisted of four to six members, as Creswell (2008) suggested. The teacher who corresponded with every fifth number on each school list was asked to participate in the focus group interview, which took place in late March and early April. The researcher used a similar process to select two teachers from each school for individual interviews, which took place in late March and early April. To select individual interview participants, two teachers who did not participate in the focus group interview were chosen by dividing the list of teachers in half and selecting the

teacher who corresponded with the last number on the list. All focus group and individual interviews were tape recorded and transcribed so that the researcher could review and code the various themes that emerged from the discussions.

The quantitative data collected through the survey was coded via ordinals and descriptive statistics were analyzed. The researcher read through the data collected from the qualitative questions on the survey to get an overall sense of the material. Then the researcher coded the data, looking for themes. Once themes were established, focus group interview questions were written. The process for data analysis was repeated. Creswell (2008) and Seidel (1998) both acknowledged that the data analysis process for all research is iterative. The data was also entered into text analysis software at each stage of the process to confirm these findings. An independent researcher, who was a doctoral student, reviewed the collected data at each stage of the process by reading the data and giving feedback on assigned themes, which were established based on the themes prevalent in the literature review and the commonalities of the responses provided by the teachers.

The researcher was able to maintain validity and reliability through the use of multiple instruments in data collection. The use of SPSS software allowed the researcher to analyze the quantitative data generated by the surveys by considering frequencies but to also utilize text analysis to validate the themes generated by the qualitative data. Once the themes were established, the researcher generated tables and narratives to inform those themes. The researcher also provided tables created by SPSS to support those narratives.

Triangulation of the data helped ensure validity and reliability. According to Creswell (2008), when one compares evidence from multiple types of data or multiple

methods of data collection, triangulation occurs. By analyzing two types of data from three different schools collected in three different ways, triangulation was achieved. As Creswell (2008) shared, triangulation allows the researcher to validate his or her findings. Using the independent party and the data analysis software also helped triangulate the data.

Limitations

The following limitations may have impacted the outcome of the study due to the fact that they stemmed from internal validity.

1. The researcher had a time constraint created by funding. The program being studied had already been funded for this school year. However, due to budget constraints, funding for Study Island cannot be guaranteed for another year.
2. The formative assessment data created by Study Island was the only data considered in this study.
3. This study was limited to three middle schools in a single county. Therefore, the participant pool was limited to math, language arts, and eighth-grade science teachers.

Delimitations

The following delimitations may have impacted the effectiveness of the study due to issues of external and internal validity.

1. The study focused only on math, language arts, and eighth-grade science because Study Island only addressed these subjects in the middle grades.
2. This study was conducted in three middle schools in a rural county in western North Carolina. Therefore, the findings in this study were only applicable to the schools studied. However, other schools may find the results of interest when determining how formative assessment data is utilized in the planning, implementation, and assessment of

instruction.

Summary

The purpose of this study was to determine how teachers were using the formative assessment data generated by the Study Island computer program in the planning and implementation of instruction. A mixed methods collective case study was conducted to explain the issue. The focus of the study was on three middle schools in a rural county in western North Carolina. All teachers of math, language, and eighth-grade science were surveyed to establish themes. Focus group and individual interviews were conducted to explain themes and clear up misconceptions. Data was analyzed using the computer program SPSS. The researcher shared the findings with the administration at each school involved in the study as well as the superintendent of the county involved.

Chapter 4: Results

Overview

Schools have been purchasing technology to help teachers use data to make instructional decisions because of the pressure from the state and federal government. However, there is a distinct lack of research in how teachers were employing that data in their classrooms. Consequently, this collective case study was conducted to establish the impact the formative assessment data generated by Study Island had on the planning and implementation of instruction in three schools in a district in rural western North Carolina. The following research questions guided the study:

1. How do teachers characterize their use of formative assessment data from Study Island?
2. How do teachers characterize their use of formative assessment data from Study Island with regards to the planning of instruction?
3. How do teachers characterize their use of formative assessment data from Study Island with regards to the implementation of instruction?

An online survey, focus group interviews, and individual interviews were conducted to determine teacher perceptions of data use. Quantitative and qualitative data were collected and analyzed.

The results from the survey and the interviews can be categorized into three themes. Those themes are training, frequency of use, and support. The theme of frequency of use is divided into two parts: frequency of use of the program and frequency of use of the data. This chapter begins with a summary of the quantitative results from the survey. Then the researcher divides the quantitative responses into themes and presents them in individual tables that provide both mean and mode. The qualitative

results from the focus group interviews are also divided into the same themes as the survey. Since the focus group interviews were based on the survey responses, the results from the focus group interviews are discussed after their corresponding table from the survey. Some of the individual interview results can also be addressed in this manner, so individual interview responses are also reported with tables as appropriate. Teachers who participated in individual interviews were also given mock reports provided by Study Island and were asked questions about that data. The researcher reports the findings from that part of the individual interviews in a separate data analysis section.

Description of Cases

In order to fully understand the results from the survey and the interviews, an explanation of computer use and CAI use at all three schools is provided. This section explains the various CAI programs that are available at each school. Next there is a brief explanation of each program and its purpose. The section ends with a picture of computer access at each school.

The schools studied were traditional middle schools that served Grades 6 through 8. The school district purchased several computer-assisted instructional programs and mandated their use over the past 2 years. Study Island was one of the programs purchased. Other computer programs have been purchased as well. ClassScape, Renaissance Place, Renzuli, and My Access have all been purchased and use has been mandated since 2009. Table 8 shows program access by school.

Table 8

CAI Program Access by School

	School A	School B	School C
Study Island	X	X	X
ClassScape	X	X	X
Accelerated Reader*	X	X	X
STAR Reading*	X	X	X
Accelerated Math*		X	
Renzuli	X	X	X
My Access	X	X	X

Note. *Accelerated Reader, STAR Reading, and Accelerated Math were all part of the Renaissance Place suite of programming but could be purchased separately.

Study Island usage began being monitored in the spring of 2009 (Anonymous, personal communication, 2010). ClassScape is a CAI program, written specifically for North Carolina, that all three schools were using. The program is closely aligned with the North Carolina end-of-grade tests and the school and district administration monitored use (Focus Group A, personal communication, 2011; Focus Group B, personal communication, 2011; Focus Group C, personal communication, 2011). Renaissance Place is a suite of CAI programs that uses multiple choice questions to determine a student's grade level equivalent in reading and math using STAR Reader and STAR Math. Once a grade level equivalent has been established, a teacher can assign paper and pencil practice goals to specific students in accelerated math to help move students to the next grade level. The students bubble their answers to the practice questions on a scan sheet and scan their answers in the computer, which generates a report for the teacher.

With Accelerated Reader, a teacher helps a student select appropriate books and conferences with the student as he or she reads the book. The students then take a multiple-choice test on the computer that is based on the book. Again, this program generates a report for the teacher. This cycle is designed to move the student to the next grade level in reading. Use of Accelerated Reader was the only piece of Renaissance Place being monitored by the district (Anonymous, personal communication, 2010). My Access is a web-based computer-assisted instructional program that gives feedback on writing (Focus Group B, personal communication, 2011). District administration had mandated that at least two papers be entered by the student into the program for scoring purposes in Grades 6 and 8, and that four papers be entered and scored for Grade 7 (Teacher 1B, personal communication, 2011). Renzuli is the newest computer-assisted instructional program introduced to the system. Targeted for academically gifted (AG) students, teachers felt that the program would be beneficial to all students. At the time of implementation, the district had mandated usage of Renzuli solely with AG students (Focus Group A, personal communication, 2011; Focus Group B, personal communication, 2011; Focus Group C, personal communication, 2011).

With all of these programs and mandates came a need to add computer labs at each school. Each school was given some money by the district to help with the acquisition of new technology and to outfit a new computer lab (Anonymous, personal communication, 2010). However, not all schools had the same number of computer labs at the outset, so the numbers of labs varied per school (Focus Group A, personal communication, 2011; Focus Group B, personal communication, 2011; Focus Group C, personal communication, 2011). Table 9 depicts computer lab distribution by school.

Table 9

Computer Lab Distribution by School

	School A	School B	School C
6 th Grade Lab	X	X	X
7 th Grade Lab	X	X	
8 th Grade Lab	X	X	X
Library Lab	X	X	X*
Extra Lab	X		

Note. *The Library Lab is the designated 7th Grade Lab at School C.

All three schools also have two computer labs that are for the purpose of teaching computer classes. Teachers at all three schools acknowledged that they could sign up for these labs when the computer teachers did not have class (Focus Group A, personal communication, 2011; Focus Group B, personal communication, 2011; Focus Group C, personal communication, 2011). Teachers at School C also mentioned that they could use the other grade-level labs if no one from that grade level had signed up for it (Focus Group C, personal communication, 2011). All schools had computer labs assigned per grade level, but each school had a different number of computer labs. Schools also used the labs differently. School A and School B both assigned teachers computer time in their grade-level labs (Focus Group A, personal communication, 2011; Focus Group B, personal communication, 2011). School C had grade-level labs, but teachers on that grade level could just sign up for use as needed (Focus Group C, personal communication, 2011). School A had the most computer labs available for sign-up, but had the fewest number of students enrolled, at 498.

An explanation of the various types of CAI used at each school was given, followed by a brief description of each program. Availability of computer labs at each

school was also discussed. A description of the sample from the three schools involved follows.

Description of Sample

Information for the description of the sample came from the background information collected in the online survey or in the focus group and individual interviews. Teacher demographics are addressed first. Then a brief description of focus group participants is given. Information about individual interview participants concludes the section. The population of this study consisted of 56 teachers in three middle schools. Forty-five of the 56 teachers responded to the survey, which was an 80% response rate. This allowed for a confidence interval of 95% with a +/- of 7. Table 10 shows a breakdown of number of respondents per school.

Table 10

Respondents by School

	School A	School B	School C	Total
Possible Respondents	16	20	20	56
Actual Respondents	14	14	17	45

All language arts, math, and eighth-grade science teachers were asked to respond. All respondents answered every question in the survey. Eleven of the respondents were male and 34 of the respondents were female. Twenty-four of the respondents held a Bachelor's degree, and 21 held a Master's degree. Table 11 delineates the number of years the respondents have been teaching per school.

Table 11

Number of Years Teaching of Survey Respondents

No. of Years	School A	School B	School C	Total
0-5	5	0	4	9
6-10	5	3	4	12
11-15	1	4	5	10
16-20	2	4	3	9
21-25	1	2	1	4
26-30	0	0	0	0
More than 30	0	1	0	1

Only one teacher had been teaching more than 30 years, and that person worked at School B, which had no novice teachers who responded to the survey. Table 12 shows how long respondents had been using Study Island in their individual classrooms.

Table 12

Number of Years of Study Island Use per School

	School A	School B	School C	Total
1 year	0	2	5	7
2 years	4	3	10	17
3 years	2	5	2	9
4 years	2	2	0	4
5 years	1	1	0	1
6 or more years	6	1	0	7

Seventeen teachers started using Study Island for the first time in their classrooms when the district mandate began. For seven of the teachers who responded to the survey,

this was their first year using the program.

Focus group participants were randomly selected from the teachers who were asked to respond to the survey. School A's focus group consisted of four interviewees, School B's focus group had six members, and School C's focus group had five respondents. Thirteen of the 15 interviewees were female. Seven of the 15 interviewees taught language arts, six taught math, and two taught science.

The individual interviewees were randomly selected from the teachers who were asked to respond to the survey and were not selected to be in the focus group interviews. Two individual interviews were conducted at each school. Five of the six individual interviewees were female. Four were language arts teachers. One was a math teacher and one taught math and science. Even though the participants for all interviews were selected randomly, all subject areas were represented.

Survey Results

Survey results were analyzed by addressing the online survey and summarizing the overall results by theme first. Individual questions were analyzed for mean and mode. Correlations and an Analysis of Variance were also discussed.

The online survey was one that had been modified by the researcher with permission from a similar research study conducted by Millitello et al. (2007) titled *Readiness, fit, and coherence: The implementation of formative assessment products in three Massachusetts school districts*. The survey was set on a Likert scale with a range of 1 to 5. The total possible summated score across all items ranged from 15, if a respondent answered with all ones, to 75, if a respondent answered with all fives. The reliability for the assessment, using Chronbach's Alpha, was found to be 0.906. This implies adequate reliability. Under classical test theory, one can assume the

measurement instrument is an adequate indicator of true latent trait levels. All items provided adequate discrimination, as measured by a corrected item total correlation. Also, the summated scores for individuals could serve as an approximation of their location on the underlying trait continuum. For example, if one summarized the scores for the questions regarding support, then one could get an idea of where that respondent fell in the trait continuum. This assumed monotonically increasing values of the scale, thereby allowing one to surmise that as a respondent went up in value on the Likert scale, the respondent also went up in the trait continuum. Therefore, all responses from Survey Monkey were reverse coded to accommodate monotonically increasing values. Consequently, low summated scores implied low trait values, or low perception and use, while high summated scores implied high trait values, or high perception and use.

Three main themes were included in the survey. The first theme, training, measured the perceived amount of training the teachers received with Study Island and assessment. The possible total training scores ranged from 4 to 20. The second theme, frequency of use, measured the perceived frequency of use the teachers had with Study Island and with the data generated by Study Island. The possible total frequency of use scores ranged from 9 to 45. The third theme, support, measured the perceived amount of support the teachers received from the district, the school, and the company. The possible total support scores ranged from 3 to 15. Summary statistics for each theme, as well as the survey as a whole, are shown in Table 13.

Table 13

Summary of Online Survey Results

	N	Minimum	Maximum	Mean	Mode	Std. Deviation	Variance
Perception and Use, Total	45	22.00	66.00	42.9778	3	10.47397	94.574
Training	45	6.00	19.00	11.7556	3	2.86955	8.234
Frequency of Use	45	9.00	35.00	24.0667	3	6.87684	36.477
Support	45	3.00	15.00	7.1556	2	2.57572	6.634

Based on the summary of results, one can see that no teacher reported that he or she had received no training on Study Island and assessment, but no teacher reported that he or she had received a great deal of training, either. The reported feelings on frequency of use were different. At least one teacher reported that he or she did not use Study Island and the data generated by Study Island at all, while at least one teacher reported that he or she used Study Island and the data generated by Study Island regularly. When it came to the theme of support, at least one teacher reported that he or she received no support of any kind, while at least one teacher felt he or she received a great deal of support. The mode, at 2, also suggests that teachers reported a more negative perception of support than any other theme.

Table 14 conveys the descriptive statistics for individual questions. The questions not reported in this table are the demographic information or the qualitative, open-ended questions. The information shared via the open-ended questions is shared in the discussion of each theme later in the chapter.

A low mean implied that the respondents, on average, identified on the low end of

the trait, answering either a 1 or a 2 on the scale. A high mean implied that the respondents, on average, identified on the high end of the trait, answering either a 4 or a 5 on the scale. The question with the lowest mean was, “How often do you take group instructional time for the use of Study Island results?” Having the lowest mean showed that more teachers, on average, felt they had none for frequency of use more than any other question. The question with the highest mean was, “How often do you use Study Island with your students?” Having the highest mean showed that more teachers, on average, felt they had a great deal more use of the program than stated in any other question. No teacher reported that he or she had no training in assessment. Also, no teacher felt he or she had a great deal of training when it came to analyzing and interpreting the data generated by the Study Island program. Furthermore, no teacher reported that he or she used the data generated by the Study Island program for lesson planning frequently, even though teachers reported that they analyzed the data from the program and discussed the results with individual students frequently.

Table 14

Descriptive Statistics per Question by Theme

	N	Min	Max	Mean	Mode	SD
<i>Training</i>						
How much training in assessment have you had?	45	2	5	3.40	3	.889
How much training in formative assessment have you had?	45	1	5	3.24	3	.981
How much training have you had with using the Study Island program?	45	1	5	2.73	3	.863
How much training have you had with analyzing and interpreting the data generated by the Study Island program?	45	1	4	2.38	3	.834
<i>Frequency of Use</i>						
How often do you use Study Island with your students?	45	1	5	3.49	4	.991
How often do you use Study Island to assess your students?	45	1	5	3.04	3	1.086
How often do your students use Study Island outside of your class during the school day?	45	1	4	2.69	3	.848
How often do your students use Study Island outside of school?	45	1	4	2.24	2	.743
How often do you analyze the data generated by Study Island?	45	1	5	3.02	4	1.138
How often do you discuss the results from Study Island with individual students?	45	1	5	2.67	3	1.087
How often do you take group instructional time for the use of Study Island results?	45	1	4	2.16	1	1.043
How often do you use the data generated by Study Island for lesson planning?	45	1	4	2.47	3	1.079
How often do you use the data generated by Study Island to change your instruction?	45	1	5	2.29	3	1.014
<i>Support</i>						
How much support do you receive from the district in regard to utilizing Study Island data?	45	1	5	2.29	2	.968
How much support do you receive from the school in regard to utilizing Study Island data?	45	1	5	2.58	2	.988
How much support do you receive from the Study Island company?	45	1	5	2.29	2	1.121

Analyzing the correlations among the three themes could inform one about the

relationships among them. The correlations are found in Table 15.

Table 15

Correlations

		Training with Study Island	Support with Study Island	Frequency of Use
Training with Study Island	Pearson Correlation	1	.623**	.519**
	Sig. (2-tailed)		.000	.000
	N	45	45	45
Support with Study Island	Pearson Correlation	.623**	1	.504**
	Sig. (2-tailed)	.000		.000
	N	45	45	45
Frequency of Use	Pearson Correlation	.519**	.504**	1
	Sig. (2-tailed)	.000	.000	
	N	45	45	45

Note. **Correlation is significant at the 0.01 level (2-tailed).

If a correlation was significant and positive, then as one theme increased, so did another. As one can see from Table 15, the correlation between training and frequency of use is significant and positive ($r=.0532$, $p<0.001$). This meant that as the teachers felt they received more training, they felt that they used Study Island more often. All correlations were significant and positive; therefore, the teachers who felt they received more training and support felt that they used the program and the data generated by the program more.

An Analysis of Variance (ANOVA) was also run to determine if perceived perception differed significantly by school, teacher's gender, degree, subject taught, and/or reported frequency of use. A three (answers for school had three levels) by three (answers for subject level had three levels) by five (frequency of use had five levels)

ANOVA was run using SPSS. The dependent variable was overall perception and use. No significant values were found. Therefore, none of the demographic variables could account for the differences in frequency of use, support, or training.

The following sections discuss the themes found in the survey in more detail. Each question from the survey is shown in a table, followed by elaboration of the table, discussion of the focus group responses in relation to the question, and discussion of the individual interview responses, where applicable.

Training

The researcher asked four questions in the survey pertaining to training. The questions related to training in assessment, training in formative assessment, training with the Study Island program, and training with analyzing the data generated by the Study Island program. A table was created to sum up the responses per school. An explanation of the table follows, with a discussion of focus group responses and individual interview responses, as appropriate.

The first question was, “How much training in assessment have you had?” Table 16 summarizes the responses by school.

Table 16

Perceived Mode and Percentage of Assessment Training by School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
A Great Deal	4	28.6	1	7.1	1	5.9	6	13.3
Much	3	21.4	4	28.6	5	29.4	12	26.7
Some	4	28.6	8	57.1	9	52.9	21	46.7
Little	3	21.4	1	7.1	2	11.8	6	13.3
None	0	0.0	0	0.0	0	0.0	0	0.0

The highest mode of response total was some. However, School A teachers responded with the same frequency for a great deal and some. Over half of the teachers at School B and School C felt they only had some assessment training. When teachers were asked about their training in assessment, teachers at School B and School C both referenced the training that was mandated by the state through a writing moodle (Focus Group B, personal communication, 2011; Focus Group C, personal communication, 2011). No teacher at School A could provide examples of training in assessment (Focus Group A, personal communication, 2011). Two teachers at School B mentioned training in graduate school (Focus Group B, personal communication, 2011) and one teacher at School C had this to say:

Well, because of my background, I had a lot of training in individual assessment at both the graduate and undergraduate level, and was expected to give and analyze individual tests. As a regular classroom teacher, most of our training in assessment has to do with the standardized test. (Focus Group C, personal

communication, 2011)

According to the focus group interviews, training in assessment had taken place either in undergraduate or graduate school or through the North Carolina writing moodle. No questions were asked about training in the individual interviews; however, one teacher addressed her training when asked about her education background. She had this to say about training in assessment:

And I student taught with the best person that I think had and still does have such an impact on the way I do things, how I teach, and just keeping good records.

You know, being able to test your children just to see exactly where they are and using that data in preparing lessons. She just really helped me with that, and then as I moved on into my graduate career, I had so many professors who helped me look at students as individuals and not just as a whole group. I try to incorporate all of that as I teach every day, looking at the individual child instead of just

lumping them together as a group. (Teacher 1B, personal communication, 2011)

Again, the training that was remembered was a direct outcome of a teacher preparation program and graduate school.

The second question was, “How much training in formative assessment have you had?” The responses are summarized in Table 17.

Table 17

Perceived Mode and Percentage of Formative Assessment Training by School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
A Great Deal	4	28.6	1	7.1	1	5.9	6	13.3
Much	1	7.1	2	14.3	5	29.4	8	17.8
Some	6	42.9	11	78.6	7	41.2	24	53.3
Little	1	7.1	0	0.0	4	23.5	5	11.1
None	2	14.3	0	0.0	0	0.0	2	4.4

Again, most teachers responded with some; however, some teachers at School A felt they had a great deal while some teachers at School C felt they had much. Overall, teachers did not report a negative trait when responding to this question. School C had the highest percentage of teachers that identified having little training, at 23.5%. When asked about training in formative assessment in focus group interviews, a teacher at school A said, “I remember some, but I can’t...it’s not been recent” (Focus Group A, personal communication, 2011). Teachers in School B could not remember any specific formative assessment training, and a teacher in School C mentioned the training with the new North Carolina Teacher Evaluation Instrument (Focus Group C, personal communication, 2011). No one mentioned any other specific formative assessment training.

The third question asked “How much training have you had with using the Study Island program?” The responses by mode and percentage are shown in Table 18.

Table 18

Perceived Mode and Percentage of Training with the Study Island Program by School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
A Great Deal	2	14.3	0	0.0	0	0.0	2	4.4
Much	3	21.4	0	0.0	0	0.0	3	6.7
Some	4	28.6	10	71.4	10	58.8	24	53.3
Little	5	35.7	4	28.6	4	23.5	13	28.9
None	0	0.0	0	0.0	3	17.6	3	6.7

School A teachers reported more training with the Study Island program than the teachers at the other two schools. However, again, the most frequent response in all schools was some. There was a higher frequency of negative trait reporting with this training question than with the first two training questions. When the researcher asked teachers about their training with the Study Island program in focus groups, one teacher said the following:

I've been here 7 years, and for 6 of those years every year we've had some kind of Study Island training, whether it's rigid or just "here's a brief overview" of what it was, and you know, a refresher at the beginning of the year. (Focus Group A, personal communication, 2011)

A teacher from School B stated, "One of the teachers here did the training, because she used it a lot. So she taught us some of the basic concepts about it" (Focus Group B, personal communication, 2011). This teacher clarified by explaining that the day she was referring to was a mandatory training day set aside by the district. Teachers

had to choose some type of professional development to attend that day, and she chose Study Island training. One of the teachers who worked with Exceptional Children (EC) had this to say about training:

I remember last year in the spring. I believe we met at (a local high school), but not everybody got to go, we were kind of designated, like it was two or three per hallway. It was such a quick training. You know, show you, got to go, and you're like, "whoa." That was the first workshop that I had attended that actually sat there and taught me how to do the read-aloud – you know, I finally got somebody to tell me how to modify it with the read-aloud buttons and all that. Before that I had not had enough training, but I was finally able to connect the pieces for my EC children. But that was the first (training) we had really had in a while. (Focus Group A, personal communication, 2011)

This teacher did comment that she could probably have learned how to use the modifications from the online tutorial provided by the company, but that it was easier to learn at the face-to-face training (Focus Group A, personal communication, 2011).

When the group was asked about the online training, one teacher responded by saying,

Yeah, I liked them. I could pick what I wanted to, and I could spend the time I wanted to, and could look through it. That's the way I learned how to do the different accommodations and how to set things differently. Although they had been mentioned briefly, I could never get them to work. But after I did the training on there (online), I figured out how to do it in my room to make it work. (Focus Group A, personal communication, 2011)

This teacher was comfortable with the online format, but she was the only one

who had used that feature of the program.

A first year teacher at School A used Study Island extensively in her classroom. When asked if she had received training on Study Island, her response was as follows:

Actually, no. I just went in and played with it. My curriculum coach that was stationed here before she moved said, “Well, you have Study Island days and you have My Access times,” and I’m like, “What are those?” So I basically took it upon myself to teach myself how to do it. I’m still learning a little bit, but you know, the kids know more about it than I do. So, if I don’t know something, I’m like, “How do you do this?” and they say, “Okay, I’ll show you.” (Teacher 1A, personal communication, 2011)

She was not the only teacher who relied on students to understand the program. A veteran teacher at School B reported the same thing. He said, “The kids know more than I do when they turn it on and do it. I don’t know anything about it” (Focus Group B, personal communication, 2011).

The fourth question asked, “How much training have you had with analyzing and interpreting the data generated by the Study Island program?” Table 19 portrays the frequency and percentage of response by school.

Table 19

Perceived Mode and Percentage of Training with the Data Generated by the Study Island Program per School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
A Great Deal	0	0.0	0	0.0	0	0.0	0	0.0
Much	2	14.3	0	0.0	0	0.0	2	4.4
Some	5	35.7	8	57.1	8	47.1	21	46.7
Little	5	35.7	3	21.4	6	35.3	14	31.1
None	2	14.3	3	21.4	3	17.6	8	17.8

No teacher at any school felt that he or she had a great deal of training with using the data, but again, most felt that they had some. Many more teachers reported a negative perception on the trait continuum than with any other training question. When asked about the training in focus groups, teachers had varied responses; however, none were able to specifically recall any training with how to interpret and analyze the data.

Teachers at Schools A and B felt that any training with Study Island had to do with the program itself (Focus Group A, personal communication, 2011; Focus Group B, personal communication, 2011). One teacher at School C said, “The training I’ve had...it’s been ‘here’s the data’ and ‘here’s the section.’ For me personally, I’ve ordered my own reports and stuff, but as far as anything extensive in analyzing that (the data), no” (Focus Group C, personal communication, 2011). Another teacher said, “The administrators have used it, but they haven’t shown us how to use it” (Focus Group C, personal communication, 2011). However, another teacher was quick to point out that this was most likely due to time because of the number of other computer programs that the

district had implemented recently (Focus Group C, personal communication, 2011).

The number of computer programs that teachers had been trained in recently was a common subtheme in the focus group interviews. A teacher in School A mentioned ClassScape, Accelerated Reader, and My Access training that had happened in the previous year, making the point that Study Island training was not offered as much (Focus Group A, personal communication, 2011). A teacher at School C stated, “My Access is one that they’ve really emphasized at the beginning of the year, because of all the writing and everything” (Focus Group C, personal communication, 2011).

When teachers were asked needs in the focus group and individual interviews, training was a common topic. One teacher, who does not use the program, had the following response when asked why she was not using it, “Mainly because I have not really received any training in it and also the time limit on trying to learn it by myself doesn’t help” (Teacher 1C, personal communication, 2011). A teacher at School C said, “I actually just figured out how to look at reports to be quite honest. That’s something I would actually like to have more instruction on, is the reports you can pull” (Teacher 2C, personal communication, 2011). Teachers at School A even had specific ideas of their needs when it comes to training. One teacher said the following:

When you get trained in this, there’s so much. And you pick up a little bit and you do that a little bit, and then you’re kind of ready for more. It would be kind of good to just say, “Okay, today we are going to learn how to use this report or whatever.” (Focus Group A, personal communication, 2011)

Another teacher in the same focus group followed up with, “Yeah, it would be nice to have somebody who said, ‘Okay, I took this data, and this is how I changed my teaching with this data, and this is what you could do with the data’” (Focus Group A,

personal communication, 2011). A third teacher chimed in with

Yeah. Like a refresher course or something at the beginning of each year, or mid-year, just to hear from somebody who has gone in and had time to manipulate the data or the program for what works. That would be very beneficial. (Focus Group A, personal communication, 2011)

A teacher at School B had an idea about conducting training, comparing it to another training in which she participated. She said the following:

I'd like to go through all parts of it. I'd like to know the different types of reports and how to use those reports and stuff. Kind of like we did with My Access. I mean, we had a lot of training. I had a lot of training in it, and I feel there are still things I may not understand, but I feel like I have a really good sense of it. But with Study Island, I didn't. (Focus Group B, personal communication, 2011)

She went on to express that part of the problem was that other people went to the Study Island trainings that were offered, so that was probably one reason she felt "a little bit behind the eight ball" (Focus Group B, personal communication, 2011). Teachers at School C also felt the need for more training. "See, that's what we need more training in—the other elements of it, and we don't have that" (Focus Group C, 2001) was said by a teacher in response to a comment about the various reports and features of the program. Another teacher at School C expressed the idea of follow-up training sessions and her frustration with a lack of those:

For me, it's helpful if I have some training, and then I'm able to use some things. Then they come back in a couple of months and let me be able to know what I'm talking about. It seems to me in the past we've had a one-shot deal and then some people will jump into it, and use it. But the questions usually come up after

you've had a chance to use it and then when they do come and show you the nice features you've used it, so you can understand what those features mean to you more. (Focus Group C, personal communication, 2011)

The group was enthusiastic about the follow-up concept; although another teacher did feel that sometimes those follow-up sessions were offered at times when teachers could not attend (Focus Group C, personal communication, 2011).

Teachers at all schools felt that much of their understanding of the program had come from other teachers at the school. Some training was set up that way, with a few teachers going who were then supposed to come back and share what they learned with teachers who could not or did not go. One teacher said when asked about training,

I've had none, except for what my colleague got when she went to training. My problem with the training was that it was held during a school day, so you had to go during the day. She had to share and another colleague shared, so mine is secondhand. (Focus Group C, personal communication, 2011)

Another teacher said,

This person that I work with knows a lot about the Study Island program, so we did use it as a benchmark once every 9 weeks, and he showed me how to print a report off. Then he showed me how to look at what my strengths and weaknesses are and my growth from the first, second, and third time. He showed me all that stuff because he knows how to do that. (Focus Group C, personal communication, 2011)

Teachers have learned to check with their colleagues if they do not understand how to do something with the program, and have learned who in their building uses the program the most.

Teachers also felt that they learned about the program from their students. One teacher said, “You know how I found out about it? The kids showed me. They had found out that it had three different sections that you could go to” (Focus Group C, personal communication, 2011). This was in response to a discussion about the Common Core feature that had recently been added to the program.

When the researcher asked teachers about why some negative views were expressed about the program in the survey, one teacher responded, “I don’t think people would be as negative about it if we were given the chance to use it, time to analyze the data, and training on how to use it” (Focus Group B, personal communication, 2011). In this teacher’s mind, training would help overcome the negative attitude that was apparent from the survey data.

Based on the survey, most teachers in all three schools felt that they had some training in assessment, formative assessment, Study Island, and use of the data generated by Study Island. Teachers in the interviews could identify some of this training, but had trouble elaborating on much of the training. Training was a significant topic expressed in the interviews when it came to a discussion of needs, especially since several of the teachers interviewed expressed that most of their training had come from other teachers or the students.

Frequency of Use

Nine of the survey questions dealt with teacher’s perceptions of frequency of use. The survey had four questions about frequency of use of the program, and five questions about the frequency of use of the data. Teachers were asked to estimate how often in an average week they used the program or the data with each Likert-style question. The questions about frequency of use were also asked in focus group and individual

interviews.

Frequency of use of the program. The survey had four questions pertaining to the frequency of use of the program. The first question asked, “How often do you use Study Island with your students?” Table 20 displays the frequency and percentage of response by school.

Table 20

Perceived Mode and Percentage of Study Island Use by School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
Frequently	2	14.3	3	21.4	0	0.0	5	11.1
Regularly	9	64.3	5	35.7	7	41.2	21	46.7
Occasionally	2	14.3	5	35.7	5	29.4	12	26.7
Rarely	1	7.1	1	7.1	3	17.6	5	11.1
Never	0	0.0	0	0.0	2	11.8	2	4.4

Most teachers felt they regularly or occasionally used Study Island with their students. School A reported the most positive trait values on the continuum overall. Narrative responses from the online survey in relation to the amount of time used ranged from never to 30 to 45 minutes every 2 weeks. The most common response, at 17% and a mode of 8, was 60 minutes a week (Online Survey, 2011). Focus group responses ranged from “Once every other week” (Focus Group A, personal communication, 2011) to “Once a week for about an hour” (Focus Group B). One teacher at School C stated this:

And I don’t use it quite as extensively. I planned an assignment for January that took about 4 weeks to complete. It took longer than I thought, and I was trying to

go for half a period, so for a month I was using it about once a week, but otherwise it's used for our focus class. (Focus Group C, personal communication, 2011)

Responses from the individual interviews were more specific about program use. A teacher at School B said the following:

My students every 9 weeks...what I have done this year is assign certain objectives to be completed by the end of that 9-week grading period. So they know what those objectives are going to be at the beginning of the grading period, and then usually once a week we have our library visit. During that 40-45 minute period, they will usually go and work on their objectives for that current grading period. Then we also go periodically to our computer lab so most often they are working on it at least once a week during class time. And then, a lot of my students pull it up at home and work on it if they can. (Teacher 1B, personal communication, 2011)

A language arts teacher at School A explained her use of the program this way:

We go to Study Island every other Monday. We flip/flop between math and language arts using Study Island. I like to go at least once or twice a week when I do get to go, because I assign it as an assignment and I usually give them about two or three. And I say they need to do 20 questions or more, because the more questions you do, the better your score's going to be. I make it a grade, because the only way that my kids really care about it is if they're held accountable for it. (Teacher 1A, personal communication, 2011)

Another language arts teacher in a different grade level at School A used the program several times a week. She explained as follows:

The way that I used it last year, since we had two computer labs and they were booked up, was to make a calendar that just has five spaces for each day (Appendix M). I would use it as a whole class warm-up, and that's the thing that has been most effective for me. At the beginning of the year I went in and put in some assignments for students this year, and they wouldn't read the lessons, and it was just a bomb. You know, they really weren't getting anything out of it. I went back and made all of those inactive, so they couldn't get in anything I didn't want them in to. And then I used the calendar like I did last year. I don't do it every day. I would say I average probably 3 days a week with it. I just pick a topic that we're going to do, and we'll do 3 days a week on that. It might be "fact and opinion," and so I do five questions with each class. They just read the question, and we go over it, of course, and they write down their answer, and then we do whole group "what's the answer." (Teacher 2A, personal communication, 2011)

This teacher did point out that she could use the program in this way because she had a data projector in her classroom.

A math teacher at School B characterized his use of the program in a different light. He stated the following:

In all honesty I use it in my classroom because I'm told I'm supposed to. And what happens is I get a slot in the computer lab every 2 weeks, roughly. So a day or 2 beforehand or maybe even that morning before the kids go down there, I will set up a very small exercise. I try to relate it to what we're working on, but that is often difficult, because I have trouble matching up the objectives that Study Island offers with what the standard course of study is. It's aligned with the standard course of study, there's just a lack of specificity. To me Study Island

does broad brush strokes just fine, and there are some components about that I kind of like, but the last couple of times it hasn't matched what we were working on, so I did cumulative review of things that we covered earlier in the year, and then we go to the lab. (Teacher 2B, personal communication, 2011)

A math and science teacher at School C used the program in a similar way. When asked about her use, her response was, "Just as a reinforcement activity. You know, after we do a lesson we usually go in and do a Study Island lesson that goes along with what we're doing in the classroom" (Teacher 2C, personal communication, 2011). She did say that she only used the program in math, though (Teacher 2C, personal communication, 2011).

However, teachers at School C were the only group that responded that they never used the program. One of the teachers from School C who was interviewed individually said she did not use the program with her students because of a lack of training and a lack of time (Teacher 1C, personal communication, 2011). A science teacher's response on the survey was,

I never use Study Island as part of my class, because of scheduling difficulties. I see my students every other day, so it is more important for me to actually teach my students than for me to park them in front of a computer. Furthermore, some teachers are constantly in the computer lab and I do not feel that it is worth the battle. (Online Survey, 2011)

Computer lab access seemed to be a common factor in responses to program usage at all three schools. One difference is the number of computer labs each school has and how the time in those computer labs has been set up. School A has a computer lab per grade level, a computer lab for general use, and two teaching labs that other teachers can use during the computer teachers' planning. The teachers have a set schedule for

their grade-level lab. One teacher said, “I think we’re better off this year than we have been in the past because we have more computer labs than we’ve ever had” (Focus Group A, personal communication, 2011). School B has a computer lab per grade level, a computer lab in the library, and two teaching labs that other teachers can use during the computer teachers’ planning. They are also on a set schedule for their grade-level lab (Focus Group B, personal communication, 2011). School C has a computer lab per grade level, of which one is in the library, and two teaching labs that other teachers can use during the computer teachers’ planning. They have no set schedule for use. One teacher stated, “No, you have to get first come, first serve and you have to sign in” (Focus Group C, personal communication, 2011). The differences in access to computer labs may explain the differences in perceived percentage of program use per school.

The second question from the survey that addressed program usage was, “How often do you use Study Island to assess your students?” Table 21 summarizes the response per school.

Table 21

Perceived Mode and Percentage of Use of Study Island to Assess Students per School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
Frequently	2	14.3	0	0.0	0	0.0	2	4.4
Regularly	4	28.6	6	42.9	5	29.4	15	33.3
Occasionally	6	42.9	6	42.9	5	29.4	17	37.8
Rarely	1	7.1	1	7.1	3	17.6	5	11.1
Never	1	7.1	1	7.1	4	23.5	6	13.3

Again, the majority of responses to this question were regularly and occasionally.

At least one teacher at each school responded never; although only one teacher in School C reported no use of the program in her individual interview (Teacher 1C, personal communication, 2011). In the focus group interviews at all schools, when this question was asked, the subject of using the program for benchmarks came up. This may have been a reason for the discrepancy in responses to questions about use of the program and use of the program for assessment.

One teacher at School B explained, “We have to do benchmarks. That’s one thing English and math teachers are supposed to do” (Focus Group B, personal communication, 2011). However, another teacher in the same group explained his use this way:

Because it’s used as a benchmark, I kind of choose an objective or two objectives for the kids to work on. But because it is used as a benchmark to avoid skewing the results for me, I try to just have them practice those same items, because I don’t know how much that would actually...I mean they practice the same items and I kind of keep that in the back of my mind what when I’m kind of planning what objectives to use. That may not be on target but that’s kind of how I see it for me, just getting back into it, and using Study Island again, just kind of learning it [Study Island]. (Focus Group B, personal communication, 2011)

His concern was that if the students were practicing the same items that were going to be assessed on the benchmark then the results would be skewed, so he always kept that in his mind as he was planning what to do with his students during Study Island time (Focus Group B, personal communication, 2011).

A teacher at School A started off using the Study Island for benchmark testing, but switched to paper and pencil testing in the middle of the year. She described it this way:

I did the first 9-week benchmark and I did the second 9-week benchmark. I didn't do the third one, and to be honest I have found, looking at what my students can do in class on paper and what they can do on that benchmark, there is a discrepancy because when they're in class, the strategies that I teach them are: you read the questions first, you go back and highlight the important words in the question. You go back after you read the text and find where the answer is. And not being able to underline, not being able to highlight, not being able to have your hands on that material, it just doesn't stick. And it's easier to click and move on than it is to say, "now wait a minute, let me go back." (Teacher 2A, personal communication, 2011)

This response may be another reason for the discrepancy in answers between the questions of program use and program use for assessment. Teachers may have been using the program initially for assessment, but have since stopped using the program in that manner. Another possible explanation is that teachers did not trust how students were using the program. A teacher from School C elaborated, "I wouldn't use it as my sole assessment because I know that three of my students finished my benchmarking in 9 or 10 minutes and 5 minutes, and I know they didn't try" (Focus Group C, personal communication, 2011). A second teacher chimed in with, "I use it as a pre-assessment, an introduction" (Focus Group C, personal communication, 2011). Apparently, teachers were using the program in various ways with regard to assessment.

The third question in the survey that addressed program usage was, "How often do your students use Study Island outside of your class during the school day?" Table 22 displays the frequency and percentage of responses per school.

Table 22

Perceived Mode and Percentage of Use of Study Island Outside of Class by School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
Frequently	0	0.0	0	0.0	0	0.0	0	0.0
Regularly	2	14.3	2	14.3	3	17.6	7	15.6
Occasionally	8	57.1	8	57.1	5	29.4	21	46.7
Rarely	1	7.1	4	28.6	8	47.1	13	28.9
Never	3	21.4	0	0.0	1	5.9	4	8.9

No teacher felt any student frequently used Study Island outside of class. The most common responses to this question were occasionally and rarely. Almost half of the respondents at School C felt that their students rarely used Study Island outside of school, where School A and School B felt that their students occasionally used the program outside of school. When asked to estimate the average time a student spent on Study Island outside of class, the responses ranged from none to 2 hours a week. One teacher responded, “My students use Study Island in other teachers’ classrooms, but not in mine” (Online Survey, 2011). In contrast, another teacher’s response was, “Study Island goals are homework throughout the 9 weeks. Some students may use it only for 30-45 minutes twice weekly in enrichment whereas some students may utilize it as much as 2 hours weekly” (Online Survey, 2011). Enrichment is a time set aside each week for students to work on areas of need or areas of interest. Each school in the study has an enrichment time, also called focus time; however, the times per school vary (Focus Group A, personal communication, 2011; Focus Group B, personal communication, 2011; Focus

Group C, personal communication, 2011).

When asked in focus groups where students were using the computer for Study Island use outside of class time, but within the school day, responses varied. A teacher from School B responded, “I have another teacher on the team that brings the kids to the lab sometimes” (Focus Group B, personal communication, 2011). A language arts teacher from School C said, “They ask me to use it in the library sometimes to get out of reading” (Focus Group C, personal communication, 2011). Another teacher from School C stated, “I think Computers, because my kids will message me. So I don’t know how often that is, but they have sent messages from there” (Focus Group C, personal communication, 2011).

Teachers from School A had more to say on the topic. They felt that their students were using it in a variety of locations throughout the school. One said it this way:

I’ve heard mine say in the past that if they finish up, in art class or another class, or even a language arts class, if the teacher approves and you’ve completed their assignment, you may get on the computer. So we try to require that [Study Island] instead of going to Google Earth. (Focus Group A, personal communication, 2011)

They also mentioned students using the program in the library (Focus Group A, personal communication, 2011). Another teacher stated, “I think some grade levels are using it after school for remediation” (Focus Group A, personal communication, 2011). No matter how or where the students are using the program outside of a teacher’s class, the perception is that it is not being used often.

The fourth question that dealt with program use in the survey was, “How often do

your students use Study Island outside of school?” Table 23 shows the mode of responses by school.

Table 23

Perceived Mode and Percentage of Use of Study Island Outside of School by School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
Frequently	0	0.0	0	0.0	0	0.0	0	0.0
Regularly	0	0.0	1	7.1	0	0.0	1	2.2
Occasionally	6	42.9	5	35.7	5	29.4	16	35.6
Rarely	7	50.0	5	35.7	9	52.9	21	46.7
Never	1	7.1	3	21.4	3	17.6	7	15.6

Again, the respondents felt that students only occasionally or rarely used Study Island outside of school. When discussed in focus groups, reasons for this perception were similar. At School A, teachers felt that students either “don’t have computers or internet access” or are “not motivated to use that” (Focus Group A, personal communication, 2011). Teachers at School B also mentioned motivation, explaining it this way:

Well, I think that it’s too much like school, and they want to be entertained when they’re on the computer at home, and do all their fantasy, video games, and all that and Facebook, and you know, who can blame them? (Focus Group B, personal communication, 2011)

They also expressed a concern about the lack of computers. One teacher said the following:

And I was thinking that for the kids that don't have them, you don't want to punish them, and the other kids get more practice or advantage because you don't know. A lot of kids will not say that they don't have a computer at home, and so I think that's probably why we don't assign it. (Focus Group B, personal communication, 2011)

However, another teacher did just the opposite. She elaborated with,

Yeah, and I asked my kids today, because with their individualized goals, I told them that's due by the end of the 9 weeks, and that's going to be a major break for them, so I was like, "OK, you've only got this amount of time in class. How many of you have computers at home?" And just about every hand went up, and I was like, "OK, so what do you need to be doing even if I don't assign it to you?" And they're like, "Ooh, we can work on this at home." (Focus Group B, personal communication, 2011)

Teachers at School C echoed the responses from the teachers at School A and School B. Lack of computers at home and teachers not assigning the program for homework were discussed. Two teachers did give assignments to complete at home (Focus Group C, personal communication, 2011). One teacher brought an issue to light that was not discussed at the other schools. She stated, "Some of them [the students] can't get on it. Their computers won't recognize it. They're not updated enough" (Focus Group C, personal communication, 2011). According to the responses, more teachers felt that their students did not use Study Island at home because of a lack of computers and a lack of motivation more than anything else.

Frequency of use of the data. Five questions in the survey addressed the frequency of use of the data generated by the Study Island program. The first question

was, “How often do you analyze the data generated by Study Island?” Table 24 displays the frequency and percentage of responses by school.

Table 24

Perceived Mode and Percentage of Time Analyzing Data Generated by Study Island per School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
Frequently	1	7.1	0	0.0	1	5.9	2	4.4
Regularly	7	50.0	6	42.9	4	23.5	17	37.8
Occasionally	3	21.4	5	35.7	4	23.5	12	26.7
Rarely	2	14.3	2	14.3	4	23.5	8	17.8
Never	1	7.1	1	7.1	4	23.5	6	13.3

Teachers responded that they regularly or occasionally analyzed the data generated by the Study Island program. One outcome of these results was that the teachers at School C were evenly split on how often they analyzed the data, with the exception of the response frequently. Teachers at School A and School B reported more positive use on the trait continuum. When asked to estimate how much time was spent in an average week analyzing the data, responses on the survey ranged from “once every 9 weeks” to “120 minutes a week” (Online Survey, 2011). The most frequent response, with 7 replies at 15%, was “30 minutes a week” (Online Survey, 2011). When asked in a focus group about this question, teachers at School A had varied responses, too. One teacher said, “If I do it on a Thursday, by Friday, the end of the week, I’ll look at it, usually” (Focus Group A, personal communication, 2011). Another teacher said, “I look at it after we’re done with our session just to see, you know, we covered Goal Five, so

let's see how the class did first. And then I start looking at individuals" (Focus Group A, personal communication, 2011). These teachers tended to look at the data fairly soon after students completed a session or assignment. However, another teacher used it in a different way. She stated the following:

I do mine about every 2 weeks. I just did it, and I kind of called out the number of blue ribbons the range, and you know, give my top five kids, like "Wow, congratulations for spending some time." That's the only way I really look at the data. (Focus Group A, personal communication, 2011)

A first year teacher looks at her data every day. When asked about it, she said it this way:

So I look at them at various points while we're in there [the computer lab]. And then I give them an assignment, usually that assignment has to be due within a week and a half, because a lot of my kids don't have computers at home. So I have to give them the opportunity as much to get in there and make the grade that they want. And then I take that, put it in my grade book, and I do it individual, not just the whole [class], entire grade. And I really love that they put the benchmark tests on Study Island for us because it mixes it up, like one kid can be sitting beside another who is doing completely different questions, but also I can go back from benchmark one, and then look at benchmark two, and I keep it all in my grade book, so I can see if they've made any improvements. And they actually have, a lot, so that makes me happy. (Teacher 1A, personal communication, 2011)

Not only did the teacher look at the data every day, she went back and compared past data to measure growth.

Teachers at School B also tended to look at the data almost immediately, if they used the data. Two of the teachers said that they look at the data while the students are in the computer lab working with the program. One teacher said the following:

I sit with the student at the computer at the end while they are working, and the whole time they're working I'm looking at reports and seeing how I might use that. So I'd say at least once a week for the hour that I'm in there. (Focus Group B, personal communication, 2011)

Another teacher at School B had just looked at her data the night before. She looked at the data every 9 weeks, and said the following:

Last night actually I was looking at the Blue Ribbon Report. We have it set for my class at 85%, making that mark to get a blue ribbon. So usually what I do every 9 weeks I set a certain number of blue ribbons that the students need to get, and I'll say, "If you get to this point, this is what you can do for an A. If you get this level, that's a B level. This would be average, this is C." I really like that Blue Ribbon Report. (Teacher 1B, personal communication, 2011)

She went on to explain that the Blue Ribbon report was broken down by objective aligned with the North Carolina Standard Course of Study. However, a different teacher at School B was not so positive about the reports. He said, "It's just not practical to do it often. I'm analyzing items that I don't necessarily agree with, you know? Their usefulness is minimal in my opinion" (Teacher 2B, personal communication, 2011). He did go on to explain that if the format of Study Island was combined with the depth and breadth of the accelerated math program he would really find that program useful (Teacher 2B, personal communication, 2011).

Teachers at School C reported that they use the data less than the teachers at

School A and School B. Several teachers responded in the focus group interview that they used it once every 9 weeks, with the benchmark testing (Focus Group C, personal communication, 2011). One teacher had a Blue Ribbon report e-mailed to her every Monday on all of her classes. She also said she “checks periodically throughout the week to see who’s been logging on, if anybody, outside of school” (Focus Group C, personal communication, 2011). Teachers were reporting that they were looking at the data, but at different frequencies and for different purposes.

The second question that addressed data usage was, “How often do you discuss the results from Study Island with individual students?” Table 25 portrays the mode and percentage of responses by school.

Table 25

Perceived Mode and Percentage of Use of Individual Results with Individual Students per School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
Frequently	1	7.1	0	0.0	0	0.0	1	2.2
Regularly	4	28.6	3	21.4	3	17.6	10	22.2
Occasionally	7	50.0	5	35.7	3	17.6	15	33.3
Rarely	2	14.3	4	28.6	5	29.4	11	24.4
Never	0	.0	2	14.3	6	35.3	8	17.8

Teachers responded that they occasionally or rarely discussed individual results with individual students. Again, School A was the only school that had teachers respond that they frequently used the data with individual students and no teacher responded that they never discussed the data with individual students. School C responded more

negatively on the trait continuum than the other two schools. When asked to estimate how often in an average week they discussed the data with individual students, answers ranged from “none” to “60 minutes per week” (Online Survey, 2011). The most frequent response, with a mode of 10 at 22%, was “5 minutes per week” (Online Survey, 2011). Some teachers in each focus group discussed the data individually with students on a regular basis. One teacher had this response:

When I’m in there I will call the kids up one at a time, and we’ll talk about specific areas that...because I’ll say this is a certain percentage goal that you’re looking at if...and I’ll try to individualize it as much as possible if you’re at a certain percentage goal and success rate, then we’re working on the primary areas, so I’ll individualize it for a certain kid in the previous month and look at it, but I’d say once a week for me during that time. (Focus Group B, personal communication, 2011)

Another teacher said the following:

We also do the benchmark and testing every 9 weeks. I really like the way that it breaks it down by the objective and you can exactly pinpoint what objective the student is weak in, and that allows you to go back in with your lessons and focus on that objective and more work for that particular child. (Teacher 1B, personal communication, 2011)

A teacher at School C also discussed how she used the benchmark results with individual students. She said the following:

The kids can visually see their growth and their lack of growth. One kid even commented the last time, “I went down in Algebra? Look at that, I plummeted! What the heck?” So then we started questioning “What did you do?” But yes, I

think I've used it this year as I did the benchmark a lot, and that gives me a visual and the kids a visual. (Focus Group C, personal communication, 2011)

One teacher mentioned that she looked at a Blue Ribbon report every week.

When asked what she did with the report, she said the following:

If they're not making any blue ribbons say by week 3, I have a conference with them. If they've gotten a blue ribbon in everything in week 1, I have a conference with them again and reset it at a higher grade level. That's only happened a few times. (Focus Group C, personal communication, 2011)

Teachers were discussing the results with the students, but sometimes they were giving more immediate feedback. One teacher stated, "Before they move on they have to show me what they've done, so I conference with each one as they are working" (Focus Group C, personal communication, 2011). Another teacher said, "I talk to every kid. 'What are we doing?' and 'What's going on?' Talking through that particular question, finding out what are they having issues about" (Focus Group C, personal communication, 2011). Teachers in School A commented that they conference with students two to three times per 9 weeks, but another responded as follows:

I do blue ribbons after every assignment that we do, because good, bad, or ugly, that's what motivates them. Because for every blue ribbon, you know I look at the questions, and I'm like, "13 seconds on two questions, you're not getting anything," but usually if they get a blue ribbon and no white ribbons, they get a piece of candy. (Focus Group A, personal communication, 2011)

When asked why teachers were not discussing the data with individual students, as 17.8% of teachers reported on average overall, most answers related to time factors.

For example, one teacher stated the following:

To be honest with you, from my perspective, it's the time factor. If I had 30 more minutes in a day, or a week, to really assess how students are going to do in here, I feel like I've got so much else I've got to be assessing as far as their daily work and their practice, and I just need to see it get graded. It's a time factor. (Focus Group A, personal communication, 2011)

Another reason teachers thought other teachers were not discussing the data with their students was because the use of the program has been mandated; therefore, the teachers were not invested in the program (Focus Group C, personal communication, 2011). One teacher expressed feedback from the program as the problem. She explained the following:

I would say also because that program gives feedback to the students, so it's like that's their feedback. When I praise them for a blue ribbon, well, it's like they've already gotten that reward. I think because it gives the same feedback. (Focus Group C, personal communication, 2011)

One teacher said that other teachers may be using Study Island time as "down time." She described it this way:

There's been times when I've taken my kids in there and I've been so relieved, I called it "to be on the Island," and I do some things that I need to do, and they're doing their thing. I'm in my world and they're in theirs. (Focus Group C, personal communication, 2011)

This teacher did go on to clarify that she did check to see how her students were progressing, but that had been her attitude once in a while.

The third question that addressed data usage was, "How often do you take group instructional time for the use of Study Island results?" Table 26 represents the frequency

and percentage of responses by school.

Table 26

Perceived Mode and Percentage of Group Instructional Time Used for Study Island Results per School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
Frequently	0	0.0	0	0.0	0	0.0	0	0.0
Regularly	2	14.3	2	14.3	2	11.8	6	13.3
Occasionally	3	21.4	4	28.6	3	17.6	10	22.2
Rarely	5	35.7	4	28.6	5	29.4	14	31.1
Never	4	28.6	4	28.6	7	41.2	15	33.3

Most teachers reported rarely or never using group instructional time for Study Island results. No teacher reported frequently using group instructional time to discuss Study Island results with their students. When asked to estimate how often in an average week they used group instructional time for Study Island results, survey respondents replied “none” to “60 to 180 minutes per week,” with the most responses, 22% and a mode of 10, being “none” (Online Survey, 2011).

The researcher asked teachers about this in focus group interviews. One teacher responded that teachers might not be using it because of a lack of technology. She stated, “If [you are] not in the lab you can’t do it in the classroom unless you have the Smart Board, or a projector. So that makes it difficult because we’re limited as far as that goes” (Focus Group B, personal communication, 2011). Another teacher responded, “I rarely use the results for the whole group. It’s more individual” (Focus Group C, personal communication, 2011). A teacher at School A said the following:

I don't use it that way, because my kids are on different things, but I will use group instruction time to pull it up, since we have the Smart Board, to study on as a whole group and walk through some of those [questions], but I won't go over results as a whole group. (Focus Group A, personal communication, 2011)

However, some teachers in the focus groups could give examples of how they did use Study Island results with the whole group. Most responses centered on using the Blue Ribbon reports as some sort of class competition. A teacher at School A explained it this way:

We'll do reports like, "you've got this many ribbons this week, and you've got this many this week." I kind of recognize that, and the kids seem to like it as long as I'm not saying, "Well, you're the highest one and you're the lowest one." I mean, even the highest kid can get five [Blue Ribbons] and even the lowest kid can get five. (Focus Group A, personal communication, 2011)

A teacher at School B used the results with the whole class in a different way. She said the following:

I use it to help in class reviews. There's one report that you can pull up where you can see how the whole class did, and it breaks it down, and it tells you which areas need improvement, high priority, medium priority, and which ones they've met their goals, so I showed that to the whole class. Then we go to specifically choose the area that they need. It might be point of view, and then I go through that quiz with them, some of the words on it, and that helps. (Focus Group B, personal communication, 2011)

Only a few teachers were able to explain how they used the actual reports for group instructional time, and most of those used the reports as a form of competition. For

example, a teacher at School C keeps class percentages on goals posted in the back of her classroom. The students keep up with which class is doing better on which concept, and work toward making their percentage the highest (Focus Group C, personal communication, 2011).

The fourth question that addressed data usage was, “How often do you use the data generated by Study Island for lesson planning?” Table 27 shows the frequency and percentage of responses by school.

Table 27

Perceived Mode and Percentage of Use of Data for Lesson Planning per School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
Frequently	0	0.0	0	0.0	0	0.0	0	0.0
Regularly	4	28.6	3	21.4	2	11.8	9	20.0
Occasionally	3	21.4	5	35.7	6	35.3	14	31.1
Rarely	3	21.4	4	28.6	4	23.5	11	24.4
Never	4	28.6	2	14.3	5	29.4	11	24.4

While 14 teachers reported that they occasionally used Study Island data for lesson planning, no teacher reported frequent use of the data and 11 teachers total reported no use. When asked to estimate how much time in an average week they used Study Island data for lesson planning, survey responses ranged from “none” to “120 to 180 minutes per week,” with “none” again being the most common response, at 17% with a mode of 8 (Online Survey, 2011). Focus group participants were asked about the responses in relation to lesson planning. Teachers cited a lack of training and time. One teacher said the following:

I could say it may be a lack of time, to really look over the reports and integrate that in a meaningful way for lessons. It's just being spread so thin with doing so many other things. It's hard to have the time to do that in an effective way.

(Focus Group B, personal communication, 2011)

Another teacher felt that teachers might not use it because of the North Carolina Standard Course of Study. She explained, "Well, I think because you're following the standard course of study, most of your lessons are already planned by pacing guides" (Focus Group A, personal communication, 2011). Again, it seems to be a time issue.

However, many teachers gave examples of how they were using the data to plan their lessons. A teacher at School C said the following:

Then when I get the benchmark results or whenever I see the proficiency, that's when I go back and incorporate that in my starter, or I'll review something that I've seen, saying "Oh, we've got to go back and work on this." So I'll throw it in my upcoming lesson. (Focus Group C, personal communication, 2011)

One teacher at School A explained how she used it at the beginning of the year to help plan:

I used it more at the beginning of the year, because I had no idea where they're at, and so I used it some for that. I'll put across the board assignments on there, and see do they have any idea about this concept at all, but that's usually less than the first month until I can get an idea of where they are at. (Focus Group A, personal communication, 2011)

Several teachers discussed that they did not deliberately use the results to plan instruction, but they maintained an awareness of the weaknesses the results showed. A teacher at School B said the following:

I guess I always keep it in the back of my mind, when I think that theme, for example, is a problem. Then I use every opportunity with upcoming lessons. It may not be prepared in advance; it just might be there, like this might be a good time to say that again. So it does direct my teaching for sure. (Focus Group B, personal communication, 2011)

Another teacher said that she used the data to help her plan what do next. She said, “What I try to do is look at what they’re not doing well. Say for example, author’s purpose. Then I’ll start pulling from my files and from the textbook or whatever things about author’s purpose, and we’ll target that” (Focus Group B, personal communication, 2011).

A first year teacher explained how she used the data to plan instruction, including using the Study Island program to continue to measure how students were progressing. She elaborated with the following:

Well, their assignment now is based off of what I looked at from the last report. The last report my kids did not do so well with plot, actually, which is very surprising, because we’ve worked on that so many times. They all understand it’s a sequence of events. So what I try to do, especially when we just finished a play and we’re going to be starting a new one is I have them map it out, and we talk about this sequence of events and then that one goes next, and what’s the climax, and I try to bring in as much as possible, and then I assign the same thing the next week. And if they haven’t made any growth from what I’ve done in my classroom, then I need to work on it a little bit more. So from what they’ve done from the previous assignment, I see, “OK, what do they all need to work on?” I’ll work on it in class, and then I’ll assign it again. Just because I want to make sure

that they're making growth in something. (Teacher 1A, personal communication, 2011)

She went on to explain that she also makes grouping decisions based on the data:

I look at the overall report and think, "OK, how well did my class do as a whole?" I will break it down into parts, who did really well at this, and I try to look at that. I like to put my kids in groups, obviously, and so I base it on what they do on that [the objective] with putting them in groups. A lot of these kids are really good at summarizing, and getting the key points, and this child isn't as good, just based off that information, so I try to stick them together so they can rub off one another. (Teacher 1A, personal communication, 2011)

Another teacher also uses reports to plan lessons and to group students. She said the following:

I would look at it [the reports] closely probably at the midterm, and see, OK, this is where we're lacking, and a lot of times with my warm-up or bell-ringer exercise, I'll try to pull more activities in with that particular object if I see that it's a whole-class issue. Or if it is more of an individual student issue then sometimes just some individual work; or I do that a lot in groups. I'll give this group this particular assignment versus this group over here. They will work on a different objective that they need help with. (Teacher 1B, personal communication, 2011)

While teachers could elaborate on why their peers reported that they did not use the data generated by Study Island for lesson planning, they could also give specific examples of how they were using the data.

The fifth question that addressed data usage was, "How often do you use the data

generated by Study Island to change your instruction?” Table 28 depicts the number and percentage of responses by school.

Table 28

Perceived Mode and Percentage of Use of Data for Changing Instruction per School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
Frequently	0	0.0	1	7.1	0	0.0	1	2.2
Regularly	1	7.1	1	7.1	1	5.9	3	6.7
Occasionally	7	50.0	5	35.7	4	23.5	16	35.6
Rarely	3	21.4	5	35.7	5	29.4	13	28.9
Never	3	21.4	2	14.3	7	41.2	12	26.7

Most frequently, teachers reported using data to change instruction occasionally or rarely. Fifty percent of teachers at School A reported occasionally using the data to change instruction, while 41.2% of teachers at School C reported never using the data to change instruction. Teachers at School B were more evenly distributed along the trait continuum. When asked to estimate how often in an average week they used the data generated by Study Island to change their instruction, responses again ranged from “none” to “180 minutes per week” (Online Survey, 2011). The most common response, at 20% with a mode of 9, was “none” (Online Survey, 2011). Teachers in focus groups were asked about this; one responded with:

From a science perspective, I never change anything, because it pretty much correlates with the chapters. Towards the end, you know, I’ll go back and hit hydrosphere, because it’s huge, but if we’re studying fossils in the book and I have them do the fossil assignment on there, if it tells me that they have no idea

about it, well, I mean I've got 10 more chapters to cover. (Focus Group A, personal communication, 2011)

The amount of material to cover and the lack of time to get everything done was a recurring theme throughout the interviews. Another teacher stated, "And mine would be both lack of experience and lack of knowledge of how to do those things" (Focus Group C, personal communication, 2011) when asked why teachers were not changing instruction based on the data. A lack of training was another common theme that kept being discussed.

Like with the lesson planning, however, teachers gave plenty of examples of how they were changing their instruction based on the data generated by Study Island. One teacher thought they had grasped a concept until she had her students do an assignment on it in Study Island. She elaborated with the following:

There was a compare and contrast that we had done in class, and they were pretty proficient on it. And then when they went into the computer lab, they didn't do very well. One block in particular didn't do well on that, and so then I found some things, paper/pencil that we could go back and highlight...these are the same, these are different, and do them in different colors, and then do a Venn diagram. (Teacher 2A, personal communication, 2011)

A veteran language arts teacher who typically works with academically gifted (AG) students explained how she used the data at the beginning of the year to change upcoming instruction:

I know back at the beginning of the year we were doing short stories, and I remember I thought you know coming in to this year, most AG students come in and they know theme, they know characterization, they can tell you so much

about that. This particular group was weak in those areas though. And I could tell that on their Study Island. We did a Study Island objective on characterization one day, and just the terminology, they were calling me over to the computer, “What does this word mean?” And it was a character trait word, and so they just weren’t familiar with it. But they began to really question me, so I knew that was a weak area, and I could tell, so when we did our short story unit, we kind of went back to basics a little bit on that, and just filled in some gaps that I thought they had on that one particular area. (Teacher 1B, personal communication, 2011)

Another teacher responded this way, “Well, I’ll take that group report, and say as a whole they’re missing this, this is the part they’re missing. Then I’ll tailor the instruction or say, ‘OK, the literature book covers this hard, so let’s hit that harder’” (Focus Group A, personal communication, 2011). Even though these teachers are reporting that they are not using the results to inform instruction, they are able to give examples of use.

Teachers felt that they used the Study Island program a good bit in their own classrooms, but were not so confident about use of the program outside of their classrooms and outside of school. One of the reasons they perceived low use outside of school was a lack of access to computers on the part of the students. When reporting on their usage of the data generated by Study Island, they perceived that they did not use the data with the same frequency that they used the program. Interviewees reported the reasons for this most likely included a lack of time and a lack of training. Nonetheless, when asked about how the data was being used, teachers had a wealth of examples.

Support

Three questions in the survey addressed the support the teachers were receiving from the district, the school, and the company with regard to the Study Island program. Questions about support were also asked in focus group interviews.

The first question was, “How much support do you receive from the district in regard to utilizing Study Island data?” The responses regarding district support are displayed by mode and percent per school in Table 29.

Table 29

Perceived Mode and Percentage of District Support by School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
A Great Deal	1	7.1	0	0.0	0	0.0	1	2.2
Much	2	14.3	2	14.3	1	7.1	5	11.1
Some	4	28.6	2	14.3	2	14.3	8	17.8
Little	5	35.7	7	50.0	11	64.7	23	51.1
None	2	14.3	3	21.4	3	17.6	8	17.8

Over half of the teachers felt that they rarely received support from the school district. Exactly 50% of teachers at School B and 64.7% of teachers at School C felt that they rarely received support from the district, while only 35.7% of the respondents at School A felt that way. When asked about this in focus group interviews, teachers recalled a district-wide training that had been offered last year (Focus Group A, personal communication, 2011). A teacher at School C mentioned that there is a district-wide training coming up in May, but that was all she knew about it (Focus Group C, personal

communication, 2011). Teachers at School B felt that part of the support was data analysis on the benchmarks that they had to turn in to administration every 9 weeks. One teacher explained, “You’re supposed to analyze the data from your benchmarks, and I think most of the academic subjects are using Study Island for their benchmarks, but we’re told to do it, not how to do it” (Focus Group B, personal communication, 2011). This response echoes earlier frustration expressed with regard to training.

Another frustration that was expressed by the teachers at all schools and on the survey was the fact that the district was mandating use of Study Island, along with other computer programs. One teacher commented on the survey that in order to help the program have an impact on teaching practice, he or she needed “time to become familiar with the system and its capabilities, as well as to feel free to use the program in the way that best suits the needs of their individual students. Usage should not be mandated or monitored” (Online Survey, 2011). Another teacher in an individual interview said, “It is in all honesty that I say I use it in my classroom because I’m told I’m supposed to” (Teacher 2B, personal communication, 2011). A teacher summed up all of the frustration that was expressed by saying the following:

I don’t like being pressured to use it [Study Island]. Because I’m having trouble getting through all that I need to get through in the classroom; and having to do My Access, and ClassScape, and Study Island, and finding time to get on the computer. It causes friction between teachers, because you’re battling for that one little time. And I just don’t have enough time, and I’m not getting through everything I need to get through in the classroom because I have to get in the computer lab to do all these different programs. (Focus Group C, personal communication, 2011)

The second question about support was, “How much support do you receive from the school in regard to utilizing Study Island data?” Table 30 depicts responses by mode and percentage.

Table 30

Perceived Mode and Percentage of School Support by School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
A Great Deal	1	7.1	0	0.0	0	0.0	1	2.2
Much	3	21.4	2	14.3	3	17.6	8	17.8
Some	5	35.7	5	35.7	2	11.8	12	26.7
Little	4	28.6	5	35.7	10	58.8	19	42.2
None	1	7.1	2	14.3	2	11.8	5	11.1

Teachers felt that they were rarely receiving support from the school. However, the respondents did not align as negatively on the trait continuum as they did with the question pertaining to district support. Teachers at School C again perceived that they were receiving the least amount of support. When asked about school-based support, teachers mentioned the Instructional Technology Facilitator that was assigned to their school or the Instructional Coach that was assigned to their school (Focus Group A, personal communication, 2011; Focus Group B, personal communication, 2011; Focus Group C, personal communication, 2011). School A thought that they were the first middle school to implement the program, and therefore felt they had received a good bit of support from the school in general. One teacher explained it this way:

I think we’ve always had support at the school level since the very beginning,

because I'm trying to remember, but I'm thinking we were one of the very first schools to even use it. I think when the principal purchased it, then immediately it was kind of spread around and everybody got it, and we were all just kind of learning together, but our support comes from within each other. Usually if we have a question, we go to somebody who we know has used it more. (Focus Group A, personal communication, 2011)

Other instances of support at the school level were in reference to having teachers who had used the program or been to a district training to train teachers who had not. Those responses were reported in the section on training.

The third question relating to support was, "How much support do you receive from the Study Island company?" The responses are shown by mode and percentage per school in Table 31.

Table 31

Perceived Mode and Percentage of Company Support by School

	School A		School B		School C		Total	
	N	%	N	%	N	%	N	%
A Great Deal	1	7.1	0	0.0	2	11.8	3	6.7
Much	2	14.3	0	0.0	0	0.0	2	4.4
Some	3	21.4	7	50.0	2	11.8	12	26.7
Little	5	35.7	6	42.9	5	29.4	16	35.6
None	3	21.4	1	7.1	8	47.1	12	26.7

Teachers at School A and at School B felt that they occasionally or rarely received support from the company, whereas almost half of the teachers at School C felt

that they never received support from the company. Conversely, only teachers at School B reported positive support from the company when asked about this topic in focus group interviews, even though School B survey responses indicated a more negative perception on the trait continuum. One teacher said, “The one time I needed to [get support], I got it instantly, with a live tech, problem fixed” (Focus Group B, personal communication, 2011). Another teacher followed up with, “It pops up, live chat, if you need them” (Focus Group B, personal communication, 2011). However, a teacher at School A had a very different experience with the company. She said the following:

I’ve e-mailed several times because I knew that I could get to some of that stuff [modifications] but I couldn’t figure out how to do it. We were having problems with getting the read aloud to work on a consistent basis, and I think I e-mailed three times, but I didn’t hear back. (Focus Group A, personal communication, 2011)

Teachers at School C expressed frustration at the feeling that they did not have the same customer support or follow-up that they had with another computer program. One teacher stated,

We don’t have the follow-up instruction or follow-up support like we did with ClassScape. When I used it 2 years ago, you could e-mail, and they would help you out. It felt like you got more support. But Study Island seems to be a bigger thing. (Focus Group C, personal communication, 2011)

This teacher was referencing being able to e-mail the ClassScape representative who came to the school and trained all of the teachers in the use of the program (Focus Group C, personal communication, 2011). However, when the researcher followed up to this response by asking if anyone had ever tried to e-mail Study Island, no teacher said they

had attempted it (Focus Group C, personal communication, 2011).

Data Analysis from Individual Interviews

The researcher gave teachers who participated in individual interviews three mock reports provided by Study Island and were asked questions about what they would do with that data. The reports that they discussed were a Benchmarking Report (Appendix A), an Individual Student Report (Appendix B), and a Compare With Others Individual Student Report (Appendix C). The researcher first asked teachers to discuss students' strengths and weaknesses based on any of the reports. Teacher 1A said the following:

There's definitely a few that just sped through it and it definitely knocked down the score. But then there's one who took enough time, and probably was able to look through it. Jack Bauer, he's very close to everything, if not above the school and the state, except for one. This is one [a report] I use a lot, because I like to see what I'm up against, and what we need to work with. But then I look at this [Individual Student Report], and this child has done 17 sessions in 55 minutes, so you have to think about what he has been doing with just 55 minutes if he's had 17 sessions. So either he is not getting a lot of time in the computer lab to be able to do it, or he is just rushing through the tasks. (Teacher 1A, personal communication, 2011)

This type of response was common among the teachers who used the program and the data with their students on a regular basis. All of the teachers mentioned the amount of time spent on the sessions as a problem to discuss with that student. Another issue that some of the teachers looked at was the percentage correct. One teacher elaborated in this way:

As you go down, of course, this is broken down by objective. And I kind of set in

my mind a cut-off goal of around 80%. If I feel like they're getting close, or they're right there at that 80%, I think that that sort of shows that they are beginning to master that. Of course one of these students has 100% mastery on measurement, processes and tools, so his time could be better spent working on probability and statistics where he's just 67%. Andy Garcia, 0% across the board, so I would think you begin with maybe not so many objectives for him, but maybe one or two objectives, and hit those home with Andy, and see if you can't get those to increase. (Teacher 1B, personal communication, 2011)

Even the teacher who did not use Study Island at all and had never seen a report mentioned that the percentages were important to consider. When asked what she saw as strengths and weaknesses, she said, "Only the areas they need to cover. What percentage they got right, how much time they spent on it. So I can tell either they were out in left field or they needed more time on whatever fraction and decimal models" (Teacher 1C, personal communication, 2011).

The next question referred to instructional decisions that might be made based on the reports. One teacher explained how he would individualize instruction for a struggling student by giving him manipulatives:

So I would say, all right, even if it's as simple as taking a couple of rulers, and putting a piece of tape at the end to make an angle, and let them fiddle around with them and a protractor, and say, "You see how it changes?" Or maybe put two or three of them together to make a triangle or whatever, something tangible to match what they see on the screen. Or if you don't want to leave the computer lab, there are plenty of like Java programs, if you just Google "online geometry help." But my first impulse for a kid like like is to put something in their hands.

Have them do something, because the abstract is always going to be abstract while it's on a flat piece of paper or on a flat screen. When you start doing something with it, it becomes a little easier to wrap your head around. I also might partner him with somebody who's a little stronger, because a lot of times kids can say stuff to each other in a way that I can't. (Teacher 2B, personal communication, 2011)

Several other teachers mentioned sitting down with students individually to see where the problem may have been. For example, a math and science teacher who just learned about the reports said this:

You can see the areas where they're struggling, so you'd want to definitely spend more time individually with that student. Maybe you'd go through the individual questions with them, watch them work it out, and see the mistakes that they are making. And then you'd not spend as much time on their strengths as their weaknesses. (Teacher 2C, personal communication, 2011)

One teacher explained a preassessment, instruction, postassessment cycle she would use. She explained the following:

Across the board they're all below 80%. So they all need work. They all need help, and I think again, just starting with a single objective, and really working on that objective on a daily basis, and then coming back and just kind of do a pre[assessment], and maybe a post[assessment] to see if that's helping, if that instruction helps that objective to come up. These that are...like the spatial reasoning, 25%. That seems to be the low, and that might be where I start, and see if we can't start with the lowest and move that up higher as we go, and then go up to the next one, the 40% one. And do some individual targeting of that

particular objective, and then come back to it and let them maybe redo that part of the benchmark, or even print out that part of the benchmark. I found out you can do that. And so just kind of see if you know on the second time around, if that did not come up. (Teacher 1B, personal communication, 2011)

The last question that was asked about the reports pertained to individual feedback. One teacher was concerned about time and wanted to discuss that with the student. She had the following questions for the student:

Well, I would talk to them about the time. You know, “what are you doing? Why are you answering this many questions in this short a time? Are you working them out or are you just guessing? What’s your strategy here?” So that would be the big concern, then I would say, “OK, let’s sit down and do some flash cards. Let’s look at these angles. Let’s figure out what we need to do with this.”

(Teacher 2A, personal communication, 2011)

Another teacher mentioned helping rebuild the student’s confidence:

I would tell the student that we need to start focusing a little bit, and he needs to be able to voice what he’s having problems with, and maybe we can work on those together. My feedback is always I want to lift them up a little bit. Because if they’re not getting any confidence, especially some of my students who don’t like technology whatsoever, they get kind of like, I don’t want to go on the computer. So I want them to feel comfortable with it. So I try to make them as confident as possible. I sit down with them individually, work through some things, and then I start to slowly move away from them, and see if they can do it by themselves, and then go back to a same report and see if they’ve made any progress. (Teacher 1A, personal communication, 2011)

All teachers discussed working with the student individually on his or her specific weaknesses. Even though the teachers all had various experiences with the Study Island program and the various experiences with the use of the data the program generates, their responses on a whole were similar.

Summary

The purpose of this study was to determine how the data generated by the Study Island program was used to inform, plan, and implement instruction. The researcher administered an online survey with a Likert scale, focus group interviews, and individual interviews to collect data. Teachers' overall perceptions of use, as determined by the survey, were neither positive nor negative. A description of the cases in regards to computer use and access was discussed in order to help understand teacher perceptions. A description of the sample followed, again to help better understand teacher perceptions. The online survey was broken down into the themes of training, frequency of use, and support. The researcher discussed the results from the survey, from focus group interviews, and from individual interviews, where appropriate, by theme. Teachers' perceptions of training were neither positive nor negative, however, interview respondents all expressed that more training was a need. Perceptions of frequency of use were neither positive nor negative. Interview respondents felt that training with various aspects of the program, time to analyze the data generated, time to incorporate training, and time to focus on only Study Island with their students would be beneficial. Overall perception of support was negative according to the survey. Again, interview respondents reported that training and time were issues, along with an expressed frustration at district mandated use of various computer programs. The researcher gave individual interviewees sample reports and asked questions about the data in those

reports. The individual respondents had varied backgrounds, taught the range of grade levels and subjects encompassed in the study, and reported use of Study Island from not at all to two or three times a week, yet their responses with the data analysis prompts based on sample reports were very similar.

Chapter 5: Conclusions

Overview

Even though pressure from state and federal governments has moved schools to focus on formative assessment and the utilization of technology to help with inherent issues of analyzing formative assessment data, little research has been conducted in the realm of how teachers are using this data in actual practice. In order to get a picture of teacher perceptions of data use, a collective case study was conducted in three middle schools in rural western North Carolina. This study focused on how teachers were using the data generated by the CAI program, Study Island, to inform, plan, and implement instruction. The following research questions were the focus of the study.

1. How do teachers characterize their use of formative assessment data from Study Island?
2. How do teachers characterize their use of formative assessment data from Study Island with regards to the planning of instruction?
3. How do teachers characterize their use of formative assessment data from Study Island with regards to the implementation of instruction?

The researcher conducted a literature review to gain insight into the topics of data-driven decision making, formative assessment, computer-assisted instruction, and Study Island. Findings from the literature showed that there was confusion over the definitions and types of formative assessment. However, research clearly delineates that formative assessment data should be used to change instruction. The researcher found much research that informed teachers about how they should use formative assessment data, including feedback, in their classrooms; nonetheless, there was little research that showed what teachers were actually doing with formative assessment data in their

classrooms.

In order to determine how teachers were using formative assessment data in their schools, particularly the formative assessment data generated by the Study Island program, an online survey was administered to teachers who used the program in three schools. In order to further understanding and to triangulate data, focus group interviews and individual interviews were also conducted in those schools.

Both quantitative and qualitative data were collected. Quantitative data was analyzed using SPSS. Qualitative data was analyzed for themes and coded as such. All coding was verified by an independent researcher. Three themes, training, frequency of use, and support, emerged from the survey and were repeated in focus group interviews. Individual interviews spoke to training and frequency of use as well. Individual interviews also consisted of an analysis of generic Study Island reports. The researcher reported findings by theme, with an examination of both the quantitative and qualitative data by question within each theme. The findings from the data analysis piece of the individual interviews were reported separately.

A summary of the findings, including answers to the research questions, follows. Conclusions are drawn from the findings and are based on the themes of training, frequency of use, and support. The theme of frequency of use was divided into two sub-topics: frequency of use of the program and frequency of use of the data. A discussion of the data analysis piece of the individual interviews is also included in the summary and conclusions. Limitations of the study are addressed, and recommendations based on theme are made.

Summary of Data and Conclusions

This summary begins with an overview of the survey as a whole, then discusses

the theme of training and moves to the theme of frequency of use. The researcher summarized the findings associated with the theme of support next. Lastly, the findings from the data analysis section of the individual interviews are reviewed. Research questions are addressed as appropriate. The researcher draws conclusions at the end of each section.

When one considers the online survey responses overall, teachers reported neither positive nor negative perceptions of use of the Study Island program. While the reported perception of the themes of training and frequency of use were also neither positive nor negative, the overall perception of support was negative. Looking at individual questions from the survey, two questions were reported in a positive manner on the trait continuum with a mode of 4 on the Likert scale, while two questions were reported at the lowest level of the trait continuum, with a mode of 1 on the Likert scale. The questions that had the most positive perception were “How often do you use Study Island with your students” and “How often do you analyze the data generated by Study Island.” Conversely, the questions that had the most negative perception were “How often do your students use Study Island outside of school” and “How often do you take group instructional time for the use of Study Island results.” All four of these questions fell in to the theme of frequency of use, even though the theme of support had the most negative perception on the trait continuum. Correlations were also calculated in regards to the domains of training, frequency of use, and support. All correlations were positive and significant. An ANOVA was also run to determine if teacher demographics had any impact on perception, however, no significant values were found.

Training. Within the domain of training, the reported perception is that teachers have had some training when it comes to assessment, formative assessment, the Study

Island program, and analysis and interpretation of the data associated with the Study Island program. General training in assessment and specific training in formative assessment were reported to have a more positive perception on the trait continuum, with more teachers responding with a 3, 4, or 5 on the Likert scale. In fact, 86.7% of teachers reported that they had had some, much, or a great deal of training in assessment. Similarly, 84.5% of teachers perceived that they had some, much, or a great deal of training in formative assessment (Online Survey, 2011). When asked about general assessment in focus group interviews, teachers at School A did not report any training in general assessment, even though they had the most positive perception of use according to the survey (Focus Group A, personal communication, 2011). Teachers at School B and School C referenced training in undergraduate and graduate school and with the state mandated writing moodle (Focus Group B, personal communication, 2011; Focus Group C, personal communication, 2011). In regards to formative assessment, a teacher at School C mentioned training with the new North Carolina Teacher Evaluation Instrument (Focus Group C, personal communication, 2011), but teachers at School A and School B did not mention anything specific. In fact one teacher at School A said, “I remember some, but I can’t...it’s not been recent” (Focus Group A, personal communication, 2011).

When it came to training with the Study Island program and the data generated by Study Island, perceptions were more negative. As reported on the survey, 88.9% of the respondents felt they had some, little, or no training with the Study Island program. Likewise, 95.6% of teachers reported that they had some, little, or no training when it came to analyzing and interpreting the data generated by the Study Island program. Teachers at School A were the only group that reported having much or a great deal of training on the program. They were also the only group to report having much training

on the data, with a mode of 2. This may be due to the fact that more of them, at 42.9%, reported using Study Island longer than either of the other schools in the study (Online Survey, 2011). When asked about training for the program in focus group interviews, School A reported yearly training at the school (Focus Group A, personal communication, 2011), while School B and School C reported occasional school and district training (Focus Group B, personal communication, 2011; Focus Group C, personal communication, 2011). Only one teacher from the entire study reported using the online training feature provided by Study Island (Focus Group A, personal communication, 2011). As for training with the use of the data generated by Study Island, only one teacher even mentioned a training in which he or she was shown the data, and then there was no discussion in how to use it (Focus Group C, personal communication, 2011). Teachers at all schools mentioned that one of the problems with training was that they had been trained on so many computer programs in the past 2 years, but they also expressed a need for more training on various aspects of the Study Island program (Focus Group A, personal communication, 2011; Focus Group B, personal communication, 2011; Focus Group C, personal communication, 2011).

Conclusions with regard to training. Even though teachers reported on the survey that they had some training in assessment, formative assessment, Study Island, and the analysis of Study Island data, most teachers could not remember specific examples of training. The most examples of training that were mentioned were with the Study Island program itself, and no one could remember any training associated with the analysis of Study Island data. Interestingly, the question with the second highest mean on the survey was, “How much training in assessment have you had?” Also, teachers at all schools mentioned a need for more training with the Study Island program and the use of

the data generated by the Study Island program. One reason that teachers may have reported positively on the trait continuum is that they perceive that they should have had a great deal of training on assessment and formative assessment because of the focus on assessment with the new North Carolina Teacher Evaluation Instrument (NCDPI, 2008). Another reason for the disconnect between perceptions on the survey and perceptions reported in the interviews may be a result of the lack of clarity in the research when it comes to the types and purposes of assessment. Dunn and Mulvenon (2009) pointed out that the confusion comes when the same assessment is used for both summative and formative purposes. This may be a problem for the teachers caused by a lack of training, because they may not be aware of how exactly to use the program and the data. Nonetheless, it appeared from the data analysis that even though the teachers reported average levels of training, not much training was remembered.

Frequency of use of the program. Overall, teachers perceived their frequency of use as neither positive nor negative. When it came to perceptions of frequency of use of the program, responses were more positive with respect to general use of the program and use of the program to assess students. Teachers perceived that they used the program occasionally, regularly, or frequently with an 84.5% response rate. The response was similar, but not as high, with regards to the use of the program for assessment, at 75.6%. Even though use of the program was mandated and was being monitored by the district, there was no consistent answer about how frequently the program was being used. Responses ranged from “not at all” (Teacher 1C, personal communication, 2011) to “several times a week” (Teacher 2A, personal communication, 2011). When teachers responded to the question about frequency of use with assessment, all schools reported using the program as a benchmarking tool. This may be the reason for the discrepancy in

answers between the use of the program and the use of the program to assess students. Teachers answering this question may have been specifically thinking about the use of benchmark testing. Another teacher mentioned feeling that paper and pencil assessments were more valid than the Study Island assessments (Teacher 2A, personal communication, 2011), so that could also explain the discrepancy.

Perceptions were more negative when it came to use of the program outside of class and outside of school. When asked about use of the program outside of class, 84.4% of the teachers reported that students used it occasionally, rarely, or never. Responses were even more negative on the trait continuum when it came to use of the program outside of school, with 98.8% of teachers responding that students used the program occasionally, rarely, or never (Online Survey, 2011). Focus groups could come up with a few specific examples of where students were using Study Island outside of their classroom. Common responses were in enrichment time, with another teacher in the school, or in the library (Focus Group A, personal communication, 2011; Focus Group B, personal communication, 2011; Focus Group C, personal communication, 2011). Teachers at all three schools felt that students were not using the program outside of school because of a lack of computers and because of a lack of motivation. In fact, most teachers did not even assign it as homework because they felt that it was unfair to students who did not have computer access in the home (Focus Group A, personal communication, 2011; Focus Group B, personal communication, 2011; Focus Group C, personal communication, 2011).

Conclusions about frequency of use of the program. Teachers responded in a positive manner on the trait continuum when it came to use of Study Island with students. In fact, that question had the highest mean of any question in the survey. Nonetheless,

teachers at School C characterized their use of Study Island in a negative manner. In fact, one teacher reported not using the program at all (Teacher 1C, personal communication, 2011). This may be because School C had fewer computer labs than any other school and also had no set schedule of use, unlike School A and School B. The responses were average when it came to using Study Island to assess students. Since Study Island bills itself as “a formative, ongoing assessment tool” (Magnolia Consulting, 2008, p. 6), a lack of training might explain this discrepancy in reporting. Teachers focused their responses on the benchmarking feature of the program in interviews, so they may not be aware of all of the other features of Study Island. Training could help fill in those gaps in awareness.

Frequency of use of the data. The questions from the online survey, focus group interviews, and individual interviews that pertain to how teachers analyze and use the data generated by Study Island to plan and change instruction directly relate to the research questions that guided the study. Even though the responses for overall frequency of use were neither positive nor negative, when one considers the responses on the topic of frequency of use of the data, only one question was perceived as more positive than negative and that question directly informed research question one. Research question one was, “How do teachers characterize their use of formative assessment data from Study Island.” Teachers reported that they analyzed the data generated by Study Island occasionally, regularly, or frequently with a rate of 68.9%. The most frequent response, with a mode of 17, was regularly. When asked about the frequency of use of the data in focus group and individual interviews, responses were varied. Time responses ranged from “every day” (Teacher 1A, personal communication, 2011) to “once every 9 weeks” (Focus Group C, personal communication, 2011).

Research question two was, “How do teachers characterize their use of formative assessment data from Study Island with regards to lesson planning.” When teachers were asked about use of data as it pertained to lesson planning, 80% of the teachers responded with occasionally, rarely, or never, at the negative end of the trait continuum (Online Survey, 2011). Teachers in focus group and individual interviews cited a lack of training and a lack of time as a reason for this negative perception. For example, one teacher responded, “I could say it may be a lack of time, to really look over the reports and integrate that in a meaningful way for lessons” (Focus Group B, personal communication, 2011). However, even though they had reasons why teachers were not using the data with regards to lesson planning and changes in instruction, they also could give specific examples as to how they were doing both in their classrooms.

Research question three was, “How do teachers characterize their use of formative assessment data from Study Island with regards to the implementation of instruction.” Teachers reported an even higher negative trait response when it came to changing instruction, with 91.1% of teachers replying that they occasionally, rarely, or never used the data to change instruction (Online Survey, 2011). Teachers in focus group interviews cited the amount of material that they are required to cover and a lack of time to complete all activities as reasons for the negative response rate. One teacher said, “and mine would be a lack of experience and a lack of knowledge of how to do those things” (Focus Group C, personal communication, 2011). However, teachers were also able to give specific examples of how they were changing instruction and implementing new instruction based on Study Island data in both focus group interviews and individual interviews.

Two other questions from the survey addressed the use of data generated from

Study Island. Teachers reported negatively on the trait continuum with regards to use of individual results with individual students, with 75.6% of respondents replying occasionally, rarely, or never. Similarly, 86.7% of teachers reported that they occasionally, rarely, or never used group instructional time for Study Island results. Teachers in focus groups and individual interviews felt this negative perception was probably a result of time constraints and district mandating. Teachers also felt that results were more focused on individual results, so it would be difficult to use them with a whole group. However, teachers at all schools could give specific examples of how they were using the data with students both individually and as a whole group.

Conclusions about frequency of use of the data. When it came to the use of the data, teachers responded positively on the trait continuum in reference to the analysis of the data generated by Study Island. Nonetheless, they reported a negative perception when it came to using the data in lesson planning, to inform instruction, with individual students, and with the whole group. Even though low use of those four topics was the perception, teachers at all schools in both focus groups and individual interviews could give very specific examples of how they were using the data to plan lessons, change instruction, and give feedback to individual students. An explanation for this apparent dichotomy may be a lack of awareness of what formative assessment entails. If one considers the definition of formative assessment set forth by the CCSSO (McManus, 2008), that was adopted for this study, then several of the interviewees are actually using the data to provide feedback to students and to adjust instruction to improve achievement. In fact, one teacher mirrored the recursive piece of formative assessment as outlined by Margaret Heritage. Heritage (2007) suggested closing the instructional gap by “modifying instruction, assessing again to give further information about learning,

modifying instruction again, and so on” (p. 142). Two individual interviewees at two different schools explained this same process in their interviews, without realizing that they were describing the formative assessment cycle (Teacher 1A, personal communication, 2011; Teacher 1B, personal communication, 2011). Another reason for the conflict may be the perceptions of data use when it comes to time and the district mandate. Although the use of data has a positive impact on teaching practice (Wayman & Stringfield, 2006), the teachers expressed two common barriers to data usage as defined by Ingram et al. (2004). Those two common barriers that were frequent themes in interviews at all schools were a lack of time and perceived political use of the data, in this case through district mandating of use. This negative perception speaks to a larger issue involving teacher buy-in and motivation. Teachers in all three schools responded negatively in regards to the district mandate of use of this program. Ingram et al. (2004) directly stated that “the extent of data-driven decision making and organizational learning will depend on the level of agreement and good will among the various constituents of the educational process” (p. 1282). Since teachers do not perceive good will on the part of the district administration regarding the use of Study Island, use of the data in decision making may be directly impacted. Teachers reported feeling forced to use the program, and, therefore, are not motivated to fully implement all aspects of the program.

Support. Overall, teachers rated the domain of support negatively on the trait continuum. In reference to the support received from the district, 86.7% responded that they occasionally, rarely, or never perceived they obtained support. Likewise, 80% of teachers felt that they occasionally, rarely, or never received support from the school, and 88.9% of teachers felt that they occasionally, rarely, or never received support from the company (Online Survey, 2011). Teachers at School A reported that training of some

sort was offered at their school every year (Focus Group A, personal communication, 2011), but teachers at School B and School C reported that their access to training had not been as frequent (Focus Group B, personal communication, 2011; Focus Group C, personal communication, 2011). Interestingly, teachers at School B reported support from the company in regards to the email and live chat features, even though School B had the most negative responses on the trait continuum (Focus Group B, personal communication, 2011; Online Survey, 2011).

Conclusions about support. The domain of support was perceived as negative on the trait continuum. Teachers did not feel supported from the district, the schools, or the company. However, when asked about support in focus group interviews, teachers expressed some support at the school level and some support from the company. They even mentioned occasional trainings provided from the district. Teachers felt most supported by other teachers in their school who had been using the program. This reflects the literature in that a common use of formative assessment in schools is to begin discussion and collaboration among educators (Brunner et al., 2005; Lachat & Smith, 2005; Wayman & Stringfield, 2006). Another issue that teachers brought forth several times was the number of CAI programs that the district had mandated usage of in the past 2 years. This may be the reason for the negative perception of support. With the number of CAI programs being required to use with students, teachers seem to be frustrated because of inadequate computer lab access and inadequate training.

Data analysis. In order to inform teachers' knowledge of data analysis, the researcher gave teachers in individual interviews three generic reports, provided by Study Island, and asked questions about how they might use that data. Teachers were asked about individual student strengths and weaknesses, types of whole group and individual

instructional decisions that could be made, and what kind of feedback could be given to individual students. The teachers interviewed, who ranged from using the Study Island program and the data generated by that program every day to not at all, had similar answers. They all discussed percentages when it came to understanding the data. They all mentioned some form of individualized instruction when it came to making instructional decisions, and they all discussed providing feedback that addressed a student's specific weaknesses.

Conclusions about data analysis. On a whole, teachers appeared to be comfortable with looking at data and determining next steps. They seemed to agree that percentages helped them better understand where students were in their learning progressions. All teachers also mentioned providing feedback to the students, which seems to prove that they understand data analysis and practices of formative assessment. In fact, Sadler (1989) suggested that teachers who gave feedback based on formative assessment data helped students identify gaps in their learning and moved those students toward closing the gaps. Heritage (2007), Cauley and McMillan (2009), and Colantonio (2005) echoed the importance of feedback in their articles on formative assessment.

A summary of the results of the data from the online survey, focus group interviews, and individual interviews began with a brief explanation of the survey as a whole, and then moved into a discussion of the domains found within the survey. Encompassed in those domains was a review of findings from focus group interviews and individual interviews. Research questions were addressed where applicable. The summary ended with a brief discussion of the data analysis piece of the individual interviews. The researcher addressed conclusions based on the data at the end of each domain. Based on the data analysis and the conclusions drawn, limitations are addressed

and recommendations are made.

Limitations

The following may be limitations of this study:

1. The results of this study may not be generalized to other schools or districts using Study Island and are only applicable to the schools in the study.
2. Responses in the interviews may have been positively skewed due to the fact that the researcher was a former administrator in one of the schools in the study. Another reason responses may have been more positive in interviews may have been because the teachers were responding to each other's ideas in a favorable manner.
3. Due to the qualitative nature of the study, it was impossible to discount researcher bias. However, steps were taken to ensure internal validity and reliability.

Recommendations

Based on a review of the data, the following recommendations have been made:

1. The district in this study should work toward reducing the number of required CAI programs implemented in order to address the frustrations teachers expressed with time and computer lab access. The number of computer labs in each school should also be comparable. Further study would be necessary to determine which CAI programs should be kept and which should be eliminated. Research into general guidelines for CAI usage in school settings should be conducted to determine if each school is equipped to manage the number and type of CAI already implemented. A quantitative study to determine correlations between each CAI program and end-of-grade test scores should be conducted. This data, along with a study of curriculum alignment in regards to each program, should be taken into consideration when determining which programs to keep. This reduction in programs and increase in computer labs should also help teachers with

regard to time. They will have more time in computer labs to work with fewer programs, resulting in a better depth of knowledge of each program.

2. The district should set forth guidelines that all schools would follow with regards to CAI program usage. School A and School B overall had a more positive perception of use of Study Island, and they had a set schedule for computer lab time and Study Island usage. Again, in conjunction with adult learning theory (Knowles et al., 2005), teachers at School A and School B felt a distinct need to learn more about Study Island. Teachers at School C reported a more negative perception overall, which may have been a result of not having a set schedule. Administrators in the district should determine guidelines for the use of Study Island and other CAI programs, along with use of data generated by the programs by examining research in the areas of data-driven decision making, formative assessment, and general use of CAI. Administrators could then create a checklist of how to best use these programs and the data generated by these programs. This checklist could also be used when considering additional types of CAI to add to the district.

3. Teachers in these schools need more training on the Study Island program, the use of the data generated by the Study Island program, and formative assessment. Since teachers had difficulty recalling training that had taken place, retention, as explained by Leib (1991), apparently did not occur. In order to determine the training needs of the teachers in these schools, those providing professional development should consider Knowles et al.'s (2005) characteristics of adult learners and the minimalist theory by Carroll (1990). Minimalist theory suggests that learning tasks should be meaningful and independent activities, realistic projects should be given in the process, instruction should increase the number of interactive activities, there should be time to allow for mistakes

and learning correction, and the training and the system should be closely tied together. It also takes into consideration that the learners are adult learners and that they have little patience for being treated as if everything is new information. Adult learners bring a wealth of prior knowledge to any task and can access that prior knowledge without being prompted (Carroll, 1990). Trainers should determine the stage of concern (Hall & Hord, 1987) of each teacher needing training and plan instruction accordingly. Trainings should be frequent and ongoing, as suggested by Wayman and Cho (2008). Also, the same training should be offered at various times, as suggested by a teacher in School C (Focus Group C, personal communication, 2011). The district might consider training a teacher at each school who is already using Study Island with a high degree of success to work with other teachers at their home school. That way, a site-based expert will have been identified and trained in all aspects of the program. That teacher can then offer trainings based on the individual needs of the teachers at each site, in regards to both confusion about the program and time constraints. These *trainers* would be able to help alleviate the negative perceptions of data use and support because of their accessibility and knowledge. This can also help with the negative perceptions brought about by the mandating of the program in regards to teacher buy-in and motivation. Having immediate access to someone who is knowledgeable about the program in use and who is nonjudgmental will help alleviate some of the anxiety revolving around computer use as explained by Bohlin (n.d.). In fact, providing an on-site expert can help build confidence and reduce anxiety by allowing for mistakes to be made in a low risk environment and providing frequent opportunities for hands-on learning by allowing the teachers to work at their own pace through the program while having someone immediate to answer questions and troubleshoot as problems arise (Bohlin, n.d.; Carroll, 1990; Knowles et al.,

2005; Wayman & Cho, 2008). As for training in formative assessment, the researcher recommends that the district begin with NC FALCON, which is North Carolina's online formative assessment training.

Summary

This study set forth to determine how teachers in three schools in a rural district in western North Carolina used the data generated by the CAI program Study Island to inform, plan, and implement instruction. A mixed methods collective case study was conducted and data was collected via an online survey with a Likert scale, focus group interviews, and individual interviews. Data was analyzed and the themes of training, frequency of use, and support emerged. The theme of frequency of use was subdivided into frequency of use of the program and frequency of use of the data. A summary of the data and conclusions drawn from the data were addressed. Overall perception of use of Study Island and the data generated by Study Island was neither positive nor negative. Correlations among themes were all significant and positive, so as perceptions of support trended positively, perceptions of frequency of use and training also trended positively. Teachers' perceptions of training were neither positive nor negative. Teachers in interviews had difficulty recalling any specific training. Teachers had a positive perception of their frequency of use of the program, but did not report positive use when using the program to assess students. When it came to frequency of use of the data, teachers were neither positive nor negative in their perceptions. They did have negative perceptions of the use of the data to inform, plan, and implement instruction. When given sample reports from Study Island, teachers appeared to be comfortable with analyzing the data and determining next steps. Limitations were discussed and recommendations with regards to training, computer lab use, CAI use, and time were made.

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Appendix A
Benchmarking Report

BENCHMARKING REPORT
(Student names are fictitious)

		Objective 1: Numbers, Operations, and Quantitative Reasoning [8]	Objective 2: Patterns, Relationships, and Algebraic Reasoning [5]	Objective 3: Geometry and Spatial Reasoning [4]	Objective 4: Measure ment [4]
<u>Student</u>	<u>Minutes</u>	<u>Score</u>	<u>Score</u>	<u>Score</u>	<u>Score</u>
Clooney, George		-	-	-	-
Custom, Matt		-	-	-	-
Damon, Matt	7.3	87.50%	100%	75%	100%
Fallon, Jimmy		-	-	-	-
Garcia, Andy	1.6	0%	0%	0%	0%
Parnell, Chris		-	-	-	-
Pitt, Brad	1.8	37.50%	20%	0%	25%
Student, Fake		-	-	-	-
Total		41.70%	40%	25%	41.70%

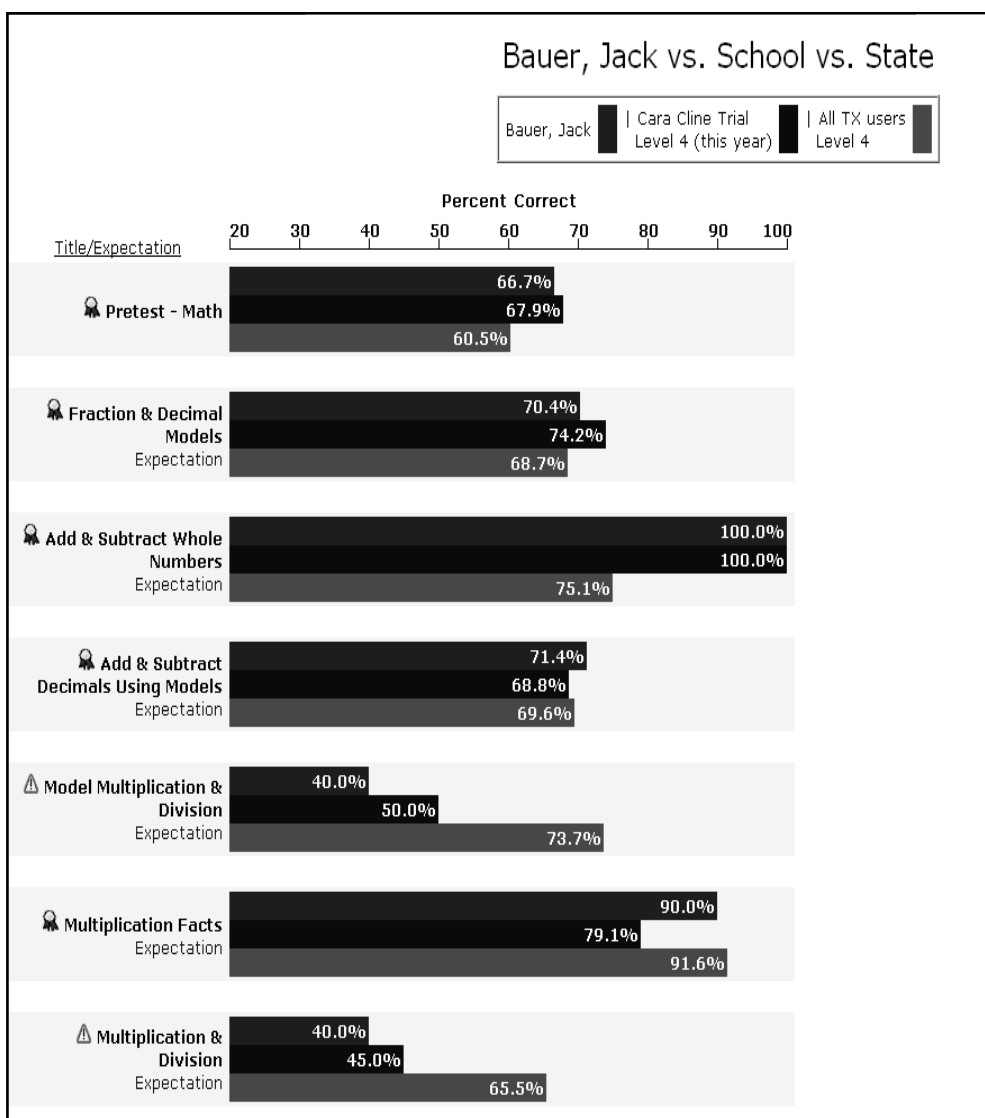
Appendix B
Individual Student Report

STUDY ISLAND INDIVIDUAL STUDENT REPORT

Study Island Topics				
Topic	Sessions	Time Spent	Correct / Total	% Correct
<input type="checkbox"/> 1. Pretest - Math	2	1:53	10 / 15	66.7%
2. Numbers, Operations, & Problem Solving (TAKS OBJ. 1 & 6)				
<input type="checkbox"/> a. Fraction & Decimal Models - Expectation	6	28:38	38 / 54	70.4%
<input type="checkbox"/> Fractional Parts of Objects	2	3:23	12 / 15	80.0%
<input type="checkbox"/> b. Add & Subtract Whole Numbers - Expectation	1	4:41	10 / 10	100.0%
<input type="checkbox"/> c. Add & Subtract Decimals Using Models - Expectation	3	3:21	20 / 28	71.4%
<input type="checkbox"/> d. Model Multiplication & Division - Expectation	1	2:24	4 / 10	40.0%
Model Multiplication & Division	0	-	-	-
<input type="checkbox"/> e. Multiplication Facts - Expectation	1	0:42	9 / 10	90.0%
<input type="checkbox"/> f. Multiplication & Division - Expectation	1	1:40	4 / 10	40.0%
<input type="checkbox"/> Multiplication & Division	2	2:08	8 / 30	26.7%
g. Rounding Numbers - Expectation	0	-	-	-
h. Estimate Solutions - Expectation	0	-	-	-
i. Problem Solving - Expectation	0	-	-	-
j. Real World Problems - Expectation	0	-	-	-
3. Patterns & Relationships (TAKS OBJ. 2)				
a. Fact Families - Expectation	0	-	-	-
b. Number Patterns - Expectation	0	-	-	-
4. Geometry (TAKS OBJ. 3)				
<input type="checkbox"/> a. Angles - Expectation	1	2:30	2 / 10	20.0%
<input type="checkbox"/> Angles	2	5:21	3 / 20	15.0%
b. Parallel and Perpendicular Lines - Expectation	0	-	-	-
c. Properties of Geometric Figures - Expectation	0	-	-	-
d. Symmetry & Congruence - Expectation	0	-	-	-
e. Object Transformations - Expectation	0	-	-	-
f. Number Lines - Expectation	0	-	-	-
5. Measurement (TAKS OBJ. 4)				
a. Measuring Objects - Expectation	0	-	-	-
b. Perimeter, Area, & Volume - Expectation	0	-	-	-
c. Convert Similar Units - Expectation	0	-	-	-
d. Temperature - Expectation	0	-	-	-
e. Time Elapsed - Expectation	0	-	-	-
6. Probability & Statistics (TAKS OBJ. 5)				
a. Possible Outcomes - Expectation	0	-	-	-
<input type="checkbox"/> b. Bar Graphs - Expectation	1	9:12	5 / 6	83.3%
7. Post Test - Math	0	-	-	-

Appendix C
Compare With Others Report

COMPARE WITH OTHERS: Student vs. School vs. State: INDIVIDUAL STUDENTS (Student name is fictitious)



Appendix D
Study Island Survey

Study Island Survey

1. Demographics

Thank you for participating in this survey.

1. At which school do you teach?

- ☐ School A
- ☐ School B
- ☐ School C

2. What is your gender?

- ☐ Male
- ☐ Female

3. What is your age?

- ☐ 20-30
- ☐ 31-40
- ☐ 41-50
- ☐ 51-60
- ☐ 61 or above

4. What is the highest degree you hold?

- ☐ Bachelor's
- ☐ Master's
- ☐ Education Specialist
- ☐ Doctorate

5. How many years have you been teaching?

- ☐ 0-5
- ☐ 6-10
- ☐ 11-15
- ☐ 16-20
- ☐ 21-25
- ☐ 26-30
- ☐ more than 30

6. How many years have you been in your current position?

- ☐ 0-5
- ☐ 6-10
- ☐ 11-15
- ☐ 16-20
- ☐ 26-30
- ☐ more than 30

7. Which of the following subjects do you teach?

- ☐ Language Arts
- ☐ Math
- ☐ Science

8. How long have you been using the Study Island program in your classroom?

- ☐ 1 year
- ☐ 2 years
- ☐ 3 years
- ☐ 4 years
- ☐ 5 years
- ☐ 6 or more years

9. How often do you use Study Island with your students?

- ☐ Frequently
- ☐ Regularly
- ☐ Occasionally
- ☐ Rarely
- ☐ Never

Estimate the amount of time in an average week you use Study Island with your students.

2. Perceptions and Use of Study Island Data

1. How much training in assessment have you had?

- ☐ A Great Deal
- ☐ Much
- ☐ Some
- ☐ Little
- ☐ None

2. How much training in formative assessment have you had?

- ☐ A Great Deal
- ☐ Much
- ☐ Some
- ☐ Little
- ☐ None

3. How much training have you had with using the Study Island program?

- ☐ A Great Deal
- ☐ Much
- ☐ Some
- ☐ Little
- ☐ None

4. How much training have you had with analyzing and interpreting the data generated by the Study Island program?

- ☐ A Great Deal
- ☐ Much
- ☐ Some
- ☐ Little
- ☐ None

5. How often do you use Study Island to assess your students?

- ☐ Frequently
- ☐ Regularly
- ☐ Occasionally

- ☐ Rarely
- ☐ Never

6. How often do your students use Study Island outside of your class during the school day?

- ☐ Frequently
- ☐ Regularly
- ☐ Occasionally
- ☐ Rarely
- ☐ Never

Estimate the amount of time in an average week your students use Study Island outside of your class during the school day?

7. How often do your students use Study Island outside of school?

- ☐ Frequently
- ☐ Regularly
- ☐ Occasionally
- ☐ Rarely
- ☐ Never

8. How often do you analyze the data generated by Study Island?

- ☐ Frequently
- ☐ Regularly
- ☐ Occasionally
- ☐ Rarely
- ☐ Never

Estimate the amount of time in an average week you analyze the data?

9. How often do you discuss the results from Study Island with individual students?

- ☐ Frequently

- ☐ Regularly
- ☐ Occasionally
- ☐ Rarely
- ☐ Never

Estimate the amount of time in an average week you discuss the results with individual students?

10. How often do you take group instructional time for the use of Study Island results?

- ☐ Frequently
- ☐ Regularly
- ☐ Occasionally
- ☐ Rarely
- ☐ Never

Estimate the amount of time in an average week you take instructional time for the use of Study Island results?

11. How often do you use the data generated by Study Island for lesson planning?

- ☐ Frequently
- ☐ Regularly
- ☐ Occasionally
- ☐ Rarely
- ☐ Never

Estimate the amount of time in an average week you use the data in lesson planning?

12. How often do you use the data generated by Study Island to change your instruction?

- ☐ Frequently

- ☐ Regularly
- ☐ Occasionally
- ☐ Rarely
- ☐ Never

Estimate the amount of time in an average week you use the data to change instruction?

13. How much support do you receive from the district in regard to utilizing Study Island data?

- ☐ A Great Deal
- ☐ Much
- ☐ Some
- ☐ Little
- ☐ None

14. How much support do you receive from the school in regard to utilizing Study Island data?

- ☐ A Great Deal
- ☐ Much
- ☐ Some
- ☐ Little
- ☐ None

15. How much support do you receive from the Study Island company?

- ☐ A Great Deal
- ☐ Much
- ☐ Some
- ☐ Little
- ☐ None

3. Open-Ended Questions

1. What do you like about Study Island?

A rectangular text input field with a light gray border. On the right side, there are three small, vertically stacked buttons: a triangle pointing up, a triangle pointing down, and a square button. On the bottom left, there are two small square buttons, and on the bottom right, there is a small square button with a right-pointing triangle.

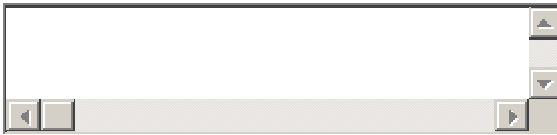
2. What do you dislike about Study Island?

A rectangular text input field with a light gray border. On the right side, there are three small, vertically stacked buttons: a triangle pointing up, a triangle pointing down, and a square button. On the bottom left, there are two small square buttons, and on the bottom right, there is a small square button with a right-pointing triangle.

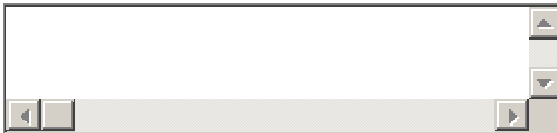
3. What are some specific things that you have changed about your teaching as a result of information from Study Island?

A rectangular text input field with a light gray border. On the right side, there are three small, vertically stacked buttons: a triangle pointing up, a triangle pointing down, and a square button. On the bottom left, there are two small square buttons, and on the bottom right, there is a small square button with a right-pointing triangle.

4. What needs to happen in order for the data to have an impact on teaching practices?

A rectangular text input field with a light gray border. On the right side, there are three small, vertically stacked buttons: a triangle pointing up, a triangle pointing down, and a square button. On the bottom left, there are two small square buttons, and on the bottom right, there is a small square button with a right-pointing triangle.

5. What needs to happen in order for the data to have an impact on student learning?

A rectangular text input field with a light gray border. On the right side, there are three small, vertically stacked buttons: a triangle pointing up, a triangle pointing down, and a square button. On the bottom left, there are two small square buttons, and on the bottom right, there is a small square button with a right-pointing triangle.

Appendix E

Electronic Mail Permissions to Adapt Research Study

Gentlemen:

I have just read your study on formative assessment systems and the evaluation of the systems' fit. I am writing a case study about how teachers are using computer-generated formative assessment data, as generated by the program Study Island, to inform their instruction in three middle schools in western North Carolina. I have been looking for research like yours and was very excited to find your study. May I have permission to cite your findings, in particular the findings related to teacher use of the data, in my study? Would you give me permission to use the interview questions you asked the teachers in your study to determine how they were using the data in their classrooms and lessons in my interviews? Even though they may be program specific, I feel that the data you collected is the type of data I am interested in collecting. Also, would any of you know of any similar research that has been or is currently being conducted in this line of inquiry? Thank you for your time and help. It is greatly appreciated.

Sincerely,

Ms. Kelly Taylor

Instructor and Coordinator of Middle Level Education

Gardner-Webb University

(704) 406-2209

Kelly:

All of your requests sound reasonable. I would be interested in seeing your work when you have finished.

Also, feel free to contact me should you have any questions about our work-- especially if you are in the Raleigh area in the future.

Matt

| *Matt Militello* | *Assistant Professor* | North Carolina State University |
Leadership, Policy and Adult and Higher Education

Yes, it sounds like you are doing important work. Please keep us posted and thanks for the kind words. If I can think of any other relevant research, I will let you know. --Steve

Stephen G. Sireci, Ph.D.

Professor of Educational Policy, Research, and Administration

Director, Center for Educational Assessment

School of Education

Appendix F

Focus Group Interview Protocol School A

Focus Group Interview Protocol
For School A

Interviews will be audio recorded and transcribed for accuracy. The interviewer will give a minimum of 30 seconds of wait time before moving on through all questions.

1. According to the survey, 57 percent of teachers in this school have been using Study Island for 4 years or less. Tell me about how the expectations for usage have changed over the past four years.
2. 79 percent of the teachers in this school say that you have had some, much, or a great deal of training in assessment. What kinds of training have you had?
3. 79 percent of teachers in this school say you have had some, much, or a great deal of training in formative assessment. What kinds of training have you had?
4. 64 percent of teachers in this school say you have had some or little training in use of the Study Island program. What kind of training have you had?
5. 86 percent of teachers in this school say you have had some, little, or no training in use of Study Island data. What kind of training have you had?
6. How often are you able to use Study Island with your students, specifically?
7. 72 percent of teachers in this school say they regularly or occasionally use Study Island to assess students. How do you use the program to assess students, for example in the computer lab or as a whole class?
8. 71 percent of teachers in this school say students occasionally use Study Island outside of class. Where are the students using this program other than your class?
 - a. Why are they using it in those places?
9. 100 percent of teachers in this school say students occasionally, rarely, or never use Study Island outside of school. What are your thoughts as to why students do not use outside of school?
10. 71 percent of teachers in this school say they regularly or occasionally analyze the data generated by Study Island. However time estimates ranged from five minutes a day to once a nine weeks. How often do you analyze the data?
 - a. What do you do with that analysis?
 - b. What reports do you use?

11. 79 percent of teachers in this school say they occasionally or rarely discuss the results from Study Island with individual students. How often do you discuss the results with students?
 - a. What are the outcomes of those discussions?
 - b. Why do you think some teachers may not be doing it at all, as 14 percent of teachers reported?
12. 86 percent of teachers in this school say they occasionally, rarely, or never use group instructional time for the use of Study Island results. What are your thoughts about this?
13. 71 percent of teachers in this school say they occasionally, rarely, or never use the data generated by Study Island for lesson planning. What are your thoughts about this?
 - a. How do you use the data for lesson planning?
14. 93 percent of teachers in this school say they occasionally, rarely, or never use the data generated by Study Island to change instruction. What are your thoughts about this?
 - a. How do you use the data to change instruction?
15. What kind of support have you received from the district in regard to using Study Island data?
16. What kind of support have you received from the school in regard to using Study Island data?
17. What kind of support have you received from the Study Island Company?
18. Several respondents liked the ability to individualize the program for students. What are your thoughts on that?
19. Several respondents liked the instant feedback the program provided. What are your thoughts on that?
20. Several respondents liked the games feature on the program. What are your thoughts on that?
21. Several respondents liked way the program addressed relevant skills. What are your thoughts on that?

22. Several respondents liked the EOG prep features of the program. What are your thoughts on that?
23. Several respondents expressed negative attitudes toward Study Island. What are your thoughts on that?
24. Some of the teachers in the school indicated that there was a lack of alignment with the NCSOCS. Do you agree?
 - a. Where are the problems with alignment?
25. 8 percent of the teachers in the school indicated that Study Island data has changed their teaching because the program has helped identify student weaknesses or they are re-teaching concepts. Do you see this as two separate issues?
 - a. Has anything else changed about your teaching, specifically?
26. The majority of responses to the survey about the data impacting teaching practices and student learning both have to do with lack of time and lack of training.
 - a. What are the time constraints when it comes to impacting teaching practice?
 - b. What are the time constraints when it comes to impacting student learning?
 - c. What do you see as training needs to help improve teaching practice?
 - d. What do you see as training needs to help improve student learning?
27. Several respondents mentioned that the program needs to be more similar to the EOG. What are your thoughts on that?
28. Is there anything you would like to add to the discussion that we have not already covered?

Appendix G

Focus Group Interview Protocol School B

Focus Group Interview Protocol
For School B

Interviews will be audio recorded and transcribed for accuracy. The interviewer will give a minimum of 30 seconds of wait time before moving on through all questions.

1. According to the survey, 75 percent of teachers in this school have been using Study Island for 3 years or less. Tell me about how the expectations for usage have changed over the past four years.
2. 85 percent of the teachers in this school say that you have had some or much training in assessment. What kinds of training have you had?
3. 92 percent of teachers in this school say you have had some or much training in formative assessment. What kinds of training have you had?
4. 100 percent of teachers in this school say you have had some or little training in use of the Study Island program. What kind of training have you had?
5. 100 percent of teachers in this school say you have had some, little, or no training in use of Study Island data. What kind of training have you had?
6. How often are you able to use Study Island with your students, specifically?
7. 86 percent of teachers in this school say they regularly or occasionally use Study Island to assess students. How do you use the program to assess students, for example in the computer lab or as a whole class?
8. 57 percent of teachers in this school say students occasionally use Study Island outside of class. Where are the students using this program other than your class?
 - a. Why are they using it in those places?
9. 93 percent of teachers in this school say students occasionally, rarely, or never use Study Island outside of school. What are your thoughts as to why students do not use outside of school?
10. 79 percent of teachers in this school say they regularly or occasionally analyze the data generated by Study Island. However time estimates ranged from five minutes a day to once a nine weeks. How often do you analyze the data?
 - a. What do you do with that analysis?
 - b. What reports do you use?

11. 64 percent of teachers in this school say they occasionally or rarely discuss the results from Study Island with individual students. How often do you discuss the results with students?
 - a. What are the outcomes of those discussions?
 - b. Why do you think some teachers may not be doing it at all, as 14 percent of teachers reported?
12. 86 percent of teachers in this school say they occasionally, rarely, or never use group instructional time for the use of Study Island results. What are your thoughts about this?
13. 79 percent of teachers in this school say they occasionally, rarely, or never use the data generated by Study Island for lesson planning. What are your thoughts about this?
 - a. How do you use the data for lesson planning?
14. 86 percent of teachers in this school say they occasionally, rarely, or never use the data generated by Study Island to change instruction. What are your thoughts about this?
 - a. How do you use the data to change instruction?
15. What kind of support have you received from the district in regard to using Study Island data?
16. What kind of support have you received from the school in regard to using Study Island data?
17. What kind of support have you received from the Study Island Company?
18. Several respondents liked the ability to individualize the program for students. What are your thoughts on that?
19. Several respondents liked the instant feedback the program provided. What are your thoughts on that?
20. Several respondents liked the games feature on the program. What are your thoughts on that?
21. Several respondents liked the ease of use of the program. What are your thoughts on that?

22. Several respondents liked the EOG prep features of the program. What are your thoughts on that?
23. Several respondents expressed negative attitudes toward Study Island. What are your thoughts on that?
24. Some of the teachers in the school indicated that there was a lack of alignment with the NCSOCS. Do you agree?
 - a. Where are the problems with alignment?
25. 24 percent of the teachers in the school indicated that Study Island data has changed their teaching because the program has helped identify student weaknesses or they are re-teaching concepts. Do you see this as two separate issues?
 - a. Has anything else changed about your teaching, specifically?
26. The majority of responses to the survey about the data impacting teaching practices and student learning both have to do with lack of time and lack of training.
 - a. What are the time constraints when it comes to impacting teaching practice?
 - b. What are the time constraints when it comes to impacting student learning?
 - c. What do you see as training needs to help improve teaching practice?
 - d. What do you see as training needs to help improve student learning?
27. Several respondents mentioned problems with the tutorial portion of the program. Do you agree or disagree with that?
28. Is there anything you would like to add to the discussion that we have not already covered?

Appendix H

Focus Group Interview Protocol School C

Focus Group Interview Protocol
For School C

Interviews will be audio recorded and transcribed for accuracy. The interviewer will give a minimum of 30 seconds of wait time before moving on through all questions.

1. According to the survey, 100 percent of teachers in this school have been using Study Island for 4 years or less. Tell me about how the expectations for usage have changed over the past four years.
2. 82 percent of the teachers in this school say that you have had some or much training in assessment. What kinds of training have you had?
3. 71 percent of teachers in this school say you have had some or much training in formative assessment. What kinds of training have you had?
4. 82 percent of teachers in this school say you have had some or little training in use of the Study Island program. What kind of training have you had?
5. 100 percent of teachers in this school say you have had some, little, or no training in use of Study Island data. What kind of training have you had?
6. How often are you able to use Study Island with your students, specifically?
7. 59 percent of teachers in this school say they regularly or occasionally use Study Island to assess students. How do you use the program to assess students, for example in the computer lab or as a whole class?
8. 77 percent of teachers in this school say students rarely or occasionally use Study Island outside of class. Where are the students using this program other than your class?
 - a. Why are they using it in those places?
9. 100 percent of teachers in this school say students occasionally, rarely, or never use Study Island outside of school. What are your thoughts as to why students do not use outside of school?
10. 47 percent of teachers in this school say they regularly or occasionally analyze the data generated by Study Island. However time estimates ranged from five minutes a day to once a nine weeks. How often do you analyze the data?
 - a. What do you do with that analysis?
 - b. What reports do you use?

11. 65 percent of teachers in this school say they rarely or never discuss the results from Study Island with individual students. How often do you discuss the results with students?
 - a. What are the outcomes of those discussions?
 - b. Why do you think some teachers may not be doing it at all, as 14 percent of teachers reported?
12. 88 percent of teachers in this school say they occasionally, rarely, or never use group instructional time for the use of Study Island results. What are your thoughts about this?
13. 88 percent of teachers in this school say they occasionally, rarely, or never use the data generated by Study Island for lesson planning. What are your thoughts about this?
 - a. How do you use the data for lesson planning?
14. 94 percent of teachers in this school say they occasionally, rarely, or never use the data generated by Study Island to change instruction. What are your thoughts about this?
 - a. How do you use the data to change instruction?
15. What kind of support have you received from the district in regard to using Study Island data?
16. What kind of support have you received from the school in regard to using Study Island data?
17. What kind of support have you received from the Study Island Company?
18. Several respondents liked the ability to individualize the program for students. What are your thoughts on that?
19. Several respondents liked the instant feedback the program provided. What are your thoughts on that?
20. Several respondents liked the games feature on the program. What are your thoughts on that?
21. Several respondents liked way the program could review concepts. What are your thoughts on that?

22. Several respondents liked the EOG prep features of the program. What are your thoughts on that?
23. Several respondents expressed negative attitudes toward Study Island. What are your thoughts on that?
24. Some of the teachers in the school indicated that there was a lack of alignment with the NCSOCS. Do you agree?
 - a. Where are the problems with alignment?
25. 8 percent of the teachers in the school indicated that Study Island data has changed their teaching because the program has helped identify student weaknesses or they are re-teaching concepts. Do you see this as two separate issues?
 - a. Has anything else changed about your teaching, specifically?
26. The majority of responses to the survey about the data impacting teaching practices and student learning both have to do with lack of time and lack of training.
 - a. What are the time constraints when it comes to impacting teaching practice?
 - b. What are the time constraints when it comes to impacting student learning?
 - c. What do you see as training needs to help improve teaching practice?
 - d. What do you see as training needs to help improve student learning?
27. Several respondents mentioned that there were errors in the questions. What are your thoughts on that?
28. Is there anything you would like to add to the discussion that we have not already covered?

Appendix I
Individual Interview Protocol

Individual Interview Protocol

Interviews will be audio recorded and transcribed for accuracy. The interviewer will give a minimum of 30 seconds of wait time before moving on through the questions in part B. The interviewer will give the interviewee at least five minutes to review the data before beginning questions in part C.

Part A – Demographic Information

1. Tell me about yourself.
 - a. What subject/grade level do you teach?
 - b. How long have you taught this?
 - c. What is your educational background?
 - d. What are your past educational experiences?

Part B – Perceptions of Use of Study Island Data Reports

1. What reports generated by Study Island do you like to use? (Pull copies if allowed)
2. What do you do with the data from the reports? Can you give some examples?
3. How often do you generate the reports?
4. How often do you change what you are doing in class based on the reports? Can you give some examples of the changes you make?

Part C – Perceptions of Data Analysis

1. Based on the report provided, what does the data tell you about these students' strengths? Weaknesses?
2. Based on the report provided, what instructional decisions would you make for individual students in this class? For this class as a whole?
3. Based on the report provided, what feedback would you provide for this student?

Part D – Final thoughts

1. Is there anything else you would like to add about any of the topics discussed today?

Appendix J

Superintendent Permission Letter

Dear Superintendent:

I am a doctoral candidate at Gardner-Webb University. One of the requirements of the degree is that I complete a dissertation. I have chosen to research how teachers are using the data generated by the computer program, Study Island, to inform, implement, and assess their instruction. Schools at all levels within the district are currently using Study Island. However, I would like to focus my research at three middle schools in the district. I plan to conduct a mixed-methods collective case study using online surveys, focus group interviews, and individual interviews.

Upon collecting and analyzing this data, I will share my findings with the principals at the schools in which this study is being conducted and any other interested parties in the district. All information and data that will be collected will remain confidential, as will any information about the schools and the district.

If you have any questions about this study, you may contact the researcher, Kelly C. Taylor, at (828) 413-0117 or by email at ktaylor2@gardner-webb.edu. Any questions regarding the research or requirements for Gardner-Webb University may be directed toward the chair of the dissertation committee, Dr. Jane King, at (794) 406-2015.

If you agree to the proposed study, please sign below. Thank you for your time cooperation with this study.

Sincerely,

Kelly C. Taylor
Doctoral Candidate, Gardner-Webb University

Superintendent Signature

Date

Appendix K

Principal Permission Letter

Dear Principal:

I am a doctoral candidate at Gardner-Webb University. One of the requirements of the degree is that I complete a dissertation. I have chosen to research how teachers are using the data generated by the computer program, Study Island, to inform, implement, and assess their instruction. Schools at all levels within the district are currently using Study Island. However, I would like to focus my research at three middle schools in the district. I plan to conduct a mixed-methods collective case study using online surveys, focus group interviews, and individual interviews. With your permission, I would like your school to be one of the three schools studied.

Upon collecting and analyzing this data, I will share my findings with the principals at the schools in which this study is being conducted and any other interested parties in the district. All information and data that will be collected will remain confidential, as will any information about the schools and the district. Participation in this study is voluntary; however I am asking all teachers who use Study Island in each school to participate in order to gather more accurate data.

If you have any questions about this study, you may contact the researcher, Kelly C. Taylor, at (828) 413-0117 or by email at ktaylor2@gardner-webb.edu. Any questions regarding the research or requirements for Gardner-Webb University may be directed toward the chair of the dissertation committee, Dr. Jane King, at (794) 406-2015.

If you agree to the proposed study, please sign below. Thank you for your time cooperation with this study.

Sincerely,

Kelly C. Taylor
Doctoral Candidate, Gardner-Webb University

Principal Signature

Date

Appendix L

Teacher Permission Letter

Dear Teacher:

I am a doctoral candidate at Gardner-Webb University. One of the requirements of the degree is that I complete a dissertation. I have chosen to research how teachers are using the data generated by the computer program, Study Island, to inform, implement, and assess their instruction. Schools at all levels within the district are currently using Study Island. However, I would like to focus my research at three middle schools in the district. I plan to conduct a mixed-methods collective case study using online surveys, focus group interviews, and individual interviews. With your permission, I would like for you to participate in the study.

As a participant in this study, you will be asked to complete a short online survey. You may be asked to participate in a focus group interview. You may also be asked to participate in an individual interview. All information that is collected will remain confidential and no names will be associated with any responses collected, with the exception of this permission.

Upon collecting and analyzing this data, I will share my findings with the principals at the schools in which this study is being conducted and any other interested parties in the district. I will also share my findings with you at your request. Thank you for your time. If you have any questions, please contact me by email at ktaylor2@gardner-webb.edu or by phone at (828)413-0117.

Please respond to this letter by signing one of the following options.

_____ I agree to participate in the research study.

_____ I do not agree to participate in the research study.

Signature: _____

Sincerely,

Kelly C. Taylor

Doctoral Candidate, Gardner-Webb University

Appendix M

Teacher Created Calendar for Study Island

Name _____

Block _____

Study Island
November 2010

Monday	Tuesday	Wednesday	Thursday	Friday	Totals
1	2	3	4	5	Total Correct
1.	1.	1.	1.	1.	
2.	2.	2.	2.	2.	
3.	3.	3.	3.	3.	
4.	4.	4.	4.	4.	
5.	5.	5.	5.	5.	
8	9	10	11	12	Total Correct
1.	1.	6.	No School	No School	
2.	2.	7.			
3.	3.	8.			
4.	4.	9.			
5.	5.	10.			
15	16	17	18	19	Total Correct
1.	1.	1.	1.	1.	
2.	2.	2.	2.	2.	
3.	3.	3.	3.	3.	
4.	4.	4.	4.	4.	
5.	5.	5.	5.	5.	
22	23	24	25	26	Total Correct
1.	1.	1.	Happy Thanksgiving!	No School	
2.	2.	2.			
3.	3.	3.			
4.	4.	4.			
5.	5.	5.			

Study Island
December 2010

Monday	Tuesday	Wednesday	Thursday	Friday	Totals
29	30	1	2	3	Total Correct
1.	1.	1.	1.	1.	
2.	2.	2.	2.	2.	
3.	3.	3.	3.	3.	
4.	4.	4.	4.	4.	
5.	5.	5.	5.	5.	
6	7	8	9	10	Total Correct
1.	1.	6.	1.	1.	
2.	2.	7.	2.	2.	
3.	3.	8.	3.	3.	
4.	4.	9.	4.	4.	
5.	5.	10.	5.	5.	
13	14	15	16	17	Total Correct
1.	1.	1.	6.	1.	
2.	2.	2.	7.	2.	
3.	3.	3.	8.	3.	
4.	4.	4.	9.	4.	
5.	5.	5.	10.	5.	
20	21	22	23	24 No School	Total Correct
1.	1.	1.	1.		
2.	2.	2.	2.		
3.	3.	3.	3.		
4.	4.	4.	4.		
5.	5.	5.	5.		