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A phenomenological study of assessment methods in the inquiry -based science classroom: How do educators decide?

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COLLEGE OF EDUCATION

This is to certify that the doctoral study by

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ABSTRACT

A Phenomenological Study Of Assessment Methods In The Inquiry-Based Science Classroom: How Do Educators Decide?

by

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M.A., University of North Alabama, 1991
B.S., University of North Alabama, 1989

Doctoral Study Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Education
The Teacher as Leader

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ABSTRACT

The purpose of this phenomenological study was to describe the experiences of science educators as they select and develop assessment methods for inquiry learning. Balancing preparations for standardized tests and authentic inquiry assessment experiences can be challenging for science educators. The review of literature revealed that current research focused on instructional methods and assessment, students' assessment experiences, and teachers' instructional methods experiences. There remains a gap in current literature regarding the experiences of science educators as they select and develop assessment methods for inquiry learning. This study filled the gap by providing a description of the experiences of science educators as they select and develop assessments for inquiry learning. The participants in this study were 16 fifth through eighth grade science teachers who participate in the Alabama Math, Science, and Technology Initiative (AMSTI) in northwest Alabama. A phenomenological research method was chosen in order to describe the experiences of AMSTI science teachers as they select and develop assessments for inquiry learning. Data were collected through interviews and focus group discussions. The data analysis used a modified Stevick-Colaizzi-Keen framework. The results showed AMSTI science teachers use a variety of assessment resources and methods, feel pressures to meet Adequate Yearly Progress (AYP), and implement varying degrees of change in their assessment process due to No Child Left Behind (NCLB). Contributing a positive social change, this study's findings supplied science teachers with descriptions of successful inquiry classrooms and creative assessments that correspond to inquiry-based learning methods.

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DEDICATION

This is dedicated to my loving husband and my beautiful daughter. Without their support and strength I would not have been able to complete this program. Thank you for all the times you picked up my responsibilities so that I could work on this study. You have been so patient with listening to me go on and on about research plans and inquiry learning. I love both of you dearly.

To my wonderful parents who have instilled in me the love and joy of learning, I thank you from the bottom of my heart. Your faith in me and your encouragement have always been a constant in my life. And to my wonderful mother-in-law, Faye, thank you for all your support during this long process.

To my best friends, Jennifer and Jill, you have been my rock. Having best friends who are also your colleagues is without a doubt a marvelous thing. Without your support and shoulders to lean on, I would not have made it to this point. Whether through a box of chocolate pick me ups after a disappointment or a shopping trip to celebrate an accomplishment, you have both been there to encourage and support me and I thank you.

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SECTION 1: INTRODUCTION TO THE PROBLEM

Introduction

Using the goals and suggestions of the National Research Council (NRC), the American Association for the Advancement of Science, and the National Association of Science Teachers, science educators experiment with inquiry learning strategies and corresponding assessment methods to provide students with learning methods to improve achievement (Hohenshell & Hand, 2006; Llewellyn, 2002). With a modern global economy, the educational leadership in the United States understands the importance of science, math, and technology as well as the benefits science education has encountered through assessment measures (Clymer & Wiliam, 2007). According to research from Mohr et al. (2004), stated schools might develop tunnel vision with subject continuums and could fail to be flexible enough to meet students' needs due to high stakes standardized tests and AYP reports. In addition, Mohr et al. found that science teachers in general need to evaluate their assessment policies for inquiry learning methods to develop best practices for their inquiry classroom and their students. Crumrine and Demers (2007) and Gearhart et al. (2006) stated that science teachers need to use the results of assessments to fine tune their instructional practices to improve student achievement. In addition, Crumrine and Demers and Gunzenhauser (2003) suggested testing methods align with instructional approaches. Since the implementation of the No Child Left Behind Act of 2001 (NCLB), educators are searching for ways to assist their schools in illustrating AYP. AYP is an accountability system mandated by NCLB to report schools' progress in each state within the United States (United States Department of Education, n.d.). According to AYP guidelines, 95% of students in third through eighth grade must be tested yearly, average daily attendance for grades kindergarten through eighth must be 92%, and 70% of high school students must pass an exit exam which is a requirement for graduation (National Education Association, n.d.). While students construct understanding based on their prior knowledge and scientific theories of the world around them using inquiry-based learning methods, teachers are faced with the difficulty of assessing this constructed knowledge (Gunzenhauser, 2003). With the intricacies of the decision making processes associated with inquiry learning and its assessment, science teachers are challenged to create an authentic inquiry experience for their students while still preparing them for success on the standardized tests of AYP (Crumrine & Demers, 20007).

Traditional classrooms are teacher centered with demonstrations and lectures, while inquiry classrooms are supported by the learners' real world experiences involving laboratory experiences and investigations (Colburn, 2007a; Gallager-Bolos & Smithenry, 2004; Hammer & Schifter, 2001; NRC, 2000; Ordonez & Ramler, 2004). According to Ellis (2001), traditional science instructional strategies limit the creativity of both students and teachers. As a result, science teachers need to employ alternative instructional and assessment strategies to improve student achievement. An inquiry-based environment allows science students to build understanding (Colburn, 2007a; Cheng, 2006). Palincsar, Magnusson, Cutter, and Vincent (2002) and Yoshina and Harada (2007) referred to inquiry-based learning as a sequence of experimentation started by a question. Watson, Swain, and McRobbie (2004) and Ding, Piccolo, Kulm, Xiaobao (2007) stated inquiry-based learning, along with cooperative grouping, provide teachers with a way of assisting their students in the association of theories taught in the classroom with laboratory experiences. Colburn (2004) and Crumrine and Demers (2007) established assessment as a critical element of inquiry-based learning. In addition, Hammer and Schifter (2001) encouraged teachers to expand their collection of evaluation tools to include “written and oral open-response questions to observations of activity” (p. 442). In order to create a positive impact on the field of education and create generations of individual thinkers, teachers should employ a variety of testing methods to meet the diverse needs of students (Cavanagh, 2005; Chudowsky & Pellegrino, 2003; Clymer & Wiliam, 2007; Crumrine & Demers, 2007; Gunzenhauser, 2003; Mertler, 2005).

Inquiry-based learning is a realistic method of instructing science which allows students to establish connections between prior knowledge and scientific descriptions of the world when compared with traditional methods (Clymer & Wiliam, 2007). Unlike a traditional science classroom, this instructional method requires science teachers to create a decision making process while considering the complexities of how students use prior knowledge and scientific theories to create an understanding of the world around them. Part of this decision making process for science teachers includes assessing the complexities of their students’ science knowledge in a nontraditional way. Due to NCLB and AYP, one of the most challenging aspects of inquiry-based learning is its assessment (Crumrine & Demers, 2007). With the intricacies of inquiry learning and the additional challenges of assessing inquiry learning due to NCLB with AYP requirements, a phenomenological research method was chosen by the researcher to gather data on the decision making process of science teachers as they select and develop assessments for inquiry learning.

This phenomenological study examined assessment selection and development for science teachers who use inquiry-based instructional methods. In a phenomenological study, the researcher seeks to describe a phenomenon based on the experiences of the participants with the phenomenon (Creswell, 1998). For this study, the phenomenon studied was the decision making process of science teachers as they select and develop assessments for inquiry learning. To ensure that the participants of the study experienced this phenomenon, the researcher recruited science teachers from the Alabama Math, Science, and Technology Initiative (AMSTI) which provides professional develop and instruction materials for implementing inquiry-based learning (AMSTI, 2004). This study focused on the experiences or knowledge and skills gained from the day to day activities of AMSTI science teachers as they select and develop assessment methods for their inquiry-based science classroom.

According to Colburn (2007b) and Viney (2007), inquiry learning, using constructivism, is identified as students constructing knowledge through solving problems, investigating ideas, and questioning in the science classroom. According to the NRC, American Association for the Advancement of Science, and National Association of Science Teachers, inquiry-based learning is an instructional method teachers need to pursue in order to build generations of individuals who are scientifically literate (NRC, 2000; 1996). Inquiry-based learning presents challenges which include the movement from a traditional teacher centered classroom environment to a student centered classroom environment, the intricacies of assisting science students connect prior knowledge and their scientific experiences to create new understandings of scientific concepts, and the assessments of inquiries which allow both students and teachers to express their creativity (Clymer & Wiliam, 2007). In addition, the demands of NCLB and AYP have made the assessment of inquiry-based learning more challenging (Crumrine & Demers, 2007). Inquiry-based learning methodology and the nature of science are a lock and key model in which inquiry-based instructional methodologies are the key to releasing the lock which represents the science potential of students (NRC, 1996; Viney, 2007; Yoshina & Harada, 2007). Consequently, science teachers need to examine their decision making processes regarding the selection and development of assessments for the inquiry methods their students use to construct scientific knowledge. While this provides an introduction to the literature on inquiry learning and assessment, Section 2 provides a more detailed discussion.

Problem Statement

Since the implementation of NCLB, many educators employ traditional tests similar to those seen on high stakes standardized tests to evaluate their students' science achievement rather than implementing assessment methods that correspond to the instructional methods used in the classroom (Clymer & Wiliam, 2007; Colburn, 2004; Crumrine & Demers, 2007; Gunzenhauser, 2003; Mertler, 2005; & Raizen, 1998). The National Science Education Standards encouraged the use of multiple assessment methods with inquiry learning methodologies (NRC, 1996). Quantitatively, most current research in science education focuses on instructional methods and their assessments while qualitatively students' experiences with assessment or educators' experiences with instructional methods are the focus (Bilgin & Geban, 2006; Cerezo, 2004; Chin & Chia, 2004; Cowie, 2005; Lorsback, Jinks, & Templeton, 2004; Vogler, 2006). However, little focus in current research has been placed on science teachers' lived experiences regarding the assessment of inquiry-based learning. These lived experiences include the daily decision making processes of science teachers as they select and develop assessments that correspond to the way in which their students are constructing scientific knowledge through inquiry. This phenomenological study filled some of the gap by focusing on the lived experiences of AMSTI science teachers regarding their assessment selection and development processes for inquiry learning.

Presently, many kindergarten through eighth grade science students in the state of Alabama are instructed using inquiry-based learning methods through the AMSTI which was developed using the National Science Education Standards. Science teachers who implement inquiry learning are challenged to balance inquiry and content knowledge (Robertson, 2007). However, Robertson stated educators can allow students to discover phenomena by investigation and facilitate learning such that students ascertain knowledge. Currently, research is not available on AMSTI science teachers or their assessment selection and development experiences. This study led to an increased the awareness of AMSTI and the assessment process of AMSTI science teachers from northwest Alabama.

This phenomenological study created a heighten awareness of the assessment selection and development experiences of AMSTI science teachers for grades five through eight. The insight established from this study allows science educators to improve assessment practices. In doing so, science teachers can reflect on their assessment process to improve teaching practices while preparing their students for high achievement on the assessment tests mandated by NCLB. To address social change, this study (a) provided knowledge on best practices in teaching and assessing inquiry learning methods as it focuses on the experiences of AMSTI science teachers during the assessment decision process, (b) filled a void in the literature on science teachers' assessment process experiences while implementing inquiry learning, and (c) provided current information on AMSTI science teachers which is currently not available.

Purpose of the Study

The purpose of this phenomenological qualitative study was to describe the lived experiences of northwest Alabama AMSTI science educators' as they select and develop their classroom assessment methods when implementing inquiry-based learning instructional methods. Inquiry learning is defined in terms of constructivism in which students build knowledge through inquiries such as questioning, investigating, and solving problems (Colburn, 2007b; Gallager-Bolos & Smithenry, 2004; Hammer & Schifter, 2001; Krajcik, et al. 2000; NRC, 2000; Ordonez & Ramler, 2004). Therefore, a phenomenological study focusing on the experiences of science teachers as they determine their classroom assessment methods was employed.

Research Question and Subquestions

The overarching research question for this study was: How do fifth through eighth grade Alabama Math, Science, and Technology Initiative science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes? Subquestions included:

1. What is the structural design of AMSTI science teachers lived experiences with their assessment process?

2. What are the essential components of the assessment methods for inquiry learning methods used by science educators participating in AMSTI that result in these experiences?

3. What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?

4. What do AMSTI science teachers find most helpful when determining assessment methods?

Nature of the Study

Inquiry-based learning is an instructional method endorsed by the NRC in the National Science Education Standards (NRC, 1996). This study employed a phenomenological qualitative research plan in order to describe the lived experiences of northwest Alabama AMSTI science educators as they determine their classroom assessment methods for student achievement when implementing inquiry-based learning instructional methods for grades five through eight. In this study, the lived experiences of AMSTI science teachers were the day to day decisions these teachers made with assessing inquiry learning. Through these experiences, these AMSTI science teachers gained knowledge and skill for assessing inquiry-based learning. The study of the decision making process of AMSTI science teachers as they select and develop assessments for inquiry learning is important because of the challenges inquiry-based learning presents to science teachers. These teachers are abandoning traditional science classrooms and replacing them with student centered classrooms that encourage creativity and thinking skills (Colburn, 2007b). Students are combining prior knowledge and personal experimentation to create new understandings of scientific concepts (Gunzenhauser, 2003). With the complexities of inquiry-based learning, it is important to understand how science teachers proceed in assessing this instructional method (Robertson, 2007). In addition, Robertson stated science teachers are faced with the challenges of creating authentic inquiry experiences for their students while preparing them for the standardized tests of AYP. A phenomenological study provided the best approach for describing and understanding these challenges and complexities.

As stated by Hatch (2002), phenomenological research is used to find the "essence of human experience" (p. 30). Using Merriam's (2002) description of this type of research, the researcher's focus was "on describing the essence of the phenomenon from the perspectives of those who have experienced it" (p.93). According to Creswell (2003), this research approach involved a small number of participants describing their experience of a phenomenon. Accordingly, the researcher completed an in depth study of the lived experiences of northwest Alabama AMSTI science educators' for grades five through eight as they select and develop their classroom assessment methods when implementing inquiry-based learning instructional methods using extensive interviews with individuals and focus group discussions.

To ensure that the participants experienced the phenomenon of interest, the target population of the study included science teachers located in northwest Alabama who are taking part in the Alabama Math, Science, and Technology Initiative (AMSTI). According to AMSTI, the University of North Alabama Regional Inservice Center which provides professional development for northwest Alabama educators includes the counties of Lauderdale, Colbert, Franklin, Marion, Winston, and Walker Counties (AMSTI, 2004). The researcher is a resident of northwest Alabama and has a vested interest in the science education of the region. Of the schools in the northwest Alabama counties, 27 participated in AMSTI. If each school had one science teacher for each grade, five through eight, then the population of possible participants was 108 AMSTI science teachers.

According to Creswell (1998), a phenomenological study should examine in depth the experiences of 6 to 10 participants. Furthermore, Hatch (2002) described focus groups as a small group of individuals who experience a similar phenomenon. During this study, the researcher transcribed and analyzed interview data from individual interviews and focus group discussions to create categories based on the study’s research questions. From the transcribed interviews, the researcher coded each category for themes that arose from the interviews. The collection of in depth data used a target population of eight individual AMSTI science teachers and two focus groups each composed of four to six AMSTI science teachers. A more detailed discussion of the qualitative methodology utilized for this study is provided in section 3.

Conceptual Framework

The conceptual framework for this qualitative study was based on phenomenology. According to Moustakas (1994), phenomenology is a subset of human science philosophy in which what humans know and understand from within their personal experiences is the scaffold of knowledge. Knowledge is the result of self experience. Husserl founded phenomenology as a method of discovering the essence of human experiences (Moustakas, 1994). In addition, human sciences focus on (a) looking at phenomena, (b) studying all aspects of phenomena, (c) defining phenomena in terms of appearances when the essence is discovered, (d) giving vivid descriptions of phenomena from the experiences of individuals, (e) collecting information of experiences based on questioning, and (f) beginning studies with self reflection (Moustakas, 1994). Any phenomenon can provide a starting point for a phenomenological study and by applying phenomenology researchers' focus on the lived experiences of their subjects (Creswell, 2003; Groenewald, 2004; Hatch, 2002; Moustakas, 1994).

For this study, the examined phenomenon was the experiences of AMSTI science teachers with regard to their assessment selection and development. According to Creswell (2003), phenomenology is a qualitative research method used to identify "the essence of human experiences concerning a phenomenon" (p. 15). In addition, Creswell (1998) described phenomenology as a method used to describe the lived experiences of several individuals regarding a single phenomenon. For this study, the researcher interviewed eight AMSTI science teachers and facilitated two focus group discussions in order to describe their experiences with assessment selection and development. The researcher bracketed personal experiences with assessment selection and development. According to Hatch (2002), bracketing is a phenomenology concept that dates back to Husserl in which researchers set aside personal bias by investigating their experience with the phenomenon creating a situation where the researcher can study the phenomenon without previously determined ideas. Moustakas (1994) described phenomenology as looking at experiences without the prejudices or preconceived ideas of lived experiences which in turn leave the researcher with a fresh openness wherein the researcher can view the experiences described by individuals. Therefore, the researcher described (a) AMSTI science teachers' personal experiences with assessment selection and development as well as the structural design of these lived experience with assessment practices, (b) the essential components of their assessment methods, (c) the meanings of the guidelines used for their assessment methods, and (d) what they feel was helpful in determining assessment methods.

Definitions

Heuristics research: refers to the investigation of human experiences using a systematic method (Moustakas, 1994). In addition, the researcher grows in self awareness while seeking to understand the phenomenon or experience being studied. In other words, heuristic research is a scientific investigation in which the results lead to the discovery of human experiences. Heuristic research is an open experiment of the phenomenon that investigates the written works of the study's subjects while providing a creative description of the experience.

Duquesne studies: are described as an empirical approach to phenomenology (Moustakas, 1994). This empirical approach focuses on the conditions within which the phenomenon occurs. In addition, Duquesne studies describe the phenomenon by showing the structure of the experience. This type of phenomenology study does not involve the participants in the analysis phase of the investigation.

Lived experience: is the knowledge and skills acquired over a period of time that human beings interpret as having meaning to them (Merriam, 2002). According to Creswell (2003), phenomenology is a research method that seeks to describe the experiences lived through by the study's participants. In this study, the participants were asked to describe their lived experiences with assessment selection and development.

Phenomenology: is a qualitative research method in which the focus is the lived experiences of the participants (Creswell, 2003; Hatch, 2002; Merriam, 2002; Moustakas, 1994). Furthermore, Hatch (2002) stated phenomenology uses questions to find the essence of a human experience. As a result, interviews are a common data collection method in phenomenology (Creswell, 2003; Hatch, 2002; Merriam, 2002; Moustakas, 1994). For this study, the researcher interviewed eight AMSTI science teachers and facilitated two discussion groups focusing the interviews on the teachers' assessment selection and development processes.

Bracketing: occurs when the researcher sets aside "prejudgments, biases, and preconceived ideas about things" (Moustakas, 1994, p. 85). By exploring personal experiences with the phenomenon, the researcher can set aside preconceptions and bias (Merriam, 2002).

Epoche: is that bracketing allows researchers to develop a portrait of the experience without prejudice and without inserting their own experiences into the study thus allowing the voices of the participants to describe the phenomenon (Creswell, 1998).

Theme: is a meaning unit of a lived experienced resulting in a description of the essence of a phenomenon discovered in a phenomenological study (Creswell, 2003). Themes are discovered when researchers submerge themselves in the reading of transcribed interviews and other data (Hatch, 2002). The themes are common threads occurring within the data which lead to the essence of the lived experience (Creswell, 2003). In this study, themes emerged from the transcribed interview data in which the participants describe their assessment selection and development process.

Traditional test: is defined as a measurement of an individual student’s topic understanding through the use of paper-and-pencil type questions (Enger & Yager, 2001). Furthermore, the category of paper-and-pencil tests includes questions formatted as true-false, multiple-choice, fill-in-the-blank, and short-answer. Typically, textbook publishers provided a data base of this type of evaluation for educators to employ when assessing student learning. These assessments are formatted similar to the high-stakes tests of AYP.

Nontraditional assessment: is defined by Enger and Yager (2001) as an assessment that does not involve the paper-and-pencil category of questions. For example, Enger and Yager described a nontraditional assessment as “teacher observations of student performance, student interviews, student self-assessment, presentations, projects, concept maps, and portfolios” (p. 17). In addition, these researchers included four types of nontraditional assessments: alternative, authentic, holistic, and performance.

According to Marzano, Pickering, and McTighe (1993), alternative assessments do not include the typical multiple-choice questions usually associated with standardized tests. Furthermore, Waters, Smeaton, and Burns (2004) provided examples of alternative assessments which include presentations, projects, and performances all of which focus on individualization and the choice of the student, Using Wiggins' (1989a, 1989b) definition of authentic assessment, this type of test used by students is based on their application of knowledge to real world experiences. As said by Raizen and Kaser (1989), holistic assessments encompass the total performance of the student which includes all the important components of learning. With Marzano et al. (1993) definitions, performance assessment included any tasks in which students are provided the opportunities to show their knowledge, critical thinking, and reasoning skills.

Peer assessments: allow students to evaluate other students' work or findings similar to the manner in which actual scientist review the work or findings of other scientists (Enger & Yager, 2001). Self assessments involve students' evaluating their work or findings which promotes students to take a greater responsibility for their learning (Enger & Yager, 2001). Portfolios are "a limited collection of student work that is used to either present best work(s) or to demonstrate a student's education growth over time" (Enger & Yager, 2001, p. 19).

Summative assessments: are used at the end of a teaching unit or learning activity to establish student achievement for the unit or activity (NRC, 2000). On the other hand, the NRC defined formative assessments as those occurring any time during a unit or activity and whose results are used to influence educators' instructional plans and provide useful feedback to students.

Inquiry learning: "refers to the activities of students in which they develop knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world" (NRC, 1996, p. 23). As inquiry relates to science education, Hammerman (2005) defined inquiry learning as an instructional approach through which students develop an understanding of scientific concepts. Cooperative learning involves individuals working in groups of three or four to promote thought processes (Johnson, Johnson, & Stanne, 2000). Problem-based learning involves students working within a group to construct their learning process from a question or problem statement (Chin & Chia, 2004). Project-based learning is the use of "knowledge, skills, and values as instruments to be used in solving problems and getting things done" (Ellis, 2001, p. 34).

AMSTI: is a program funded by the state of Alabama. This initiative has three main functions (AMSTI, 2004). First, the program provides teachers with professional development for implementing inquiry-based learning in the form of a two week summer institute. Second, the initiative supplies essential laboratory materials needed to implement inquiry-learning methodologies for grades kindergarten through twelfth. Third, the initiative provides teachers with on-site support through visits from science specialists.

Assumptions, Limitation, Scope, and Delimitations

Assumptions of the Study

This study used the following assumptions:

1. The science educators accurately articulated their experiences with assessment selection and development when interviewed.

2. The science educators within the population had commonality with others in similar contexts.

3. The researcher described personal experiences with assessment selection and development.

4. The researcher bracketed her personal experience with assessment selection and development.

Limitations of the study

The results were not generalized to all science classes because of the criterion sampling method used to locate accessible participants. To obtain a group of participants who have experienced this phenomenon, the researcher interviewed science teachers from northwest Alabama who instruct grades five through eight and participate in AMSTI. The National Science Education Standards divided assessment suggestions into three categories, kindergarten through fourth grades, fifth through eighth grades, and ninth through twelfth grades. The researcher interviewed AMSTI science teachers from the middle category, fifth through eighth grades. In addition, the results were not generalized to all science programs in Alabama. While the State of Alabama is working to implement AMSTI throughout the state, this objective has not been completely accomplished. The complete acceptance of this program has not occurred statewide. Some school systems only incorporate inquiry learning programs into a portion of their science curriculum. Science classes vary from state to state and all results will not transfer to other states.

AMSTI science educators brought their own instructional style and bias to the classroom. As a result, the researcher verified that each participant experienced the phenomenon and provided an in depth record of the phenomenon through the interviewing process.

Teachers from the population’s sample might feel judged by their responses during the interview process and therefore may not accurately supply data for this study. To address this limitation, the researcher discussed with each participant the confidentiality measures used in the study. These measures placed the anonymity of the participants at the highest priority.

The data were collected using a phenomenological qualitative research plan. According to Creswell (2003), qualitative data of this type are subject to various interpretations. With this in mind, the researcher ensured the accuracy of the interpretive findings by searching the data from the individual interviews and the focus group discussions as well as grade levels, peer reviews, member checks, and the researcher’s position and audit trail for common themes and patterns. Creswell (2003) listed these measures as a way of building verification of the common themes that emerge in qualitative research. Therefore, four areas of limitations were addressed by the researcher during this study.

Scope of the Study

This phenomenological study interviewed science educators to describe their experiences when selecting and developing assessments to be used in their classrooms. In addition, this study concentrated on science educators participating in the AMSTI program which implements inquiry learning methodology into science curriculum. The researcher verified each school implements inquiry-based learning strategies, using the definition given in the Definitions of this section and the instructional methodologies endorsed by AMSTI during professional development opportunities.

Delimitations of the Study

1. The study took place during September, October, and November of the 2008 2009 academic school year for the state of Alabama.

2. The study interviewed science educators who teach at least one of four grade levels which included grades five through eight.

3. Inquiry-based learning methodology was implemented in all the fifth through eighth grade participating science teachers' classrooms.

4. The school systems involved in the study were from northwest Alabama with in-service professional development provided by the University of North Alabama.

Significance of the Study

This phenomenological study was significant because it generated knowledge and insights into the decision making processes of AMSTI science teachers as they select and develop assessments for inquiry-based learning. With the intricacies of implementing inquiry methods into the science classroom and the challenges of assessing these methods, the findings of this study provided a stepping stone for additional studies to eliminate the gap in current educational research. Providing a positive social change, this study's findings supplied science teachers with descriptions of successful inquiry classroom and creative assessments that correspond to inquiry-based learning methods. In addition, this study's findings presented science teachers with successful alternatives to address creating authentic inquiry experiences while preparing students for the high stakes standardized tests of AYP. By examining the lived experiences or day to day decision processes of AMSTI science teachers as they assess the complexities of inquiry-based learning, this phenomenological study could prove advantageous to science educators, administrators, and educational leaders as they address the future of science education in a global economy.

The significance of this phenomenological study was to provide research based data for science educators that describe the lived experiences of educators as they assess inquiry-based learning environments. Taking into account the current trends in science education due to the implementation of NCLB, the assessment of inquiry learning and science students' achievement has become increasingly challenging for science educators (Cowie, 2005; Crumrine & Demers, 2007). Science teachers can no longer foster a teacher centered learning environment (Güvenç & Ün Açikgöz, 2007). Instead, student centered learning environments in which science students solve problems and are assessed based on the products they develop must be created to allow a real world learning experience (Sungur, Tekkaya, & Geban, 2006). Due to the challenging nature of assessing science students' achievement in an inquiry setting, this study on the lived experiences of science teachers during the assessment process revealed valuable knowledge on how and why science teachers select and develop assessments for inquiry learning.

This phenomenological study provided significant data from a qualitative stand point regarding the experiences of northwest Alabama AMSTI science teachers and their decision making process for assessing students in an inquiry-based learning environment. First, this study provided science teachers with research of current assessment processes to dissect and then compare with their own assessment process. Research has been conducted to investigate assessment methods and their application to inquiry learning (Cavanagh, 2005; Clymer & Wiliam, 2007; Cowie, 2005; Crumrine & Demers, 2007; Gioka, 2007). However, limited research is available on assessing inquiry learning for science students in grades five through eight and even less research can be found on the assessment process experiences of science teachers who use inquiry-based learning. Using the examples of assessment selection and development from this study's population of fifth through eighth grade AMSTI science teachers, a comparison of individual assessment processes with those of the teachers from the study provided the knowledge necessary to improve assessment selection and development processes. Therefore, this phenomenological study started to fill the information void by generating research based knowledge on the assessment selection and development experiences of AMSTI science educators while using inquiry-based learning to applications in the field of education.

This study provided the lived experiences of fifth through eighth grade AMSTI science teachers' assessment selection and development processes in order to create a working balance between authentic inquiry experiences and AYP assessments in their classrooms. One of the most challenging aspects of inquiry learning is its assessment. This challenge is related to the requirements of NCLB (Crumrine & Demers, 2007). Using the emergent themes and meaning units from this study, science teachers who implement inquiry learning strategies into their classrooms drew from the examples provided in this study's data to revise their assessment processes thus creating the balance that so many science teachers find so difficult. By examining the working assessment processes of this study's population, science teachers can uncover the best combination of assessments to create the balance needed between inquiry experience and the standardized tests of AYP.

Additional research involving science grades kindergarten through fourth and math grades kindergarten through twelfth with regard to teachers' assessment selection and development processes will be needed. The recording of additional teachers' experiences with assessment decisions will lead to improved assessment practices for both inquiry science and math programs as well as inventive professional development opportunities. Because AMSTI includes kindergarten through eighth grade science and kindergarten through twelfth grade math, further research is needed to provide inquiry teachers with as much information as possible so that they can make informed decisions regarding their assessment processes.

With the implementation of NCLB, a large body of current research is focused on types of assessments or students' perception of their assessments with little research regarding how science teachers select assessments (Cowie, 2005). However, this phenomenological study highlighted the experiences of science teachers providing new insights into how science teachers select and develop assessment practices in an inquiry learning environment. Science educators who implement inquiry-based instructional strategies struggle with their assessment decision making process in order to ensure their students receive a positive inquiry learning experience with the highest possible achievement level. This study provided science teachers with many examples of assessment experiences of AMSTI science teachers. From these examples, science teachers who use inquiry learning methods can compare their personal assessment processes in order to create a genuine inquiry learning experience while giving their students the highest level of achievement.

Summary

This research used a phenomenological qualitative study in order to describe the lived experiences of northwest Alabama AMSTI science educators' as they select and develop their classroom assessment methods when implementing inquiry-based learning instructional methods. The National Research Council (1996) endorsed inquiry-based programs as a way to create individuals who can apply scientific knowledge to everyday life events. Students must be able to think and reason critically to maintain the United States edge on economic development (Colburn, 2004). While inquiry strategies improve students' thinking and reasoning skills, science educators need to correlate their assessments to their inquiry instructional method (Akkus, Kadayifci, Atasoy, & Geban, 2003; Blumenfeld et al., 1991; Colburn, 2007b; Dalton & Morocco, 1997; Hawley & Rollie, 2002; and Krajcik et al., 2000). Section 2 presented a detailed review of the literature as it relates to the lived experiences of northwest Alabama AMSTI science educators' as they select and develop their classroom assessment methods when implementing inquiry-based learning. This section included instructional methods such as constructivist/inquiry methodology, the history of AMSTI, and assessment methods and their correlation to this study. Section 3 outlines the methodology to be utilized in this study. Section 4 supplies the presentation and analysis of data while section 5 offers summaries and conclusions as well as recommendations and commentaries.

SECTION 2: EVIDENCE FROM LITERATURE

Introduction

This section reviews current and relevant literature concerning three main features as they relate to this phenomenological study. A history of constructivism and inquiry methodology as well as an overview of the AMSTI is provided. Current practices with constructivism and inquiry methodology is included. This section includes a review of research literature for strategies incorporated with cooperative learning, inquiry learning, and problem-based learning. A review of assessments associated with constructivism and inquiry methodology is presented. This literature review focused on constructivism and inquiry methodology including current practices in cooperative learning, inquiry-based learning, problem-based learning, AMSTI, and the assessment methods that correlate to these methodologies along with a critical analysis of the literature for each of these constructivist methods.

To conduct the search for this review, the researcher began with the National Science Education Standards (NRC, 1996). Using the references from these standards, the researcher reviewed books and journal articles, as well as conducted web-based searches. These web-based searches included scholarly databases such as Academic Search Premier, other EBSCO databases, and ERIC. With the use of an Internet search, the researcher incorporated key terms to limit each search. For example, the key words included but were not limited to *constructivism*, *inquiry-based learning*, *cooperative learning*, *problem-based learning*, *assessment*, *formative assessment*, *summative assessment*, *standardized tests*, *traditional tests,* and *alternative tests*.

Inquiry learning is a complex but realistic process in which students use their prior knowledge and scientific theories to generate new understandings of science (Yoshina & Harada, 2007). With the complexities of this instructional method and its assessment along with the additional challenges of assessing inquiry learning due to NCLB with AYP requirements, a phenomenological research method was chosen by the researcher to gather data on the decision making process of science teachers as they select and develop assessments for inquiry learning. By employing a phenomenological research method, the researcher was able to describe the decision making processes of AMSTI science teachers as they select and develop assessments for inquiry learning. While most current research focuses on inquiry-based learning strategies and the assessment of these strategies, little research has been conduct to describe the experiences of science teachers as they select and develop their assessment methods while implementing inquiry-based instructional strategies. Since the population of science teachers to be used in this phenomenological study is associated with AMSTI, the researcher provided an overview of the history of AMSTI. Therefore, a review of the history of constructivism and inquiry methods, an overview of the history of AMSTI, current views of inquiry strategies, and the assessments of inquiry methods provided insights in order to address the research question: How do fifth through eighth grade AMSTI science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes?

Subquestions include:

1. What is the structural design of AMSTI science teachers lived experiences with student assessment processes?

2. What are the essential components of the assessment methods for inquiry learning methods used by science educators participating in AMSTI that result in their assessment experiences?

3. What meanings do AMSTI science teachers place on the guidelines they use to determine their student assessment methods?

4. What do AMSTI science teachers find most helpful when determining student assessment methods?

Review of Related Research and Literature

History

For this study, the history of constructivism begins in the 20th century and focus on the ideas of Dewey, Vygotsky, and Piaget. Dewey (1907) described teaching as an active process in which students are problem solvers rather than passive learners. According to his beliefs, science education placed excessive emphasis on the acquisition of information and he felt the key to improving science education is in the process of thinking. In addition, Dewey felt education should be personal for students. This personal environment should be based on students' interests rather than the interests of the teacher such that students will maintain a personal interest and understanding of their learning. In order to create this interest, Dewey believed education should be structured so that students' prior knowledge created a bridge within the infrastructure of the brain to new understanding.

Similar to Dewey, Vygotsky's (1967) theoretical structure is based on cognition in which an individual's learning is influenced by their environment. With the assistance of others, an individual can increase their level of learning. As this applies to education, student interactions with teachers and peers will lead to a greater level of understanding. He stated knowledge is accumulated through a constant growth of reasoning and is a continuous process. Vygotsky described learning as student centered in which students create understanding by connecting past experiences and knowledge to current investigations of concepts. Since past experiences and prior knowledge are greatly influenced by an individual's cultural environment, Vygotsky placed a family type of environment as a key factor in the learning process. He stated that learning is individual and teachers must look at each student to determine best strategies of instruction. Vygotsky's theoretical structure is in line with a constructivist educational environment (Llewellyn, 2002).

Piaget (1970) described the acquisition of knowledge as a process of construction in which students' build new understanding through interactions with their environment. Piaget's research identified the cognitive images of students' experiences as schemas. These schemas are described as models from which students can infer and evaluate phenomena using prior knowledge. According to this concept, teachers need to understand that these schemas include misconceptions of scientific concepts as well as accurate understanding of these concepts and should adjust instruction to take into account these misconceptions. Piaget believed just the observation of science would not lead science students to assimilate their previous knowledge and understanding. He felt students needed to create questions based on their prior knowledge and experiences and interactions with people and the environment. Piaget explained student learning as construction based on explorations and interactions with peers and the environment. Piaget believed knowledge attained from nonmeaningful learning would not be retained over long periods of time. However, knowledge created from linking existing experiences to new understanding creates life long learning. According to Piaget (1970), learning theory is based on knowledge as (a) dynamic process that results from interactions with both individuals and the environment, (b) intelligence as a creation from prior knowledge and new understandings, and (c) cognitive growth as autonomous which includes both social settings and the physical environment of the learning.

According to the NRC (2000), Schwab, an educator, endorsed presenting science as an inquiry. Schwab's inquiry process included posing open-ended questions and having students investigate phenomena (NRC, 2000). In 1957, the launch of the Russian satellite, Sputnik, accelerated the development of inquiry-based curricula. This event led to the increased use of inquiry-based methods to engage students in science. These ideas and events provided the foundation for the developers of the National Science Education Standards to include inquiry as "a learning goal and as a teaching method" (NRC, 2000, p. 18).

Using the ideas of Dewey, Vygotsky, and Piaget, Llewellyn (2002) summarized the key points of today's constructivism. First, learners' sensory passageways are the means for associating new knowledge with prior understandings. Second, learners' prior knowledge establishes the acceptance and interpretation of new information. Third, learners' knowledge is built from prior experiences saved within the memory centers of the brain. Fourth, learners' employ scaffolds to build and rebuild new understanding. Fifth, learners' self assess and test new understanding with peers. Sixth, inquiry-based methods are excellent strategies for linking prior knowledge and new understandings.

According to Llewellyn (2002), science teachers should use constructivism as the basis for understanding inquiry-based methodology in which constructivism is the way of understanding how we know information. According to Dalton and Morocco (1997), constructivism occurs as students actively learn through constructing and evaluating their views of the world around them. Colburn (2007a) reported inquiry learning is a category of constructivist learning. When science teachers implement inquiry-based methods, they need to take a cognitive approach to instruction. Colburn (2007a) stated understanding is built using students' prior knowledge and experiences. A constructivist classroom setting will be student centered and include students' experiences along with their misconceptions (Llewellyn, 2002).

According to Llewellyn (2002), there are several characteristics a constructivist science teachers should address when establishing this type of learning environment. Initially, science teachers need to develop an understanding of the way in which students learn and how to approach instruction based on this information. Next, science teachers should understand that constructivist theory can provide meaning to teaching and learning. Science teachers should begin lessons with what students know and understand.

Science teachers should understand the necessity of tangible and manipulative resources to initiate scientific ideas through the use of investigations and the time necessary for students to manipulate data so that new understandings will be established. Science teachers should expect constructivist learning to lead to higher-order and critical thinking on the part of students as well as challenging students to think and problem solve. Using constructivism, science teachers can create active learners who build new understandings of scientific concepts and their relationships to real world situations by providing students with an environment that fosters cooperative learning in order to collaborate with peers.

In contrast, a traditional classroom environment is teacher centered (Llewellyn, 2002). Characteristics of a traditional classroom environment include emphasizing basic skills, employing a rigid curriculum that relies on textbooks, lecturing to disperse information, assessing student knowledge without regard to teaching, creating a teach to the test atmosphere, and emphasizing independent work (Llewellyn, 2005).

Colburn (2007b) maintained inquiry-based learning as a means for improving students' critical thinking and reasoning skills while engaging students in science classrooms and laboratories. According to Zion and Sadeh (2007), science teachers need to promote the use of inquiry-based learning in order to show their students the learning process and to develop each student's sense of curiosity. Krajcik et al. (2000) acknowledged inquiry learning in terms of constructivism stating students construct knowledge through real world problem-solving based on information gained during experimentation. Their mixed method study included data from pretests-posttests, surveys, and interviews of students participating in the Detroit's Urban Systemic Program and focused on technology used to support inquiry-based learning. The Krajcik et al. (2000) results showed students were learning key scientific concepts through the use of inquiry learning and placed peer collaborations and the debate of laboratory results as a primary action leading to the improvement of student understanding. According to Ellis (2001), traditional approaches to science education restrict the creativity of students and teachers. Science educators need to implement alternative strategies in their classrooms to promote student achievement (Ellis, 2001).

Inquiry is a method of teaching and learning (NRC, 2000). As a teaching method, inquiry involves the creation of a constructivist learning environment. According to the National Science Education Standards (NRC, 1996; NRC, 2000), teachers implementing inquiry instructional strategies should include several features. For example, teachers need to plan an inquiry-based program by developing short-term and long-term goals, selecting content that meets the interests, abilities, and understandings of their students as well as employing teaching and assessment strategies that support inquiry methods. Science teachers must facilitate learning rather than dissimilating learning which is accomplished by providing support, encouraging discussions among students, challenging students to guide and fully participate in their own learning, and promoting openness in students for new ideas. Teachers need to continuously evaluate their teaching and student learning by using several assessment methods including students' data, analyzing these assessments to direct their teaching, and allowing students to self-assess. Also, science teachers need to cultivate a learning environment that allows students to engage in inquiry. This is accomplished by providing the necessary time for inquiry, establishing an inquiry learning environment, and supplying the essential materials and resources for inquiry. Science teachers need to grow societies of science learners by respecting students' ideas and experiences, nurturing cooperation between students, facilitating scientific discussions between students, and modeling scientific skills for inquiry.

As a learning method, the inquiry process combines students' prior knowledge with new knowledge gained from the inquiry. According to the NRC (2000), the inquiry learning process begins with observations which guide students to questions. From this point, students research the questions and plan investigations. With their research and investigative plan, students then gather, analyze, and interpret data from the inquiry. After collecting and analyzing the inquiry's data, students develop answers, explanations, and predictions. In the final step of inquiry learning, students communicate their findings in a format similar to the process that real-world scientists would use to publish findings (NRC, 2000).

Colburn (2007b) and Llewellyn (2002) described inquiry learning as a cyclic method. This cycle begins with a question for investigation followed by a period of brainstorming for potential solutions. The next phase of the cycle is supposition in which students develop a hypothesis to be tested that leads to the design and investigation of the inquiry. Mirroring the actions of actual scientists, students then collect data and draw conclusions following up these actions up by communicating these conclusions with others.

According to Colburn (2007b) and Llewellyn (2005), inquiry is a 5E process involving engagement, exploration, explanation, elaboration, and evaluation. During engagement, science educators will set the stage for the inquiry by grabbing the attention or hooking the students with a purpose for the inquiry. With exploration, science educators will incorporate inquiry-based laboratories and activities that include questions, hypotheses, cooperative interactions with other peers, and data collection. During explanation, inquiry students need to articulate their thoughts and experiences while constructing new meanings for the inquiry. Using elaboration, the students should reinforce science concepts by expanding the data to real world experiences which will lead to additional inquiries. During the last phase, evaluation, students need to summarize relationships using higher order questions to make judgments, analyses, and evaluations of prior and newly attained knowledge.

Llewellyn (2002) also listed several challenges associated with the implementation of this 5E inquiry method. For example, teachers may lack the foundation in constructivist learning theory necessary to implement inquiry into their classrooms. Teachers struggle to balance learning opportunities with the reality of current day high-stakes standardized assessments required by NCLB (Llewellyn, 2005). Science teachers may struggle with today’s one-size-fits-all standards approach. This includes the challenge science teachers’ face with constructivist methods that address fewer topics with greater depth while still meeting national and state standards. With these standards, science teachers’ struggle with time constrictions and the lack of inquiry-based materials associated with their textbook resources.

According to Colburn (2007b) and Llewellyn (2005), educational setting needs to include some the key aspects of constructivism. For example, new knowledge is incorporated through sensory stimuli by incorporating learners' current and prior understandings. Learners' current and prior understandings establish how information will be interpreted. Individuals communicate but do not convey knowledge meaning knowledge is created when learners associate prior information with current information stored within the brain. Learners use associations to create new knowledge in which they are continuously building and rebuilding understanding. Using these associations, learners' need to reflect on their knowledge as well as testing their knowledge with peers. Inquiry is a practical teaching method for establishing the connections between prior knowledge and scientific descriptions of the world.

Literature showed the use of inquiry learning assists in the development of citizens who can apply their scientific knowledge to real-world situations (Clymer & Wiliam, 2007). Hofstein, Shore, and Kipnis (2004) declared inquiry learning is a method of gaining knowledge through experimenting. The research of Hofstein et al. (2004) focused on inquiry-based experiments, assessment tools for these experiments, and professional develop for science teachers using the experiments for regular chemistry for grades 11 and 12 in Israel. They reported the experience gained through laboratory activities in the science classroom promote thinking. According to Colburn (2004), Enger and Yager (2001), and Gunzenhauser (2003), the assessment methods educators implement must correspond to the instructional method used in their classrooms. A review of literature for constructivism established the background needed to understand inquiry methods as they apply to the experiences of northwest Alabama AMSTI science educators' as they select and develop their classroom assessment methods when implementing inquiry-based learning instructional methods.

The National Science Education Standards as written by the National Research Council (1996) maintained its support of inquiry learning as a main component of scientific literacy when developing well-informed citizens. Scientific inquiry monitors and explains the physical world while allowing students to engage in experimenting and thinking processes as scientists. Raizen (1998) found inquiry-based learning a necessity for science educators to prepare students for life in a global market. The Nation Research Council emphasized the importance of addressing scientific processes and establishing inquiry science curricula in the National Science Education Standards. In a study conducted by Burry-Stock and Casebeer (2003), state test coordinators and curriculum specialist were provided a questionnaire via phone or email focusing on the status of state science standards and achievement testing. The study was conducted over three time intervals, 1998, 2001, and 2002. The results showed the states within the United States were establishing science standards and correlating their achievement testing programs. In 1998, 17 states within the United States had not developed science standards and correlating achievement testing programs. By 2001, only two states had not developed science standards and consequently correlating achievement testing programs. In 2002 when NCLB was enacted, only one state had not developed science standards and correlating achievement testing programs. However, the National Assessment for Educational Progress showed that only 1 to 4% of science students in the United States demonstrated an advanced level of scientific understanding (Burry-Stock & Casebeer, 2003). This historical timeline of constructivism and inquiry methodology provided a conceptual framework for the basis of this phenomenological study which includes the lived experiences of northwest Alabama AMSTI science educators' as they select and develop their classroom assessment methods when implementing inquiry-based learning instructional methods.

AMSTI

The AMSTI is a program implemented by the Alabama Department of Education and was designed by a Blue ribbon committee comprised of kindergarten through twelfth teacher leaders, higher education leaders, and business leaders to improve math and science teaching throughout the state (AMSTI, 2004). In 1999, Richardson, State Superintendent of Education, and Morton, Deputy State Superintendent of Education, embarked on a journey to develop a program to improve Alabama's math and science instruction (AMSTI, 2004). Under the supervision of Ricks, a world class model was developed to accomplish the vision of Richardson and Morton. Using the successful Alabama Reading Initiative as a model, Ricks along with the Blue ribbon committee began researching methods to improve math and science education in the state by:

1. Examining assessment data for the state as well as national and international assessment data, currently successful Alabama programs, and the needs of state business and industry leaders.

2. Reviewing national standards for math and science education along with needs assessment data from an Alabama math and science educators' survey.

3. Examining successful programs established by other states, Alabama educator certification requirements, and the Alabama math and science courses of study as well as current research literature on math and science education (AMSTI, 2004). After one year of research, the committee presented to Richardson, Morton, and the Alabama State Board of Education their initiative's plan which was unanimously approved on December 14, 2000 (AMSTI, 2004).

Immediately after this vote, Ricks and his committees began working on the specifics of the initiative now known as the AMSTI (AMSTI, 2004). First, the state was divided into 11 AMSTI regions. Each region would have an AMSTI center to dispense resources and provide professional develop for kindergarten through twelfth math educators and kindergarten through eighth grade science educators (AMSTI, 2004). For this phenomenological study, the University of North Alabama Regional Inservice Center is the AMSTI center used. Following this sectioning of the state, two main committees were formed to develop the specifics of the initiative. These committees were responsible for developing a grade and subject specific science curricula and resources along with and a grade and subject specific math curricula and resources (AMSTI, 2004). This phenomenological study is only interested in the science portion of the initiative and will therefore focus on this portion. For the science portion of the initiative, the team incorporated modules developed through the support of the National Science Foundation and inquiry-based methodologies. Following this phase, science curriculum writers developed modules and specific guideline instructions for creating and implementing an inquiry-based learning environment (AMSTI, 2004).

After specific guidelines were created in 2000 for AMSTI professional development, kindergarten through eighth grade science educators were trained and certified (AMSTI, 2004). During 2001, the first Requests for Proposals were distributed in order to determine the first AMSTI sites. A funding issue developed which suspended the program. During this time, Richardson, Morton, and Ricks along with other distinguished education leaders visited the National Science Foundation and the office of Congressman Bud Cramer, the congressional representative for north Alabama (AMSTI, 2004). During 2002, Congressman Cramer secured a three million dollar grant from NASA, an industry leader in north Alabama due to the work of NASA on the Red Stone Arsenal located in Huntsville, to fund the first year of AMSTI. Because of their prior experience with hands-on science programs, the first AMSTI site was located at the University of Alabama at Huntsville (UAH) (AMSTI, 2004). A smaller award to provide the money necessary for establishing a second AMSTI site was granted to the University of North Alabama (UNA) in Florence. The first summer institute training sessions for AMSTI teachers was held in the summer of 2002 in Huntsville during which 20 schools participated in a 2 week inquiry-based instructional training institute at a local school in the Huntsville City School System (AMSTI, 2004).

Using the developed modules, AMSTI training was implemented in two phases (AMSTI, 2004). During a 2 week summer institute, AMSTI science teachers would be trained on half of the inquiry-based learning modules which would be followed by a second summer institute the following year. During year two, AMSTI science teachers were trained on the remaining inquiry-based learning modules (AMSTI, 2004). The committee had to train the trainers who would then lead the AMSTI summer institutes. To accomplish this task, science educators were selected and provided with the AMSTI curriculum and resources for half the inquiry modules which they implemented in their science classrooms (AMSTI, 2004). During the 2001-2002 academic year timeframe, these science teachers directly experienced implementing inquiry-based methodology in their classrooms using the AMSTI curriculum and resources. These science educators would become the trainers for all year one AMSTI science teachers (AMSTI, 2004). During the following academic school year, these science teachers were given the remaining inquiry modules to implement in their classrooms. They would become the trainers for year two AMSTI science teachers. This initial training required a time frame of 2 years from 2001 through 2003 (AMSTI, 2004).

Before the second summer institute began in 2003, the inquiry modules were evaluated and some realignment was conducted by AMSTI in order to maximize student achievement (AMSTI, 2004). During this summer, the UAH AMSTI site trained both year one and year two AMSTI teachers at a local school site and the UNA AMSTI site trained year one AMSTI teachers. In order for a school to qualify as an AMSTI school, the school must agree to send its math and science faculty to a two week summer institute for training as well as providing delivery and return services for all inquiry resources (AMSTI, 2004). During the summer of 2003, the University of South Alabama was awarded a grant by the United States Department of Education's Math and Science Partnership to become the third AMSTI site. In 2005 as the first and a second 2.7 million dollar NASA grant awarded to the Alabama Department of Education for AMSTI development was running out, the Governor of Alabama, Bob Riley asked the state legislature to add 15 million dollars to the education budget in order to fund and expand AMSTI. The state legislature voted in favor of the educational budget provided by Governor Riley (AMSTI, 2004).

This funding followed the release of achievement data following the implementation of AMSTI (AMSTI, 2004). This initial data showed that science students from AMSTI schools scored significantly higher on achievement tests than students at nonAMSTI schools (AMSTI, 2004). In addition, the AMSTI modules included reading and writing skills practice and AMSTI schools showed significantly higher achievement in these areas than nonAMSTI schools (AMSTI, 2004). With this data in mind during the spring of 2005, six additional AMSTI sites were funded which included the University of Montevallo, Troy University, the University of Alabama, Wallace Community College-Selma, Alabama State University, and Jacksonville State University. In 2007, the Alabama legislature budgeted 22 million dollars to allow all AMSTI sites to be fully funded and expand the program to include two addition sites, Auburn University and the University of Alabama at Birmingham. In 2007, AMSTI soared with 5,000 math and science teachers at 10 sites participating in AMSTI 2 week summer institutes. This included 168 new AMSTI schools providing AMSTI with a total of 364 AMSTI schools which communicates to roughly one-fourth of Alabama's public schools (AMSTI, 2004). Governor Riley publicized the success of AMSTI and plans to see AMSTI in every school in the state. The Alabama legislature agreed and supplied AMSTI with a 35.7 million dollar budget for 2008(AMSTI, 2004).

The purpose of this phenomenological qualitative study was to describe the lived experiences of northwest Alabama AMSTI science educators' as they select and develop their classroom assessment methods when implementing inquiry-based learning. With this purpose in mind, the researcher provided a history of AMSTI and insight into its success. With the Governor of Alabama stating all schools need AMSTI, science teachers will to be exposed to inquiry-based learning and instructional strategies (AMSTI, 2004). With the exposure to AMSTI, science teachers will need to assess student achievement while implementing inquiry methodology (AMSTI, 2004). The purpose of this phenomenological study was to describe the lived experiences of northwest Alabama AMSTI science educators' as they select and develop their classroom assessment methods when implementing inquiry-based learning instructional methods thus allowing current and future AMSTI science teachers to develop best teaching and assessing practices for inquiry learning.

Cooperative Learning

Cooperative learning is a type of constructivist method based on inquiry (Colburn, 2007b). Cooperative learning methods use peer deliberations for improving student knowledge and comprehension (Abrami, Poulsen, & Chambers, 2004). Students instructed with cooperative learning in the science classroom showed higher level thinking skills than those taught with a more traditional method (Siegel, 2005). While Johnson et al. (2000) argued cooperative learning and peer negotiations can improve student comprehension in the science classroom, they also caution educators on the effectiveness of all cooperative learning methods. Barbosa, Jofili, and Watts (2004), Gupta, (2004), and Palincsar et al. (2002) stated small group inquiries impose the role of the teacher onto students which provides a powerful intervention for all students. They also found participating in small groups of students requires allowances to engage all students including those with special needs. Educators must develop an understanding of the methods for implementing peer conversation groups to adapt with the real-life situations that occur in their classrooms. Science educators need to understand the experiences faced when determining assessments of this inquiry strategy.

In addition to peer dialogue of scientific concepts and peer debates on laboratory results, students require communication on scientific theories and misconstructions (Colburn, 2007b; Schmidt & Hrynyshyn, 2004). According to Schmidt and Hrynyshyn, educators often depend on textbook information to present science concepts which can lead to students' misunderstanding of these concepts. Sewell (2002) endorsed the use of conversation to assist in the elimination of students' erroneous beliefs. Science educators have an array of options when using cooperative learning methods to improve the science achievement of students (Eckersley, Evans, & Hoke 2004; Mitchell, Reilly, Bramwell, Lilly, & Solnosky, 2004). Sewell found that educators who facilitate small group discussion environments expose students' misconceptions in an effort to elevate these ideas. This environment allowed students to confront their misconceptions in an effort to replace inappropriate information. While Colburn (2007b), Eckersley et al. (2004) and Mitchell et al. (2004) provided knowledge of cooperative learning focusing on methodology, little is discussed regarding the experiences of teachers as they decide how to assess student understanding. With the implementation of NCLB, teachers must consider the advantages and disadvantages of their assessment of cooperative learning methods as it relates to constructivism in their classrooms (Sewell, 2002). Unfortunately, the process science educators experience as they select and develop assessments for their inquiry classrooms was not addressed.

In a study conducted by Bilgin and Geban (2006), the effects of cooperative learning as compared to traditional learning regarding student understanding and student achievement were investigated for 10^{th} grade chemistry students during a unit on chemical equilibrium concepts. The Bilgin and Geban study included 87 10^{th} grade chemistry students instructed by the same teacher in a public high school in Turkey over a 4 week period. The randomly assigned experimental group was instructed using cooperative learning methods and contained 44 students of which 21 were girls and 23 were boys while the control group was instructed using traditional methods and contained 43 students of which 19 were girls and 24 were boys.

During the Bilgin and Geban (2006) study's data collection, students in both groups were given a chemical equilibrium test which was used to identify conceptual understanding and misconceptions as both a pretest and a posttest. In addition, both the experimental and control groups were given a science process skills test to establish the students' understanding and achievement and a researcher developed chemical equilibrium achievement test to evaluate understanding on chemical equilibrium problem solving as a posttest. To provide depth of understanding on the students' reasoning skills, 12 students were interviewed from both groups with the interview questions focusing on equilibrium approaches and characteristics, effects of concentration, temperature, and volume on equilibrium, and the effects of catalysts on equilibrium. Using data from the chemical achievement test, the teacher selected four volunteers with high achievement scores, four volunteers with middle achievement scores, and four volunteers with low achievement scores for the interview portion of the study.

During the treatment phase of the Bilgin and Geban (2006) study, the students in the control group were instructed using traditional lectures while the students in the experimental group were assigned to four member heterogeneous learning groups with one high achieving student, two middle achieving students, and one low achieving student. In addition, the experimental group was given content information and instructions for completing a problem solving assignment related to the content information. After this instruction, the students worked in their four member teams to complete the assignment during which time the teacher facilitated discussions and explanations within each group. Furthermore, quizzes were used to evaluate within group participation with the top three groups receiving rewards for their improvement over the four week period on cooperative work.

The results of the Bilgin Geban (2006) study showed there was no statistical significance between the two groups' scores on their prior understanding of equilibrium. In addition, the results showed a statistically significant mean difference with the students who were instructed using cooperative learning as compared to traditional instruction in regards to understanding and achievement. During the posttest, the experimental group showed fewer misconceptions about chemical equilibrium than the control group. The Bilgin and Geban study concluded that students who discuss scientific concepts within a peer group environment experience greater achievement. While the Bilgin and Geban study used pretests and posttests to gather data on student achievement and cooperative learning, the experiences of science teachers as they decide how to assess student achievement while incorporating this learning strategy was not addressed. Like the Bilgin and Geban study, science educational research focuses mainly on inquiry strategies with some focus on students' experiences with these strategies. However, little research has been conducted concerning science teachers' experiences as they assess student achievement while implementing inquiry methods. Therefore, this phenomenological qualitative research provided science educators with the lived experiences of other science educators' who select and develop their classroom assessment methods while implementing inquiry-based learning instructional methods.

Chang and Mao (1999) investigated the affect of cooperative learning in contrast to traditional instruction on students' grasp of science concepts with their research focusing on student knowledge, comprehension, and application. Chang and Mao found no significant difference in students' knowledge and comprehension level achievement when students were instructed traditionally or with cooperative learning methods. However, the same research showed students' application scores were significantly higher when students were instructed through cooperative methods as opposed to traditional learning strategies. Chang and Mao found student groups that presented their laboratory results applied greater thinking and reasoning skills. The participating educators in the Chang and Mao study valued the format of cooperative learning but they discussed concern for other educators who implemented this method of teaching which requires thoughtful preparation for its success. While Chang and Mao research study investigates one theme of constructivism, it does not address how science educators assess this form of inquiry. As such, this phenomenological research described the experiences that science educators have as they select and develop assessment methods for inquiry.

In a mix method research plan, Geok Chin Tan, Kim Eng Lee, and Sharan (2007) investigated the effectiveness of cooperative learning for 241 eighth grade Singapore geography students over a 6 week time period. Of this population, 103 students were instructed using a traditional instructional method while 138 students were instructed using cooperative group of four to five students per group. The Geok Chin Tan et al. study collected data using a pretest/posttest for two units of environmental geography and an open ended questionnaire on the experiences and feelings of working in cooperative groups.

During the data collection of the Geok Chin Tan et al. (2007) study, a pretest which included 20 multiple choice and three essay questions was given before the unit on pollution and the unit on climate change while a posttest of 20 multiple choice and three essay questions was given after the units of pollution and climate change. Also, the Geok Chin Tan et al. study incorporated an intrinsic motivation to learn questionnaire comprised of five categories with six items per category. The categories addressed by the questionnaire contained challenge which included inclination toward hard or easy work, mastery which included independent learning or teacher instructed learning, curiosity which included individual interest or teacher approval, judgment which included individual conclusions or teacher conclusions, and criteria which included judgment of success or failure. Qualitatively, the Geok Chin Tan et al. study collected data using an open ended questionnaire focused on students' experiences with cooperative learning.

The results of the Geok Chin Tan et al. (2007) study found no significant difference in achievement or motivation between the experimental group and the control group. Quantitatively, the results showed a significant increase in achievement for high achieving students while no significant difference was shown for low achieving students. Qualitatively, the experimental group recorded greater positive responses to the cooperative group method of learning than the control group who was instructed using traditional instructional methods. In addition, both high and low achieving students recorded positive comments regarding cooperative learning. The negative statements recorded by students instructed with cooperative groups regarded self discipline and a dislike of changing study methods. Conversely, the positive statements focused on the creation of interest and fun experienced with comprehensive content learning as a team of learners. While the Geok Chin Tan et al. study focused on the effectiveness of cooperative learning in regard to student achievement and motivation to learn, their mix method research did not concentrate on the experiences science teachers with regard to cooperative learning or the process they use to select and develop assessments for cooperative learning.

The purpose of the mix method research conducted by Ding and Harskamp (2006) was to determine how partner gender influenced the problem solving abilities of students in cooperative pairs. During the research, Ding and Harskamp studied 50 physics students from Shanghai, China of which 26 were female and 24 were male. Each student was randomly paired created three groupings of students which included 12 male and female pairs, seven female and female pairs, and 6 male and male pairs. Each pair received the same experimental time and content. Prior to data collection, two sessions 45 minutes in length were conducted with all the participants in which Newtonian mechanics and motion were discussed which was followed by a pretest and four sessions 45 minutes in length in which the participants worked in pairs. After the pair working sessions, each participant was given a posttest. During the pair working session, each participant was asked to fill out a communication log of all dialogue between the pairs. The pretest and posttest was a standardized pencil and paper assessment on Newtonian mechanics and motion.

The results of the Ding and Harskamp (2006) study showed significantly lower achievement for mixed group which included one male and one female per pair when compared to the pairing of female and female and no significant difference in achievement between mixed group and the male and male group. The communication log results showed on task behavior increased, the female and female group had the greatest amount of communication followed by the mix groups and then the male and male group. Female members of a mix gender pair were more likely to ask for their partner's ideas and opinions while male and male pairings showed greater tension than the mixed group of female and female pairs. In a mixed group, females were less likely to make statements on problem solving while the females in a female and female pairing demonstrated greater confidence than those in a mixed group. Males were more likely to give explanations while females were more likely to ask questions. When pairing students in physics cooperative groups or pairs, consideration must be given to gender in order for all students to increase achievement. The Ding and Harskamp (2006) study spotlighted cooperative learning and student gender without considering the experiences of the physics teachers as they journey through the assessment process. Consequently, this phenomenological study spotlighted the experiences of science teachers as they select and develop assessments for inquiry learning.

Research conducted by Ding, Piccolo, Kulm, and Xiaobao (2007) focused on the use of cooperative groups to improve thinking skills by mathematics teachers. This qualitative study video taped six mathematics teachers from three school districts in Delaware and three school districts in Texas ranging from no experience to 25 years of experience. Of the six teachers, four were elementary and two were middle school mathematics teachers. In addition, each teacher's class was made up of 18 to 35 students, instructed using only cooperative learning, and recorded for 30 to 50 minutes. Each video was transcribed and coded for four categories or themes which included length of intervention, type of intervention, frequency of intervention, and quality of intervention.

The results of the Ding et al. (2007) study showed four teachers demonstrated interventions of less than one minute while two teachers demonstrated prolonged interventions of greater than two minutes. All teachers demonstrated more interventions with individual students than with the entire class and fewer interventions with individual students than with a group of students. In addition, five of the six teachers intervened with each group at least once. Ding et al. created three categories to describe intervention frequency which include high, middle, and low. Teacher intervention frequency as a whole was 33% to 60% giving a middle rating. The Ding et al. study showed teachers were intervening but the quality of intervention was poor and teachers experienced problems facilitating cooperative group learning. The Ding et al. research found mathematics teachers need to place a greater emphasis on thinking and learning and promoting learning based on students' misconceptions. Despite the fact that the Ding et al. research centered on cooperative learning, it did not address the experiences of the teachers with cooperative learning or their selection and development of assessment methods. This phenomenological study focused on the assessment selection and development experiences of science teachers who use inquiry-based learning for grades six through eight.

Cooperative learning is an instructional method in which students work in small groups or pairs and use peer dialogue to develop knowledge and understanding (Colburn, 2007b). In general, research studies showed that cooperative learning increases student achievement (Bilgin & Geban, 2006; Chang & Mao, 1999; Ding & Harskamp, 2006; Ding et al., 2007; Geok Chin Tan et al., 2007). Research studies also showed that educators must focus on the makeup of groupings or pairs in order to ensure improvement in achievement for all students regardless of gender or ability level (Ding & Harskamp, 2006; Geok Chin Tan et al., 2007). Research focused on the cooperative methods and the students' experiences without a focus on the experiences of the educators. This phenomenological study described the assessment selection and development experiences of AMSTI science teachers as they assess inquiry learning.

Inquiry Learning

According to Colburn (2007b), inquiry methodologies are based on independent thinking, students' instruction and practice of critical thinking, and the active engagement of students in scientific concepts. Dalton and Morocco (1997) found students who used an inquiry approach performed well on content assessments and developed scientific concepts regardless of ability level. Yoshina and Harada (2007) stated inquiry learning encourages student learning by creating knowledge through asking questions, investigating, evaluating data, presenting organized information, and expressing personal views thus mirroring the processes real world scientists incorporate daily. Colburn (2004) listed three basic forms of inquiry learning: (a) structured inquiry, (b) guided inquiry, and (c) open inquiry. Structured inquiry provides instructions for laboratory activities but it requires students to generate data tables, graphs, and conclusions. In guided inquiry, students developed the laboratory procedure as well as the requirements of a structured inquiry. Open inquiry allowed students to make the majority of decisions regarding the laboratory focus. This environment placed students in a role similar to actual scientists (Colburn, 2004). According to Colburn, the use of these methods allowed educators to gradually build the students' skills from structured inquiry toward an open inquiry laboratory setting in order to advance achievement in science.

According to Colburn (2004), the implementation of inquiry-based educational methods faced many problems. Traditionally, students are trained to receive knowledge passively from their instructor. Inquiry methods require the training of students to think actively. According to Orgill and Thomas (2007), inquiry learning is based on a 5E model in which engage, explore, explain, elaborate, and evaluate which provides a cyclic model for science education. Shields (2006) and Zion et al. (2004) stated inquiry-based learning is not the transmission of knowledge but rather a learning model where students' minds are engaged. In order to implement this method successfully in science classrooms, educators must address the varied levels of their students' laboratory skills and content knowledge (Shields, 2006; Zion et al., 2004). Shields (2006) stated teachers must educate administrators, parents, and the community of the importance of this type of instructional method.

Ikpeze and Boyd (2007) conducted research on the effectiveness of Web-based inquiry activities on student engagement and motivation. The Ikpeze and Boyd study included a population of 6 middle class fifth graders of average or above average achievement levels in a large urban city in the northwest United States. These 6 students participated in 50 minute Web-based inquiry environmental protection sessions two to three times per week. Data was collected using several sources such as observations, notes, written material, reflective journals, and interviews.

The Ikpeze and Boyd's (2007) results from the analysis of the data showed an increase in student engagement and motivation in which the students experienced real world environmental issues, discussed actual environmental problems experienced by communities, and showed expanded knowledge of environmental content. The Ikpeze and Boyd research showed Web-based inquiry activities were an excellent instructional tool for literacy and technology skills which allow students to solve authentic environmental problems by linking the classroom and the real world. It did not address the experiences of teachers as they select and develop assessments for inquiry learning. With this in mind, this phenomenological study showed the assessment experiences of science teachers who incorporate inquiry learning into to their classrooms.

Bodzin, Waller, Santoro, and Kale (2007) conducted a mix method study to determine the effectiveness of Web-based and hands-on inquiry methods for inclusion students in high school biology. The Bodzin et al. study included 48 middle class, ninth grade biology students from a suburban high school setting in the northeastern United States of which 12 were inclusion students with Individual Educational Programs (IEP). During the Biodzin et al. study, data was collected for a 6 week time frame using individual and group interviews, pretest and posttest scores from two units, and performance task assessment rubrics. The interviews were transcribed and themes analyzed to determine students' attitude regarding Web-based and hands-on inquiry activities. The pretests and posttests of the Bodzin et al. study included 12 multiple choice questions and were given before and after the units on photosynthesis and cellular respiration. On the other hand, the performance tasks of the Biodzin et al. study included the assessment of laboratory reports based on a rubric with scores of 0, 1, 3, or 5. Using this rubric, 0 was the lowest possible score given for no response and 5 was the highest score given for advanced understanding.

According to the results of the Bodzin et al. (2007) study, the students' content knowledge increased significantly for both the regular education students and the inclusion students. Regular education and inclusion students communicated a positive experience based on greater interest using Web-based and hands-on inquiry methods.

Performance based tasks showed below proficient scores for students with an IEP and those without an IEP. Bodzin et al. stated the significant increase in student content knowledge for students with an IEP was likely due to the format of the Web-based inquiry in which constant feedback and coaching were provided by the Web-based activity. Bodzin et al. found the positive attitude of inclusion students was based on the de-emphasis of instructional strategies that inclusion students find difficult. They stated the below proficient scores on the performance task assessments were due to lesser emphasis being placed on laboratory reporting and that a greater amount of coaching and teacher led practice would be needed for inclusion students to improve these scores. While the Bodzin et al. (2007) study focused on the effectiveness of Web-based inquiry and hands-on inquiry methods with only a brief statement on the assessments used during the study, attention was given to the teachers' experiences during the process of assessment selection and development. This phenomenological study focused on the assessment selection and development experiences of science teachers who employ inquiry learning.

Pedaste and Sarapuu (2006) conducted a mix method research study to investigate the effectiveness of inquiry learning. The Pedaste and Sarapuu study included two phases in which the first phase collected data from 65 teams comprised of 262 Estonian students in grades six through 12 while the second phase collected data from 60 teams made up of 235 Estonian students from grades seven through 12. In both phases, the majority of students were in the eighth grade. Each voluntary team was made up of 3 to 5 students and competed in a virtual inquiry exercise on ecological and environmental problems.

During the first phase, the Pedaste and Sarapuu study maintained the same sequence of events in each problem for each team. In the second phase, Pedaste and Sarapuu varied the sequence of problems and provided a help and support section to assist each team. Each team worked at their own pace but was required to finish the activity in five weeks.

The Pedaste and Sarapuu (2006) study included a pretest and prequestionnaire completed by each team prior to complete the 25 ecological or environmental problems and was followed by a posttest and post questionnaire. In the first phase of the Pedaste and Sarapuu study, the results showed an increase in problem solving skills as well as an increase in skills for analyzing data and photographs while no improvement was seen in skills for analyzing graphs. During the second phase of the Pedaste and Sarapuu study, the results showed an increase in increase in skills needed to solve problems and analysis data, photographs, and graphs. According to Pedaste and Sarapuu, the clustering of students in the second phase based on individual learning processes and personal data provided for the increase in skills for problem solving and analyzing graphs, data, and photographs. While the Pedaste and Sarapuu study focused on the effectiveness of inquiry learning, it does not address the experiences of the inquiry teachers during the assessment selection process. This phenomenological study addressed the assessment selection and development experiences of science teachers who implement inquiry learning.

Because inquiry-based lessons require greater development time from educators to implement, the transition from a traditional learning environment to an inquiry-based setting is not easily made by educators (Shields, 2006; Roehrig & Luft, 2004). Colburn

(2004) recommended a gradual change that begins with structured inquiry and leads to open inquiry. Watson et al. (2004) reported the weakness of inquiry learning methods is teacher preparation. They cited the need for teacher inservice and preservice for the successful implementation of inquiry-based strategies in the science classroom. Inquiry learning research showed an increase in student achievement, student engagement, and student motivation (Bodzin et al., 2007; Ikpeze & Boyd, 2007). Research focused on instructional methods but do not address the experiences of teachers who employ inquiry-based strategies as they decide on their assessment processes (Robertson, 2007). With these implications and the addition of NCLB, science teachers have addition guidelines for assessing students. This phenomenological research described the experiences AMSTI science teachers as they select and develop assessment methods in this type of learning environment.

Problem-based Learning (PBL)

PBL is a reversal of the traditional learning method where questions are answered after students obtain knowledge of a subject. According to Chin and Chia (2004), PBL begins with an ill-structured problem. Students must use cooperative groups and teacher mentoring on the problem to construct the learning process. Furthermore, PBL uses the introduction of a problem that motivates learning while the solution to the problem requires students to develop ideas and skills (Brooks, 2004; Frank & Barzilai, 2004). Cerezo (2004) found PBL improved students' self-image. In the learning process, students are engaged through group participation and problem solving when PBL strategies are incorporated into the science classroom. PBL allows educators to teach for meaning.

While PBL illustrates many positive learning outcomes, students also have problems with this method (Chin & Chia, 2004). In research conducted by Chin and Chia, students listed group dynamics as one such problem. Group members were unwilling to participate in the problem-solving process. For example, group members disagreed on problem solving steps, the amount of work assigned to each member, and the direction of their research (Chin & Chia, 2004). Chin and Chia also discussed ownership of the topic as a reason for a lack of concentration and off-task behaviors. With this in mind, educators must address these problems in order to affectively implement this learning strategy. While the study of Chin and Chia focused on group dynamics and problem solving, it does not describe experiences from an educators' point of view. As with cooperative learning and inquiry-based learning, the research on PBL focused on students' experiences and involvement with the strategy and does not address the experiences of science teachers who use constructivist strategies regarding the selection and development of assessment methods.

In a mix method study conducted by Sungur et al. (2006), the focus involved the effectiveness of PBL on performance skills and academic achievement. In the Sungur et al. research, the study's population included 61 tenth grade biology students with an average age of 16 from two biology classes instructed by the same teacher. Of the 61 students, 39 were male and 22 female all of which were from middle to upper class backgrounds. The Sungur et al. study's control group consisted of 31 students instructed with traditional methods while the experimental group consisted of 30 students instructed with PBL. The experimental group was divided into five groups of six students per group and each member was given a specific role in order to solve the problem. Each group was instructed on the structure and function of the human excretory system during four sessions lasting 40 minutes over a four week time frame. A researcher developed pretest/posttest was employed to collect data which included 25 multiple choice questions and one essay question. To collect data on the students opinions of PBL, a two part researcher developed feedback form which included 14 Likert style questions and seven open ended items was used.

According to the results of the Sungur et al. (2006) study, the experimental group showed higher achievement when integrating and organizing knowledge as well as higher achievement on applying information in order to solve a problem. The experimental group showed better communication skills due to the cooperative setting of the problem based activities. With this data, Sungur et al. concluded that student centered classrooms show higher achievement than traditional, teacher centered classrooms. While the Sungur et al. study focused on PBL from the students' perspective, it does not research the experiences of the teachers as they select and develop assessment methods for this learning method. This qualitative study researched the assessment process experiences of science teachers implementing inquiry learning.

Sung Hee and Ertmer (2007) conducted a quasi experimental pre/post survey research study to determine the impact of PBL and preservice teachers. The population of participants included three sections of a 1 hour course on educational technology at a midwestern university from which two sections served as the experimental group and the third section as the control group. During the Sung Hee and Ertmer study, the course met once a week for 2 hours over an 8 week period. The experimental sections were assigned a problem in which they work individually and within a group to solve while the control group was instructed with traditional methods. The Sung Hee and Ertmer study collected data from a 54 question Likert style survey on PBL and use of technology. Pre and post lesson plans were collected and analyzed for teaching practices.

The results of the Sung Hee and Ertmer (2007) study showed no significant difference between the groups regarding their beliefs on the use of technology. A significant difference was recorded for the use of teaching practices in which the teachers who used PBL changed their instructional practices to create a student centered learning environment over a teacher centered environment. The Sung Hee and Ertmer study provided teachers with ideas for implementing PBL. While the Sung Hee and Ertmer addressed PBL from a teacher's perspective, it does not consider the assessment process and how teachers experienced this process. This qualitative study considered the assessment experience of science teachers.

With research conducted by Haney, Jing, Keil, and Zoffel (2007), researchers focused on teachers' beliefs for effective environmental health instruction. Using 18 teachers from grades six through eight, the researchers collected data from four Likert style questionnaires given pre and post professional development over a two year period. The results found a significant improvement in teacher self efficacy, constructivist teaching practices, and use of constructivist teaching strategies over traditional strategies.

With these improvements in mind, teachers effectively used PBL as well as other inquiry strategies in their classrooms. The teachers did not feel that their use of any particular teaching strategies could conquer student issues such as motivation or environmental factors such as resources, planning, and support. Whereas the Haney et al. study focused on educators from grades six through eight, it only considered developing, implementing, and revising PBL without any mention of the teachers' experiences during the assessment process of PBL. This study focused on the assessment process experiences of science teachers.

In the qualitative case study conducted by Cerezo (2004), the researcher examined PBL and middle school science and math students' perceptions of the effectiveness of PBL. The Cerezo study was conducted in an urban school system with a minority student population ratio. The participants were selected by the science and math teachers who were trained in PBL instructional strategies and had two to five years of experience using PBL. As requested by the researcher, each teacher chose three at risk female students from the three middle schools chosen for the study.

During the Cerezo (2004) study, the participants worked in groups and were given scenarios in which they created a table of what they knew and what they needed to know, designed and conducted research for the scenario, and presented the group's findings. Each scenario was graded using a teacher constructed rubric. The researcher interviewed 14 participants and from the analysis of these interviews concluded (a) that the participants believed this learning strategy was beneficial to their understanding of science or math, (b) that working in groups taught them to respect others and their views, and (c) that they developed self efficacy for research, concentration, deadlines, and participation in discussions. In addition, the Cerezo study showed that group dynamics played an essential role in PBL. While the Cerezo study showed the experiences of female science and math students from an urban educational setting, it did not address the experiences of the educators as they determine how to assess their students' while using PBL. This phenomenological research study described the experiences of science educators as they select and develop their assessment methods of inquiry method.

Problem-based learning is a constructivist learning strategy in which students are given a problem and must work in a group setting to solve the problem (Brooks, 2004; Chin & Chia, 2004; Frank & Barzilai, 2004). Generally, most research showed the PBL increases student achievement and creates positive attitudes for learning among students (Haney et al., 2007). In addition, research conducted by Sung Hee and Ertmer (2007) and Sungur et al. (2006) showed teachers increased their use of PBL when they were provided professional development opportunities in PBL. PBL research addressed this constructivist learning method and its affect on student achievement or educators' use of this method. Research does not address the experiences of educators as they assess PBL. This phenomenological study illustrated the assessment selection and development experiences of AMSTI science teachers who implement inquiry learning and other constructivist strategies in their classrooms.

Assessment of Constructivist's Methodologies

The NRC (1996) stated that "assessments provide an operational definition of standards, in that they define in measurable terms what teachers should teach and students should learn" (p. 5-6). With accountability and high-stakes tests in the minds of all science educators, typical tests focus on the measurement and documentation of student learning (Keely, Eberie, & Farrin, 2005). In order to advance learning, evidence is gathered and applied to investigate students' knowledge and skills (Harlen, 2000; Yan Yip, 2004). Harlen suggested a threefold meaning of assessment which involves collecting data with a systematic plan, interpreting data to make judgments, and communicating these judgments. Harlen provided three purposes of assessments. Formative assessment is discussed as "assessment for learning" (Harlen, 2000, p. 110). This type of assessment involved a teacher's need to understand students' prior knowledge and skills (Crumrine & Demers, 2007). According to Gioka (2007), the feedback teachers provide students from assessments plays a significant function in learning. Wiliam, Lee, Harrison, and Black (2004) and Ruiz-Primo and Furtak (2004) found student achievement increased when educators implement formative assessments into their daily tasks. The improvement of formative assessments raised standards (Black, Harrison, Lee, Marshall, & Wiliam, 2004; Clymer & Wiliam, 2007), Summative assessment is discussed as "assessment of learning" (Harlen, 2000, p. 110). This type of assessment involved a summary of each student's achievement at a given time. School evaluation is discussed as "assessment of learning of groups of children" (Harlen, 2000, p. 110). This type of assessment involved the performance of groups of students or schools. Assessments can be evaluated as "for learning, of learning, or of learning groups" (Harlen, 2000, p. 110).

In a study conducted by Lorsback et al. (2004), assessments are discussed in terms of miscommunication. Their study found that some assessments invited miscommunication of middle school students' understanding of scientific concepts. The assessments that attracted the greatest miscommunication include word pairs and trios, experimenting in a test setting, observations and inferences, and journals. With the word pairs and trios, students were asked to relate two or three terms in writing. The study found that "a large percentage of students were unable to communicate their ideas clearly to the teacher in one sentence" (Lorsback et al., 2004, p. 254). Experiments in a test setting are poor communicators of students' understanding of scientific concepts (Lorsback et al., 2004). In this type of assessment, students were given equipment to assist them in answering questions about a scientific concept. Lorsback et al. noted observations and inferences were found to be poor communicators. In this assessment, students were asked to match observations with inferences. Journals were listed as poor communicators of students' understanding of scientific concepts. With journal assessments, students were asked to outline the class periods' activities and reflect on what was learned during the period.

According to the findings of the study by Lorsback et al. (2004), five assessment methods demonstrated moderate levels of miscommunication. Teacher demonstrations in which students watch a teacher demonstration and were then asked to explain the scientific concepts behind the demonstration attracted moderate miscommunication of students' understanding. The researchers listed open-response questions as problematic for communication of students' understanding. With this type of assessment, teachers expected lengthy, detailed responses while students provided short responses with little detail. The study listed picture questions where students are given sketches of concepts in which they must explain the scientific concept as a problematic assessment method. Written assessments that required students to write a paragraph using two to six terms provided by the teacher usually inspired students to give vague writings. The study found that the greater the number of required terms to be included in the paragraph, the greater the amount of miscommunication for students and teachers. Class presentations and demonstrations in which students' created a presentation or demonstration to show their understanding of a concept showed moderate miscommunication. Individual experiments showed moderate miscommunication. In this assessment, students stated a hypothesis, tested the hypothesis by designing an experiment and collecting data, and prepared conclusions from the gathered data (Lorsback et al., 2004).

The assessments from the study of Lorsback et al. (2004) with the least amount of miscommunication of students' knowledge included concept mapping and oral quizzes. With concept mapping, students' were given a list of terms in which they create a map showing the relationship of the terms. For formative assessments, students were instructed to generate their own list of terms to use in the map and show all links between the terms. The other assessment method that showed the least miscommunication of understanding was oral quizzes in which teachers interviewed the students to ascertain students' knowledge of scientific concepts.

The conclusions of the Lorsback et al. study stated teachers need to use a variety of assessment measure in order to minimize miscommunications of students' understanding of science concepts (Lorsback et al., 2004). The students' became personally involved in their science education because they were given more latitude to communicate their understanding. While Lorsback et al. (2004) discussed in detail the assessment measures used by inquiry-based educators and their ability to communicate students' knowledge of science, they did not address the teachers' experiences with the assessment decision processes.

In an interpretive research study conducted by Cowie (2005), students' assessment experiences are described. This study included 10 teachers who instructed year 7 to year 10 science students in New Zealand. During Phase 1 of the study, each science teacher chose three students to participate in the study. These students and their teachers were interviewed regarding their opinions of formative assessments in the classroom. During Phase 2 of the study, 10 classes were observed for a three to five week time frame while the science teachers instructed a unit with 10 to 17 lessons.

Following the observations of Cowie's (2005) study, 75 students were interviewed to discover their experience with assessment during the unit. According to the themes that emerged from the data, the students perceived their assessments as helping shape their identity as a learner of science. From the interview data collected in Phase 1, the study found (a) the benefits of one-on-one interactions between the students and the teacher, (b) the need for public displays of knowledge and active participation which were subject to teacher evaluations, (c) the negative evaluations on the part of the teacher for non-participation, (d) the benefits of participating in a cooperative group, and (e) the benefits of being a part of a peer culture rather than an individual learner.

From Cowie's (2005) Phase 2 interview data, three themes were spotlighted from the students' perceptions. These three themes resulted from the teachers finding out about the students' understanding and helping them with these understandings as they moved through the unit. The students' perceived these three themes as (a) types of assessments conducted by the teachers which included communicating directly with them, (b) observing their interactions, and reading their assignments and (c) adding comments to the assignments. The question remained, how did the educators in this study experience assessment decisions? While science educators benefited by using data from student experiences with assessment, they could also incorporate the experiences of science educators' as they select and develop their classroom assessment methods when implementing inquiry-based learning instructional methods to create best teaching practices. This phenomenological study focused on the assessment selection and development processes of AMSTI science teachers as they implement inquiry learning and other constructivist strategies.

In a quantitative study conducted by Vogler (2006), science teachers were surveyed on their instructional practices and the amount of class time spent reviewing for the high school graduation examination, Gateway Examination. The research question addressed by Vogler was, "In what manner does a high school graduation examination influence instructional practices?" (p. 37). Using a stratified random sample, the study's population was composed of high school biology teachers in the state of Tennessee based on geographic regions within the state and student success. For data collection, the state was divided into three regions, East, Middle, and West Tennessee. The school systems within the regions were ranked based on the success of their students on the 2002-2003 Gateway Examinations. From the 53 school systems in the population, data was collected using a 48 item survey consisting of three parts from 141 Biology I teachers. The first part of the survey focused on the instructional practices of the Biology I teachers while the second part provided the demographics of the participants and the third part offered a comments section allowing the participants to present additional information on their graduation examination preparation practices.

Using the results from the survey data, Vogler (2006) discovered the science teachers' instructional practices were predominantly teacher centered which included multiple choice questions, textbooks, supplementary materials, text-book based assignments, and lectures. The data showed the only student centered instructional practices employed by the science teachers involved laboratory equipment and charts/webs/outlines. The results showed no significant difference between the data from the three regions, between male and female teachers, and between years of teaching experience. The results showed the science teachers used teacher centered instructional methods regardless of the amount of class time they spent reviewing for the Gateway Examinations and believed teacher centered instructional methods were the best way for students to learn. While the Vogler quantitative study focused on the influence of high school graduation examinations and instructional practices, no data was collected on the experiences of the study's population with assessment selection and development. With this lack of data in mind, this study allowed science teachers to examine best practices for instruction and assessment by making them aware of the lived experiences of other science teachers.

Enger and Yager (2001) described assessment as the collection of information to examine student performance. Enger and Yager provided three broad categories of assessments. First, traditional assessments illustrated student performance through the use of question sets such as multiple-choice, true-false, fill-in-the-blank, and short-answer. Next, commercial standardized examinations demonstrated student performance by employing a test in which the administration, scoring, and question format are fixed in order to reduce scoring errors from the use of many examiners. Third, performance assessments or alternative assessments exhibited student performance measures with the use of work assignments such as portfolio collections and long-term projects. Educators grouped their assessment measures into these broad categories (Enger & Yager, 2001).

Enger and Yager's (2001) three categories of assessments each have distinct advantages and disadvantages. According to Wiggins (1992), traditional tests do not assess students' "know-how knowledge" (p. 27). Enger and Yager (2001) stated traditional, multiple choice assessments "fail to assess higher-order skills" (p.16) and encourage "teaching to the test" (p.16). This type of test was a more cost efficient form of large-scale testing which is seen with AYP requirements (Enger & Yager, 2001; Patz, 2006). On the other hand, Burry-Stock and Casebeer (2003) stated that "standards and test may not be the answer for achieving a high level of science literacy but they do provide a type of momentum for reform" (p. 11). Burry-Stock and Casebeer also found the United States is concerned about science education such that states are requiring testing of science students in many states. They stated while the nation is concerned about science education, standardized testing may not reflect best teaching and knowledge practices. With performance assessments, students must use more than cues and predetermined information to create an end product (Wiggins, 1992). For example, a performance assessment of students' knowledge of the trends of the periodic table would include a student designed periodic table which demonstrates all periodic trends. In addition, Ruiz-Primo et al. (2004) included the use of journaling in students' science notebooks as an assessment of students' performance.

Enger and Yager (2001) provided advantages of performance assessments as promoting critical thinking, demonstrating students' abilities, providing application opportunities, and encouraging creativity. The disadvantages included time requirements, subjectivity, group management, and difficulty of design. According to Carlson, Humphrey, and Reinhardt (2003), assessment of students' knowledge should include daily or continuous assessment and performance assessment. The investment of time on the part of the educator for designing and implementing a performance assessment was the greatest disadvantage. A portion of this time allocation was used for developing rubrics in order to score performance projects. According to Kan (2007), a rubric is a guideline describing the features of each level of performance for a given task. Kan described the use of rubrics as a feedback method in which students are given a meaningful description of their performance such that improvement can be attained in future projects. With the use of a portfolio assessment, many of the performance assessment disadvantages are overcome with the student advantages greatly outweighing any disadvantages (Corcoran et al., 2004; Enger & Yager, 2001). Educators can balance the disadvantages of alternative assessments with their advantages (Corcoran, Dershimer, & Tichenor, 2004; Enger & Yager, 2001). In creating a balance, how do science educators experience the selection and development of assessment processes while using inquiry methods?

Methodology Review

The literature reviewed by the researcher included many studies in which different research methods were used to collect data. For example, the purpose of the quasi-experimental design, nonequivalent control-group study by Akkus et al. (2003) was to compare the effectiveness of constructivist instruction with traditional instruction. The ANCOVA analysis showed the students instructed through constructivism achieved a mean score twice that of the traditionally instructed students. The achievement data collected was from a traditional pretest/posttest assessment method. The Akkus et al. study discussed alternative assessments based on teacher observations and student generated reports. Bilgin and Geban (2006) conducted pretest/posttest research to determine the effectiveness of cooperative learning in 10^{th} grade chemistry students in Turkey. In the Bilgin and Geban study, the participants were randomly placed into two groups in which the experimental group was instructed using cooperative strategies and the control group was instructed using traditional strategies. The MANCOVA analysis of the results of Bilgin and Geban study’s showed that the experimental group demonstrated statistically significant increases in achievement over the control group. Geok et al. (2007) conducted a mix method study to investigate the effectiveness of cooperative learning in eighth grade geography students from Singapore. During the Geok et al. study, half the study's population was instructed using cooperative learning methods while the remaining half was taught using traditional methods. The ANCOVA analysis of the pretest/posttest data of the Geok et al. study found the students instructed cooperatively scored significantly higher on achievement than the students in the control group while the qualitative data analysis showed the students instructed cooperatively experienced a more positively learning experience than the students instructed traditionally. With the results of these studies, research showed that students illustrate greater achievement and a more positive learning attitude when instructed through cooperative learning methods. Little research was available on the assessment process experiences of teachers as they evaluate this learning method.

Chin and Chia (2004) conducted a mix method study to determine the potential of PBL for providing students with real-world inquiry. The results of this mixed method showed PBL supplied authentic inquiry when compared to traditional project work. Sungur et al. (2006) performed a mix method research study on the effectiveness of PBL for 10th grade biology students in Turkey. During the Sunger et al. study, the participants were randomly divided into two classes of which one class was instructed with traditional strategies and the other class was divided into groups of six students and instructed using PBL strategies. Sungur et al. collected data using a pretest/posttest for achievement data and a questionnaire to determine the experiences of the students with PBL. The pretest/posttest results of the MANCOVA analysis showed the students instructed with PBL had greater achievement than those instructed traditionally while the questionnaire results showed that students instructed with PBL considered their learning as more positive than those instructed traditionally. The quasi experimental pretest/posttest survey research study conducted by Sung Hee and Ertmer (2007) focused on the impact of PBL on preservice technology teachers enrolled in three sections of an educational technology class. During the Sung Hee and Ertmer study, teachers turned in lesson plans of their PBL use before and after the course as well as being surveyed before and after on PBL. The MANCOVA analysis results of the Sung Hee and Ertmer study showed no significant differences in the teachers' belief in technology use before and after the course. The results showed a significant increase in the use of PBL after the course. With this in mind, research showed that the use of PBL increases student achievement and generates a more positive attitude for learning but does not provide information of the assessment experiences of teachers as they implement this learning method.

The results from the quasi-experimental research conducted by Dalton and Morocco (1997) determined the benefits of inquiry-based science instruction for all students regardless of ability level did not address alternative assessments. They discovered students of all ability levels scored higher on traditional posttest when they were given the opportunity to participate in collaborative and individualized assignments. The qualitative study conducted by Hofstein et al. (2004) measured inquiry-based learning of grade 11 and grade 12 chemistry students in Israel. The results showed students who were experienced in inquiry methodologies were aware of the positive impact of this learning strategy. In the qualitative research of Ikpeze and Boyd (2007), the study focused on the effectiveness of Web-based inquiry on student engagement and motivation. The Ikpeze and Boyd study interviewed 6 fifth grade students from an elementary school in the northwestern United States. The results of the interview analysis showed the students were more engaged in their learning and more motivated to learning. The mix method research conducted by Bodzin et al. (2007) studied the effectiveness of Web-based and hands on inquiry learning. The Bodzin et al. study's participants included ninth grade biology students in which 12 of the students had Individual Educational Programs (IEP). Data was collected using a pretest/posttest format and interviews. The results of the Bodzin et al. study found all students demonstrated an increase in content knowledge and a more positive learning experience was recorded by the students who were instructed with inquiry learning. The results of the Bodzin et al. study stated that neither group, those with an IEP and those without an IEP were proficient in performance skills. These students discussed the constructive force provided by the authentic inquiry learning environment. Research showed the positive impact of inquiry learning but does not address the assessment experiences of science teachers as they evaluate inquiry learning.

Using a qualitative study, Cowie (2005) interviewed 31 science students and observed and then interviewed 75 science students to determine the perceptions of these students regarding their assessment of science concepts. Using the interview and observational data, Cowie identified several themes of which students believed their teachers discovered and assisted their learning by assessing them through communication, observations, and commentary of their assignments. In the quantitative research conducted by Vogler (2006), a population of high school biology teachers in

Tennessee was studied to determine how graduation examinations influenced teaching practices. The results of the Vogler study showed the majority of the high school biology teachers in the 53 school systems represented by the study's population used teacher centered instructional practices. The results found this type of learning environment was used regardless of the teachers' gender, location within the state, or teaching experience. These research studies generated information of students' experiences with assessment and how teachers assess their students. Research has not focused on the lived experiences of science teachers' selection and development of assessment processes in an inquiry learning environment. These lived experiences or the day to day decisions science teachers make regarding the assessment of inquiry learning are a difficult part of implementing this learning method (Ellis, 2001). Science teachers who implement inquiry-based learning must alter their traditional mindset of science instruction such that students are allowed to use prior knowledge and scientific theories to create scientific understanding. In addition to this challenge, these teachers must also change their assessment methods to correspond to inquiry-based learning. With the challenges of assessing inquiry learning and the complexities of inquiry learning, a phenomenological research method was the best tool for collecting data for this study. This study used a phenomenological qualitative methodology to collect data on the experiences of science educators from grades five through eight as they select and develop assessments this learning method.

Summary

With the review of literature on constructivists' learning methodologies and correlating assessment methods, the researcher showed the need for an in-depth investigation of the experiences of science teachers when selecting and developing their assessment methods for inquiry-based learning. Inquiry-based learning methods included several alternative approaches to science instruction. In cooperative, inquiry-based, or problem-based learning, students discussed topics, ask questions, and comment with little direction from the teacher. This gives the traditional teacher a guidance role in the classroom which means the role of the teacher is to set the task, provide starting criteria, manage student interactions, and provide direction when the students within a group deviate from their stated goal (van Zee, 2000). In this environment, the students communicate with one another and the educator only interjects when students need refocusing. This learning setting is based on trust so students feel comfortable voicing their beliefs in an honest and concise manner. Educators must develop trust in the learning atmosphere to accomplish this goal (Gallagher-Bolos and Smithenry, 2004 & McKittrick, Mulhall, and Gunstone, 1999). There is a lack of research concerning the experiences of science educators as they assess inquiry learning.

While many educators have developed an inquiry environment in their science classrooms, the assessment measures used by these educators has not been fully investigated (Colburn, 2004). Students in the United States must learn the skills necessary to compete in a global economy (Clymer & Wiliam, 2007). While inquiry-based learning provide students with the thinking and reasoning skills needed for such an economy, educators need to develop an understanding of the way in which they select and develop their assessment measures in an inquiry-based learning environment while considering the standards placed by National Science Education Standards and the guidelines of the No Child Left Behind Act of 2001 and its requirements for AYP. This phenomenological research study illustrated the experiences of science educators as they select and develop assessments for inquiry-based learning. Furthermore, this phenomenological research aligned with Walden's Mission Statement in which a positive social change could occur in science education by establishing a broader knowledge base of AMSTI science teachers and their assessment experiences. While this section provided a review of literature relevant to this study, Section 3 discusses the methodology to be used. Section 4 supplies the presentation and analysis of data whereas section 5 presents summaries and conclusions in addition to recommendations and commentaries.

SECTION 3: METHODOLOGY

Introduction

Hohenshell and Hand (2006) supported the use of inquiry learning and multiple forms of assessing inquiry learning in U.S. science classrooms. With the application of NCLB legislation, many science teachers find instructional practices and their assessment challenging due to the responsibilities placed on teachers by AYP (Cavanagh, 2005; Gearhart et al, 2006; Mertler, 2005). Currently in the state of Alabama, many kindergarten through eighth grade science students are instructed using inquiry learning through the AMSTI which promotes the use of inquiry learning for math and science students in grades kindergarten through twelfth by providing professional development for teachers and inquiry resources for students (AMSTI, 2004). However, a problem existed because there is little research available regarding AMSTI or the assessment experiences of AMSTI science teachers. The phenomenon described in this study was the decision making process of science teachers as they select and develop assessments for inquiry learning. With the complexities of integrating inquiry-based learning into the science classroom and the challenges of assessing this learning method, greater knowledge and insights are needed to describe and understand the decision making processes that AMSTI science teachers employ with inquiry-based learning. With this in mind, the researcher used a phenomenological approach to this study to provide the greatest detail of the phenomenon. A descriptive portrait of how fifth through eighth grade AMSTI science teachers who implement inquiry instructional methods described their experiences in assessment selection and assessment development was needed to fill the gap in current research.

According to Creswell (2003), qualitative research methods should be employed when the researcher is unsure of the variables to study, the issue is new, or the topic has not been explored for a certain population. Quantitative research methods should be used when the researcher needs to predict outcomes or compare interventions. Creswell (1998) distinguished qualitative research with questions involving how or what to describe the problem. On the other hand, quantitative research uses researcher questions on why there is a problem. With the gap in current literature regarding AMSTI science teachers and their assessment experiences and Creswell's suggestions for choosing a research method, the researcher employed a qualitative research method. In qualitative research, Creswell (1998) described five different traditions: (a) biography which focuses on exploring an individual's life, (b) phenomenology which explores the experiences of a phenomenon, (c) grounded theory which develops a theory from the data collected, (d) ethnography which describes a cultural group, and (e) case study which develops a detail analysis of a single or multiple cases. Because the overarching research question of this study focused on the experiences of AMSTI science teachers regarding the phenomenon of assessment processes, a phenomenological qualitative method was chosen for this study.

Using phenomenological qualitative methodology, the purpose of this qualitative study was to describe the lived experiences of northwest Alabama AMSTI science educators' as they select and develop classroom assessments when implementing inquiry-based learning instructional methods. The phenomenon studied was the assessment selection and development experiences of AMSTI science teachers. The problem this study addressed was to assist in filling the gap in current research on the experiences of current fifth through eighth grade AMSTI science teachers as they select and develop assessment methods. The significance of this study was to provide science teachers with research-based assessment knowledge to develop best teaching and assessment practices for inquiry learning. The topic is of importance to these educators because of the implementation of NCLB and its guidelines for assessment to meet AYP. This phenomenological study shared the voices and experiences of present AMSTI science teachers for fifth through eighth grade such that other science teachers can examine and compare their assessment practices in order to create exceptional learning environments.

According to Creswell (2003), a phenomenological study is a description of the lived experiences of a small number of individuals regarding a phenomenon. For this study, the phenomenon studied was the experiences of AMSTI science teachers as they select and develop their assessment measures in an inquiry-based learning environment. This study included a small number of participants who teach AMSTI science in grades 5 through grade 8 throughout northwest Alabama. With the implementation of NCLB, educational leaders are focusing on assessment measures (National Education Association, n.d.). This study provided data on the assessment selection and development experiences of northwest Alabama AMSTI science teachers in order to fill a void in current literature and provide current and new AMSTI science teachers with data to develop best practices for assessing inquiry-based science methods.

During this section, a discussion of the rationale for qualitative research design and approach is provided by discussing the rationale of a phenomenological qualitative method including research literature and a comparison of other qualitative methods. The role of the researcher during participant selection and the data collection process is provided. The context for the study is given including the procedure for access to the participants and the establishment of a working relationship between the researcher and the participants. A discussion of ethical considerations followed to clarify the ethical protection of the participants. The researcher communicated the method for participant selection. The researcher described data collection for the study including how and when the data will be collected and recorded. A description of data analysis is supplied which will contain information on software programs used, coding procedures, the themes of data, and the measures taken to address the validity and reliability of the study.

Research Design and Approach

Phenomenology

The research design employed for this study was a phenomenology design. According to van Manen (2002), this design was cultivated by Hüsserl during the 20th century. According to Moustakas (1994), Hüsserl believed an experience or phenomenon could be investigated using the knowledge of several individuals who had experienced the phenomenon. These experiences provide a researcher with the overall meaning or essence of the phenomenon. Hatch (2002) described a phenomenological study as a search for “the essences of human experience” (p. 30). According to Groenewald (2004), the intent of the researcher was to accurately describe a phenomenon using the participants' descriptions from interviews and discussions which serve as the study's data. For this study, the phenomenon was the lived experiences regarding assessment selection and development of AMSTI science teachers for fifth through eighth grades located in northwest Alabama. With this in mind, the lived experiences described by this study are the day to day decision making processes of science teachers that allow them to gain knowledge and skill for assessing inquiry-based learning. This phenomenon is complex in that it encompasses the problematic issues of implementing inquiry learning and the challenges of assessing this type of learning. With the addition of NCLB and AYP, the challenges of assessing inquiry-based learning while providing each student with an authentic inquiry experience become even greater. A phenomenological study was the most advantageous of the qualitative methodologies for studying this phenomenon.

Qualitative research incorporates five traditions which include biography, phenomenology, grounded theory, ethnography, and case study (Creswell, 1998). Creswell provided researchers with clues to assist in the determination of the best design for their use. When a researcher plans to study one individual who is willing to share information, a biography is the best possible design. If the researcher intends to develop or create a theory through interview data, a grounded theory design should be employed. An ethnography design is chosen when the researcher plans to study a groups' behaviors through interviews and observations. A researcher would choose a case study design if a case restricted by time or place is studied gathering data through multiple sources to create a detail description of the case. Creswell (1998) suggested the use of a phenomenology design when the researcher seeks to find the essence of meaning for a given phenomenon.

According to Moustakas (1994), phenomenology is used to provide descriptions of experiences and more specifically empirical phenomenology investigates the phenomenon to gain descriptions of the essences of the experience. Hatch (2002) described phenomenology as a search for the essence of a human experience. van Manen (2002) defined essence as the meaning of a collection of experiences that makes it what it is. van Manen also provided six categories of phenomenology. These included (a) transcendental, (b) existential, (c) hermeneutical, (d) linguistical, (e) ethical, and (f) phenomenology of practice. Each of these categories is historically based on the life works of different human science scholars. Because this study applied phenomenology to the practice of education, an empirical phenomenology of practice served as the basis for the study.

Creswell (1998) recommended in-depth interactions through interviews that follow a set of procedures leading the researcher to the meaning of the lived experience being studied. According to Moustakas (1994), most empirical phenomenological research is grounded from the Duquesne Studies in Phenomenological Psychology. Moustakas described the researchers’ objectives in a Duquesne studies as (a) focusing on the circumstances of the experience, (b) seeking descriptions of the experience, (c) building components of the experience, and (d) placing the participants or co-researchers outside the research process after data collection has occurred.

During this phenomenological study, these in-depth interactions with the study's participants made the researcher very sensitive to the feelings of the participants which in turn allowed the researcher to determine the circumstances of the participants' experiences when making decisions about assessing inquiry-based learning. The researcher described the participants' experiences and built a structure of experiences for their assessment selection and development process. After the interview sequence of the study, the researcher only included the participants during the member checking phase of the study in order to improve the validity of the study. The participants were not involved in the analysis phase as is the case in heuristics phenomenology. The researcher chose a phenomenological study as the best design for this study because of the (a) in-depth interactions between the researcher and the study's participants, (b) the application of phenomenology to education, and (c) the noninclusion of the participants in the data analysis phase of the study (Moustakas, 1994).

Validity and Reliability

The researcher employed several methods to address the validity and reliability of this phenomenological study. According to the nature of qualitative research, the researcher is the principal mechanism of data collection and analysis on the reality of the participants' experiences (Merriam, 2002). With this in mind, Merriam (2002) stated "that when reality is viewed in this manner-that it is always interpreted-internal validity is considered a strength of qualitative research" (p. 25). Merriam (2002) listed several means for addressing internal validity in qualitative research. For example, she described the common forms of triangulation as (a) using several researchers, (b) using several theories, (c) collecting several sources of data, and (d) using several methods to verify a study's findings. While Merriam stated that the use of various theories is not commonly employed in qualitative research, she provided the other three forms of triangulation as frequently practiced in qualitative research.

For this study, the researcher established themes from individual interviews and from focus group discussions made up of four different grade levels. Merriam (2002) and Hatch (2002) listed member checks which include the participants reviewing the researcher's transcription of their interview data in order to verify accuracy. To strengthen the validity of a qualitative study, they suggested peer reviews which include a colleague's review of data and their comments on the emerging themes. This study included the researcher's position which explains the main objectives for selecting participants, collecting data, and analyzing data in order to intensify the validity of the study.

Reliability in qualitative studies is addressed through themes, peer reviews, investigator position, and an audit trail (Creswell, 2003; Merriam, 2002; Hatch, 2002). For this qualitative study, the researcher incorporated themes, peer reviews, and the researcher's position as methods to improve validity in addition to reliability. The researcher added an audit trail to improve the reliability of this study. Merriam described an audit trail as a means of providing the reader with detailed accounts of data collection, development of codes and themes, and the decision making processes experienced by the researcher throughout the study. A specific description as it applies to this study is given in the data analysis portion of this section. The researcher incorporated several mechanisms to improve both the validity and the reliability of this phenomenological study.

Role of the Researcher

According to Creswell (2003), qualitative research is an interpretative process in which the researcher is intensely involved with the participants. A qualitative researcher has a “range of strategic, ethical, and personal issues” to address during data collection (Creswell, 2003, p. 184). For example, a researcher must identify bias or prejudices, explain the accessibility of the participants, and recognize any ethical issues that may arise during the study. Hatch (2002) stated researchers need to bracket biases and prejudices by starting a phenomenological study with an exploration of their personal experiences regarding the phenomenon. Moustakas (1994) stated researchers who have a personal experience with the phenomenon being investigated must set those experiences aside by bracketing. He described bracketing as the suspension of the researchers’ beliefs by giving a detailed account of these beliefs in advance. Hatch described bracketing as a “specific strategy for separating impressions, feelings, and early interpretations from descriptions during qualitative data collection” (p. 86). The role of the researcher for this study addressed the procedures associated with bracketing and data collection.

During the researcher’s 17 years of science teaching experience, she was assigned many teaching responsibilities. For example, the first seven years of her teaching career was in a city school system and involved the instruction of biology, physical science, physics, and chemistry. After seven years, the researcher changed teaching assignments and school systems. At this new position, the researcher taught eighth grade science, health, and the overflow of seventh grade science. During her third year at this assignment, AMSTI requested proposals from schools wishing to participate in the initiative. The researcher through information obtained during state and national science education conferences was familiar with the AMSTI program. For the following two years, the researcher participated in AMSTI for eighth grade science which included attending a 2 week summer institute for 2 years. At this point, the researcher's teaching assignment again changed at which point she started teaching science courses for grades 9 through 12. The inquiry portion of AMSTI is only implemented through the eighth grade. The researcher no longer participated in the AMSTI program but does participate in Alabama Science In Motion which is a science laboratory equipment leading program that is included under the AMSTI umbrella for funding purposes.

With the 2 years of AMSTI experience, the researcher developed best practices for inquiry-based learning strategies. The researcher's assessment experiences with inquiry learning occurred before NCLB. During the researcher's participation in AMSTI, the Alabama Science Course of Study and her school system's science curriculum continuums aligned with the National Science Education Standards and AMSTI objectives. Since the researcher's experience with assessment decisions did not involve NCLB and AYP requirements, her experiences with assessment decisions in an inquiry-based learning environment may not compare to current AMSTI science teachers for fifth through eighth grades. The researcher suspected that NCLB and AYP would influence the assessment method experiences of current AMSTI science teachers. By writing about these experiences in advance, the researcher was made aware of her beliefs on assessment method decisions. When the researcher began the interview phase of this phenomenological study, she was open to the experiences of these participants and had a greater sense of the methods needed to probe the participants for greater detail during the interview process.

Throughout the course of seventeen years of teaching science, the researcher has an established professional association with many of the study's participants. For example, some of the participants were familiar with the researcher from previous AMSTI summer institutes. Other participants were familiar with the researcher from system and regional in-service opportunities. The researcher lives in northwest Alabama and was familiar to some participants from community events. In order to avoid backyard research and supply greater confidence in the study's results, the researcher did not gather data from the high school where she teaches.

The researcher supplied the Institutional Review Board at Walden University with all necessary information regarding the study in order to review all possible risks to the participants and received the approval number 09-05-08-0304798. The researcher obtained a consent form from each participant in which the researcher discussed the measures taken to maintain the confidentiality of each participant (See Appendix A). Throughout the course of this study, the researcher informed all participants of the measures taken to minimized ethical issues. For example, all participants were reminded that they are participating in a research study from which they could withdraw at any time. The participants were given random false names to be used during the reporting of data. To accomplish this, the researcher obtained a list of the 20 most popular male and female names in the United States from an Internet search using the Google search engine. Then, the researcher placed these names in a bin. As each interview was transcribed, the researcher drew a false name from the bin and assigned the drawn name to that participant along with the participant's grade level. From this point forward, the researcher referred to the participants by their false name. All data was kept confidential in which the researcher maintains the only records in a locked safe for the duration of the study. Furthermore, all participants were adults and all interviews took place at a convenient location for the participants which may or may not have been at their school. With this in mind, the researcher did not obtain permission from gatekeepers as Creswell (2003) suggests with other participants.

Research Questions

According to Creswell (1998), researchers should reduce their phenomenological studies to one central question with several subquestions. This study examined the experiences of science educators when assessing inquiry-based learning using the following main question: How do fifth through eighth grade AMSTI science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes? Subquestions include:

1. What is the structural design of AMSTI science teachers lived experiences with assessment processes?

2. What are the essential components of the assessment methods for inquiry used by science educators participating in AMSTI that result in their assessment experiences?

3. What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?

4. What do AMSTI science teachers find most helpful when determining assessment methods?

Context for the Study

Purpose

The purpose of this phenomenological qualitative study was to describe the lived experiences of northwest Alabama AMSTI science educators' as they select and develop their classroom assessment processes when implementing inquiry-based learning instructional methods. Many studies have addressed the experiences of students with the assessment process and the use of a variety of assessment methods including those methods that match inquiry-based learning and those with similar formats to the high-stakes tests needed for AYP (Ellis, 2001; Gunzenhauser, 2003; Razien, 1989). Cowie (2005) described the experiences of science students as they are assessed by science educators. Also, the research study conclusions from Lorsback, Jinks, and Templeton (2004) focused on assessment types and the miscommunication resulting from each type. Little research has been conducted to investigate the lived experiences of science teachers as they select and develop their assessment methods. This phenomenological study focused on describing the lived experiences of northwest Alabama AMSTI science educators' as they select and develops their classroom assessment methods when implementing inquiry-based learning instructional methods.

Participants

A criterion sampling strategy was employed by the researcher. According to Creswell (1998), each participant of a phenomenological study must experience the phenomenon to be studied. With this in mind, the researcher established the criterion for the participants which included current use of inquiry-based learning strategies. The participants of this study consisted of science teachers from northwest Alabama. Furthermore, these teachers instructed fifth through eighth grade science students. To ensure that each participant instructed with inquiry learning and therefore experienced the phenomenon addressed in this study, each teacher participated in AMSTI, an inquiry-based instructional initiative endorsed and funded by the Alabama State Department of Education, previous to the 2008-2009 school year.

In order to gain access to the population, the researcher used the AMSTI school participants list located on the AMSTI webpage (AMSTI, 2004). From the schools located in northwest Alabama counties, 27 participated in AMSTI during the 2007-2008 school year. If each school has one science teacher for each grade, fifth through eighth, then the population of possible participants was 108 AMSTI science teachers. During September of the 2008-2009 school year, 40 emails were sent to AMSTI fifth through eighth grade science teachers and interview data was collected from eight northwest Alabama AMSTI science teachers teaching grades five through eight. Two AMSTI science teachers per grade level were interviewed by the researcher. The first 2 AMSTI science teachers per grade level who agreed to participate in the study were interviewed. The researcher also collected data from 2 focus group discussions. These groups were purposively chosen from the northwest Alabama schools and contained AMSTI science teachers from fifth through eighth grades. Using each school's email and geographic location, the researcher contacted participants via email (See Appendix B).

Researcher Participant Relationship

With the use of a qualitative phenomenology study, the researcher must ensure that each participant has experienced the phenomenon of the study (Creswell, 1998; Creswell, 2003; Hatch, 2002; Moustakas, 1994). In this study, the participants were science teachers who instruct fifth through eighth grade and participate in AMSTI. The participant teachers were located in several northwest Alabama counties and employed by rural and urban school systems. The participants were chosen from the 108 AMSTI science teachers located in the 27 AMSTI schools in northwest Alabama for grades five through eight as determined from the AMSTI website (AMSTI, 2004). The researcher emailed 40 possible participants from this list of AMSTI science teachers. Purposively, the researcher chose the first two AMSTI science teachers per grade level for fifth grade science through eighth grade science to participate in this study. The focus group discussions were conducted with four AMSTI science teachers from fifth through eighth grade. One focus group contained AMSTI science teachers from the same rural school while the other focus group contained AMSTI science teachers from three different urban schools. The researcher participated in AMSTI for two years previous to her current teaching position and therefore has a working relationship with many AMSTI science teachers. The researcher developed or reestablished collegial relationships to conduct eight individual interviews and two focus group discussions which were comprised of 4 science teachers from fifth through eighth grade depending on the availability of AMSTI science teachers.

Ethical Considerations

After selecting the study's participants, the researcher obtained the necessary consent forms from each participant (See Appendix A). Throughout the study, the researcher informed the participants of their involvement in a research study and the purpose of the study. This was accomplished with the initial contact via email (See Appendix B) and at the beginning of each interview. The researcher supplied the participants with the purpose of the study, research questions addressed by the study, and interview questions in the form of an Interview guide (See Appendix C). With this in mind, the researcher informed the participants that they could withdraw from the study at any time without consequence. During the data collection process, the researcher communicated to the participants that every effort would be made to protect their confidentiality. To accomplish this, the researcher randomly assigned false names for each participant. After each interview or discussion was transcribed, the researcher provided each participant with a copy of his or her interview transcript in order to check for accuracy. To further address this issue, the researcher informed all participants that data pertaining to the study would be maintained in a locked safe.

Selection of Participants

Using a criterion sampling method, participants for this study were selected based on three criteria. First, each participant must experience the phenomenon the study was describing. This phenomenon was the experiences of AMSTI science teachers as they select and develop their assessment methods while using inquiry-based learning. Second, each participant must have participated in AMSTI prior to the 2008-2009 school year to ensure that each participant had experienced assessing inquiry learning. A list of AMSTI schools is available on the AMSTI web site (AMSTI, 2004). From this list, the researcher contacted 40 AMSTI science teachers who use inquiry instruction in fifth through eighth grade. Third, the researcher purposefully selected participants from northwest Alabama. The researcher resides in northwest Alabama and has a vested interest in the science education of this area's students. Since the researcher is a science teacher in northwest Alabama, she has an established collegial relationship with many AMSTI science educators in the area.

Because this qualitative phenomenology study was an in-depth study, the researcher conducted eight individual interviews. According to Hatch (2002), a phenomenological study will use between four and 10 interviews. The researcher conducted two focus group discussions. Creswell (1998) suggested researchers use four to six participants for a focus group discussion. For this study, the researcher included four AMSTI science teachers in each group. The focus group discussions were conducted using a mixture of AMSTI science teachers from grades fifth through eighth. Each of these schools employed a number of science teachers for grades five through eight. The number of participants per grade in each focus group depended on the number of science teachers available for the discussion. AMSTI only requires 80% of the schools faculty to participate in AMSTI for the school to be an AMSTI school. With this in mind, the researcher realized not every science teacher at an AMSTI school would be AMSTI trained. One focus group was comprised of a mixture of 1 sixth, 2 seventh, and 1 eighth grade AMSTI teachers while the other focus group was comprised of 2 fifth, 1 sixth, and 1 eighth grade AMSTI science teachers. The researcher contacted science educators based on the above criteria in order to describe the lived experiences of northwest Alabama AMSTI science educators' as they select and develop their classroom assessment methods when implementing inquiry-based learning instructional methods.

Data Collection

Prior to data collection, the researcher explored her own experiences with assessing inquiry-based learning. According to Merriam (2002), this action is done for two specific reasons. First, this process made the researcher examine the dimensions of the phenomenon. Second, this process made the researcher aware of her assumptions, viewpoints, and prejudices. After the completion of these two actions, the researcher bracketed all prejudices and assumptions. Merriam described bracketing as the process that "allows the experience of the phenomenon to be explained in terms of its own intrinsic system of meaning" (p. 94). Groenewald (2004) described two types of bracketing including the bracketing conducted by interviewees in which they discussed the phenomenon without confusing jargon and bracketing in which researchers set aside their own personal preconceptions. For this research, both forms of bracketing were employed.

During the course of this phenomenological study, data was collected using two interview techniques. According to Rubin and Rubin (2005) when a researcher needs information that cannot be given quickly or easily and the researcher will need explanations or examples from the participants, the interviewer should conduct in-depth interviews.

First, individual interviews were conducted with 8 AMSTI science teachers from fifth through eighth grade during the fall of the 2008-2009 school year. This timeframe was chosen because it allowed the northwest Alabama AMSTI science teachers to experience the phenomenon for at least one school year before being interviewed by the researcher. All participants described their selection and development of assessment methods while implementing inquiry-based learning prior to the 2008-2009 school year in which they participated in AMSTI. Each interview was conducted in an unobtrusive, convenient location based on the needs of the interviewee.

Second, the researcher conducted two focus group discussions with science teachers from grades fifth through eighth during the fall of the 2008-2009 school year. Each focus group was composed of 4 AMSTI science teachers depending on the availability of the teachers. This qualitative phenomenology study collected interview data from eight individual AMSTI teachers and two focus groups each composed of four AMSTI science teachers.

Third, the researcher sent each participant a copy of the purpose of the study, the main research question and its subquestions, and a copy of the interview guide once the participants were selected and a date and location for each interview was established. This information included an Interview guide and was sent through e-mail prior to the interview (See Appendix C). A correlation between the interview questions and the study’s research questions are included in Appendix F.

Fourth, the researcher emailed each interviewee a reminder of the interview date, time, and location two days prior to the interview date (See Appendix D). The timeframe for interview data collection was during the fall of the 2008-2009 school year. This was chosen by the researcher to allow the participants to experience the phenomenon for at least one school year prior to the 2008-2009 school year. Each interview was conducted at the convenience of the interviewees. Each interview was recorded using a traditional audio recorder with a microphone and transcribed using a computer, related computer software, and audio headphones.

Each interview followed an interview protocol. First, the researcher set the stage for the interview session. To begin, the researcher established a comfortable interview environment and confirmed the working status of all equipment before the participant(s) arrival. The researcher made all necessary introductions to ensure that each participant is comfortable, relaxed, and at ease. At this time, any adjustments were made to establish each participant's comfort. The researcher discussed the ethical issues involved with the research study. Each participant was informed of their involvement in a research study from which they could withdraw at anytime without consequence. Following this, the researcher asked each participant to read and then sign an informed consent form for research being conducted through Walden University. The researcher provided each participant with a copy of the interview guide and reviewed the purpose of the study and the associated research questions.

Second, the researcher began the interview session using the interview guide as a road map to the discovery of the experiences of AMSTI science teachers as they select and develop their assessment methods while using inquiry learning (See Appendix C). According to Moustakas (1994), phenomenology studies employ interviews which use open-ended questions and a conversational tone. Moustakas (1994) and Creswell (2002) recommended the use of an interview guide to direct the interview process similar to a road map. Through conversations of the question's answers, the experiences of the participants were communicated and recorded. As the interview proceeded, the researcher asked follow-up questions to ensure the accuracy of the descriptions the participants were giving based on their answers to the interview questions. According to Creswell (2002), the use of follow-up questions is needed to assist the interviewer in drawing out the descriptions of the experiences from the participants. The shortest individual interview lasted 60 minutes while the longest individual interview lasted 90 minutes. In addition, the two focus group discussions lasted approximately 90 minutes. Both the individual interviews and the focus group discussions ended with a communication of thanks from the researcher to the participants for their time and candid comments during the study.

Third, the content of each interview was transcribed verbatim into a Word document using Microsoft Word software, a laptop computer, an audio player, and audio headphones. Such that the session was recent in the researcher's mind, the transcription of each interview session occurred within two days of each interview. This data was stored in an external storage medium using the researcher's laptop computer as well as being saved on the laptop's hard drive. The external storage medium was maintained in a locked safe at the researcher's home for the length of the study. At this point, the researcher began the data analysis phase of the study.

Data Analysis

According to Creswell (1998), qualitative data analysis weaves the meanings of words inductively in order to describe “a process that is expressive and persuasive” into language (p. 15). This study employed a modified Stevick-Colaizzi-Keen which according to Creswell is frequently used in phenomenology studies. To begin this process, the interviews and discussions were transcribed into a Word document using a laptop computer, Microsoft Word software, an audio player, and audio headphones. During transcription, each statement made by the researcher and the interviewees was distinctly labeled in order to distinguish each statement. The researcher assigned a false name to each participant after each interview was transcribed. This was accomplished by choosing a name from a bin which contained the top 20 names in the U.S. This process allowed the researcher to easily review the transcribed interviews during analysis and established the confidentiality of each participant.

Next, the researcher found statements regarding the phenomenon from the interview transcripts and horizontalized the data by listing significant statements equally and developing a list of significant statements without repetition in a Word document. According to Merriam (2002) and Moustakas (1994), horizontalization is the process in which data is set out and treated with equal weight. The researcher reviewed the interview transcripts to determine the participants’ experiences when selecting and developing their assessment methods when using inquiry-based learning strategies. Using a coding method, the researcher identified themes from the interview questions (Merriam, 2002). A method of highlighting was used within the Word document in which each research question was assigned a color. A separate Word document was maintained with a color coding key and a list of the criterion for each code (Appendix G). Within the Word documents, the researcher kept notes and memos throughout the analysis process by using the comment insertion feature of Microsoft Word to provide an audit trail (Appendix H). The answers for each question were highlighted with the corresponding color. The color coding of each statement allowed the researcher to easily identify the statements and eliminate repetitious statements. This color coding process allowed the researcher to easily identify common themes. The researcher sent a copy of the transcribed interviews or discussions via email to each participant in order to verify the accuracy of the transcribed interview and the researcher's interpretations.

Last, the researcher used a third Word document to group the significant statements into "meaning units" in order to develop a picture of the phenomenon (Creswell, 1998, p. 150). Using this Word document, the researcher contemplated and searched for meaning from the participants statements. The researcher used her experience along with all the possible meanings from the participants' statements to create a description of the phenomenon. The researcher developed an overall description of the meaning of the phenomenon, the experiences of AMSTI science teachers when assessing inquiry-based learning, based on her experience and the shared experiences of the participants.

During the analysis phase of a phenomenological study, the researcher converted the transcribed data of facts and units into meanings which is an imaginative process. According to Moustakas (1994), the themes of the participants' experiences will surface as the data is analyzed into descriptions which reveal the essence of the phenomenon. He used the concept of imaginative variation to describe the movement from facts and units toward the meaning or essences of an experience. According to Moustakas (1994), imaginative variation can be created in four steps. First, the researcher should create an organized method of divergence from the facts and units. Second, the researcher must identify the themes that provide the experience of the phenomenon. Third, the researcher should develop common units that provide the thoughts and feelings of the phenomenon experienced. Fourth, the researcher can explore for illustrations that lead to a description of the experienced phenomenon.

Using this process, the researcher painted a verbal picture of the essence of the lived experiences of northwest Alabama AMSTI science educators’ as they selected and developed their classroom assessment methods when implementing inquiry-based learning. This was accomplished by leaving the facts and units of their interviews behind and embracing the themes acquired from their thoughts and feelings. To address the overarching research question, how do fifth through eighth grade AMSTI science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes, the transcribed interview data was coded and the themes used to build a description of AMSTI science teachers’ assessment selection and development experiences. All transcribed interview data were color coded for (a) structural design which was the focus of subquestion 1, (b) essential components of assessments which was the focus of subquestion 2, (c) the meanings for guidelines used during assessment selection and development which was the focus of subquestion 3, and (d) all helpful information for assessment selection and development which was the focus of subquestion 4. Following the coding process, the researcher described each research question's focus using the experiences of the interviewed AMSTI science teachers.

A descriptive portrait was illustrated of the participants' assessment phenomenon. The external validity of this study was addressed using these descriptive assessment portraits such that the findings can be transferred to the reader's assessment practices. By selecting participants from various settings such as rural and urban settings and various grade levels, the researcher created a larger range of situations for the readers to compare with their assessment phenomenon. According to Merriam (2002), these methods are key approaches used in addressing the external validity of qualitative studies. Merriam (2002) listed peer reviews, member checks, and researcher position and audit trails as techniques for addressing the reliability of a qualitative study. For this study, peer reviews, member checks, researcher's position and audit trail were used to focus on reliability.

Peer Reviews

The researcher utilized 3 peer reviewers to analyze and confirm the themes constructed by the researcher based on the descriptions of the experiences of AMSTI science teachers' assessment selection and development processes while using inquiry methods. The first peer reviewer is a science teacher who has two years of AMSTI science experience for seventh grade. The second peer reviewer is a science teacher who has three years of AMSTI science experience for eighth grade. The third peer reviewer The 2 peer reviewers only had access to data that was de-identified and each peer reviewer signed a confidentiality form in order to protect the confidentiality of the participants (See Appendix E). The peer reviewers were not part of the study's participant population and were purposively chosen based on their AMSTI experience.

Member Checks

In order to improve the validity and reliability of this study, the researcher used member checks. Merriam (2002) stated that member checks are the second most commonly used method to validate qualitative data with the most common method being triangulation. According to Hatch (2002) and Merriam (2002), member checks involve each participant reviewing their transcripts for the creditability of the data. During the validity checks, the researcher sent the transcribed interview data and the researcher's interpretations back to the interviewee and they confirmed the accuracy of the researcher's interpretation of their descriptions of the phenomenon. To accomplish this task, Merriam (2002) stated, "While you may have used different words, participants should be able to recognize their experience in your interpretation or suggest some fine-tuning to better capture their perspectives" (p. 26).

Researcher's Position and Audit Trail

Using Merriam's (2002) description of researcher's position, a researcher who uses a qualitative study method should explain in detail the participant selection process, the framework of the study, and insights into the collection and analysis of data. With a qualitative study, these detailed descriptions validate the way in which the researcher gains recognition of his or her interpretation of the data. In this study, the researcher communicated in detail the selection of the study's participants as well as the context of the study while including insights into the collection and analysis of data in the appropriate portions of this section. Merriam discussed an audit trail in terms of reliability for a qualitative study. During an audit trail, the researcher included the data collection process as does the researcher's position. This reliability method also included a description of how the categories and themes are developed in addition to a description of the interpretations of the qualitative data. For this study, the researcher provided a description of how the data was collected for the lived experiences of northwest Alabama AMSTI science educators' as they select and develop their classroom assessment methods when implementing inquiry-based learning instructional methods. A description of how the categories, coding, and themes were developed was included.

Summary

This research employed a phenomenological study in order to describe the lived experiences of northwest Alabama AMSTI science educators' as they select and develop their classroom assessment methods when implementing inquiry-based learning instructional methods. The participants for this study were chosen by criterion sampling based on their current participation in the AMSTI which is an inquiry-based instructional initiative funded by the Alabama Department of Education and their geographical location of teaching at an AMSTI school located in northwest Alabama. According to Creswell (1998), Hatch (2002), Merriam (2002), and Moustakas (1994), a phenomenological study involves an in-depth study of a small number of participants. To address this description of a phenomenological study, the researcher conducted eight in-depth individual interviews and two focus group discussions with 4 participants per group from fifth through eighth grade. In order to analyze the interview data from this phenomenological study, the researcher utilized a modified Stevick-Colaizzi-Keen method. Using this method, the researcher developed themes from coded interview transcripts and developed a description of the essence of the phenomenon experienced by northwest Alabama AMSTI science educators' as they selected and developed their classroom assessment methods when implementing inquiry-based learning instructional methods. Moustakas (1994) described the product of a phenomenological study in this way, "One learns to see naively and freshly again, to value conscious experience, to respect the evidence of one's senses, and to move toward an intersubjective knowing of things, people, and everyday experiences" (p. 101). The researcher employed, peer reviews, member checks, and the researcher's position and an audit trail to provide the study with greater validity and reliability. Data included eight individual interviews and two focus group discussions from fifth through eighth grade AMSTI science teachers. This allowed the researcher to discover the essence of the phenomenon from the view point of AMSTI science teachers from four different grade levels. This phenomenological study collected and analyzed interview data in order to describe the lived experiences of northwest Alabama AMSTI science educators' as they select and develop their classroom assessment methods when implementing inquiry-based learning. While a description of development of the categories, coding, and themes were provided in section 3, section 4 and section 5 will include a more detailed description.

SECTION 4: PRESENTATION AND ANALYSIS OF DATA

Introduction

This section focuses on the process of data collection, the systems used to track data, the findings generated from the data, and the evidence of quality for the study. Data in the form of interviews and discussions were collected and common themes were established in order to describe the lived experiences of AMSTI science teachers as they select and develop assessment methods for inquiry learning. Using a research method in which the researcher employed the words and vocabulary of the participants to paint a portrait of their experiences, this phenomenological study generated, gathered, and recorded data in order to describe the lived experiences of fifth through eighth grade AMSTI science teachers as they select and develop assessments for inquiry learning.

Process of Generating, Gathering, and Recording Data

In order to generate data, the researcher interviewed eight individual AMSTI science teachers and conducted two focus group discussions. Each individual was interviewed once for a minimum of 60 minutes while each focus group discussion occurred once for a minimum of 90 minutes. First, the researcher created a list of each AMSTI school located in northwest Alabama using data from the AMSTI website (AMSTI, 2004). From this list, the researcher made a second list of AMSTI science teachers' school email addresses using an Internet search engine. Second, the researcher emailed contact letters to 40 AMSTI science teachers who instruct fifth through eighth grade students from the 27 AMSTI schools located in northwest Alabama (See Appendix B). Of the 40 contact letters initially sent, the researcher sent 10 emails per grade level.

Within a three day timeframe, 10 of the AMSTI science teachers responded through email that they were not interested in participating in the study while 19 AMSTI science teachers responded with a reply email that they were interested in participating in the study. Of the remaining 11 AMSTI science teachers initially contacted, the researcher received no response regarding their participation in the study. Of the 19 AMSTI science teachers who responded that they were interested in participating in the research study, 5 instructed fifth grade science, 5 instructed sixth grade, 5 instructed seventh grade, and 4 instructed eighth grade.

Second, the researcher emailed all the participants to establish their availability for the study. Using the list of availabilities which included possible dates, times, and locations, the researcher determined a list of participants for the individual interviews and a list of participants for the focus group discussions. However due to scheduling conflicts, only 16 of the 19 teachers were available for the study. For the individual interviews, 8 AMSTI science teachers were available from which 5 participants were teaching in an urban setting and three were teaching in a rural setting. For the focus group discussions, 8 AMSTI science teachers were available from which one group of four were teaching in a rural setting and the other group of four were teaching in an urban setting. One focus group discussion included 2 fifth grade teachers, 1 sixth grade teacher, and 1 eighth grade teacher while the other focus group included 1 fifth grade teacher, 2 seventh grade teachers, and 1 eighth grade teacher. The individual interviews represented six different AMSTI schools and the focus group discussions represented five different

AMSTI schools located in northwest Alabama. Therefore, 14 of the 27 AMSTI schools in northwest Alabama were represented in the study.

Third, the researcher arranged a date, time, and location for each interview or discussion group. From these communication emails, a quiet, convenient location was chosen by each participant or group of participants along with the date and time of the interview or discussion group. The researcher emailed a reminder of each interview or discussion date, time, and location to the participants 2 days prior to their appointment (See Appendix D). Along with the reminder, the researcher included a copy of the Interview guide that was used as a road map to guide the interview or discussion (See Appendix C).

In order to gather data, the researcher met each participant or group of participants at a predetermined location, date, and time. First, the researcher made all necessary introductions and then established the comfort of the participants. Second, the researcher provided a brief overview of the purpose of the study. Third, the researcher reviewed and discussed the consent form with the participants which were followed by the participants and researcher signing the consent form (See Appendix A). During the discussion of the consent form, the researcher informed all participants they were part of a research study from which they could withdraw at any time without negative consequences. The researcher discussed the importance of the participants' confidentiality and the measures the researcher would take to maintain all the participants' confidentiality. Fourth, the researcher provided the participant with a copy of the Interview guide to refer to throughout the interview or discussion (See Appendix C). Fifth, the researcher informed the participants that a copy of the transcribed interview or discussion would be emailed to them in order to confirm the accuracy of the transcription. Sixth, the researcher discussed the purpose of recording each interview or discussion and established the consent of each participant for the recording. At this time, the researcher recorded each interview following the Interview guide (See Appendix C). The researcher made notes as the participant discussed different topics in order to ask follow up questions. Each interview lasted approximately 60 minutes while each focus group discussion lasted approximately 90 minutes. At the end of each interview or discussion, the researcher turned off the recorder and thanked each participant for their time and help.

In order to record data, the individual interviews' recordings and the focus group discussions' recordings were transcribed into a Word document using a laptop computer, headphones, the interview or discussion audio tapes, and an audio player. During the transcription process, the comments between the researcher and the participants were distinguished by labeling the researcher's comments and questions with the word researcher while the participants' comments were labeled using assigned false names to maintain their confidentiality. This was accomplished by conducting an internet search using Google as the search engine for the 20 most popular names in the United States, placing those names in a bin, and drawing the false names from the bin as the interviews or discussions were transcribed. From this point forward in the study, only the false names were used to refer to participants. The researcher conducted a member check in which the participants were emailed a copy of their transcribed interview or discussion to check for accuracy.

System of Tracking Data and Emerging Understandings

In order to track the data and emerging themes obtained from the individual interviews and focus group discussions, the researcher employed a laptop computer and several Microsoft Word documents with tables. First, all interviews and discussions were transcribed into a Microsoft Word document. Second, the researcher constructed a Microsoft Word document with a table for each research subquestion. Each research subquestion was assigned a color code (See Appendix G). Third, the researcher read the participants' statements and color coded each statement based on the research subquestion the statement addressed. Fourth, the researcher constructed a second Microsoft Word document with tables for each color coded research subquestion in which each subquestion had two tables, one for the individual interviews and one for the focus group discussions. Into these documents, the researcher placed the participants' statements eliminating all repetitive statements. Fifth, the researcher constructed a third Microsoft Word document with tables of nonrepetitive significant statements and the themes that emerged from these statements to create units of meaning for the AMSTI science teachers' experiences with the selection and development of assessments for inquiry learning (Appendix I).

Findings

Research Problem and Design

The purpose of this phenomenological study was to examine the lived experiences of AMSTI science teachers for fifth through eighth grade as they select and develop assessment methods for inquiry learning. This task was accomplished through the collection of data using in-depth interviews and focus group discussions of science teachers who participant in the AMSTI which endorses and supports inquiry learning for math students Pre K through grade 12 and science students Pre K through grade eight in Alabama. During the collection of data for this study, the researcher conducted eight in depth individual interviews with AMSTI science teachers and two in depth focus group discussions in which each session was composed of four AMSTI science teachers. Both the individual interviews and the focus group discussions were conducted with AMSTI science teachers from northwest Alabama who instruct science in fifth through eighth grade. During the data collection process, these AMSTI science teachers shared their lived experiences of selecting and developing assessment methods for inquiry-learning with the researcher.

The findings from this study answered the key overarching research question: How do fifth through eighth grade AMSTI science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes? Because the overarching research question of this study focused on the experiences of AMSTI science teachers regarding the phenomenon of assessment processes, a phenomenological qualitative method was chosen for this study. According to Creswell (2003), Hatch (2002), Moustakas (1994), and van Manen (2002), a phenomenon can be investigated using the knowledge of several individuals who have experiences the phenomenon. The knowledge of the assessment experiences from AMSTI science teachers for fifth through eighth grade was used to describe the overall meaning or essence of the assessment process for inquiry learning. The researcher chose a phenomenological research design to address the problem of this study.

Individual Interviews Findings

Research Subquestion #1: What is the structural design of AMSTI science teachers lived experiences with assessment processes?

The first theme to emerge from research subquestion #1 was AMSTI science teachers employed a variety of resources for the items they use on their inquiry learning classroom assessments methods. For example, the interviewed AMSTI science teachers used the AMSTI teacher and student resource books along with the item specifications for standardized tests such as the Alabama Science Assessment (ASA) and the Alabama Reading and Math Test (ARMT). They used teacher generated resources such as PowerPoint presentations, tests, rubrics, and checklists, and state adopted textbook resources during their assessment process. These teachers stated they needed to use a variety of resources when developing assessments for inquiry learning because of the need to address both the learning method and the standardized tests which are used for AYP. AYP is the accountability system built into NCLB that reports each school's academic progress during a school year. Taylor stated:

> I use the assessments that come with the AMSTI kit. There are always paper/pencil assessments and there is an observation test. I do a book [textbook] test along the way, and then we have a big assessment over the big topics. We will do the paper/pencil test first. The next day, I will bring in the hands-on and they will watch me do a demo and they have to write up their conclusion.

While later in the interview, Taylor included this about assessment resources:

> Some hands-on [assessments]. They [AMSTI] give you a paper/pencil [assessment] and then they give you some alternates [assessments] that you can

> do. Not every assessment has two or three different ideas but I use the ones that are in there [AMSTI resources] and they are pretty good. I have come up with a few [assessments] of my own with higher order questions. But it [the assessment] can be just anything from them actually doing a new lab, to me doing a demo and them writing up what they saw happen and they relate it back to the storms [unit class was covering at the time of the interview].

Abigail commented:

> Mainly I would pull [assessments] from the AMSTI teacher's book. I also have a science textbook that we [school system] have adopted and I pull from it because AMSTI doesn't touch everything. With them [AMSTI resources and the textbook] together, we hit everything in the Course of Study. So I pull from that [the Science Course of Study] and I also have PowerPoints that I have created for research that I have done and some other teachers. We [AMSTI science teachers] usually meet especially when you go to the AMSTI training. They [AMSTI science teachers] share PowerPoints and other materials. So we pull together.

Emily explained a standardized test specification resource in this way:

> There was a new test this year [teacher is referring to the 2007-2008 school year]– the ASA Alabama Science Assessment. So there are, I believe, eleven standards that they have to meet. That is when I try to pull in those item specs [standardized tests] on my assessments.

Abigail described her use of the ARMT grading scale:

> Most of the time, it depends on how much you want each [assessment] question to be point wise? What do you want them to be worth? Usually, you may go with one, three, and five where one is attempted, three is partial understanding, and then five is mastery. This is what I am going to do. That is the way it is on the ARMT. I think it is just plain one-to-four; it is easier to figure up.

Of the 8 teachers interviewed, all 8 AMSTI science teachers expressed their use of the AMSTI teacher and student resources along with teacher generated resources when selecting and developing assessments for inquiry learning. All 8 AMSTI science teachers interviewed discussed the use of item specifications for the standardized tests used for AYP as a resource when selecting and developing assessments for inquiry learning.

However, 4 of the 8 AMSTI science teachers interviewed listed their state adopted textbook as a resource used when selecting and developing assessments.

The second emerging theme for this research subquestion was AMSTI science teachers used a variety of assessment methods and formats. AMSTI teachers stated that multiple assessment methods and formats were needed to address the assessment of inquiry learning in their classroom and the practice their students needed to be successful on the standardized tests used for AYP. Madeline described the assessments methods in her room in the following way, "I use a lot of different assessments." Kaitlyn explained her assessments:

> When it [an assessment or inquiry lab activity] says explain they [the students] give me two words [for answers]. I try to always put some type of questions not all just matching/multiple choice on the tests. I usually have just a few of some types that they have to think.

Taylor also described her testing methods:

> But you have to have paper/pencil [tests]. You have to have some way of assigning your grade and I use rubrics a lot with their projects. When we do bombs, they have to research a bomb, and they bring in a PowerPoint presentation. They have their rubrics and I assess the project with the rubric.

Jordan described his testing format like this:

> This particular test is usually fill-in-the-blank but there are a lot of discussion things as far as the independent and dependent [variables], how do you know which one is which? So, I try to get them to apply some things that tell me, what they know and how do they know it. So it is kind of a mixture of things. And sometimes it is matching. Sometimes it may be A/B/C/D or multiple choice. So I kind of mix them in.

Abigail used this as a description of the assessment format used in her classroom, "Some matching [question format on terms tests] and then for the notebook, it would be fill-in-the-blank and discussion questions."

In regard to assessment methods, 7 of the 8 AMSTI science teachers discussed the use of student projects and performance based evaluations as formats for assessments. These projects included PowerPoint presentations, research topics, and photo stories. In addition, 6 of the 8 teachers discussed to use of science journal or notebooking assessments which ranged from fill-in-the-blank to matching and short answer question formats. Also, 4 of the 8 AMSTI science teachers described the use of traditional paper/pencil assessments similar to the AYP standardized tests.

From research subquestion #1: What is the structural design of AMSTI science teachers' lived experiences with their assessment processes, the researcher uncovered two themes for the individual interview data. First, AMSTI science teachers used a variety of resources during their assessment process. For instance, these teachers included the AMSTI resource books for both teachers and students, standardized tests' specifications such as the ASA and the ARMT, teacher generated resources including PowerPoint presentations, tests, rubrics, and checklist, and science textbook resources. Second, AMSTI science teachers used a variety of assessment methods and formats. For example, these teachers used student projects, performance or observation assessments, science journal or notebooking assessments, and traditional paper/pencil assessments. AMSTI science teachers employed a variety of resources, methods, and formats during their assessment process for inquiry learning.

Research Subquestion #2: What are the essential components of the assessment methods for inquiry used by science educators participating in AMSTI that result in their assessment experiences?

The first emerging theme from research subquestion #2 was the most essential part of assessments for inquiry learning were the AMSTI paper/pencil assessments included in each AMSTI instructional unit. For example, Abigail stated, “Mainly, I would pull [assessments] from the AMSTI teacher’s book.” Jordan described the most frequently used assessment method in his classroom as, “The best way to do that [assessments] is [AMSTI] paper/pencil tests. Mostly, they [my students] will do multiple-choice paper/pencil testing.” Emily illustrated this:

> Sometimes it [an AMSTI assessment] might be paper/pencil and sometimes it is performance-based. Quizzes and tests to me are kind of the same thing just the quiz tends to be smaller. Some of my grades come from performance-based. I still do paper/pencil tests; if you don’t, then you have parents who do not understand how this grade [student’s average] came about. They [students] have to know terms and probably the best way to do that is paper/pencil tests. Mostly, the paper/pencil testing is multiple choice.

Of the 8 AMSTI science teachers interviewed, all eight discussed the significance of the AMSTI resources during their assessment selection and development. AMSTI science teachers viewed the AMSTI assessment resources as the most essential component for assessing inquiry learning.

The second emerging theme for research subquestion #2 was AMSTI science teachers viewed teacher generated resources as a vital assessment component for inquiry learning. For example, Mia stated:

> They [her students] need notes. Because they [students] cannot take the AMSTI student resource books out of the classroom, I have tried to supplement with more

> notes that I have put together from the AMSTI student book and their science textbook.

Madison's description of this component was:

> An AMSTI specialist came by yesterday and told me to go on the website [AMSTI website]. They [AMSTI] have a new thing posted. It is called Filling in the Gaps. So, we [fifth grade AMSTI science teachers at this school] have been looking into that [Filling in the Gaps] but we [fifth grade AMSTI science teachers at this school] pretty much use our own [teacher generated assessments] and it is working [students' ASA scores are high].

Abigail explained the importance of this component as:

> But AMSTI is just sort of you make your own on that [teacher generated assessments]. To me, sometimes I need that extra help to make sure I am covering and assessing everything that I need to. So, it would be better to have the assessments [provided]. We [AMSTI science teachers] talk to other teachers and we get their ideas. I give them my ideas. That helps [sharing of resources].

All 8 science teacher who were interviewed illustrated their use of teacher generated assessment resources. The AMSTI science teachers interviewed portrayed teacher generated assessments as the second most essential component of their assessment process.

The third theme to surface from the individual interview data was AMSTI science teachers expressed the equal importance of standardized tests specifications, notebook/journal assessments, cooperative learning assessments, and alternative assessments as essential components of their assessment process for inquiry learning. Madison conveyed this on the use of the standardized test specifications for the ASA:

> If they [the students] get them [ASA sample questions] right on the test [given by the teacher], then they should do well on the Alabama Science Assessment. I am driven by the Alabama Course of Study and the Alabama Science Assessment right now.

Abigail described her use of notebook quizzes in this way:

> We have notebook quizzes and that may consist of just making sure that the kids are following along, taking notes, doing the components, and answering the components. That [notebook quizzes] may just consist of what was the question for Lesson 2.1, what was your answer, what was your prediction and they have to fill that out. That is one way we check it, just to make sure that they are keeping up their notebook. Another way we assess [notebooks] is just the key terms and that is usually from the teacher's book [AMSTI teachers' resource book] because the student book stays with AMSTI. They can't keep the student book. So, I take the terms from the teacher's book. They can use their notebook [on the notebook quizzes]. On the terms assessments, they do learn the terms [not open notebook].

Emily used this description of cooperative learning, "They do work in groups! They always pair up but they almost always work in groups. I will use a rubric or checklist to assess each group." The alternative assessments formats from the interview data included sketches, whiteboard assessments, quick writes, performance assessments, and students' choice of assessment method. Taylor depicted alternative assessments as an essential component by saying:

> This week and last, we were getting ready for a chapter test and we ended one [chapter] with a test on the white board. I called out a problem and they wrote on their white board and I went around and checked. I think they do work harder when they have choices. Just like if they have a choice on a project. They can do either a poster or a PowerPoint. Just that choice–as long as they get to make that choice, they will work harder.

With the 8 AMSTI science teachers who participated in the individual interviews, 6 teachers discussed their use of standardized test specifications, notebook/journaling assessments, cooperative learning assessments, and alternated assessments in their assessment process. AMSTI science teachers viewed standardized test specifications, notebook/journaling assessments, cooperative learning assessments, and alternated assessments as essential assessment components.

The fourth theme the researcher uncovered for research subquestion #2 was AMSTI science teachers viewed textbook assessments, the Science Course of Study, and Internet resources as essential parts of their assessment selection and development process. Madison stated:

> I went through the Alabama Course of Study and looked at the objectives and one of the objectives was for students to be able to describe food chains or food webs. So, I really hit that hard. The textbook [system adopted science textbook] had some examples. I used that [system adopted science textbook] as a resource. As far as the assessments go, AMSTI didn't have what I considered the assessment that would correlate with the Alabama Course of Study. Considering our accountability [due to AYP] now, I felt like I needed to use those questions [from the Course of Study and the science textbook].

Several Internet resources were listed by these AMSTI teachers such as AMSTI Internet resources, Ed Helper, and United Streaming. Taylor said:

> Now I use Ed Helper [Internet resource] and I pull reading passages, things that might clarify a concept that might be hard. United Streaming [Internet resource]–we do those little videos and the quizzes and study guides. We do that [use Internet resources]. AMSTI, to me, does a pretty good job of including some pretty good assessments.

During the review of data from the individual interviews, the researcher discovered that 4 of the 8 AMSTI science teachers regarded their system adopted science textbooks and the Science Course of Study as essential components of their assessment process. Only 3 of the teachers interviewed expressed their use of Internet resources as essential parts of the assessment process for inquiry learning.

While analyzing the data for research subquestion #2: What are the essential components of the assessment methods for inquiry used by science educators participating in AMSTI that result in their assessment experiences, the researcher uncovered four themes. First, AMSTI science teachers considered their AMSTI assessment resources as an essential component of their assessment process. Second, these same science teachers felt teacher generated assessment resources were also essential when assessing inquiry learning. The first two themes were described as equally essential components by all eight teachers interviewed. Third, the use of standardized test specifications, notebook/journal assessments, cooperative learning assessments, and alternative assessments were illustrated as vital components of the assessment process. Fourth, the use of system adopted science textbooks, the Science Course of Study, and Internet resources were depicted as essential parts of the assessment process. Half of the science teachers interviewed listed system adopted science textbooks, the Science Course of Study, and Internet resources as essential. The AMSTI science teachers interviewed communicated several essential components for their assessment process which included (a) AMSTI assessment resources, (b) teacher generated assessment resources, (c) standardized test specifications, notebook assessments, cooperative learning assessments, and alternative assessments, and (d) system adopted science textbooks, the Science Course of Study, and Internet resources.

Research Subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?

The first emerging theme from research subquestion #3 was AMSTI science teachers rank the Science Course of Study as the most important guideline they use when determining assessments for inquiry learning. The Science Course of Study is a document published by the Alabama Department of Education listing all science courses and their required learning objectives. Kaitlyn described the use of the Science Course of Study:

> We use the Course of Study and on my lesson plans I indicate which course of Study that we are working on because we have to do that here with the STI [software grade book system]. If it [the Science Course of Study] has some key terms, I make sure that those key terms are in their notes and they are tested on those key words. Like [the word] inertia, I know that it is in the Course of Study and my system continuum [school system generated document of Science Course of Study objectives and when they are covered in the classroom]. So, I just make sure that if anything ever comes up, they [school administration] can go back and can find that I covered all those steps [objectives].

Taylor used this description:

> The Science Course of Study is the be all; end all. And I do. I want to make sure that the kids can answer that question [referring to questions that address Science Course of Study objectives]. I want to know that they can get the big picture because you can get soaked up in the little things, the fun things, and forget the big picture. Ii have got my year broken down so that I know by December I have covered a certain point. Once I have covered it, I do go back and check it [the Course of Study] off for my benefit.

All 8 AMSTI science teachers interviewed discussed the Science Course of Study as the most important guideline used during assessment selection and development for inquiry learning.

The second emerging theme from research subquestion #3 was AMSTI science teachers only use System Pacing Guides/Curriculum Maps/Continuums as a check list for covering the Science Course of Study if they use these guidelines at all. System Pacing Guides/Curriculum Maps/Continuums are documents published by local school systems listing each science course offered by the system, the correlations to the Science Course of Study objectives and the state adopted textbooks, and a recommended time line for covering those objectives. Madeline explained the use of System Pacing Guides/Curriculum Maps/Continuums as:

> At our school, we were told to cover the information. It did not have to be in any particular order. I would take the guide [school system generated pacing guide of

> when teachers should cover each objective on the Science Course of Study] and make sure that they have covered everything. It just may not be in that order [order on the pacing guide] but I make sure that everything got covered. When we have a test or a lab, I just document where we covered the [objectives] on the continuum. With all my lesson plans, I have to write it [Science Course of Study objectives] and we have to write the grad exam [Alabama High School Graduation Exam objectives], the SAT [objectives] and any other type of exam that we are covering.

Emily used this description:

> Don’t use it [system continuum]! Early on, I went to my administration and I’ve been following this continuum for two years and now you want me to do AMSTI–so is it AMSTI or is it continuum? They [school administrators] said AMSTI, as long as you meet the Course of Study objectives, you are fine.

Taylor said:

> The pacing guide [school system document] to me is a pretty good document. So, I use that personal lesson plan but I have to have that Course of Study on everything but we don’t use it [Pacing Guide] as a working document necessarily anymore.

The third theme to surface from research subquestion #3 was AMSTI science teachers know AMSTI has correlated most if not all its units to the Science Course of Study and the National Science Education Standards. Abigail discussed this theme as:

> Now, the Course of Study–what our science textbook is–and then what our AMSTI is. So it is all correlated for us and you go through there and see each section that covers our continuum. So it is very nice.

Emily explained the national standards like this:

> I do not really use the national standards because I feel like if I teach AMSTI and I teach it the way it is supposed to be taught, then they are getting those–they are meeting those standards–or at least those standards are being taught because AMSTI has correlate to those guidelines.

Abigail described her beliefs of these theme by saying, “They [AMSTI] do it for us [correlations with National Standards], which is very nice.” Emily expressed her understanding of AMSTI's correlations as, "With seventh grade, every single objective was met with AMSTI. Every single one." Of the 8 science teachers interviewed, 6 teachers believed AMSTI correlated all the Science Course of Study objectives and the National Science Education Standards for their grade level. Two teachers stated their grade level AMSTI units did not cover every Science Course of Study objective. Madeline discussed the use of an AMSTI resource, Filling in the Gaps, in this way, "There are two [Course of Study objectives] that have supplemental material [Filling in the Gaps] that needs to be given but I just meet the Course of Study objectives, document that I met them, and that is it."

The fourth theme to emerge from research subquestion #3 was AMSTI science teachers worry and feel pressure because of the guidelines set by NCLB and AYP but these guidelines have not changed the methods most these teachers use when selecting and developing assessments for inquiry learning. For example, Abigail described her feelings regarding NCLB in this way:

> We worry about it [NCLB and AYP], because eventually it will catch up with us. We [teachers at this campus] are not in that level just yet but it will catch up. But it does make a difference. You start thinking about it a little bit more, and you start trying new things just to see if you can get deeper and have the kids think a little bit more about questions instead of just a yes or no and because it says so.

First, Madison explained their changes in assessment methods since NCLB as:

> I think that with having AMSTI, the No Child Left Behind, I think a lot of the needs are being met because it is hands-on. It is inquiry-based. I don't think it has really changed the way [I teach] but AMSTI has changed the way I teach. I don't think No Child Left Behind has changed a whole lot of the way I teach because I have your basic generic group of kids. I am not an inclusion classroom [no special needs students]. I have some gifted students and I have some lower achieving students but we don't have any that are on IEP [Individual Education Plan] right now. We do have some that are going through BBSST [Building Based Student

> Support Team which addresses at-risk students] and we are doing those strategies. Like for one student, I have to read her test orally but it [NCLB] has not really changed our thinking a whole lot, as far as we are not slipping or anything.

Jordan said:

> It [classroom assessments since NCLB] has not really changed much. We met our standards and we are above and beyond where we are supposed to be. We [this teacher's school] have always been up there. We have not really worried so much about hitting AYP just maybe in attendance.

Emily expressed NCLB in this way:

> I cannot say that it [NCLB] has really changed anything. I feel like when I first started teaching, if I had continued that way with the lecture and all that, it would have changed that because so many kids were getting left behind and it would have changed that method. With the inquiry, with AMSTI, and all the other different activities I do, they even become problem solvers. With all of that, I think the kids are getting it more. Do I still have kids that fail, definitely? But do they fail because they do not understand it [science concept] or do they fail because they do not want to do the work? When I talk to them one-on-one, they get it. They just don't want to do the homework and they don't. Sometimes you give a test and they just don't want to do it. They leave it blank. I think this year we only had two students who failed because there were other issues. I think [with] AMSTI and all the other inquiry-based activities that I do, the kids are getting it [science concepts]. I don't feel like they [students] are being left behind. I don't feel like there is anything else that I need to do because I think they are okay. I know that nobody has approached me and told me that I need to be doing it differently.

Jordan described her changes in assessment methods since NCLB as, "Lots more reteaching due to NCLB and AYP!" Jordan had this to say regarding NCLB:

> We [teachers] have to keep watering things down for some of them until they are able to get through and I know there are some students that are in special education who are truly not ever going to be able to succeed if we don't do that and I understand those unusual cases.

Five of the 8 teachers interviewed did not believe their assessment methods had changed due to NCLB. However, 3 of the 8 teachers interviewed believed their assessment methods had changed since the implementation of NCLB.

While analyzing the interview data for research subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods; the researcher discovered four themes from the data. First, AMSTI science teacher viewed the Science Course of Study as the most important guideline they use when assessing their inquiry classrooms. Second, the only meaning AMSTI science teachers place on System Pacing Guides/Curriculum Maps/Continuums is that of a check list for covering the Science Course of Study or they did not regard them as a guideline for assessments at all. Third, the meaning AMSTI science teachers placed on the correlations of AMSTI objectives to the Science Course of Study and the National Science Education Standards was one of minimal concern. These teachers know AMSTI has correlated most if not all its units to the Science Course of Study and the National Science Education Standards. Fourth, worry and a feeling of pressure are the meanings AMSTI science teachers place on the guidelines set by NCLB and AYP. Five of these teachers had not changed their methods of assessment due to NCLB but 7 of the 8 teachers interviewed described some form of pressure to meet AYP. Abigail teacher stated, “I feel no pressures! I don’t! I want them [students] to succeed. Maybe I am just too old to feel the pressures but I am not [pressured]. Four themes surfaced from the individual interview data regarding research subquestion #3.

Research Subquestion #4: What do AMSTI science teachers find most helpful when determining assessment methods?

The emerging theme from research subquestion #4 was AMSTI science teachers found five resources most helpful when selecting and developing assessments for inquiry learning. These resources include: AMSTI teacher and student resources, the Alabama Science Course of Study, item specifications for the standardized tests required for AYP, teacher generated resources, and state adopted textbooks and other outside resources. All 8 teachers interviewed expressed the use of the AMSTI teacher and student resources as most helpful when selecting and developing assessments for inquiry learning. Each of the 8 teachers interviewed explained their use of the Science Course of Study as helpful when selecting and developing assessments. Taylor described her use of AMSTI resources as:

> Some hands-on [assessments]. They [AMSTI] give you a paper/pencil [assessment] and then they give you some alternates [assessments] that you can do. Not every assessment has two or three different ideas but I use the ones that are in there [AMSTI resources] and they are pretty good. I have come up with a few [assessments] of my own with higher order questions. But it [the assessment] can be just anything from them actually doing a new lab, to me doing a demo and them writing up what they saw happen and they relate it back to the storms.

Madeline described her use of the AMSTI teacher and student resources like this:

> If I am having trouble choosing an assessment, the end of every lesson in the book [AMSTI teacher resource book] gives you 10 different ways you can assess the lesson. It may be with a worksheet. It may be with bell ringers or just questions that you ask from the seat or class discussion. Everybody learns differently and everybody communicates differently. I try to assess in different ways every day to give everybody an opportunity to know that they are learning.

Riley used this description, “I have to worry about Alabama Science Assessment [ASA]. So, I use that as a resource tool. I have also made up my own questions to go with each standard [of the ASA].” Jordan explained the use of specifications as:

> The ARMT thing [is stressed by school and system administration] because I have to do the ARMT part, too [ARMT does not cover science. It is covered in the ASA but elementary teachers all teach reading and they will use AMSTI as a resource for reading material]. So I pull questions from there [ARMT] but most of what I use for the AMSTI [tests] comes from what it is we experienced in class. I make the tests and change them. I keep my copy but I will look at it and say, we didn’t really get that one [test question], so I will take that one [test question] out and not use it.

Emily expressed the helpfulness of teacher generated resources as, “I have study guides that I will pull questions from. Most of them are teacher generated though [other resources, not AMSTI]. Emily illustrated the helpfulness of teacher generated resources in this way, “Most of mine [assessments] have been teacher generated and using the teacher guide, the student guide, and the project (of course) [using AMSTI resources]. The rubric thing is different. Rubrics, I have created my own.” Taylor explained the use of their state adopted science textbooks and other outside resources, “I have Exam View from my old textbook, and I pull questions from that.” Madison illustrated her use of textbooks as, “So I bring those vocabulary words that are also in our science textbook [State adopted]. I pull that as a resource and we [my students] would take a vocabulary test.” Kaitlyn stated, “I still give chapter tests using the State adopted textbook. Usually mine [assessments] are teacher made tests from their [students’] notes or I get them off the Examview Pro [assessment software].” Taylor described the use of Internet resources as, “Ed Helper and United Streaming help and there are some really good videos. They can see the things and then take a quiz on it right then.”

Using the interview comments from the 8 AMSTI science teachers interviewed, all 8 teachers discussed the helpfulness of standardized tests' item specifications while 5 of these AMSTI science teachers discussed the helpfulness of their state adopted science textbook resources. Four of the teachers interviewed described the helpfulness of supplemental resources such as Ed Helper and United Streaming which are Internet educational resources and teacher generated resources. Taylor discussed the lack of AMSTI assistance when assessing students who are absent on days when the class conducts an inquiry lab. She explains this situation as:

> If they are absent, then AMSTI is hard. If I do a lab, they can't make it up. So usually, at the end of six weeks, or at the end of the trimester, I do a demo of the main lab that we would have covered so they can at least say they saw them [the labs results].

AMSTI science teachers considered standardized tests' specifications, science textbooks, and supplemental resources helpful when determining assessment methods.

The themes discovered from the individual interviews led to three units of meaning that addressed the overarching research question: How do fifth through eighth grade AMSTI science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes? First, AMSTI science teachers who participated in the individual interviews employed a variety of traditional and inquiry-based assessment resources and methods. These resources included the Science Course of Study, teacher generated resources, AMSTI resources, standardized tests' item specifications, Internet resources, and supplemental resources such as workbooks and science textbooks. Examples of the assessment methods used by the AMSTI science teachers from the individual interviews included cooperative learning checklists and project rubrics were used while notebooking or journaling were consider essential assessment methods. These AMSTI science teachers discussed the importance of using standardized test specifications and formats in their inquiry classrooms to improve their students' success during AYP testing. Second, AMSTI science teachers expressed feeling pressure from several sources such as their school, community, school system, and state to meet AYP. Third, 5 out of the 8 AMSTI science teachers stated they had not changed their assessment selection or development processes due to NCLB. Of the 3 teachers who expressed changing their assessments due to NCLB, all three were employed in schools that had not met AYP and had large populations of special needs and low socioeconomic students. The lived experiences of these AMSTI science teachers included a variety of assessment resources and assessment methods and the specific meanings for the guidelines of NCLB and AYP used for the selection and development assessments.

Focus Group Discussions Findings

Research Subquestion #1: What is the structural design of AMSTI science teachers lived experiences with assessment processes?

The first emerging theme from research subquestion #1 was AMSTI science teachers use two resources such as AMSTI laboratory and inquiry resources and teacher generated resources when selecting and developing assessments for inquiry learning. For example, Mia stated:

> I use a lot of the ones [assessments] from the AMSTI book. The seventh grade has really good, practical type questions where they have to apply what they have learned. They have to look at a diagram and tell me the function of the liver or look at a diagram and tell me what is happening molecule wise. There are a lot of

> graphs they have to interpret or data tables they have to look at and tell you what happened. We also try to do some vocabulary. I try to mix it where they can have vocabulary questions with the AMSTI assessments. That way, I am getting not just some vocabulary background but I am getting what they actually learn [about] the concept. Actually, the seventh grade [AMSTI resource books] really has good assessments and we use a lot of those. We do short ones [assessments] and sometimes, we will just pull out five questions and do a little short quiz on one [inquiry] just to see if they have the concept. If they don't, I can go back and reteach it. That is usually what I use.

Sarah explained her use of AMSTI resources:

> There is one thing I have to help [with grades for inquiry] because you have to have grades and you have to have something to show on paper. I take all of the readings out of AMSTI's books, and I make a reading diary. All of us [AMSTI science teachers at this school] write along with the reading. They [the students] do that and that is for a daily grade. Then, we [AMSTI science teachers at this school] pull what is the most important stuff from that and I test them.

Sarah also criticized to lack of AMSTI student resource books by saying:

> I wish we had enough of them [AMSTI student resource books]. I wish when they gave us our kits, they [AMSTI] gave us more copies of the student book because I only got eight books and I have got 25 kids. So I copied what I felt was most important. I share the books [and/or copies] with the other sixth grade AMSTI teachers.

Mia said:

> They need notes and so I have tried to supplement with more notes [that I have made]. At the end, I will cut out a diagram, we will glue it in their book [notebook], and they will color or label. I have done some data tables where we cut out and put it in their notebooks and that helps to give them something to study from.

All 8 AMSTI science teachers who participated in the focus group discussions discussed the use of AMSTI laboratory and inquiry resources and teacher generated resources during their assessment process. One teacher also described the use of science workbooks as a resource for her assessment process. Ava said this about workbooks:

> What I tend to do, I have some workbooks [outside resource, not AMSTI and not system adopted textbook resource] that are excellent. They are very basic how do things [work] about movements and [the] first law of motion. It [this workbook] gives diagrams and they [students] have to look at the diagrams to tell what is going on and things like that and those are really good. I keep on my kids about accountability. You are responsible to yourself. I give quizzes.

The AMSTI science teachers from the focus group discussion used two assessment resources when selecting and developing assessments for their inquiry classroom.

The second theme to emerge from research subquestion #1 was AMSTI science teachers use a variety of assessment methods in their inquiry learning classrooms. For example, Sarah explained assessing inquiry learning in this way:

> Assessing inquiry tests–lots of observation. I do have check sheets and rubrics. As far as assessing the inquiries, I usually gather the main points they were supposed to learn and after we have had their own class discussion about what did we accomplish and what did we learn and why do you think that happened, I will do a little quiz on what we did. Then, you have to deal with kids who were absent. So, assessment is tough. You have to find ways to assess AMSTI.

Ava described her assessment methods as:

> [A lot of my assessments are] Multiple choice. Some of it is rote memory, what is this vocabulary. On my multiple choice questions, I try to make them thinking questions. That [scenarios] may be ten questions on one test. [I use] some matching [on assessments]. I may have a couple of graphs on there. Reading passages that they have got to figure out and apply. So, I try to put thinking questions.

Mia described her assessment methods in this way:

> That [assessments] is the hardest thing in AMSTI. I am getting better each year. I am trying to do a lot of questions during class to just kind of feel around [figure out student comprehension]. I try to go with the groups and sort of check what they are writing. I'm trying to do more 3, 2, 1s those quick writes at the end to sort of see where they are. Then, we try to do a quiz or short test after about three or four labs. That way, they are not doing [taking a test] eight labs of digestive system all at once. It is just too much information. I am kind of struggling with some of my things [assessments] right now and working in more little quick assessments because I don't have time in 50 minutes to give them one every day.

> So I try to give them something at the end of each lab and have them to write or tell me what they did. I think if we have a longer period next year, I will have more time to make them tell [what they learned] me in their groups. I am also trying to do thinking jobs. Along with their other roles [in groups], they have to be the hypothesis grader that tells the class [what happened in the lab] or someone has to summarize what they did or if it [the lab] didn't work, why did it not work or what they think went wrong. I am trying to do a little bit more of an oral assessment type thing. I am trying to just check more if they got it [the concept].

Five of the 8 AMSTI science teachers from the focus groups explained their use of alternative assessment methods such as observations with check sheets and rubrics, performance assessments, and oral assessments. Three of the 8 teachers from these group discussions used more traditional assessment methods such as tests with multiple choice, matching, and essay type questions, quizzes, notebook quizzes, and vocabulary tests. One teacher discussed the use of both alternative and traditional methods of assessing inquiry learning. AMSTI science teachers use a variety of assessment methods in their inquiry classrooms.

Of the 8 AMSTI science teachers who participated in the focus group discussions, all 8 described their use of AMSTI resources and teacher generated resources when selecting and developing assessments for inquiry-based learning. According to the AMSTI science teachers in the focus groups, the most frequently used resource are the AMSTI resources which includes teacher resource books, student resource books, and laboratory supplies. The 8 teachers listed a variety of assessment methods that they employed in their AMSTI classrooms. These methods included notebook assessment, vocabulary tests, written tests, oral assessments, reading diaries, observations, quick writes, quizzes, lab performance assessments, and traditional paper/pencil tests. Using this list, the most frequently mentioned assessments were observation assessments and notebook tests.

Research Subquestion #2: What are the essential components of the assessment methods for inquiry used by science educators participating in AMSTI that result in their assessment experiences?

The first emerging theme from research subquestion #2 was AMSTI science teachers considered teacher generated assessments and AMSTI resources as an essential part of their assessment process. For elementary teachers who participated in the focus group discussions, teacher generated resources were essential components for their assessment process. Ella stated:

> Most of our units [AMSTI] don't have tests that come with it. Or they may have a unit test and I just don't feel comfortable waiting until five weeks into it to give one big test. We break it [the units into small assessments] down.

Seventh and eighth grade AMSTI teachers explained the AMSTI resources as an essential part of the assessment process. For example, Brayden commented:

> Most of our [AMSTI] units have a written test and then they have a lot of hands-on [performance tests] where they always have an observation test where they watch how to make it work. The ones [students] that may not do real well on their written tests can do the other [performance test] and then you do the grades together and average them.

These teachers discussed the difficulty they experienced assessing students who are absent since most of their assessment content is from the inquiries conducted by the students. Sarah said, "Then, you have to deal with kids who were absent. So, assessment is tough." Of the 8 teachers who participated in the focus group discussions, 4 teachers listed the AMSTI assessments as the most essential component to their AMSTI classroom. The other 4 science teachers from the group discussions listed teacher generated resources as essential parts of their assessments. The AMSTI science teachers who participated in the focus group discussions found teacher generated and the AMSTI resources vital components of their assessment process.

The second theme to emerge from the focus group discussions concerning research subquestion #2 was AMSTI teachers considered the use of cooperative learning and its assessment to be essential components of their AMSTI assessments. For example, Isabella stated:

> Daily, they each have a piece of paper that they will fill out while they are waiting on me to come back to that group. They discuss it [the inquiry] and they all come up with an answer and most of the time you will have the same answers. There might be one or two that argue and say, no, that is not why that happened and that is okay if they are different because sometimes we are not always in agreement. It is pretty much just a participation thing and for me to see how much they are learning. I usually have about six of those [assessments] in six weeks.

Sophia said this about cooperative learning groups:

> They have their little groups that they work with and they know exactly who is the getter, who is supposed to get what, who is the recorder, how they are supposed to keep everything in their notebook, and they talk while they do it–to each other. They have to share their experiences. They have to figure out the reason why we are doing it [inquiry lab]. And I use a checklist to grade their groups.

All 8 teachers from the discussion groups expressed their use of cooperative groups and their assessment as a vital part of their assessment process for inquiry learning.

The third theme to appear from the discussion group data was AMSTI science teachers view notebooking or journaling as an essential component of assessing inquiry learning. For example, Ella stated:

> We do a notebook and participation grades, and then we have made our own tests or lessons, and–I mean–it is not really just a test. I mean, it could be just even their partners working together but we use it as grades, and they just build, and everything goes across with us.

Isabella explained journaling in this way:

> And I am a big journal person, so we write a lot at the beginning of class. We will do it may be a two-to-three minute jot it down/what do you think/how do you think this works/why do you think this happens this way? I also give journal quizzes throughout the unit.

The 8 AMSTI science teachers from the focus group discussions all described their use of notebooking or journaling as a vital part of their inquiry assessment process.

The fourth theme from research subquestion #2 was AMSTI science teachers in the focus group discussions detailed the vital role of the Science Course of Study correlations in their assessment process. For example, Lilly gave this description of the Science Course of Study and her AMSTI units, “Our [AMSTI] unit is fantastic. It [AMSTI units] is related to the Course of Study and everything.” Mia said:

> With our short periods, we do stuff the first day and I try to have a weekly objective in the Course of Study. Then I try to take those student objectives and give them a daily objective from the lab just to try to keep them on track. It keeps me on track and makes sure they [students] know what they are doing.

Ava illustrated the problems she experiences trying to completely cover the objectives of the Science Course of Study in this way:

> We usually spend about two-and-a-half to three-and-a-half days on each lab and it is a break neck speed. It really is. It is very quick. It is moving the kids through it but there is no way we can really cover the Course of Study if we don’t do that. It is very difficult. I don’t slack off the scientific method but a lot of times we’ll just do a scientific method every other lab just so we can get all of the concepts in. Because in three months, you have got to cover all of it. You have got to cover half of that Course of Study in three months not five [because of the amount of time testing in the spring takes]. So, it [inquiry learning] is very difficult but the kids love it!

The 8 science teachers who participated in the focus group discussions expressed the correlation of everything they do in their inquiry classroom to the Science Course of Study as an essential component of their assessment process.

While analyzing the group discussion data from research subquestion #2: What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences, four themes surfaced. First, these AMSTI science teachers found teacher generated resources and AMSTI resources an essential part of their assessment methods. Second, cooperative learning and its assessment was considered vital for their assessment process. Third, notebooking or journaling were illustrated as an important component of their assessment methods. Fourth, the correlation of all AMSTI materials to the Science Course of Study described as an essential component of the assessment process. The AMSTI science teachers expressed several key components for their assessment methods.

Research Subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?

The first emerging theme from research subquestion #3 was the most important guideline used by AMSTI science teachers when determining assessment methods is the Science Course of Study. The Science Course of Study is a document published by the Alabama Department of Education in which all the learning objectives for the science courses taught by school systems in the state are listed. For example, Lilly explained the Science Course of Study in this way:

> I use the language of the Course of Study. AMSTI actually uses energy conversions. I take that out and I tell my kids energy transformations because that is what my Course of Study says. I expose them to the other word, also. I use the exact things. Literally when I am talking about the stuff, I cover those [exact terminology from Course of Study]. Wherever I can fit in SATs, I do. I do check it [coverage of Course of Study objectives and SAT-10 objectives] off. That [Course of Study] is what I cover and everything else with SATs. I use this language [of the Course of Study and SATs]. The language that you see on [SAT-10] practice tests. I try to use the exact same language that they are going to see. It makes it more difficult but I tell my kids you know the 25 cent word and now you have to learn the five dollar word, you know the fancy word.

Isabella gave this meaning to the Science Course of Study:

> It [Science Course of Study objectives] is pretty much there. Now there are some objectives that are not covered in AMSTI. So, I will have to go back to the textbook or pull my own [teacher generated resources] but it [Science Course of Study] is pretty much covered. I want to say that 96% of it is covered in AMSTI. The other part that is not covered [by AMSTI]; it is my responsibility to make sure that I cover it through the textbook or through other technology and resources.

Of the 8 science teachers who participated in the two focus group discussions, all eight described the use of the Science Course of Study as the first guideline and most important guideline they used when developing assessments for their inquiry-based classrooms.

The second theme to come forward during the focus group discussions regarding research subquestion #3 was AMSTI science teachers place a varied meaning on their school systems' curriculum guides or plans and pacing guides. According to Lilly and Ava, their schools used a seven month plan after their schools did not meet AYP and were in School Improvement during the previous school year. Since her school met AYP for this school year, Ava described the use of the seven month plan as:

> We try to stick to the seven month plan [system generated document of when to cover each Science Course of Study objective] but they [students] are not [ready]. They [administration] are a little more flexible because they know we are covering our stuff [and we met AYP].

Lilly said, “We have a seven month plan but now that we are out of AYP it is a little more lenient.” Isabella described the meaning of her system’s continuum as:

> You have to follow that continuum [school system pacing guide and objective checklist] and the Course of Study. I try to pull in the Alabama High School Graduation Exam as I plan lessons. You’ve got to do that before you can go further. I have the Alabama Graduation Exam booklet that I use. Now, I do pull questions from if it pertains to me from that booklet [Alabama Graduation Exam booklet]. We [science teachers in this school system] got together a couple of years ago and used that [Alabama Graduation Exam booklet] to pull some questions and they are already on my tests.

Seven of the 8 teachers who participated in the focus group discussions discussed their use of a curriculum continuum or a pacing guide. All 7 of these teachers used the continuum and/or pacing guide/plan as a check list for the Science Course of Study and the different standardized tests for AYP. Two of these science teachers felt their schools’ administration was more lenient since the schools met AYP. AMSTI science teachers perceive different meanings for their school systems curriculum and pacing guidelines.

The third theme to surface from the group discussions regarding research subquestion #3 was a mixed view of the meanings of NCLB. For example, Sophia stated:

> It [NCLB] hasn’t affected science for me. It has affected math and reading but not science. Right now, the Alabama Science Test is not part of our accountability, as far as No Child Left Behind. That law doesn’t encompass science as yet [referring to AYP being based on SAT-10 scores in the state at this time. The ASA will eventually replace the SAT-10 for AYP in Alabama].

Isabella used this description of the meaning of NCLB:

> It [NCLB] has its good points but I am going to be honest now. I wouldn’t leave a child behind in the first place. I feel like I cater more to those children who are achieving at a low level. As a teacher, I don’t have the time or the energy to stimulate those who need to be pushed because I am spending so much time accommodating the work for these children [low level achievers]. I feel like it is not a good thing.

Isabella said:

> I don’t have the time or the energy to stimulate those who need to be pushed, because I am spending so much time accommodating the work for these children [special needs students due to NCLB]. And I feel like it is not a good thing. We have lowered our standards and I am not one to lower a standard but we had to because they [low level achievers] are included and they cannot be discluded. I think No Child Left Behind had a tremendous negative impact. Tremendously [negative]. I love having those children [low level achievers] and I love them being in here and I love them being able to do what we do but it is costly. We are not able to do [cover the content] because they hold us back and that is a sad, sad thing. If I had a child [low level achiever] as a parent, I would not want that child holding back a child who can far exceed what they are normally doing but I am sure I am the minority on that. We were looking back at where we were just last year [in content covered] and I have more [low level achievers] this year to deal with. Last year, we were on lesson #13 and now I am on #8. So, we are not getting any coverage. I find that I spend the majority of my class time with them [low level achievers] rather than where I need to be motivating and pushing [all students].

Ava stated:

> Standardized testing is killing any joy that these kids have in school. They hate it! I mean, it is horrible and it is hard on us [teachers] because there is stuff I would love to cover besides that stuff from the law [standardized test objectives for AYP]. I mean there is stuff that I feel in science that I really can’t spend a lot of time on because it is not on the item specs for a standardized test and NCLB says we have to meet AYP and AYP is decided in part based on the standardized tests.

Ava explained her frustration with NCLB in this way:

> [Teacher is referring to a comment made regarding students who are not prepared for her grade level science class because the student has be socially passed to the next grade level for several years] I do not understand how that is legal under No Child Left Behind because the child is not being retained in the 2nd or 3rd grade where they can’t read and forced to learn that knowledge, then go to the next grade and get that knowledge. Instead, they are pushed on to 4th grade and they didn’t learn 3rd grade [content]! They are not going to learn 4th grade and they are not going to learn fifth grade! It [socially passing students to the next grade at the elementary level] is doing a huge disservice to the student. It is going to hurt these kids and how is that not leaving a child behind?

Of the 8 teachers in the group discussions, 5 of these teachers felt that NCLB had not affected their inquiry classrooms. In contrast, 3 of these felt that NCLB had affected their inquiry classrooms. These 3 teachers were employed by schools that had not met AYP in the past and contained a large population of special needs students. The AMSTI science teachers from the focus group discussions either placed little meaning on the effects of NCLB or they placed tremendous meaning on the effects of NCLB in their inquiry classrooms.

The fourth theme from research subquestion #3 to be seen was AMSTI science teachers do not focus on the National Science Education Standards. They do not spend their time correlating assessments to the Alabama Science Course of Study and National Science Education Standards because they know AMSTI has completed this task for them. For example, Lilly during a group discussion used this description:

> It [Course of Study] just lines up well because it is the national standards and the national standards are a lot like Alabama. They [State Department] have rewritten them to make them more like the national standards.

Sophia provided this illustration:

> I think they [national standards] are embedded in our Course of Study also. I think our Course of Study was based on the national standards. So that is what I am trusting anyway, that they are based on national standards.

Furthermore, Sarah used this explanation, “I will look at the national standards to document it [for testing] but it [national standards] is embedded in our Course of Study.” Seven of the 8 AMSTI science teachers who participated in the focus group discussions expressed their lack of concern on the National Science Education Standards as a guideline regarding assessments because they felt these standards were embedded into other guidelines such as the Science Course of Study and the AMSTI unit objectives. One teacher communicated a lack of knowledge that National Science Education Standards were available for science teachers.

The fifth theme to come into view from the focus group discussions was AMSTI science teachers believe the guidelines of NCLB and AYP added tremendous pressure for teachers. For example, Ella explained the pressure she feels in this way:

> I mean that [AYP] is a pressure. We want to do our job and we want to do it right and we want our kids to succeed in science. They [the community] do look at it [AYP report card] and judge school at ballgames [school events]. So and so is in front of so and so [on the AYP report card].

Isabella described AYP pressure as, “It [AYP pressure] is society as a whole but it comes from your local and state levels. I mean, it [AYP pressure] is everywhere, your administration and your central office, it is a trickle-down effect.” Brayden expressed AYP pressure as, “You don’t know what all was invented [about students’ standardized test scores] in that [newspaper] story [on AYP] that came out in the paper. So, you feel pressure.” All 8 science teachers in the group discussions expressed some form of pressure due to the guidelines of AYP.

From research subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods, five themes were uncovered. First, AMSTI science teachers believed the Science Course of Study is the most important guideline for assessing inquiry learning. Second, AMSTI teachers felt their systems’ curriculum/pacing guides were used as a checklist for Science Course of Study objectives and standardized tests specifications. Third, these AMSTI science teachers either felt that NCLB had not affect on their inquiry classrooms or they felt

NCLB had tremendously affected their assessments for their inquiry classrooms. Fourth, these AMSTI science teachers considered the National Science Education Standards to be embedded into the Science Course of Study and the AMSTI objectives and did not specifically worry about these standards. Fifth, the AMSTI science teachers in the focus groups felt pressure from their communities, schools, school systems, and the state due to the guidelines of NCLB and AYP.

Research Subquestion #4: What do AMSTI science teachers find most helpful when determining assessment methods?

The emerging theme from research subquestion #4 was AMSTI science teachers find four resources the most helpful when determining assessment methods for inquiry learning. First, all eight AMSTI science teachers who participated in the focus group discussions expressed their teacher and student AMSTI resources as somewhat helpful when selecting and developing assessments. For example, Isabella said, “I use the AMSTI assessments at the end of the lesson.” While Ava said, “I use a lot of the ones [assessments] from the AMSTI book.” This teacher’s description was, “I use information from the lessons [AMSTI lessons].” Brayden expressed the use of AMSTI resources in this way:

> Most of our units [AMSTI resources] have a written test and then they have a lot of hands-on assessments. They always have an observation test where they watch how to make it work and then they have a written also that goes with it.

The AMSTI science teachers from the focus group discussions found the AMSTI teacher and student resources somewhat helpful when selecting and developing assessments but additional assessment resources are needed especially for fifth and sixth grades.

Second, 6 of the 8 AMSTI teachers from the discussion groups stated they found teacher generated resources most helpful when selecting and developing assessments. For instance, Sarah said, “I sometimes use some on my own [teacher generated assessments] that I have just made up myself.” Mia said, “I try to mix it where they can have vocabulary questions [teacher generated] with the AMSTI assessments.” Sophia stated, “A lot of them [assessment rubrics] I have come up with just on my own.”

Third, AMSTI science teachers from the discussion groups described the use of standardized tests item specifications as helpful when selecting and developing assessments for inquiry learning. For example, Sarah illustrated the use of standardized tests item specifications in this way:

> I try to pull from the ARMT [Alabama Reading and Math Test] specifications any type of ARMT questions that I can. And I use essay questions that are in ARMT format for my tests [All elementary teachers instruct reading]. We try to put them [assessment questions] in ARMT format to cover that part of it [practice for standardized testing].

Sophia commented:

> We [referring to the AMSTI science teachers at this teacher’s school] just used the disk we received with the item specifications for the Alabama Science Assessment some because we received the disk very late in the year. We plan to use the information on that disk more this year when we test our students.

Five of the 8 AMSTI science teachers who participated in the focus group discussions illustrated the use of item specifications for standardized test as helpful resources when selecting and developing assessments for inquiry learning.

Fourth, AMSTI science teachers from the focus group discussions explained the helpfulness of Internet resources and other supplemental resources during the selection and development of assessments for inquiry learning. For example, Brayden illustrated his use of the AMSTI website as, “You [AMSTI science teachers] could go in [AMSTI website] and pull questions and make your own tests.” Sarah expressed the use of Internet resources like this:

> You almost always have to supplement [AMSTI]. We [the AMSTI science teachers at this teacher’s school] spent the last two weeks working on different types of energy activities that come out of the science book [student AMSTI resource book]. But you [AMSTI science teachers] have just about always got to supplement with United Streaming or with Brain Pops and with other Web-based materials.

AMSTI science teachers who were part of the focus group discussions found other outside resources helpful during the assessment process. For example, Ava described the use of other resources in this way:

> There are lots of other books [not AMSTI or science textbooks] and stuff [workbooks] that you can get. I have got one that is a physical science workbook and it has got everything in it. It has got little worksheets that you can pull out and supplements in with it that you can take assessment questions from.

Four of the AMSTI science teachers who participated in the focus group discussions described their use of Internet resources and other outside resources as helpful when they selected and developed assessments for inquiry-based learning.

From research subquestion #4: What do AMSTI science teachers find most helpful when determining assessment methods, four themes surfaced during the data analysis phase. First AMSTI science teachers found the AMSTI resources fairly helpful but additional assessment resources are needed for fifth and sixth grades. Second, these science teachers found teacher generated resources most helpful when assessing inquiry learning. This is due to the fact that the AMSTI resources for fifth and sixth grade are limited. Third, AMSTI science teachers found the item specifications for standardized tests helpful when assessing inquiry learning. Fourth, these teachers found Internet resources and supplemental resources such as workbooks helpful for covering and assessing objectives not found in the AMSTI resources.

The themes discovered from the focus group discussions lead to two units of meaning for the overarching research question: How do fifth through eighth grade AMSTI science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes? First, AMSTI science teachers who participated in the focus group discussions employed a variety of essential assessment resources and methods. These resources included the Science Course of Study, teacher generated resources, AMSTI resources, standardized tests item specifications, Internet resources, and supplemental resources such as workbooks. Examples of assessment methods included cooperative learning checklists and project rubrics were used while notebooking and journaling were consider essential assessment methods. By using these resources and methods, AMSTI science teachers presented their students an authentic inquiry experience and prepared their students for success on the standardized tests of AYP. Second, these science teachers felt pressure from various sources to meet AYP. These sources of pressure included the teachers themselves, their schools' administration, school systems' administration, the state administration, and their communities. Third, some teachers felt NCLB had not affected their inquiry classroom while others felt a tremendous affect. These teachers were in schools that had not met AYP and had large populations of special needs students and/or low socioeconomic status students. The lived experiences of these AMSTI science teachers included a variety of assessment resources and assessment methods and specific meanings for the guidelines of NCLB and AYP used for their assessment processes.

Fifth Grade AMSTI Science Teachers Findings

Research Subquestion #1: What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?

The first theme to emerge from the data collected from fifth grade AMSTI science teachers was teachers enjoy inquiry learning and assess it with a variety of assessment methods and resources. For example, Jordan stated:

> To be absolutely honest, I hated teaching science before I got AMSTI. But now, it [AMSTI] changed the way I feel about science because I used to avoid it if I could. It was the last thing we did in the afternoons and I didn't spend a whole lot of time on it. Once I kind of got involved in it [AMSTI], it really changed how I thought about it [science]. The kids really enjoyed it.

Madison described her assessment of inquiry learning in this way:

> I use a lot of the AMSTI science [and its assessments]. For some assessments while they are doing that [researching or conducting lab activities], they can sketch. As long as they draw it, they can tell me what it is. Look at the difference between these two [refers to two students' assessment papers]. I can tell he has got everything in there. These are some of the things [assessments] they [AMSTI] provide us with the teacher materials.

In addition, she stated:

> I went through the Alabama Course of Study and looked at the objectives and one of the objectives was for students to be able to describe food chains or food webs. So, I really hit that hard. The textbook [system adopted science textbook] had some examples. I used that [system adopted science textbook] as a resource. As far as the assessments go, AMSTI didn't have what I considered the assessment that would correlate with the Alabama Course of Study. Considering our accountability [due to AYP] now, I felt like I needed to use those questions [from the Course of Study and the science textbook].

Fifth grade AMSTI science teacher found using a variety of assessment resources and methods as the structural design of their assessment process.

The second theme to appear from the fifth grade AMSTI science data was teachers design their AMSTI classrooms to include cooperative learning and its assessment. For example, Madison commented:

> When we did the terrariums, each group had two books per group. They had jobs assigned to them. There is a team captain. There is a getter who is the person that comes and gets all of the materials. There is a recorder so if there are any papers or questions that need to be answered or anything like that. We get in the groups. They have work stations in the classrooms. You can see where they are set up. The team captain assigns the jobs for the day. The getters come get their materials. It is really student self-sufficient. I really just go around and monitor to make sure that they are staying on task. I use a checklist to assess each group.

Sophia also described cooperative learning in her classroom in this way:

> I am sure fifth grade is different than sixth, seventh, or eighth but I know Ella and me, we put them [students] in groups. They have their little groups that they work with and they know exactly who is the getter, who is supposed to get what, who is the recorder, how they are supposed to keep everything in their notebook, and they talk to each other while they do it [the inquiry]. They have to share their experiences. They have to figure out the reason why we are doing it [inquiry lab] and I use a rubric to grade them.

Fifth grade AMSTI science teachers saw cooperative learning as a structural component of their assessment process for inquiry learning.

When reviewing the fifth grade data for research subquestion #1: What is the structural design of AMSTI science teachers' lived experiences with their assessment processes, the researcher discovered two themes. First, fifth grade AMSTI science teachers use a variety of assessment resources and methods for the structural design for assessing inquiry learning. Second, fifth grade AMSTI science teachers structurally designed their inquiry classroom to include cooperative learning and its assessment.

These fifth grade AMSTI science teachers viewed using a variety of assessment resources and methods and cooperative learning as part of their assessment process.

Research Subquestion #2: What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?

The first theme to emerge from the fifth grade AMSTI science teachers' data was teachers considered the Science Course of Study a vital component when selecting and developing assessment for inquiry learning. For example, Sophia stated, "We have to put them [Science Course of Study objectives] in our lesson plans now. It really changes making sure that we are covering everything." Madison stated her use of the Science Course of Study in this way:

> I went through the Alabama Course of Study and looked at the objectives and one of the objectives was for students to be able to describe food chains or food webs. So, I really hit that hard. The textbook [system adopted science textbook] had some examples. I used that [system adopted science textbook] as a resource. As far as the assessments go, AMSTI didn't have what I considered the assessment that would correlate with the Alabama Course of Study. Considering our accountability [due to AYP] now, I felt like I needed to use those questions [from the Course of Study and the science textbook].

Lilly used this description:

> I use the language of the Course of Study. AMSTI actually uses energy conversions. I take that out and I tell my kids energy transformations because that is what my Course of Study says. I expose them to the other word, also. I use the exact things. Literally when I am talking about the stuff, I cover those [exact terminology from Course of Study].

Fifth grade AMSTI science teachers considered the Science Course of Study as an essential component when assessing inquiry learning.

The second theme to surface from the fifth grade AMSTI science teachers' data was teachers considered supplemental resources such as science textbooks and Internet resources essential to assessing inquiry learning. With these resources in mind, Sophia stated:

> You almost always have to supplement [AMSTI units]. Our unit right now is solar energy. We spent last week and the week before in the science book [system adopted textbook] talking about different forms of energy because that is on the ASA [Alabama Science Assessment]. Our [AMSTI] unit only covers solar energy. You often have to supplement with United Streaming or with Brain Pops or with other materials because that is almost with every subject area [These are resources that cover a variety of subjects and are easy to use].

Lilly said,

> Mine [her students] are doing a paper right now on disease because that is a main activity and it is a homework option for two weeks. That way, I know they have covered that material. We have covered that on the Course of Study and we don't have to take time out of class. They did one day in the library [to use Internet resources] and then the rest of it is kind of on their own time. They have got their own set of maps [resource on how to complete the assignment] and then they write their paper.

Fifth grade AMSTI science teachers illustrated the use of supplemental resources when selecting and developing assessments as essential.

The third emergent theme from the fifth grade AMSTI science teachers' data was the use of standardized tests' item specifications, formats, and examples are essential components of assessing inquiry learning. Madison stated:

> I served on the ASA committee. They [Alabama Department of Education] have given everybody the items [items specifications for the ASA]. Those are the questions that I would just print off and put up on the screen [using a multimedia projector]. They are multiple choice [types of questions]. They correlate with what we have been talking about in class. I just use those [ASA sample questions] considering it [the ASA] is going to be multiple choice. They are not open-ended or anything. So I just use those questions [from the ASA examples] as my test questions.

Jordan described her use of the ARMT (Alabama Reading and Math Test) standardized test in this way:

> The ARMT thing [is stressed by school and system administration] because I have to do the ARMT part, too [ARMT does not cover science. It is covered in the ASA but elementary teachers all teach reading and they will use AMSTI as a resource for reading material]. So I pull questions from there [ARMT] but most of what I use for the AMSTI [tests] comes from what it is we experienced in class. I make the tests and change them. I keep my copy but I will look at it and say, we didn't really get that one [test question], so I will take that one [test question] out and not use it. I usually use what I see in class and what I feel like the kids can do. You have some groups you can challenge more than others. There are some things you just have to pull back with on those groups [ones you cannot challenge].

Jordan said, "They've [students] got to see a style of questioning [standardized test format] and I think that [using sample questions from the standardized tests of AYP] is the best way to do those [unit tests in the classroom]." Fifth grade AMSTI science teachers stated the use of standardized test item specifications, formats, and sample questions from the ASA and ARMT are essential during the selection and development of assessments for inquiry learning.

When reviewing fifth grade data for research subquestion #2: What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences, the researcher uncovered three themes. First, fifth grade AMSTI science teachers considered the Science Course of Study an essential component of their assessment methods. These teachers review the objectives of the Science Course of Study when they select and develop assessments for their inquiry learning classrooms. Second, fifth grade AMSTI science teachers stated supplemental resources like science textbooks and Internet resources are essential components of their assessment method. Because their AMSTI units do not include a variety of assessments, four of the five fifth grade teachers interviewed felt they needed to use supplemental materials for assessments. For example, Ella stated:

> Most of our units [AMSTI units] don't have tests that come with it. Or they may have a unit test and I just don't feel comfortable waiting until five weeks into it to give one big test. We break it [the units into small assessments] down. If they [AMSTI] have a test at all, it is usually a unit test [covering several weeks of information]. So, I use other materials for tests.

Third, fifth grade AMSTI science teachers regarded the use of standardized tests' item specifications, formats, and sample questions as essential components of their assessment process. These fifth grade science teachers used the information of the ASA and the ARMT in their assessment selection and development. The fifth grade AMSTI science teachers described the Science Course of Study, supplemental resources, and standardized tests' specifications essential components when selecting and developing assessments for their inquiry classroom.

Research Subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?

The first theme to emerge from the fifth grade science teachers' data was the Science Course of Study is an important guideline they use for assessments. For example, Madison stated, "I am driven by the Course of Study." Jordan said, "As far as my assessments I go back and look at those things [Science Course of Study objectives] more than anything." Fifth AMSTI science teachers rank the Science Course of Study as a very important guideline they use when assessing.

The second theme to surface from the fifth grade data was the meaning of the guidelines for NCLB have not changed the way fifth grade science teachers assess inquiry learning but they do feel the pressures of AYP. Sophia stated the following regarding NCLB:

> It [NCLB] hasn't affected science for me. It has affected math and reading but not science. Right now, the Alabama Science Test is not part of our accountability, as far as No Child Left Behind. That law doesn't encompass science as yet [referring to AYP being based on SAT-10 scores in the state at this time. The ASA will eventually replace the SAT-10 for AYP in Alabama].

Jordan commented this way on NCLB:

> It [classroom assessments since NCLB] has not really changed much. We met our standards and we are above and beyond where we are supposed to be. We [this teacher's school] have always been up there. We have not really worried so much about hitting AYP just maybe in attendance.

Madison said this about NCLB:

> I think that with having AMSTI, the No Child Left Behind, I think a lot of the needs are being met because it is hands-on. It is inquiry-based. I don't think it has really changed the way [I teach] but AMSTI has changed the way I teach. I don't think No Child Left Behind has changed a whole lot of the way I teach because I have your basic generic group of kids. I am not an inclusion classroom [no special needs students]. I have some gifted students and I have some lower achieving students but we don't have any that are on IEP [Individual Education Plan] right now. We do have some that are going through BBSST [Building Based Student Support Team which addresses at risk students] and we are doing those strategies. Like for one student, I have to read her test orally but it [NCLB] has not really changed our thinking a whole lot, as far as we are not slipping [with AYP] or anything.

However when asked about the guidelines of AYP, Ella said:

> I mean that [AYP] is a pressure. We want to do our job and we want to do it right and we want our kids to succeed in science. They [the community] do look at it [AYP report card] and judge school at the ballgames [parents talking at extracurricular activities]. So and so [school] is in front of so and so [school].

Sophia stated, "Everybody [in the community] wants to down talk [schools that don’t have favorable AYP report cards]. That [AYP] is a pressure.” Fifth grade AMSTI science teachers commented that the guidelines of NCLB had not changed the way they assess their inquiry classroom but they do feel the pressures associated with AYP.

The third theme to surface from the fifth grade AMSTI science teachers’ data was the belief that the National Science Education Standards are embedded into the Science Course of Study and AMSTI’s objectives. To illustrate, Lilly said, “It [Course of Study] just lines up well because it is the national standards and the national standards are a lot like Alabama. They [State Department] have rewritten them to make them more like the national standards. Ella commented, “AMSTI. That is just about all we do. I’ll be honest with you. The national standards, we are getting them, and I know it.” Sophia mentioned, “I think they [national standards] are embedded in our Course of Study also. I think our Course of Study was based on the national standards. I mean that is what I am trusting, anyway, that they are based on national standards.” Fifth grade AMSTI science teachers stated their belief that the National Science Education Standards are included in the Science Course of Study and the AMSTI objectives and therefore they were not worried about them.

When reviewing fifth grade data for research subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods, the researcher discovered four themes. First, the Science Course of Study was considered to be an important guideline in the assessment process for inquiry learning. Second, NCLB had not changed the way in which these science teachers assessed their inquiry classroom but they described the pressures felt due to AYP. Third, these science teachers stated their certainty that the National Science Education Standards were included in the Science Course of Study and the AMSTI objectives and as a result they gave little thought to these standards.

Research Subquestion #4: What do AMSTI science teachers find most helpful when determining assessment methods?

The first theme to emerge from the fifth grade science teachers' data was supplemental resources are helpful when determining assessment methods. From the data, the researcher found several examples of what these teachers considered supplemental resources to the resources provided by AMSTI. For example, the science textbook, United Streaming videos, Brain Pop software, and teacher generated assessments were listed by these teachers as supplemental resources. For instance, Madison stated, "We [fifth grade AMSTI science teachers at this school] pretty much use our own [teacher generated assessments] and it is working [students' ASA scores are high]." Sophia stated, "You often have to supplement with United Streaming or with Brain Pops or with other materials because that is almost with every subject area [These are resources that cover a variety of subjects and are easy to use]." Fifth grade AMSTI science teachers considered supplemental resources helpful when selecting and developing assessments for inquiry learning.

The second emerging theme from the fifth AMSTI science teachers' data was standardized tests specifications were helpful during the assessment process. These fifth grade teachers specifically mentioned the ASA, SAT, AHSGE and ARMT specifications as helpful when assessing inquiry learning. For instance, Jordan commented:

> Sometimes I just use the exact question [from the sample standardized test questions like SAT or ARMT] because there is just no other way around it [because of wording]. I will use a lot of the same questions or question types and reword it [the question] a little bit on my tests.

Jordan said:

> We had done that [ASA and AHSGE item specifications] earlier on in the year and it is just too much like the lens thing, convex and concave lens. The questions I had for samples were unbelievable and that was right before the test, so I guess they did okay on that part.

Fifth grade AMSTI science teachers found standardized test specifications helpful when selecting and developing assessments for inquiry learning.

When reviewing fifth grade data for research subquestion #4: What do AMSTI science teachers find most helpful when determining assessment methods, the researcher discovered two themes. First, the supplemental resources were considered helpful when selecting and developing assessments. Using the teachers' comments, the research found examples of computer software, teacher generated tests, science textbooks, and Internet websites as examples of supplemental resources. On the other hand, these science teachers do not mention AMSTI assessment resources as helpful. For example, Ella stated:

> Most of our units [AMSTI units] don't have tests that come with it. Or they may have a unit test and I just don't feel comfortable waiting until five weeks into it to give one big test. We break it [the units into small assessments] down. If they [AMSTI] have a test at all, it is usually a unit test [covering several weeks of information].

Second, fifth grade AMSTI science teachers found standardized tests' specifications helpful during the assessment process. These four teachers discussed the specifications of the ASA, SAT, AHSGE, and the ARMT. The ASA, the SAT replacement test for science in Alabama and the AHSGE both contain science content questions. The ARMT is a reading and math test but fifth grade teachers must instruct reading as well as science. They incorporate its item specifications in their science classes. Conversely, Jordan found other programs were not helpful for AMSTI science. She stated:

> The reading with ARI [Alabama Reading Initiative] is becoming overwhelming and it is taking away from the other subjects. I have struggled to get in my science and we have to cut social studies to two days a week, every week pretty much and that is so frustrating. Really and truly, should I cut science every once in a while [in order to get reading time in]. I am tested in science, so I can't do that. Our state department keeps piling more on us. We can't cut language because they are tested on the writing assessment. They have got too many things. They should have cut one or the other. There is no reason to pile science on top of fifth grade as well as the writing assessment test and SATs and ARMT. It is just too much on these kids.

Fifth grade AMSTI science teachers found supplemental resources and standardized test specifications helpful when determining assessment methods.

To address the overarching research question: How do fifth through eighth grade AMSTI science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes, data was analyzed from each research subquestion. From this data, three meaning units emerged which included the use of a variety of resources and methods and specific meanings for the guidelines of NCLB and AYP during the selection and development of assessments. First, fifth grade AMSTI science teachers discussed the use of a variety both traditional and inquiry-based assessment resources and methods. These resources included AMSTI resources such as books, teacher's editions, and websites, supplement resources such as science textbooks and workbooks, standardized tests' specifications for format and content, teacher generated resources such as tests, rubrics, notes, and PowerPoint presentations, and the Science Course of Study. In regard to the standardized tests' specifications, fifth grade science teachers focused on the ASA, SAT-10, ARMT, and AHSGE. Because all fifth grade teachers also teacher reading, these teachers include the ARMT in their discussions even though this test does not include any science content. Fifth grade science teachers used multiple formats on their assessments of inquiry learning including paper/pencil multiple choice, performance, observation, cooperative rubrics, and reading diaries. With the use of both traditional and inquiry-based assessment resources and methods, these teachers were able to provide their students with a genuine inquiry experience and prepare their students to succeed on the standardized tests of AYP. Second, fifth grade AMSTI science teachers expressed feelings of pressure to meet AYP from many sources. Third, the participating fifth grade AMSTI science teachers stated they had not changed their classroom instructional methods or assessments due to NCLB. The analysis of the fifth grade AMSTI science teachers' comments uncovered three units of meaning regarding their experiences selecting and developing assessment for inquiry learning.

Sixth Grade AMSTI Science Teachers Findings

Research Subquestion #1: What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?

The emerging theme from the sixth grade AMSTI science teachers' data was the use of a variety of assessment resources and methods. Taylor stated:

> I use the assessments that come with the AMSTI kit. There is always a paper/pencil assessment and an observation test. We are getting ready to do our storm assessment and I usually give the study guide before. They have a journal for everything that we do and from the very beginning of the year until the very end, they keep the journal. I do a book [using an AMSTI student book] test along the way and then we have a big assessment over the big topics because my kit I keep from August until December. It is a big box of stuff and it is set up in three sets. I have storms, earthquakes, and volcanoes that I teach. So at the end of about 8 to 12 weeks, we do an assessment and it is all over storms first. We will do the paper/pencil test first. The next day, I will bring in the hands-on and they have to write up their hypothesis and they will watch me do a demo and they have to write up their conclusion. The hands-on [assessments] are the ones that I love most! It is pretty neat that they can relate all that they saw to a brand new lab they have never seen and get it! They get why heat rises and that cool air sinks. It is pretty neat!

Abigail commented:

> We have notebook quizzes and that may consist of just making sure that the kids are following along, taking notes, doing the components, and answering the components. That [notebook quizzes] may just consist of what was the question for Lesson 2.1, what was your answer, what was your prediction and they have to fill that out. That is one way we check it, just to make sure that they are keeping up their notebook. Another way we assess [notebooks] is just the key terms and that is usually from the teacher's book [AMSTI teachers' resource book] because the student book stays with AMSTI. They can't keep the student book. So, I take the terms from the teacher's book. They can use their notebook [on the notebook quizzes]. On the terms assessments, they do learn the terms [not open notebook].

Sarah regarded her assessments in this way:

> Assessing inquiry tests–lots of observation. I do have check sheets and rubrics. As far as assessing the inquiries, I usually gather the main points they were supposed to learn and after we have had their own class discussion about what did we

> accomplish and what did we learn and why do you think that happened, I will do a little quiz on what we did. Then, you have to deal with kids who were absent. So, assessment is tough. You have to find ways to assess AMSTI.

Therefore, sixth grade AMSTI science teachers found the use of a variety of assessment resources and methods as the structural design of their assessment process.

Research Subquestion #2: What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?

The first emerging theme from the sixth grade AMSTI science teachers' data was AMSTI resources are an essential component of their assessment methods. According to Abigail, "Mainly, I would pull [assessments] from the AMSTI teacher's book." Taylor stated:

> They [AMSTI] made me a CD at my last training. I guess when I went to the teacher training, so I have got all of that [inquiry resources] on a disk and I can just pop that in. We have compiled a lot of the reading guides with the comprehension tests that come through there [the disc of resources]. We [AMSTI teachers at this school] have all made up questions and we compiled all of those and made fifteen or twenty-five questions for each learning guide. So that helps to get grades because you can't do everything. I get a lot of grades from that [the reading guides and comprehension tests]. I do a lab grade and I keep up with behavior based on them being on task and that's a grade.

Taylor said, "AMSTI, to me, does a pretty good job of including some pretty good assessments." Also, Abigail remarked, "We also have transparencies and other tools that come with the AMSTI kits. You may have some videos and you have questions with that video to ask. You make sure that they are watching the videos." Sixth grade AMSTI science teachers found the AMSTI resources an essential component of their assessment methods.

The second theme to surface from the sixth grade AMSTI science teachers' data was alternative assessments are an essential component of their assessment methods. For example, these science teachers use the assessment of projects, PowerPoint presentations, science notebooks, inquiry lab activities, and reading diaries crucial components of assessment. Taylor commented:

> I set up a composition notebook. We have a table of contents in the front and a glossary in the back just like a regular textbook. As we enter a lab, they enter it in the table of contents. They enter a page number and date and we go in and everything we do like questions, hypotheses, materials, procedures, conclusions, all of that is in their journal. About every two weeks, I make up a ten-or-fifteen-question test with questions like, on such and such date that we did this, what was your conclusion or what did you learn or what new question did you have after that lab? So, it [the assessment] makes them responsible. They are accountable and I can ask questions.

Taylor said:

> This week and last, we were getting ready for a chapter test and we ended one [chapter] with a test on the white board. I called out a problem and they wrote on their white board and I went around and checked. I think they do work harder when they have choices. Just like if they have a choice on a project. They can do either a poster or a PowerPoint. Just that choice–as long as they get to make that choice, they will work harder.

Sarah stated:

> There is one thing I have to help [with grades for inquiry] because you have to have grades and you have to have something to show on paper. I take all of the readings out of AMSTI's books, and I make a reading diary. All of us [AMSTI science teachers at this school] write along with the reading. They [the students] do that and that is for a daily grade. Then, we [AMSTI science teachers at this school] pull what is the most important stuff from that and I test them.

Taylor stated:

> We do a lot of diagramming in peer groups. We are always completing a KWL diagram. There is some kind of chart on my board all the time and the kids know they can look at it and tell you what they need. They can figure it out.

Isabella described her use of rubrics as an alternative assessment in this way:

> I was given these rubrics by a science teacher from Atlanta [Georgia]. When I went to a workshop, she gave me most of them [rubrics for inquiry] which was nice. A lot of them [rubrics] I have come up with just on my own. Some of them are AMSTI rubrics but most of them I got from her and they are pretty generic. You could use them with reading or language, social studies, or math. You could use them anywhere. You might have to change a few things but they are pretty basic. One of them [the rubrics] includes what is your purpose today, what are your main points of interest, what is your main idea. You could use that in math, you could use that in social studies, and you could even use it in English. Another [rubric] is what was your outcome, what did you learn, what did you hope to find out, what were some things that you were confused on. So, they [teachers] can use that anywhere. One rubric is what questions did you have, what are some questions that didn't get answered, and then it will have a little box with do you need to see the teacher and students check the box if they need to see the teacher. They like doing those because they are easy. They are easy, they are quick, they have gotten into a routine, they can feel them out really fast, and I can look at them quickly. Other rubrics, I score with a one, two, three, or four and it has just got a little key that tells you how well you worked with others because so many of these kids don't work will together. You've got three that do all the work and one that sits back and watches. So, it is amazing when they start scoring themselves and the people in their group they actually see sometimes well, I just didn't do my part. It holds them accountable and they actually see that for themselves. It didn't take somebody else telling them hey, I didn't do what I was supposed to do. They can see it on their own. So, they're [the rubrics] good.

Therefore, sixth grade AMSTI science teachers found the use of alternative assessments an essential component of their assessment method.

The third theme to come out of the sixth grade AMSTI science teachers' data was the use of teacher generated rubrics or checklists and oral assessments to evaluate cooperative learning are essential components of their assessment of inquiry learning. For example, Sarah said:

> The only way you can do it [assign grades] you can have observation grades from how they work in their groups and on the inquiry and have like those checklists that are either on paper or in your mind. What we do with pulling the information and making objective tests out of the information is really the only fair way to do it.

Abigail stated:

> Essentially, each [member of the group] has a job. You make sure that they are participating with the experiment. You give them a job and you make sure that everybody is doing their job. They will tell you, so and so is not doing their job. So that is when you talk to them about that [participating] and use a checklist to grade.

Isabella regarded cooperative learning assessments like this:

> Daily, they each have a piece of paper that they will fill out while they are waiting on me to come back to that group. They discuss it [the inquiry] and they all come up with an answer and most of the time you will have the same answers. There might be one or two that argue and say, no, that is not why that happened and that is okay if they are different because sometimes we are not always in agreement. It is pretty much just a participation thing and for me to see how much they are learning. I usually have about six of those [assessments] in six weeks.

Therefore, sixth grade AMSTI science teachers discussed the use of rubrics or checklists and oral assessments to evaluate cooperative learning as an essential component of their assessment process.

When reviewing sixth grade data for research subquestion #2: What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences, the researcher discovered three themes. First, these sixth grade AMSTI science teachers believed the AMSTI resources were an essential component of their assessment process. These teachers used the AMSTI resources to cover inquiry science content and to assess student understanding of the content. Second, these sixth grade teachers illustrated the use of alternative assessments as an essential component of assessing inquiry learning. They included the assessment of science notebooks, reading diaries, writings such as KWL (what I Know, What I need to know, and what I Learned), projects and PowerPoint presentations, and inquiry lab activities as critical components of assessing inquiry learning. Third, the sixth grade science teachers who participated in this study found cooperative learning and its assessment with rubrics or checklists and oral assessments an essential component of assessing inquiry learning. Sixth grade AMSTI science teachers stated AMSTI resources, alternative assessment methods, and the assessment of cooperative learning as essential parts of their assessment process.

Research Subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?

The first emerging theme from the sixth grade AMSTI science teachers' data was teachers know they must use the Science Course of Study when selecting and developing assessments. For example, Isabella described her use of AMSTI resources and correlation to the Science Course of Study in this way:

> It [Science Course of Study objectives] is pretty much there. Now there are some objectives that are not covered in AMSTI. So, I will have to go back to the textbook or pull my own [teacher generated resources] but it [Science Course of Study] is pretty much covered. I want to say that 96% of it is covered in AMSTI. The other part that is not covered [by AMSTI]; it is my responsibility to make sure that I cover it through the textbook or through other technology and resources.

Taylor stated, "I have to have the Course of Study on everything." On the other hand, Sarah's school system created a document to help teachers check off each Science Course of Study objective as they cover it in class. Sarah illustrated the document like this:

> I have been on the continuum alignment committee. We took what AMSTI had given us for how they [Science Course of Study and AMSTI unit objectives] aligned and made a check list for teachers to use. On our continuum [school system course objectives document], we have to fill out and we put which lesson meets that objective.

Abigail described her school system's documentation for the Science Course of Study like this:

> It [correlation between AMSTI units and the Science Course of Study] is really nice because someone went through and filled all that out for you. So, it is all correlated for us and you go through there and see each section that covers our continuum [school system document]. So, it is very nice. We met with curriculum mapping. We did this the past summer and so we each took a section. We also had an AMSTI map. So, we correlated SAT, ARMT, and AMSTI. We correlated all of that with our book [system adopted science textbook] and the Course of Study.

Therefore, sixth grade AMSTI science teachers placed an important meaning on the use of the Science Course of Study when determining assessment methods.

The second theme to appear with the sixth grade science teachers' data included the pressure teachers' face when addressing AYP. Taylor used this description:

> AYP is the sticker. We were on school improvement for a while. I guess it was year two because we had a huge population [special needs students] that takes all of the room for the other kids [regular ed students]. So those kids that small percentage, that you don't count, everybody else is counting. Because of that [a large special needs population], it is big. There is pressure. I don't know that I look at it every day. I try to put it behind me but I think they will get it later on. I did feel a little more pressure as far as, oh, I've got a meeting [IEP] I have to go to and I have to prove that I retaught [content]. So that is the big thing, I think. It is also good thing. We need checks and balances but we can go overboard, too. So, I think there is some pressure there to feel.

Isabella explained her AYP pressure with the inclusion of special needs students in this way:

> It [pressure] is society as a whole but it comes from your local and state levels. I mean, it [pressure] is everywhere, your administration and your central office, it is a trickle down effect. I think if more parents of regular educated children knew about the pressures and what actually went on in the classroom and how we are spending the majority of our time with those children [special needs students], it would be different. I think it would be a totally different ball game. I don't want to keep calling them those children [special needs students]. I am not trying to show differences here but there are differences. I don't think the real world out there knows how detrimental it is to our average and above average students.

> They [the public] have no clue. If I were not a teacher, I don't know that I would know because I am just assuming that my child is being afforded the opportunities that everybody else is and if I have a child who is gifted or who is very smart I am assuming that they are pushing him or her to all levels. I am assuming that but it is not happening. Because I do not have time, I can't do it. It is impossible. And I go home and stress over it but I can't fix it. You just go on and do the best you can.

Sarah illustrated her perception of AYP and the school's community with this statement:

> The parents don't understand those [AYP reports], of course. I think it makes a difference with families moving into the communities. The families that are concerned about their children and their education are going to look at those scores and decide, okay, we are going to build our house or buy our land or move into this community because of the scores that this school can get or we are NOT going to move into this community because of the school's scores. That is a fact of life if you are a concerned parent at all and if you are just moving into an area cold that is all you have to go by. You don't know who to talk to or whatever and that is all you have, just data.

Abigail described AYP in this way:

> It is a big part. This is a small community, and everyone knows the history or what this school has done in the past. It is just reality that gradually you are not seeing the over achievers that you used to. I don't know why. But it is a lot of pressure because as younger teachers, we always are worried about it because if the grades [scores on achievement tests] go down or if we don't meet AYP they are going to look at these younger teachers. They are not doing what they are supposed to. So it is very hard and stressful. There is more that they put on us every day.

With guidelines in mind, sixth grade AMSTI science teachers felt tremendous pressure concerning the guidelines of AYP.

The third theme to surface for sixth grade AMSTI science teachers' guidelines for assessment was the varied opinions on NCLB. These opinions oscillated between no affect on their assessment methods to many affects on their assessment methods. The research found that teachers from school who had not met AYP viewed NCLB negatively while teachers from school who met AYP viewed NCLB neutrally. For example, Isabella stated:

> My school did not meet AYP two years ago and we were on School Improvement. After that, I think it [NCLB] has its good points but I am going to be honest now. I wouldn't leave a child behind in the first place. I feel like I cater more to those children who are achieving at a low level. As a teacher, I don't have the time or the energy to stimulate those who need to be pushed because I am spending so much time accommodating the work for these children [low level achievers]. I feel like it is not a good thing. Before No Child Left Behind, my assessments were different for those children [low level achievers] but those children were in my science class. They have always been in my science class but now they are engaged more. I will put it that way. They are engaged more but you have to be very, very careful with what you are doing with them because of the dangers of it. Their assessment, I don't want to say they are different but they are different.

Abigail made this comment regarding NCLB:

> Well, we are in a different area [socioeconomic] here. Most of our children are at about the same level [achievement level]. We have one or two that are a little bit lower but they usually pick it up because when they work in a group that helps bring up the lower ones. They work in groups and they are learning from the higher [achievers]. I usually group mine with two higher [achievers] kids and two lower [lower achievers] kids. I usually see the lower [achieving] children are learning from the higher [achieving] kids. We used to talk about special ed but I don't have any special ed. We don't have any special ed in the sixth grade this year and we have never been on School Improvement. We have always met AYP. We worry about it [NCLB] because eventually it will catch up with us. We are not in that level just yet but it will catch up. It [NCLB] does make a difference. You start thinking about it a little bit more and you start trying new things just to see if you can get the deeper [content] have the kids think a little bit more about questions, instead of just a yes or no and because it says so.

Taylor stated:

> I have special ed kids. That is just my lot in life. But my school has always met AYP. So, truthfully, it [NCLB] has not changed at all with AMSTI, because my low end [low achieving] kids get it before my high end [high achieving] kids because they see it, touch it, taste it, feel it. Those kids [low achieving] really do better in my science class than the kids [high achieving] that need the concrete black and white words.

Therefore, these sixth grade science teachers had varying opinions on NCLB which depended on whether or not their school had met AYP.

The fourth theme to emerge with the sixth grade AMSTI science teachers was the meaning of the National Science Education Standards. Two of the four teachers believed these standards were important and that they were embedded into the Science Course of Study and the AMSTI objectives. They did not worry about the national standards in their assessment process. The other two teachers expressed a lack of knowledge about the National Science Education Standards. For instance, Sarah said, “I will have to look at the national standards to document it [for testing] but it [national standards] is embedded in our Course of Study.” Taylor described her use of the national standards in this way:

> I have honestly not looked at it [national standards] that much. I guess maybe it is because I am 1 6th certified [teacher certificate is for grades 1 to 6 only]. I have never had any formal science classes. For 7 years I taught third grade and we barely could get science in. When I came to sixth, I was able to focus on the science but still, I did not use that [national standards] a lot. We have a copy of it [National Science Education Standards] and I know where it is at and I could go get it if I need it but I just use the pacing tool [school system document] a lot.

Isabella stated this regarding the national standards:

> I wasn’t even aware of that [National Science Standards]. I mean, I knew [about them] but I don’t know that much about the National Science Education Standard. I wouldn’t know even where to go pull those up. I guess I could find it.

Therefore, sixth grade AMSTI science teachers either lack knowledge on the National Science Education Standards or they understand these standards are embedded into the Science Course of Study and the AMSTI objectives.

When reviewing sixth grade data for research subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods, the researcher discovered four themes. First, sixth grade AMSTI science teachers believed they must use the Science Course of Study when determining assessment methods for their inquiry classroom. Second, sixth grade AMSTI science teachers felt pressure due to AYP guidelines. Third, these science teachers had varied opinions on the guidelines of NCLB that stemmed from their school meeting AYP. Fourth, these sixth grade teachers either believed the National Science Education Standards were embedded into the Science Course of Study or they had limited knowledge of these standards.

Research Subquestion #4: What do AMSTI science teachers find most helpful when determining assessment methods?

The first emerging theme from the sixth grade AMSTI science teachers' data was AMSTI resources are most helpful when determining assessment methods. According to Taylor:

> Some hands-on [assessments]. They [AMSTI] give you a paper/pencil [assessment] and then they give you some alternates [assessments] that you can do. Not every assessment has two or three different ideas but I use the ones that are in there [AMSTI resources] and they are pretty good. I have come up with a few [assessments] of my own with higher order questions. But it [the assessment] can be just anything from them actually doing a new lab, to me doing a demo and them writing up what they saw happen and they relate it back to the storms.

Abigail stated, "Another way we assess [notebooks] is just the key terms and that is usually from the teacher's book [AMSTI teachers' resource book] because the student book stays with AMSTI." Therefore, sixth grade AMSTI science teachers find the AMSTI resources helpful when determining assessment methods.

The second theme to surface from the sixth grade data was alternative resources are very helpful when determining assessment methods. These alternative resources included PowerPoint presentations, Internet resources, and science textbook resources. Abigail discussed her use of teacher generated PowerPoint presentations by saying:

> I also have PowerPoints that I have created for research that I have done and some other teachers throughout the county. We [AMSTI science teachers] usually meet especially when you go to the AMSTI training. They [AMSTI science teachers] share PowerPoints and other materials. So we pull together.

Sarah added this comment:

> There is one thing I have to help [with grades for inquiry] because you have to have grades and you have to have something to show on paper. I take all of the readings out of the AMSTI books, and I make a reading diary. All of us [AMSTI science teachers at this school] write along with the reading. They [the students] do that and that is for a daily grade. Then, we [AMSTI science teachers at this school] pull what is the most important stuff from that and I test them.

Taylor described her use of Examview Pro, a software program included in her science textbook resources in this way:

> I have Exam View [science textbook software assessment data bank] from my old textbook [school system adopted science textbook] and I pull questions from that. I make up my own questions from the readings in AMSTI textbooks. I pull questions from the paper/pencil assessments that are given [in AMSTI teacher resource book] and a lot of times the kids think up questions. We were talking about el Niño today, and they have to make up five questions with the answers. I usually compile those and I take the best and I put them back out there as questions [on a test]. They [the students] usually come up with harder questions than I can! They are much pickier and want the finite details where I would have put a general question. They will get really specific.

Taylor also commented on her use of Internet resources by saying:

> Now I use Ed Helper [Internet resource] and I pull reading passages, things that might clarify a concept that might be hard. United Streaming [Internet resource]– we do those little videos and the quizzes and study guides. We do that [use Internet resources]. AMSTI, to me, does a pretty good job of including some pretty good assessments. I don’t have time to go back and recreate but the Ed

> Helper and the United Streaming does help and there are some really good videos. They [students] can see the things and then take a quiz on it right then.

As a result, sixth grade AMSTI science teachers found alternative resources such as PowerPoint presentations, science textbooks, and Internet resources as helpful when determining assessment methods.

After reviewing sixth grade data for research subquestion #4: What do AMSTI science teachers find most helpful when determining assessment methods, the researcher discovered two themes. First, the AMSTI resources were considered helpful when sixth grade teachers were selecting and developing assessments. Second, alternative resources were listed by these sixth grade teachers as helpful when determining assessments. Sixth grade AMSTI science teachers listed PowerPoint presentations, science textbook resources, and Internet resources as examples of alternative resources. On the other hand, Sarah discussed to issues that were not helpful in the assessment process. She stated a lack of science class time as detrimental to inquiry science and its assessment, “Sometimes, we [elementary teachers] have to compact two lessons one day due to library or something else. So it is not just a science class.” Sarah discussed a lack of AMSTI student resource books like this:

> I wish we had enough of them [AMSTI student resource books]. I wish when they gave us our kits, they [AMSTI] gave us more copies of the student book because I only got eight books and I have got 25 kids. So I copied what I felt was most important. I share the books [and/or copies] with the other sixth grade AMSTI teachers.

The two themes surfacing from the research data for research subquestion #4 was the AMSTI resources and alternative resources are helpful when determining assessments for sixth grade AMSTI science.

After analyzing the data from the sixth grade AMSTI science teachers, three units of meaning emerged addressing the overarching research question: How do fifth through eighth grade AMSTI science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes? First, sixth grade science teachers used a variety of resources and teacher generated resources and assessment methods. In order to give their students a genuine inquiry experiences and the skills needed to succeed on AYP standardized tests, these AMSTI science teachers used both inquiry-based and traditional assessment resources and methods. The resources discussed by the sixth grade science teachers included the ARMT, AMSTI books, and science textbooks while the assessment methods included cooperative learning assessments, notebook assessments, reading diaries, observations, oral assessments, and traditional paper/pencil assessments. Second, sixth grade teachers feel pressure from many sources to meet AYP from many sources including themselves. Third, half of the sixth grade teachers discussed changing their assessment methods since the implementation of NCLB. These teachers' stated their classroom population included several low achieving or special needs students and students with low socioeconomic status.

Seventh Grade AMSTI Science Teachers Findings

Research Subquestion #1: What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?

The first emerging theme from the seventh grade AMSTI science teachers' data was a variety of assessment resources constructed the structural design of their assessment process. For example, Riley described his use of teacher generated PowerPoint presentations with AMSTI lessons in this way:

> We will start with a demo period–a demonstration. It [the demonstration] can be as small as a match which leads us to talk about kinetic energy. We strike the match, let it burn down, and talk about how the energy was lost. From there, I do PowerPoints, very interactive PowerPoints. We discuss things and I ask questions. We have a review time. Sometimes I use notes so I can judge whether they understand the content. Today, we took our AMSTI lesson we are on and we conducted an inquiry.

Mia explains her use of AMSTI resources as:

> I use a lot of the ones [assessments] from the AMSTI book. The seventh grade has really good, practical type questions where they have to apply what they have learned. They have to look at a diagram and tell me the function of the liver or look at a diagram and tell me what is happening molecule wise. There are a lot of graphs they have to interpret or data tables they have to look at and tell you what happened. We also try to do some vocabulary. I try to mix it where they can have vocabulary questions with the AMSTI assessments. That way, I am getting not just some vocabulary background but I am getting what they actually learn [about] the concept. Actually, the seventh grade [AMSTI resource books] really has good assessments and we use a lot of those. We do short ones [assessments] and sometimes, we will just pull out five questions and do a little short quiz on one [inquiry] just to see if they have the concept. If they don't, I can go back and reteach it. That is usually what I use.

Seventh grade AMSTI science teachers described their use of AMSTI resources and teacher generated resources during their assessment process. Of the 4 seventh grade science teachers who participated in this study, three expressed the use of teacher generated resources such as rubrics and PowerPoint presentations. Also, 3 of the 4 seventh grade AMSTI science teachers discussed to use of AMSTI resources during their assessment process. Therefore, the first theme was seventh grade AMSTI science teachers used a variety of resources for their assessment process.

The second theme to surface from the seventh grade teachers comments was they use a variety of assessment methods for their assessment process. For instance, Emily stated:

> We do have quizzes and we do have tests. I try to make most of them [questions] open ended. We do a lot of performance based assessment. I do a lot of notebook grades. I grade them on their conclusions because I want to make sure that they learned what they were supposed to learn. We have all kinds of different quizzes. Sometimes they have even had to identify the organisms that they are supposed to identify [in the lab]. My two major types of assessment other than the quizzes and the tests (I try to make them [test questions] more open-ended) are performance based and notebooks.

Mia explained her assessment methods in this way:

> That [assessments] is the hardest thing in AMSTI. I am getting better each year. I am trying to do a lot of questions during class to just kind of feel around [figure out student comprehension]. I try to go with the groups and sort of check what they are writing. I'm trying to do more 3, 2, 1s those quick writes at the end to sort of see where they are. Then, we try to do a quiz or short test after about three or four labs. That way, they are not doing [taking a test] eight labs of digestive system all at once. It is just too much information. I am kind of struggling with some of my things [assessments] right now and working in more little quick assessments because I don't have time in 50 minutes to give them one every day. So I try to give them something at the end of each lab and have them to write or tell me what they did. I think if we have a longer period next year, I will have more time to make them tell [what they learned] me in their groups. I am also trying to do thinking jobs. Along with their other roles [in groups], they have to be the hypothesis grader that tells the class [what happened in the lab] or someone has to summarize what they did or if it [the lab] didn't work, why did it not work or what they think went wrong. I am trying to do a little bit more of an oral assessment type thing. I am trying to just check more if they got it [the concept].

All 4 AMSTI science teachers discussed the use of a variety of assessment methods for their assessment process. These methods included oral assessments, paper/pencil multiple choice tests, quizzes, traditional tests, performance assessments, and notebook tests. Therefore, the seventh grade science teachers used many methods during their assessment process.

While analyzing the data for seventh grade AMSTI science teachers, the researcher discovered two themes. First, AMSTI seventh grade science teachers use a variety of resources during their assessment process. These resources included AMSTI resources, teacher generated resources such as rubrics, tests, checklists, PowerPoint presentations, and notes, and the Science Course of Study. Second, these seventh grade teachers used a variety of assessment methods. For example, they used oral assessments, performance assessments, paper/pencil tests, quizzes, notebook tests, and traditional tests. Therefore, the two themes regarding the assessment process of seventh grade AMSTI science teachers uncovered from research subquestion #1 were the use of a variety of resources and a variety of methods.

Research Subquestion #2: What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?

The first theme uncovered was seventh grade AMSTI science teachers found the AMSTI resources and teacher generated resources an essential component of their assessment methods. For example, Riley explained the use of the AMSTI summer training as:

> I have been through the summer's training for seventh grade. It has been a great experience. They provide us with a lot of resources for assessments as well as the inquiries. It has been an excellent year so far. The kids are learning. One of the main things is a lot of my students have a hard time with what we are studying. They need help with their book work. Once we got started with AMSTI, they have been helped.

Mia used this description:

> I use a lot of the ones [assessments] from the AMSTI book. The seventh grade has really good, practical type questions where they have to apply what they have learned. They have to look at a diagram and tell me the function of the liver or look at a diagram and tell me what is happening molecule wise. There are a lot of graphs they have to interpret or data tables they have to look at and tell you what happened. We also try to do some vocabulary. I try to mix it where they can have vocabulary questions with the AMSTI assessments. That way, I am getting not just some vocabulary background but I am getting what they actually learn [about] the concept. Actually, the seventh grade [AMSTI resource books] really has good assessments and we use a lot of those. We do short ones [assessments] and sometimes, we will just pull out five questions and do a little short quiz on one [inquiry] just to see if they have the concept. If they don't, I can go back and reteach it. That is usually what I use.

Emily said:

> We have a teacher guide with AMSTI and it is awesome. We have a study guide that I will pull questions from. Most of them are teacher generated, though. I'll be working on that [an assessment data base with AMSTI] this January or February. All day training on evaluation. AMSTI teachers are going to generate questions. They are going to put it on the AMSTI.org and you [AMSTI teachers] can pull questions from that.

All 4 seventh grade teachers who participated in this study illustrated their use of the AMSTI resources and teacher generated resources. Therefore, seventh grade AMSTI teachers found the AMSTI resources as essential components for their assessment methods.

The second theme to emerge from the seventh grade teachers' data was cooperative learning and its assessment are essential to their assessment methods. For instance, Emily explained her use of cooperative learning as:

> I will guide them. At the beginning, I will set up a data table or a graph or whatever I want them to do but after probably about three inquiries, they are on their own there. They do their conclusions on their own. They do work in groups! They always pair up but they almost always work in groups. I use a checklist to grade the groups.

Mia expressed her interest in using cooperative learning in this way:

> I think if we have a longer period next year, I will have more time to make them tell [what they learned] me in their groups. I am also trying to do thinking jobs. Along with their other roles [in groups], they have to be the hypothesis grader that tells the class [what happened in the lab] or someone has to summarize what they did or if it [the lab] didn't work, why did it not work or what they think went wrong. I am trying to do a little bit more of an oral assessment type thing. I am trying to just check more if they got it [the concept].

Of the 4 participating seventh grade teachers, all four illustrated the use of cooperative learning and its assessment as an essential part of their assessment process.

The third theme to surface from the seventh grade teachers included notebooking as an essential component of the assessment process. Riley described her use of notebooking in this way:

> We [in this class] have a composition notebook. At the top [of the first page] is the title of the lab for the day. I give them a question or for the next 2 to 3 weeks, I will let them formulate the question. I guide their progress and they have to form a hypothesis and they have to use it. Then, they have their plan section and all their materials where they write down all we did in explicit details. With the observations, they will tell me what happened. In their conclusion, they have to give me three important facts, two interesting details, and one question. And I grade the conclusion.

Riley stated:

> I check their notebook. I will have them paste in a reading. They have highlighters and they highlight the hypothesis orange. As I go through, I will check it [hypothesis] off and they get a grade. I may check one lab today and then next week, I may check something else. They always know to be prepared.

Mia explained her use of notebooking as:

> We do a lot of the notebooking. With our short periods, we do stuff the first day and I try to have a weekly objective in the Course of Study. Then I try to take those student objectives and give them a daily objective from the lab just to try to keep them on track. It keeps me on track and makes sure they [students] know what they are doing. We will do our question or purpose. It's an easy way to grade labs [notebooking].

Three of the 4 seventh grade teachers from this study expressed the use of notebooking as an essential component of their assessment process.

The fourth theme to emerge from the seventh grade data was AMSTI science teachers viewed the use of standardized tests' item specifications as essential to their assessment process. For example, Riley stated:

> I have that [the AMSTI resource books] and I have also made up my own questions to go with each standard [on the SAT-10 and ASA]. When I have seventh grade [teacher instructs both seventh and eighth grade AMSTI science], I am going to have cards and use them as practice questions every day.

Emily explained her use of standardized tests' item specifications in this way:

> There was a new test this year [2007-2008 school year], the ASA (Alabama Science Assessment). I believe there are eleven standards that they have to meet [on the ASA]. We would do a bell ringer based on those eleven standards. I really tried to drill that [the ASA standards] all year long. We did multiples with the eleven standards on different tests. After that [the bell ringer], the kids come in and they hand out the notebooks [science notebooks] and AMSTI [student resource] books.

Two of the 4 seventh grade AMSTI science teachers expressed their use of standardized test specifications as essential components for the assessment process.

When reviewing the seventh grade data for research subquestions #2: What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences, the research found four themes for the essential components of the assessment process for AMSTI science teachers. First, the AMSTI resources and teacher generated resources were essential components. The AMSTI resources included summer training, inquiry lab activities, databases for tests questions, and tests while the teacher generated resources included rubrics, PowerPoint presentations, checklists, and tests. Second, cooperative learning and its assessment was essential for the assessment process. All 4 seventh grade science teachers placed their students in cooperative groups during inquiry labs and assessed the group participation with a rubric or checklist. Third, these teachers stated that notebooking was essential to their assessment process. Fourth, standardized test specifications were viewed as essential parts of the assessment process. Seventh grade teachers were concerned with the item specifications for the ASA and the SAT. Therefore, seventh grade AMSTI science teachers revealed four essential components to their assessment process.

Research Subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?

The first theme was seventh grade AMSTI science teachers stated the Science Course of Study was the most important guideline they used to determine their assessment methods. For example, Mia described her use of the Science Course of Study in this way:

> We [the AMSTI science 7 teachers at this school] try to make sure that weekly objective come from the Course of Study. On the tests, we try to make sure that [assessment questions] fits in the Course of Study. I am lucky that a lot of it [AMSTI objectives and Course of Study objectives] fits. If it [AMSTI unit] doesn’t, we will add a few questions that do fit with the Course of Study.

Riley said, “We have a Course of Study. We are expected to get through with every objective and everything we cover to that standard.” Of the four seventh grade AMSTI science teachers who participated in this study, all four expressed the importance of the Science Course of Study as they determine their assessment methods. Lilly also commented on her school system’s seven month plan which was used a pacing guide for the Science Course of Study. She said, “We have a seven month plan but now that we are out of AYP it is a little more lenient.” Lilly was the only seventh grade teacher who discussed the use of a pacing guide in regard to the guidelines used to determine assessment. The Science Course of Study was considered the most important guideline AMSTI science teachers used when determining assessments for inquiry classrooms.

The second theme to surface was the National Science Education Standards are embedded into the Science Course of Study and the AMSTI objectives. Emily expressed her concern over the national standards as:

> I do not really use the national standards. I do not go to the websites and print them [national standards] off and evaluate them every day because I feel like if I teach AMSTI and I teach it the way it is supposed to be taught, then they [students] are getting those standards or at least those standards are being taught. We look at all of these different modules like organisms and the human body for seventh grade or properties of matter for eighth grade and we look at them and we think AMSTI and we think Alabama [Course of Study].

Lilly said, “It [Course of Study] just lines up well because it is the national standards and the national standards are a lot like Alabama. They [State Department] have rewritten them to make them more like the national standards.” All four AMSTI seventh grade science teachers expressed a lack of concern for the national standards because they believed these standards are entrenched within the Science Course of Study and the AMSTI objectives. AMSTI seventh grade science teachers did not consider the National Science Education Standards when determining assessments for their inquiry classrooms.

The third theme to emerge was AMSTI seventh grade science teachers’ experiences with NCLB vary but they do feel pressure to met AYP. Emily explained her experiences with NCLB in this way:

> I cannot say that it [NCLB] has really changed anything. I feel like when I first started teaching, if I had continued that way with the lecture and all that, it would have changed that because so many kids were getting left behind and it would have changed that method. With the inquiry, with AMSTI, and all the other different activities I do, they even become problem solvers. With all of that, I think the kids are getting it more. Do I still have kids that fail, definitely? But do they fail because they do not understand it [science concept] or do they fail because they do not want to do the work? When I talk to them one-on-one, they get it. They just don't want to do the homework and they don't. Sometimes you give a test and they just don't want to do it. They leave it blank. I think this year we only had two students who failed because there were other issues. I think [with] AMSTI and all the other inquiry-based activities that I do, the kids are getting it [science concepts]. I don't feel like they [students] are being left behind. I don't feel like there is anything else that I need to do because I think they are okay. I know that nobody has approached me and told me that I need to be doing it differently.

Lilly said this about NCLB:

> It [NCLB] has changed the way I teach. We are holding back [because of NCLB], I feel, and most of the teachers I talk to, feel that we are holding back the upper level, gifted kids so that we can pull up kids who will never get it. Just two years ago, I had kids and there were twenty-two in my special ed class and seven or eight of them read on a second grade level–or lower. I had several nonreaders. What do you do with that? Imagine trying to teach momentum and force and they [students] don't have the math background.

Of the comments concerning NCLB, 2 of the seventh grade science teachers commented that they had not experienced any changes in their instructional or assessment methods due to NCLB. These 2 science teachers taught in schools which have never failed to meet AYP, have a small population of special needs students, and a majority population of high socioeconomic students. The other 2 science teachers expressed changes in their instruction and assessment of inquiry learning due to NCLB. Both of these science teachers taught at schools that have failed to meet AYP, have a large population of special needs students, and a majority population of low socioeconomic students. All 4 seventh grade AMSTI science teachers commented on the pressure they feel to meet

AYP. They contributed this pressure to the judgments arising from their communities and schools. Therefore, seventh grade AMSTI science teachers described the pressures they felt due to AYP and their varied experiences with NCLB when determining assessments for their classrooms.

With the analysis of seventh grade science teachers' data for research subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods, three themes emerged. First, seventh grade AMSTI science teachers expressed the importance of the Science Course of Study when determining assessments for their classrooms. All 4 seventh grade teachers who participated in this study described the Science Course of Study as the most important guideline they used when determining assessments. Second, seventh grade AMSTI science teachers are not concerned with the National Science Education Standards. These science teachers understood the national standards were embedded into the Science Course of Study and the AMSTI objectives and therefore, they do not worry about this guideline when they are determining assessment methods. Third, these seventh grade science teachers expressed varied meanings for the guidelines of NCLB but all 4 describe the pressures they feel to meet AYP. Two of the 4 seventh grade teachers felt NCLB had not affected the way they determine assessment methods while the remaining 2 teachers felt NCLB had affect the way they determine assessment methods. As a result, three themes surfaced from the data for research subquestion #3 regarding the meanings AMSTI science teachers place on the guidelines used to determine assessments.

Research Subquestion #4: What do AMSTI science teachers find most helpful when determining assessment methods?

The first theme to surface from the seventh grade AMSTI science teachers' data was the AMSTI resources are helpful when determining assessment methods. Emily gave this comment on the helpfulness of AMSTI resources, "We have a teacher guide with AMSTI and it is awesome." In addition, Lilly described the helpfulness of AMSTI's correlations to the Science Course of Study as, "It [correlation between AMSTI units and Science Course of Study] does for us. Ours correlates nicely–better than theirs [referring to another grade] does. Ours correlated almost to the T." Riley explained the helpfulness of the AMSTI summer training as:

> I have been through one summer's training for seventh grade. It has been a great experience. It has been an excellent year so far. The kids are learning. One of the main things is a lot of my students have a hard time with what we are studying. They need help with their book work. Once we got started with AMSTI, they have been helped.

Of the 4 seventh grade AMSTI science teachers who participated in this study, all 4 discussed the helpfulness of AMSTI resources such as summer training, equipment, correlations to the Science Course of Study, and the teacher and student resource books. Seventh grade AMSTI science teachers found AMSTI resources helpful when determining assessment for inquiry learning.

The second theme to emerge was seventh grade AMSTI science teachers found teacher generated resources helpful when determining assessments for their inquiry-based classrooms. Emily said, "Most of mine [assessments] have been teacher generated and using the teacher guide and the student guide and projects. Rubrics, I have created my own." Mia expressed the helpfulness of her teacher generated notes as:

> They need notes and so I have tried to supplement with more notes. At the end, I will cut out a diagram, we will glue it in their book, and they will color or label. I have done some data tables where we cut out and put it in their notebooks and that helps to give them something to study from.

All 4 seventh grade science teachers conveyed the helpfulness of teacher generated resources. These resources included PowerPoint presentations, notes, tests, rubrics to assess notebooks and cooperative learning groups, research projects, and homework options. Seventh grade AMSTI science teachers found teacher generated resources helpful when determining assessments for inquiry learning.

The third theme regarding research subquestion #4 was the use of notebooking when determining assessment methods. Emily said, "I do a lot of notebook grades. I grade them on their conclusions because I want to make sure that they learned what they were supposed to learn. We have all kinds of different quizzes." Three of the 4 seventh grade science teachers discussed the usefulness of notebooking in determining assessments for inquiry learning.

The fourth theme uncovered was the usefulness of standardized tests' item specifications. Riley expressed his use of item specifications as:

> I have that [the AMSTI resource books] and I have also made up my own questions to go with each standard [on the SAT-10 and ASA]. When I have seventh grade [teacher instructs both seventh and eighth grade AMSTI science], I am going to have cards and use them as practice questions every day.

Lilly discussed her use of SAT-10 specifications as:

> Wherever I can fit in SATs, I do. I do check it [coverage of Course of Study objectives and SAT-10 objectives] off. That [Course of Study] is what I cover and

> everything else with SATs. I use this language [of the Course of Study and SATs]. The language that you see on [SAT-10] practice tests. I try to use the exact same language that they are going to see. It makes it more difficult but I tell my kids. You know the 25 cent word. Now you have to learn the five dollar word. You know the fancy word.

Three of the 4 seventh grade science teachers who participated in this study expressed the usefulness of standardized tests' item specifications. For seventh grade science teachers, the item specifications they focused on were SAT-10 and ASA. Therefore, seventh grade AMSTI science teachers found standardized tests' item specifications helpful when determining assessment methods.

The fifth theme was seventh grade AMSTI science teachers found the Science Course of Study helpful when determining assessment methods. Lilly said:

> I use the language of the Course of Study. AMSTI actually uses energy conversions. I take that out and I tell my kids energy transformations because that is what my Course of Study says. I expose them to the other word, also. I use the exact things. Literally when I am talking about the stuff, I cover those [exact terminology from Course of Study].

Of the four seventh grade science teachers that participated in this study, three teachers described the helpfulness of the Science Course of Study when they determined their assessments.

With the analysis of research subquestion #4 for seventh grade AMSTI science teachers, the researcher uncovered five themes. First, these science teachers found the AMSTI resources helpful when selecting and developing assessments. All four seventh grade teachers described the usefulness of the AMSTI resources. Second, these teachers found teacher generated resources helpful. These resources included PowerPoint presentations, tests, notes, research projects, and homework options. Third, seventh grade

AMSTI science teachers expressed the helpfulness of notebooking when assessing inquiry learning. Fourth, seventh grade science teachers also stated the usefulness of standardized tests' item specifications such as the ASA and SAT-10. Fifth, all four seventh grade science teachers found the Science Course of Study helpful when determining assessment methods.

After analyzing the data from the seventh grade AMSTI science teachers, three units of meaning emerged addressing the overarching research question: How do fifth through eighth grade AMSTI science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes? First, seventh grade science teachers used a variety of resources and methods when assessing inquiry learning. Seventh grade AMSTI science teachers used both inquiry-based and traditional assessment resources and methods in order to provide their students with authentic inquiry experiences as well as the experiences needed to succeed on the standardized tests of AYP. The resources included the ASA specifications, AMSTI books, and teacher generated resources. The assessment methods included cooperative learning assessments, notebook assessments, observations, oral assessments, performance assessments and traditional paper/pencil assessments. Second, seventh grade teachers feel pressure from many sources such as their schools, school systems, the state, and the community to meet AYP. Third, half of the seventh grade teachers discussed changing their assessment methods since the implementation of NCLB. According to these seventh grade teachers, their classroom contained many students who were lower achieving and had a lower socioeconomic status. The other seventh grade science teachers had not changed their assessment methods due to NCLB and their classroom descriptions included small numbers of special needs students. Furthermore, these teachers indicated that their schools had always met AYP.

Eighth Grade AMSTI Science Teachers Findings

Research Subquestion #1: What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?

The first theme to emerge from the eighth grade AMSTI science teachers' data was these teachers use a variety of resources during their assessment processes. For example, Ava said, "Honestly, the biggest asset at first was that I got all this [AMSTI] equipment. I get some stuff out of the book [system adopted science textbook]." Madeline commented:

> The resources I use of assessments are the [AMSTI] website for the most part and I will use my textbook [system adopted science textbook] to cover the objectives [from the Science Course of Study] that are not covered by AMSTI. There are two objectives [on the Science Course of Study not covered in the AMSTI objectives]. If I do not think they [Science Course of Study objectives] are covered well enough, I will bring out the book [system adopted science textbook] and then sometimes I just use my chemistry books from college or go talk to my chemistry teacher from high school and she will help me.

All 4 eighth grade AMSTI science who participated in this study expressed their use of a variety of resources for assessment process. The resources mentioned by the eighth grade science teachers included the AMSTI teacher and student resource books, the AMSTI website, science textbooks, science workbooks, standardized tests' item specifications, and teacher generated resources such as rubrics, checklists, and tests. AMSTI eighth grade science teachers communicated their use of a variety of resources during their assessment process.

The second theme to surface was AMSTI eighth grade science teachers use a variety of assessment methods during their assessment process. For instance, Brayden explained his assessment methods as:

> Most of our [AMSTI] units have a written test and then they have a lot of hands-on [performance tests] where they always have an observation test where they watch how to make it work. The ones [students] that may not do real well on their written tests can do the other [performance test] and then you do the grades together and average them.

Madeline said:

> They always have one project to do out of the six weeks and there are tests built into the AMSTI book. Half of it [each test from the AMSTI resource book] is pencil/paper. So, I will do both [pencil/paper and performance assessments]. What it [performance assessments] is they are given a problem and they can use any of the materials that we have learned and the methods that we have learned and solve their problem. Then, they just have to come up with their own procedure. There is a rubric [that] is already made for you [the teacher by AMSTI]. It [the rubric] tells you to look for this and look for that. Then sometimes you can tell if the kids are getting there.

All 4 eighth grade science teachers discussed the use of multiple assessment methods for their inquiry classroom. Some of the methods used by these teachers are traditional paper/pencil tests, performance assessments, observations, notebooking, oral tests, and projects. The second theme from this data showed eighth grade AMSTI science teachers use a variety of assessment methods.

With the analysis of the eighth grade science teachers' comments for research subquestion #1: What is the structural design of AMSTI science teachers' lived experiences with their assessment processes, the data revealed two themes. First, AMSTI eighth grade science teachers expressed their use of a variety of resources when assessing inquiry learning. These resources included AMSTI resources such as the teacher's resource book, the student resource book, and the equipment, Internet website, science textbooks, science workbooks, standardized tests' item specifications, and teacher generated resources which contain rubrics, checklists, and tests. Second, AMSTI eighth grade science teachers described the use of a variety of assessment methods for inquiry learning. Eighth grade science teachers explained their use of traditional paper/pencil like those associated with standardized tests, performance tests, observations, notebooking, oral assessments, and projects. With these in mind, two themes were discovered from the eighth grade AMSTI science teachers' data for research subquestion #1.

Research Subquestion #2: What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?

From this research subquestion, the eighth grade AMSTI science teachers listed six essential components for their assessment experience. First, the AMSTI resources were judged as the most essential part of assessing inquiry learning. For example, Madeline said:

> For the most part, I just follow the notebook with AMSTI. If I am having trouble choosing an assessment, the end of every lesson in the book [AMSTI teacher resource book] gives you 10 different ways you can assess the lesson.

Brayden explained the AMSTI resources in this way:

> Most of our [AMSTI] units have a written test and then they have a lot of hands-on [performance tests] where they always have an observation test where they watch how to make it work. The ones [students] that may not do real well on their written tests can do the other [performance test] and then you do the grades together and average them.

From the eighth grade teachers' comments, all 4 teachers discussed the AMSTI resources as an essential part of their assessment process.

Second, cooperative learning was considered an essential part of AMSTI eighth grade science teachers' assessment process. These teachers discussed the use of checklist, rubrics, and observations to assessment cooperative groups in their inquiry classrooms. Madeline described her assessment of cooperative learning in terms of a performance checklist as:

> I've got three or four kids in a group, depending on the class size. I put their names [on a checklist], their group roles because I have group captains, materials managers, safety, and recorders, and how they perform [on the lab]. Are they following safety rules? Do they have the books that I told them to? Do they have their proper shoes? Is their hair pulled back? All of those kinds of things. I will take a point off for the entire group if one person messes up because the safety person should have gotten it [the violation], the group captain should have gotten it, and the materials person should have gotten it because safety goggles are a materials thing. So the poor little recorder is just along for the ride but that is three accountability things and that is what they are learning this time. At first, I wouldn't get them for it [take off points for safety violations]. I wouldn't take any points off. How they performed in lab, it is making a world of difference because all I have got to say is fix your safety violations for the timed lab [performance assessments]. I will walk around with my clipboard and I will say do you see this? When you talk, you are 1) off task, 2) not following safety procedures, and 3) you are not working cooperatively with your group. I am taking off one point right now for you doing one act of violation and they are starting to get it. I've got to drill it into them. They basically got an assessment, a very important one because if they don't do it now, will I give them fire in class next semester? No. So, I made that a huge part of their assessment right now.

Of the 4 eighth grade teachers in this study, all 4 teachers explained their use of cooperative learning and its assessment as an essential component of their inquiry learning assessment process.

Third, the data showed eighth grade AMSTI science teachers viewed teacher generated resources as essential components of their assessment process. Brayden gave this description:

> I used the vocabulary and I have vocabulary tests. I have generated just about a worksheet for every lesson. It goes is like a lab sheet. When we [this school] got cut to 50 to 55 minutes a class, it's hard to write down everything in the notebook. So, I generated a lab sheet to work out questions and hypotheses. It [teacher generated worksheet] has got all of that on there where all they have got to do is fill it in.

He also said, "I have even come up with questions on the reading [in the AMSTI resource book] that are on there like the reflection on what you have done or questions at the end." Ava illustrated her use of teacher generated resources as:

> My notes. After each lab, my kids do notes [teacher generated using the AMSTI resources] and that is the test! We talk about it. So they [students] have got something concrete to go back to [when they study for tests] and here is the terminology. I do this for the ones who were absent a little simple quiz [from the teacher generated notes of the AMSTI labs]. This is something that they actually learned in the lab and I made notes on. I give worksheets which the worksheets reflect back to the notes and the notes are based on the labs.

From the eighth grade teachers' comments, teacher generated resources included notes, tests, worksheets, reading guides, rubrics, projects, bell ringers, and PowerPoint presentations. All 4 eighth grade science teachers listed teacher generated resources as an essential part of their assessment process.

Fourth, these teachers commented that notebooking was an essential part of their assessment process. Madeline described notebooking in her inquiry classroom in this way:

> A lot of it [assessments] is with their notebook [student generated journal]. They [students] never know what part of the notebook I am going to grade. One day it may be the hypothesis. One day it may be the conclusion. One day it may just be

> the parts of the lab. One day it may be I am grading every single thing in their notebook and they have notebook tests which is just me giving them questions and it should be in their notebook and they just write the answer.

Ava explained her use of notebooking like this, “I give notebook quizzes. It [notebook quiz] is just an accountability thing. It is five questions, you get 30 points for it and that is good [way to grade lab activities].” From the four eighth grade AMSTI science teachers’ comments, three teachers discussed the use of notebooking for all assignments and its assessment as an essential part of their assessment process. The fourth teacher stated she did notebooking for the lab activities only while all the students’ other assignments were kept in a separate binder or folder. As a result, eighth grade AMSTI science teachers found notebooking an essential component of their assessment process.

Fifth, comments from research subquestion #2 showed eighth grade science teachers found the Science Course of Study as an essential component of their assessment process. Kaitlyn illustrated her use of the Science Course of Study by saying, “Usually what I do is put the objective [from the Course of Study and standardized tests] in a question type.” Madeline used this description of the Science Course of Study:

> I mean, if it [Course of Study] just wants you to list, then we would talk about it a little bit maybe not necessarily go into it in much detail. Looking ahead at the Course of Study, you can tell that there are going to be gaps that will be filled before I get there. You don’t necessarily have to go into as much detail as if it were to be demonstrated.

All 4 eighth grade teachers expressed their use of the Science Course of Study as an essential component of their assessment process.

Sixth, data showed 2 of these 4 science teachers discussed the use of standardized tests’ item specifications as essential components of their assessment process.

Specifically, they expressed the use of item specifications for the Alabama Writing Assessment (AWA), SAT-10, and AHSGE. These two teachers also mentioned that eighth grade science is not included in any standardized testing for AYP purposes. In other words, they explained their use of these specifications not for science content but as format practice only. Half the eighth grade science teachers used the AWA, SAT-10, and AHSGE formatted questions in their assessments for practice only.

As the researcher analyzed of research subquestion #2: What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences, five themes were discovered. First, all AMSTI resources are essential to the assessment process. These teachers listed AMSTI resources as the teacher resource book, student resource book, AMSTI website, and equipment. Second, eighth grade AMSTI science teachers viewed cooperative learning and its assessment an essential part of their assessment process. Third, teacher generated resources such as notes, rubrics, tests, projects, PowerPoint presentations, bell ringers, reading guides, and worksheets were a critical part of their assessment process. Fourth, notebooking which is an organized method of maintain students' work was viewed as essential. Fifth, AMSTI eighth grade science teachers believed the Science Course of Study was an essential component of their assessment process. Sixth, 2 of the 4 eighth grade teachers described their use of standardized tests' formats as essential components of their assessment process.

Research Subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?

The comments from the eighth grade AMSTI science teachers showed they used five guidelines with their assessment methods. First, the Science Course of Study was listed as the most important guideline they used for their assessment methods. Ava's description of the Science Course of Study included:

> The Course of Study is my guide. And I throw in the other stuff wherever I can, pretty much. I mean, I can't do it much or I am not going to get that [the Science Course of Study] covered and that is what I am accountable for.

Kaitlyn explained the importance of the Science Course of Study in this way:

> We use the Course of Study and on my lesson plans I indicate which Course of Study that we are working on because we have to do that here with the STI [software grade book system]. If it [the Science Course of Study] has some key terms, I make sure that those key terms are in their notes and they are tested on those key words. Like [the word] inertia, I know that it is in the Course of Study and my system continuum [school system generated document of Science Course of Study objectives and when they are covered in the classroom]. So, I just make sure that if anything ever comes up, they [school administration] can go back and can find that I covered all those steps [objectives].

All 4 eighth grade science teachers expressed their belief that the Science Course of Study was a critically important guideline for their assessment methods.

Second, pacing guides, curriculum continuums, or seven month plans were described as just checklists. Ava illustrated her use of her school's seven month plan as:

> We try to stick to the 7 month plan [system generated document of when to cover each Science Course of Study objective] but they [students] are not [ready]. They [administration] are a little more flexible because they know we are covering our stuff. It should be pushed back [allowing more time to cover objectives]. They [students] are not abstract enough. We are flying through this stuff [Science Course of Study objectives] just trying to cover it with the kids. We try to hit the high points.

All 4 teachers mentioned the use of a pacing guide/curriculum continuum/plan as a checklist for the Science Course of Study objectives. They did not describe this guideline as crucial for their assessment methods.

Third, the National Science Education Standards were not viewed as guidelines that science teachers needed to correlate with their assessment methods. These eighth grade teachers believed the National Science Education Standards were included in the Science Course of Study and the AMSTI objectives and therefore did not place an emphasis this guideline. Madeline said:

> I do have the national standards. I haven't used it very much because I have just now really been aware that they are there! I just really haven't talked about them that much. I can see where they are just built in with AMSTI. You don't have to worry a whole lot about them.

Ava explained the national standards as, "I focus on this, the Course of Study with the national standards [included in it]." As a result, the 4 eighth grade AMSTI science teachers expressed a lack of worry about national standards because they felt these standards were embedded into the Science Course of Study.

Fourth, 3 of the 4 eight grade AMSTI science teachers stated they had alternated their assessments of inquiry learning after the implementation of NCLB. According to Kaitlyn's comments on NCLB, she has changed the format of her inquiry assessments for special needs students. She said:

> For the ones [students] that I have who are really [low achieving], I have to change how I assess them [with NCLB]. If I ask five critical thinking questions, I may tell them to choose two out of five. So I want them to be exposed to that but I don't want to make them have to do all of them. Plus, the special ed teachers tell me that it takes too long for them to do it.

On the other hand, Madeline stated that she is anxious about assessing inquiry learning since the addition of NCLB but she felt her special needs students scored higher on inquiry-based assessments. Madeline's comments included:

> I was very nervous [after NCLB] about giving them [special needs students] hands-on assessments. I see that they [special needs students] get more out of it [inquiry learning] and can give me more information about what they have learned doing that than they can from just a pencil/paper test because they get confused with the wording. They have been tested so much that when they get tested hands on, it is almost like a play time and they will give you all the information you want out of it.

Ava described her frustration of NCLB and socially promoting students in this way:

> [Teacher is referring to a comment made by another teacher in the group regarding students who are not prepared for her grade level science class because the student has be socially passed to the next grade level for several years] I do not understand how that is legal under No Child Left Behind because the child is not being retained in the 2nd or 3rd grade where they can't read and forced to learn that knowledge, then go to the next grade and get that knowledge. Instead, they are pushed on to 4th grade and they didn't learn 3rd grade [content]. They are not going to learn 4th grade and they are not going to learn fifth grade. It [socially passing students to the next grade at the elementary level] is doing a huge disservice to the student. It is going to hurt these kids and how is that not leaving a child behind?

The 4 eighth grade science teachers provided different views for the meaning of the NCLB guidelines for their assessment process, but 3 of these teachers expressed a change in the way they assess inquiry learning after the addition of NCLB.

Fifth, the eighth grade science teachers described their feelings of frustration and nervousness due to the guidelines of AYP. Ava gave this account of AYP:

> Standardized testing is killing any joy that these kids have in school. They hate it! I mean, it is horrible and it is hard on us [teachers] because there is stuff I would love to cover besides that stuff from the law [standardized test objectives for AYP]. I mean there is stuff that I feel [is important] in science that I really can't spend a lot of time on because it is not on the item specs for a standardized test

> and No Child Left Behind says we have to meet AYP and AYP is decided in part based on the standardized tests.

Brayden expressed his frustration about AYP public reports as, “You don’t know what all was invented [about students’ standardized test scores] in that story [on AYP] that came out in the paper.” Three of the 4 eighth grade teachers expressed either frustration or nervousness regarding AYP. The fourth teacher did not express feeling any pressure to due to AYP.

After analyzing the comments from the eighth grade AMSTI science teachers regarding researcher subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods, the researcher uncovered five guidelines and their meanings to these teachers. First, the Science Course of Study is the most important guideline these teachers use when selecting and determining their assessment methods. Second, these teachers use their school system’s pacing guide/plan only as a checklist for documenting their coverage of the Science Course of Study objectives. Third, they did not worry about any national standards because they believed the Science Course of Study and the AMSTI objectives included the National Science Education Standards. Fourth, 3 of the 4 eighth grade science teachers expressed feelings of nervousness and frustration regarding NCLB. Fifth, these 4 eighth grade AMSTI science teachers described feeling pressure to met AYP. Therefore, the eighth grade AMSTI science from this study listed and described the meanings of five guidelines they used when selecting and developing their assessment methods.

Research Subquestion #4: What do AMSTI science teachers find most helpful when determining assessment methods?

The eighth grade AMSTI science teachers discussed five major resources as helpful when determining assessment methods. First, the AMSTI resources were considered helpful. For example, Madeline used this description, “The resources I use of assessments are the [AMSTI] website for the most part.” Brayden explained the helpfulness of AMSTI resources as, “Most of our [AMSTI] units have a written test and then they have a lot of hands on [performance tests] where they always have an observation test where they watch how to make it work.” Second, the Science Course of Study was listed as a helpful item for science teachers. The eighth grade science teachers explained their use of the Science Course of Study when planning and assessing inquiry lessons. Ava said, “The Course of Study is my guide.” Third, teacher generated resources were described as helpful. Brayden gave this illustration of the helpfulness of a teacher generated resource when his school moved to six 55 minute periods:

> I used the vocabulary and I have vocabulary tests. I have generated just about a worksheet for every lesson. It goes is like a lab sheet. When we [this school] got cut to 50 to 55 minutes a class, it’s hard to write down everything in the notebook. So, I generated a lab sheet to work out questions and hypotheses. It [teacher generated worksheet] has got all of that on there where all they have got to do is fill it in.

Fourth, 3 of the 4 eighth grade teachers explained their use of science textbook materials as helpful. Madeline used this explanation:

> I will use my textbook [system adopted science textbook] to cover the objectives [from the Science Course of Study] that are not covered by AMSTI. There are two objectives [on the Science Course of Study not covered in the AMSTI objectives]. If I do not think they [Science Course of Study objectives] are covered well enough, I will bring out the book [system adopted science textbook].

Fifth, the eighth grade AMSTI science teachers also found notebooking helpful when assessing inquiry learning. Of the 4 science teachers, three listed notebooking as a supportive method for assessment. Madeline said:

> A lot of it [assessments] is with their notebook [student generated journal]. They [students] never know what part of the notebook I am going to grade. One day it may be the hypothesis. One day it may be the conclusion. One day it may just be the parts of the lab. One day it may be I am grading every single thing in their notebook. And they have notebook tests which is just me giving them questions and it should be in their notebook and they just write the answer.

Ava modified her use of notebooking because she found her students could not use the information from their labs to study for assessments. Ava stated, “Because I tried with the notebook, I did the composition book and it didn’t work. The kids can’t extrapolate that knowledge [from their inquiry labs to test material].” In addition to these five major resources, 2 eighth grade teachers listed standardized tests’ formats and supplemental workbooks as helpful. They communicated that standardized tests’ specifications were only useful as practice with standardized tests’ formats because eighth grade science content is not included in any standardized testing for AYP in Alabama. Ava described her use of supplemental workbooks in this way:

> Our book [AMSTI resource book] correlates, but not as smoothly [as the seventh grade AMSTI book]. It is out of sequence with the textbook [system adopted textbook]. What I tend to do, I have some workbooks [outside resource, not AMSTI and not system adopted textbook resource] that are excellent. They are very basic how do things [work] about movements and [the] first law of motion. It [this workbook] gives diagrams and they [students] have to look at the diagrams to tell what is going on and things like that and those are really good.

For the major resources, all 4 eighth grade science teachers discussed their usefulness while the minor resources were listed by only 2 of the eighth grade teachers. Eighth grade

AMSTI science teachers expressed the helpfulness of five major resources including AMSTI resources, the Science Course of Study, teacher generated resources, science textbooks, and notebooking and two minor resources which included standardized tests' formats and supplemental workbooks.

After analyzing the data from the eighth grade AMSTI science teachers, three units of meaning emerged addressing the overarching research question: How do fifth through eighth grade AMSTI science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes? First, eighth grade science teachers used a variety of resources and methods when selecting and developing assessments for inquiry learning. The resources included both traditional science resources and inquiry-based resources. These teachers used AMSTI resource books and website, science textbooks, work books, Science Course of Study, and teacher generated resources. In addition, 2 of the 4 eighth grade teachers discussed their use of standardized tests formats when assessing inquiry learning. They also stated that these assessment items were only used as practice for tests in other participants because eighth grade science content is not included in AYP tests. The assessment methods contained cooperative learning assessments, performance assessments, notebook assessments, reading diaries, observations, oral assessments, and traditional paper/pencil assessments. Second, eighth grade teachers feel pressure from many sources to meet AYP. These pressure resources included their schools' administration, systems' administration, state administration, and their communities. Third, 3 of the 4 the eighth grade teachers discussed changing their assessment methods since the implementation of NCLB. These teachers also stated their schools that had not always meet AYP and contained large populations of low socioeconomic and achievement students. The themes discovered for eighth grade AMSTI science teachers included a variety of assessment resources and methods, pressure of AYP, and varied experiences with NCLB and assessments.

Stevick-Colaizzi-Keen Method

In order to address the verification of data, the researcher looked for patterns in the data by comparing the emerging themes from the eight individual interviews, the two focus groups discussions, and the 3 peer reviewers. From the transcribed data, the researcher created a list of significant states for the individual interviews (Appendix M) and the focus group discussions (Appendix N) that addressed each of the four research subquestions. At this time, the researcher emailed copies of these significant statements to the three peer reviews with instructions. These instructions asked each reviewer to read the statements for the individual interviews and the focus group discussions and create a list of themes for each research subquestion. Next, each reviewer was asked to create a list of units of meaning for the overarching research question. As the peer reviewers created their lists of themes and units of meaning, the researcher also created a list of themes for each research subquestion and units of meaning for the overarching question. Then, the peer reviewers email the researcher their lists of themes and units of meaning. Last, the researcher compared her list of units of meaning for the individual interviews and the focus group discussions with those of the reviewers. With the exception of wording differences and the separation of some themes, the researcher's list and those of the peer reviewers' were the same (Appendix O).

According to these comparisons for the overarching research question: How do fifth through eighth grade AMSTI science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes, the three meaning units that emerged from the data were (a) AMSTI science teachers use of a variety of assessment resources and methods including the item specifications for the ASA, SAT-10, AHSGE, and ARMT which are used in determining AYP and nontraditional assessments to create authentic inquiry assessments like performance and oral assessments and (b) AMSTI science teachers feel pressure from several sources such as their school, community, school system, and state to meet AYP, and (c) 9 out of the 16 teachers who participated in this study stated they had not changed their assessment selection or development processes due to NCLB.

The researcher also compared the data from the four different grade levels. First, the researcher separated all the significant statements according to grade level which created four tables of significant statements (Appendix L). Next, the researcher established the emerging themes for each research subquestion and the overarching research question for each grade level, fifth through eighth. Then, the research compared the themes and units of meaning for each grade level. From these comparisons, three units of meaning emerged from the data (Appendix P).

The three units of meaning for fifth through eighth grade were essentially the same with the exception of the standardized tests specifications used as a resource. First, AMSTI science teachers use a variety of assessment resources and methods. AMSTI science teachers used both inquiry-based and traditional assessment resources and methods in order to provide their students with authentic inquiry experiences as well as the experiences needed to succeed on the standardized tests of AYP. While sixth grade and eighth grade teachers discussed their use of assessment formats similar to standardized tests for reading and math, fifth and seventh grade AMSTI teachers described their use of the ASA and SAT-10 science item specifications when assessing their students. Second, all four grade level teachers expressed the pressure they feel to meet AYP regardless of the demographics of the students in their classrooms. Third, 9 of the 16 science teachers who participated in this study illustrated they had not changed their assessment methods due to NCLB. However, 7 AMSTI teachers expressed their changes in assessment methods since the implementation of NCLB. These 7 teachers described their classrooms and schools as having a high number of low achieving students with a low socioeconomic status. The data from fifth through eighth grade level AMSTI teachers provided similar units of meaning.

Quality of Evidence

In order to address the quality of evidence in this study, the researcher employed several procedures. To address validity, the research employed the researcher's position, member checks, and peer reviews. During analysis, the researcher mined the emerging themes and units of meanings for the overarching research question and its four subquestions using individual interviews, focus group discussions, and peer reviews (Appendix N). This was accomplished by creating Microsoft Word tables for the themes and meaning units for the individual interviews, the focus group discussions, and the peer reviews. From these tables, the researcher studied the data by comparing the themes and meaning units from the individual interviews, focus group discussions, and the peer reviews.

Using the researcher's position, a detailed account of participant selection, data collection, and data analysis was included to show the quality of the evidence. The participants were selected based on two criteria: (a) each participant instructed science in grades five, six, seven, or eight and (b) each participant taught in a northwest Alabama AMSTI school. In addition, 40 possible participants were emailed a letter of intent in which they were asked to participate in the study. Of the original 40 emails, 16 AMTI science teachers agreed to take part in the study. Of the 16, 2 teachers from grade level participated. The data was collected using eight individual interviews with 2 AMSTI science teachers from grades five through eight and two focus group discussions with 4 AMSTI science teachers. Each interview or focus group discussion began with a review of the study's purpose and research questions followed by a review of the consent form and interview guide. After each participant signed the consent form, the researcher asked permission to record the session. Upon approval, each interview or focus group discussion was recorded with an audio recorder and audio tape. For data analysis, the researcher used the transcribed interviews and focus group discussions to create tables in a Microsoft Word document of each research question and the teachers' comments that related to that question. From these tables, additional tables in Microsoft Word documents were created for the emerging themes and units of meaning.

With the member checks, the researcher emailed a copy of the participants' transcribed interview or discussion. The participants were asked to check the transcription for accuracy and make any corrections to the transcribed statements. Based on the emailed responses of the participants, no corrections were needed for the transcribed data.

Finally, peer reviews were utilized. The researcher sent the tables of significant statements based on each research subquestion for the eight individual interviews and two focus group discussions to 3 reviewers. Using these tables, the reviewers were asked to read the significant statements and develop a list of emerging themes for the research subquestions. Upon completion, the reviewers emailed their list of themes to the researcher. When the researcher compared the themes listed by the reviewers and those developed by the researcher, all the themes and units of meaning were similar in which they only varied based on wording.

To address the reliability of the study, the researcher included an audit trail within the transcripts in addition to the comparison of emerging themes, peer reviews, and researcher's position discussed above. For the audit trail, the researcher used the comment feature of Microsoft Word to insert comments and insights from the interview sessions and then into the significant statements for each research subquestion (Appendix H). An audit trail along with a comparison of emerging themes, peer reviews, and the researcher's position provided an account of the quality of evidence for this study. While this section presented the data collected during this study and the findings from this data, section 5 will give summaries, conclusions, and commentary regarding these findings.

SECTION 5: SUMMARY, CONCLUSIONS, AND COMMENTARY

Study Overview

Since the implementation of NCLB, little research has been conducted on the assessment experiences of science teachers who employ inquiry-based learning. Current research has focused on the instructional methods used in science classrooms and their assessments (Bilgin & Geban, 2006; Vogler, 2006). Other research has centered on the experiences of students with different assessment methods or the experiences of teachers with different instructional methods (Cowie, 2005; Lorsback et al., 2004). As a result, the problem this phenomenological study addressed was to fill a portion of the gap in research on the experiences of science teachers as they select and develop assessments for inquiry learning. In addressing this problem, the purpose of this phenomenological study was to illustrate the lived experiences of northwest Alabama AMSTI science teachers' as they select and develop assessment methods for their inquiry-based classrooms.

The research question for this study was: How do fifth through eighth grade AMSTI science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes? Subquestions included:

1. What is the structural design of AMSTI science teachers lived experiences with their assessment process?

2. What are the essential components of the assessment methods for inquiry learning methods used by science educators participating in AMSTI that result in these experiences?

3. What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?

4. What do AMSTI science teachers find most helpful when determining assessment methods?

In order to discover the answers to these questions, the researcher employed a phenomenological study. According to Moustakas (1994), phenomenology should be used to create the description of a phenomenon. In this case, the phenomenon was the lived experiences of fifth through eighth grade AMSTI science teachers as they select and develop assessments for their inquiry-based classrooms. AMSTI is an initiative that promotes inquiry learning in math for grades kindergarten through twelfth and in science for grades kindergarten through eighth by providing professional development and inquiry resources to teachers in Alabama. To ensure that all participants for this study experienced the phenomenon of selecting and developing assessments for inquiry learning, the researcher purposively chose the study's participants from AMSTI schools located in northwest Alabama. Using the AMSTI website (AMSTI, 2004), the researcher determined there were 27 AMSTI schools located in northwest Alabama. From this list, the researcher established a list of school email addresses from an Internet search which then lead to a list of email addresses for fifth through eighth grade AMSTI science teachers in northwest Alabama. From this list, emails were sent to 40 AMSTI science teachers and 16 of these teachers participated in this study.

The researcher conducted eight individual interviews with 2 science teachers from each fifth through eighth grade and two focus group discussions which contained 4 science teachers per group. One focus group was made up of 2 fifth grade teachers, 1 sixth grade teacher, and 1 eighth grade teacher while the other focus group was made up of 1 sixth grade teacher, 2 seventh grade teachers, and 1 eighth grade teacher. Using email communications, the researcher established a convenient time, date, and location for each interview or focus group discussion based on the needs of the participant. Next, the researcher conducted and recorded each interview or focus group discussion. Using the transcriptions of the interviews and focus group discussions, the researcher created a list of significant statements which provided the description of the lived experiences of AMSTI science teachers' assessment process when selecting and developing assessments.

The findings of this study showed three units of meaning based on the research question. All the participating AMSTI science teachers described the use a variety of traditional and non traditional assessment resources and methods in order to give their students an authentic inquiry experience and prepare their students for success on the standardized tests of AYP. In addition, 15 out 16 of the participating AMSTI science teachers described experiencing pressures to meet AYP which originate from themselves, their schools' administration, their school systems' administration, the state administration, and their communities. AMSTI teachers' expressed varied degrees of change in their assessment of inquiry classrooms due to NCLB which stemmed from whether or not their school had meet AYP and the number of special needs students in their classrooms. When AMSTI teachers described their special needs students as low achieving or low socioeconomic status, their statements included descriptions of changing the way they selected and developed assessments for their inquiry classroom. The AMSTI teachers who did not describe their classes in this way stated they had not changed their assessment process due to NCLB.

Interpretation of Findings

This study was conducted to investigate the lived experiences of fifth through eighth grade AMSTI science teachers as they select and develop assessments for inquiry learning. To accomplish this task, the researcher bracketed her experiences with assessing inquiry learning while participating in AMSTI. This allowed the researcher to focus on the comments of the participants which led to the discovery of the assessment experiences for AMSTI science teachers from fifth through eighth grades. These findings were based on collected data for the research question and its four subquestions.

Overarching Research Question

The results found three units of meaning for the overarching research question. First, the results showed AMSTI science teachers use of a variety of inquiry-based and traditional assessment resources and methods. As described in Section 4, AMSTI science teachers for grade five through eight expressed the need to use both traditional and inquiry-based resources and assessments because they wanted to ensure their students received the practice necessary to succeed on the standardized tests for AYP and a genuine inquiry experience. The assessment resources and methods used by AMSTI science teachers were based on the needs of their students such as maturity level and achievement level and the standardized tests their students would be taking as part of AYP (Appendices M & N). Second, most AMSTI science teachers expressed feeling pressure to meet AYP standards. When reading the comments in Section 4, these pressures were especially noticeable in the teachers whose schools had not met AYP in the past. However, even teachers from schools who had consistently met AYP described some pressure due to AYP. Most AMSTI teachers contributed these feelings to the pressures they place on themselves, their schools' administration, their school systems' administration, the state administration, and their communities (Appendices M & N). Third, AMSTI science teachers listed varied degrees of change regarding their assessment process due to NCLB. Consequently, 9 of the 16 participants expressed a lack of change on their assessments due to NCLB. Of the 7 AMSTI teachers who described changes to their assessment process due to NCLB, they also described a year of School Improvement due to not meeting AYP and large classroom populations of special needs students. These AMSTI teachers expressed the most frustration due to NCLB (Appendices M & N).

Research Subquestion #1

As stated in Section 4, the researcher uncovered two themes. AMSTI teachers used a variety of resources to assess inquiry learning. The assessment resources most used by AMSTI science teachers included AMSTI resources, teacher generated resources, science textbooks and workbooks, and Internet resources. Fifth through eighth grade AMSTI science teachers used a variety of assessment methods. These assessment methods included both traditional assessments like those seen on standardized tests and inquiry-based assessments such as oral assessment, performance assessments, cooperative learning assessments, and notebook or journal assessments. The two themes discovered from the data collected for research subquestion #1 were AMSTI science teachers use a variety of assessment resources and a variety of assessment methods in order to address both inquiry learning and standardized testing (Appendices M & N).

Research Subquestion #2

AMSTI science teachers listed four essential components of their assessment methods. These teachers stated teacher generated resources, supplemental resources, and AMSTI resources which included both resource books for teachers and students and resources from the AMSTI website as essential part of their assessment methods. AMSTI science teachers described the use of cooperative learning and its assessments as essential. These AMSTI science teachers commented on their daily use of cooperative groups and their need to assess group performance using checklist and rubrics. These teachers discussed the importance of using notebooking or journaling and its assessment. All the participants listed some form of notebooking or journaling with each inquiry activity. Furthermore, 15 of the 16 teachers who participated in this study used notebooking for all aspects of their inquiry classroom while one teacher only used notebooking to record inquiry laboratory exercises. AMSTI science teachers viewed the Science Course of Study as an essential component for their assessment process. AMSTI science teachers listed the variety of assessment methods and resources, cooperative learning, notebooking, and the Science Course of Study as essential components of their assessment process as seen on Section 4 (Appendices M & N).

Research Subquestion #3

As seen in section 4, the researcher discovered four guidelines that AMSTI science teachers placed specific meanings on. The Science Course of Study was the most important guideline listed by AMSTI science teachers. Pacing guides/plans/continuums guidelines were only used as a check sheet for the objectives listed in the Science Course of Study. They described their use of a pacing guide/plan/continuum as a way of documenting their coverage of the Science Course of Study. Some teachers stated their school system did not have this type of guideline and others stated their school did not require them to use this guideline as long as they documented their use of the Science Course of Study in their lesson plans. AMSTI science teachers use the National Science Education Standards but they do not actively document the National Science Education Standards. They stated their belief that the national standards were embedded into the AMSTI objectives and the Science Course of Study. Nine out of the 16 participants stated they had not changed their assessment process based on the guidelines of NCLB and AYP. Seven of the participants expressed tremendous frustration regarding the changes to their assessment process based on NCLB and AYP guidelines (Appendices M & N).

Research Subquestion #4

As provided in the AMSTI teachers' comments in Section 4, the conclusions for this research subquestion included three helpful components for their assessments of inquiry learning. The participants found AMSTI resources including the teacher and student resource books and the AMSTI website as helpful when selecting and developing assessment. AMSTI science teachers listed standardized test item specifications and formats as helpful. They described teacher generated resources including PowerPoint presentations, tests, notes, rubrics, projects, and supplemental resources such as textbooks, workbooks, and Internet resources helpful during the selection and development of assessments. The fifth grade AMSTI science teachers commented on their use of teacher generated and supplemental materials because they felt the AMSTI resources for fifth grade were limited. AMSTI science teachers for grades five through eight found the AMSTI resources, standardized test specifications and formats, and teacher generated and supplemental materials as helpful when selecting and developing assessments for the inquiry-based classrooms (Appendices M & N).

Current research contained a void of information on the assessment experiences of science teachers who implement inquiry learning. Because this study focused on the assessment experiences of science teachers, the conceptual framework for this qualitative research study was centered in phenomenology. According to Creswell (2003), phenomenology is a qualitative research plan used to discover the meanings of the experiences regarding a phenomenon. In this study, the phenomenon was the assessment experiences of fifth through eighth grade AMSTI science teachers when they implement inquiry learning. Therefore, the description obtained from this study's data of the lived experiences of fifth through eighth grade AMSTI science teachers included three elements. First, the lived experiences described the use of a variety of traditional and inquiry-based assessment resources and methods. Second, the lived experiences explained the pressures AMSTI science teachers feel to meet AYP. Third, the lived experiences illustrated that most of the participants have not changed their assessment process due to the guidelines of NCLB.

Implications for Social Change

The significance of this phenomenological research study focused on providing science teachers who employ inquiry-based learning methods with descriptions of the lived experiences of fifth through eighth grade AMSTI science teachers as they select and develop inquiry learning assessments. From these descriptions, the researcher provided research based data on the assessment processes of AMSTI science teachers to provide science teachers with the information they need to compare and improve their inquiry assessment processes.

The data from this research study contained three units of meaning. The first unit of meaning was AMSTI science teachers use a variety of assessment resources and methods such as AMSTI resources, science textbook resources, the Science Course of Study, teacher generated resources, Internet resources, item specifications for standardized tests like the SAT-10 and ASA, traditional tests, and inquiry-based assessments. To continue the use of various assessment resources and methods, AMSTI needs to continue providing a variety of resources for AMSTI science teachers to use during assessment processes. This study’s data showed that fifth grade AMSTI science teachers did not find the AMSTI assessment resources helpful. They described a greater use of teacher generated assessment resources because few assessment resources were provided by AMSTI. Therefore, AMSTI needs to provide a larger number of assessment resources for fifth grade AMSTI science teachers.

The second unit of meaning was all the participating fifth through eighth grade AMSTI science teachers experienced pressure due to AYP. The study's participants listed themselves, their schools' administration, their school systems' administration, the state's administration, and their communities as sources of this pressure. In the researcher's experience, the pressure due to AYP is a result of a lack of knowledge and planning. With this in mind, AMSTI science teachers must understand the components of AYP and their responsibilities for their schools' meeting AYP. Additionally, AMSTI schools and their school systems must inform science teachers of their school's goals to meet AYP by analyzing SAT-10 and ASA data. Once science teachers are informed of AYP goals, they can then organize their instructional and assessment methods to address these goals. This preparation will alleviate the pressure AMSTI science teachers experience due to AYP because these teachers will no longer question themselves about AYP but instead execute an organized AYP plan with specific goals. AMSTI schools and their school systems must inform their communities of the schools' goals to meet AYP rather than waiting for an AYP report card to be published in their local newspapers. If communities only have information on the pass or fail grade of a school, then the communities are more likely to pressure their schools' teachers in a public forum. By making the communities more informed of schools' AYP goals, the pressure AMSTI science teachers experience from the comments made by members of their communities at school functions and outside of school functions will be reduced if not eliminated. Knowledge on the part of the teacher and the community is a powerful tool for eliminating AYP pressure.

The third unit of meaning was most AMSTI science teachers have not changed their assessment processes due to NCLB. However, 7 of the 16 participating AMSTI science teachers described changing their assessment processes due to NCLB. All 7 of these teachers taught at schools that had not met AYP and described their classroom populations as including large numbers of special needs students. These 7 teachers discussed the success of their special needs students when using inquiry-based assessment methods and the lack of success of the standardized tests of AYP. As a result, AMSTI and AMSTI schools must explore methods to bridge the gap between inquiry-based and standardized assessments for special needs students.

Recommendations for Action

The findings of this phenomenological study included three units of meaning. The findings showed AMSTI science teachers use of a variety of inquiry-based and traditional assessment resources and methods. The study's participants stated their use of a variety of assessment resources and methods was to guarantee their students received the necessary practice for success on the standardized tests of AYP and a genuine inquiry experience. In addition, 15 out of the 16 participating AMSTI science teachers commented on feeling pressures to meet AYP in which these pressures originated from the teachers themselves, their schools' administration, their school systems' administration, the state administration, and their communities. AMSTI science teachers listed varied degrees of change for their assessment process due to NCLB in which 9 out of the 16 participants stated they had not changed their assessment methods as a result of NCLB. The 7 AMSTI science teachers' that provided descriptions of changing their assessment processes due to NCLB are the most memorable voices to the researcher. These voices expressed complete frustration and a distressed need for additional assessment resources in order to bridge the gap for their special needs students between inquiry assessments and standardized tests. With these findings in mind, AMSTI science teachers, AMSTI specialists, and AMSTI schools must address the professional development needs of AMSTI science teachers regarding a continuous supply of innovative assessment resources, a method of communicating AYP information, and NCLB assessment resources for special needs students.

The distribution of this research study's findings through email communications and AMSTI newsletters prior to AMSTI's summer institute or the compressed training in the fall would be an informational springboard for professional development opportunities regarding the use of a variety of assessment resources and methods. The goal of this professional development opportunity would be to supply new and innovative assessment resources and methods for both veteran and novice AMSTI science teachers. Other than the fifth grade science teachers who participated in this study, the AMSTI science teachers described the AMSTI assessment resources as very helpful when selecting and developing assessments for inquiry learning. Rather than resting on the fact that AMSTI has done a good job provided assessment resources and methods for most of its science teachers, they should continuously search for new resources and methods to add to their already excellent resources. Unlike the sixth, seventh, and eighth grade

AMSTI science teachers who participated in this study, the fifth grade AMSTI science teachers did not express the AMSTI assessment resources as helpful. AMSTI specialists need to address this by adding additional assessment resources for this grade level. The fifth grade AMSTI science teachers who participated in this study expressed the need for additional assessments with each unit. They stated the need of additional assessments within each unit rather than just a comprehensive assessment at the end of a unit. According to the comments of this study's participants, this professional development opportunity would need to be established such that veteran AMSTI science teachers conducted round table discussions on assessment selection and development. In order to provide a significant experience for the teachers, these round table discussions must include working assessment models and their resources from actual AMSTI teachers and include a collaborative sharing of assessment process ideas.

AMSTI schools need to provide professional development opportunities within each school to inform AMSTI science teachers of the science components of AYP and their responsibilities for meeting the goals as set by AYP. While AMSTI specialists supply valuable resources for this opportunity, this professional develop program must be initiated within each school because each school will employ its own individualized AYP goals based its AYP report card. Once the AMSTI science teachers are informed on their AYP goals and responsibilities, these teachers must conduct departmental meetings to discuss and implement assessment methods targeting the school's AYP goals. At this point, AMSTI science teachers should include their AMSTI specialists in the departmental meetings as a resource. When AMSTI science teachers, their schools' administrators, and school systems' administrators are well informed of the actions of each other and are prepared for AYP goals, the pressures AMSTI science teachers expressed experiencing from themselves, their schools' administrations, their school systems' administrations, and the state administration will be reduced if not eliminated. The AMSTI schools should inform their communities of AYP goals. This should be accomplished through school newsletters, web page bulletins, and local media outlets. All the teachers who participated in this study taught at schools where methods such as newsletters and web page bulletins are in place to allow the schools and communities to communicate. Since local media outlets report each school's AYP report card, a following up story on the AYP goals of each school would create more informed communities thus eliminating some of the pressures AMSTI science teachers experience from their communities.

Assistance is needed for the AMSTI science teachers who are overwhelmed by NCLB and assessing inquiry learning. While 9 of the 16 AMSTI science teachers did not express changing their assessment process as a result of NCLB, 7 of the AMSTI science teachers stated they are changing their assessment process. While they described the success of their special needs students on inquiry-based assessments, these science teachers also described a lack of success for these students on the standardized tests of AYP. These 7 AMSTI science teachers need to see what other successful teachers with similar classroom student populations were doing for assessment. Science teachers need new assessment methods and resources in order to bridge the gap between inquiry learning assessments and standardized tests. A mentoring program with teachers whose schools have met AYP and have similar student populations should be established to help AMSTI science teachers whose schools are not meeting AYP deal with the challenges of assessing special needs students. With larger school systems, mentoring programs should be established within the system's school.

Another possibility for addressing this unit of meaning would be for AMSTI to create a professional development program along with each AMSTI school or system that focuses on assessing special needs students in the inquiry classroom. To accomplish this task, AMSTI should provide a round table forum similar to the one described for the first meaning unit of this study. This opportunity would require at least 2 veteran AMSTI science teachers leading the discussion. At least 1 veteran science teacher should teach in a school that has not met AYP while the other must teach in a school that has met AYP. Since AMSTI specialist are former science classroom teachers, they must be included in the discussions as a mediator and resource. During these round table discussions, AMSTI science teachers would focus on resources to assist each other bridge the gap between successful inquiry-based assessments and standardized tests failure for special needs student. If the schools, school systems, and AMSTI specialists work together, then a mentoring and discussion forum would easily be established. These 7 AMSTI science teachers are suffering in relative silence. With the educational resources available in northwest Alabama, this problem can easily be addressed but everyone needs to understand that there is a problem.

To address the three units of meaning gathered from this phenomenological research study, three programs must be implemented. A round table discussion forum must be established through AMSTI professional development opportunities in which AMSTI science teachers discuss and share working assessment resources and methods. While most of the AMSTI assessment resources were described as excellent, AMSTI must continue to include new and innovative assessment resources for both the veteran and novice AMSTI science teacher. Communications must be established such that AMSTI science teachers are knowledgeable on the science requirements of AYP and on their schools' AYP goals in order to reduce the pressures AMSTI science teachers experience due to AYP. To address AYP communications, each school must develop a program to inform both teachers and communities of the schools' AYP goals. With knowledge, AMSTI science teachers will organize and develop lessons and assessments to address AYP goals. AMSTI science teachers who teach at schools that have not met AYP each year and have large numbers of special needs students need assessment methods and resources to bridge the gap between the success of their special needs students on inquiry-based test and their failure on standardized tests. This would be accomplished with two programs. One program would include a mentoring system set up by the school systems in which AMSTI science teachers are given a mentor from a school with a similar student population that has met AYP. Through this mentoring program, AMSTI science teachers will develop assessments to help their students be successful on both traditional and inquiry-based assessments. The second program is a AMSTI opportunity for science teachers in which a round table discussion between veteran AMSTI science teachers from schools meeting AYP and not meeting AYP work with other AMSTI science teachers to develop working assessment resources and methods to create an authentic inquiry experience along with success on the standardized tests of AYP for all science students.

Recommendations for Further Study

This phenomenological study focused on the assessment processes of fifth through eighth grade AMSTI science teachers located in northwest Alabama. During the analysis of this study's data, three units of meaning emerged which included (a) AMSTI science teachers employed a variety of assessment resources and methods, (b) 15 out of the 16 AMSTI science teachers experienced pressure due to AYP, and (c) AMSTI science teachers described a varied degree of assessment changes due to NCLB. As a result of these units of meaning, further studies are needed to address the assessment experiences for teachers who implement inquiry learning. Additional phenomenological studies with AMSTI science teachers for grades kindergarten through fourth would fill the gap in current literature on the assessment experiences of teachers who employ inquiry-based learning methods in their classrooms and provide a better description of the challenges inquiry-based teacher experience when balancing between authentic inquiry experiences and standardized tests of AYP. Additional phenomenological studies with AMSTI math teachers for kindergarten through twelfth grade would also add to the research data on the experiences of math teachers as they select and develop assessments for inquiry learning. Because many scientific concepts are translated with the language of math, both AMSTI science and math teachers would benefit from additional research into the assessment experiences of AMSTI math teachers. These two issues bring up questions for further studies such as (a) how do the assessment experiences of kindergarten through fourth grade AMSTI science teachers compare to those of fifth through eighth grade AMSTI science teachers, (b) how do the assessment experiences of kindergarten through twelfth grade AMSTI math teachers compare to those of fifth through eighth grade AMSTI science teachers, and (c) how do the AYP pressures experienced by kindergarten through twelfth grade AMSTI math and kindergarten through fourth grade AMSTI science teachers compare to fifth through eighth grade AMSTI science teachers. Additional research is needed to understand and develop programs to help teachers who use inquiry-based learning address the assessment requirements of special needs students. The participants of this study described the success of special needs students in their inquiry-based classrooms. However, 7 of the 16 participants expressed their frustration and desperation when trying to create a balance between genuine inquiry experiences and practice for the standardized tests of AYP for special needs students. This issue generated new questions such as (a) why are some inquiry teacher successful at bridging the gap between inquiry learning and standardized tests for their special needs students but other teachers are not, (b) what resources do these successful inquiry teachers use, and (c) is this an issue prominent in northwest Alabama only or do other regions of the state have inquiry teachers with the same issue. One AMSTI fifth grade science teacher and one AMSTI sixth grade science teacher expressed their lack of preparedness at the college level to teach and assess science. If this phenomenon is present in just a few fifth and sixth grade science teachers, it may be an issue in the lower elementary grades. Further study is needed to investigate the preparedness of kindergarten through sixth grade AMSTI science teachers to assess inquiry learning. The meaning units from this phenomenological research study provided the need for additional studies including but not limited to additional research on the assessment experiences of kindergarten through fourth grade AMSTI science teachers and kindergarten through twelfth grade AMSTI math teachers, assessment experiences of teachers who use inquiry learning and special needs students, and the level of preparedness for elementary science teachers to assess inquiry learning.

Researcher's Experiences

The researcher taught seventh and eighth grade AMSTI science for two years, but for the last several years her teaching responsibilities only involve ninth through twelfth grade science students. The researcher had some preconceived ideas based on her experiences with assessing inquiry learning. For example, the researcher used mostly teacher generated assessments including tests, rubrics, checklists, and projects. As the study's participants discussed their assessment resources and methods, the researcher actively focused on not projecting her experiences onto the participants. And again when analyzing the significant statements, the researcher pointedly placed aside her experiences with assessments to allow the participants' experiences to emerge. To accomplish this, the researcher reflected on her assumptions and preconceptions regarding the decision making process of AMSTI science teachers as they select and develop assessment for inquiry learning by making notes through out the research process. Through this reflection, the researcher bracketed her assumptions and preconceptions such that the experiences of the participating science teachers emerged. When the researcher taught AMSTI science, NCLB and AYP had not been implemented.

The researcher had few preconceived ideas about the assessment experiences of AMSTI science teachers as they related to the guidelines of NCLB and AYP. The researcher knew several of the study's participants from different professional development opportunities and community activities. While this collegial relationship between the researcher and the participants was beneficial to creating a comfortable atmosphere, the researcher was acutely aware of guiding the conservations during the individual interviews and focus group discussions. As a result of the research process, the researcher is now aware of the need for professional development opportunities regarding the assessments of inquiry learning. The researcher understands most AMSTI science teachers need help dealing with the pressures they experience due to AYP. The researcher actively focused on the participants' experiences during the data gathering and analyzing processes. The descriptive portrait of the lived experiences of AMSTI science teachers for grades five through eight was based solely on the comments of the participants.

From personal experience, the researcher knew AMSTI science teachers were using a variety of assessment resources and methods. The researcher did not know to what extent NCLB and AYP had affected AMSTI science teachers' assessment processes. Based on conservations with different educators and administrators, the researcher thought most AMSTI science teachers were altering their assessment process due to NCLB. The results of this study showed this was not the case. Only 7 of the 16 AMSTI science teachers who participated in this study described changing their assessment selection and development processes as a result of NCLB. The researcher heard first hand the frustration these seven AMSTI science teachers are experiencing as they address the demands of changing assessment processes due to NCLB and AYP. The researcher's views of the assessment experiences of AMSTI science teachers were altered from a belief that NCLB was significantly changing how teachers assessed inquiry science to an understanding that only some teachers were altering their assessment processes due to NCLB. These teachers who described altering their assessment process were employed in schools that had not always met AYP or had a large number of special needs students in their classrooms.

Conclusion

In the state of Alabama, many science students are instructed using inquiry-based instructional methodologies through AMSTI. With the implementation of NCLB and AYP guidelines, AMSTI science teachers have to establish a balance between the demands of the standardized tests required by AYP and the need to give students an authentic inquiry experience. The researcher is a secondary science teacher who previous participated in AMSTI while teaching seventh and eighth grade science. When the researcher's teaching responsibilities changed to sciences for grades 9-12, the researcher brought her experiences with inquiry learning into these new science classes. The researcher's vested interest in science education in Alabama and her successful experiences with inquiry learning methods and it corresponding improvement in student achievement led to this research study.

The significance of this phenomenological study was the generation of knowledge and insights into the decision making processes of AMSTI science teachers as they select and develop assessments for inquiry-based learning. Implementing inquiry methods into the science classroom is challenging and complicated for traditional science teachers. They must shift their instructional focus to a student centered environment rather than the teacher centered environment of which they are familiar. Science teachers struggle to balance the requirements of AYP testing and provide their students with authentic inquiry experiences. Science teachers face the challenges of assessing inquiry-based learning methods in order to address the complexities of inquiry-based learning methods. Providing a positive social change, this study's findings supply science teachers with descriptions of successful inquiry classrooms and creative assessments that correspond to inquiry-based learning methods. The findings of this study present science teachers with winning choices to address creating authentic inquiry experiences while preparing students for the high stakes standardized tests of AYP. This phenomenological study's findings provide a stepping stone for additional studies to eliminate the gap in current educational research. By examining the lived experiences or day to day decision processes of AMSTI science teachers as they assess the complexities of inquiry-based learning, this study could prove advantageous to science educators, administrators, and educational leaders as they address the future of science education in a global economy.

This research suggests several programs and professional development opportunities could be established to address the issues emerging for this study's findings. Professional development forums must be implemented through AMSTI to allow AMSTI science teachers to share authentic, working models for assessing inquiry learning and balancing that need with the need for success on the standardized tests of AYP. AMSTI schools must develop programs to communicate to AMSTI science teachers the schools' goals for AYP and the teachers' responsibilities for AYP. Drawing from the researcher's 17 years of science educational experience, pressures develop from being uninformed and therefore unprepared. Clearly communicating the science teachers' responsibilities for AYP and the goals for AYP allows science teachers to better prepare and organize lessons in order to succeed thus reducing the pressures felt by science teachers. In addition, communities need to be informed. This study's participants listed their communities as a source of the pressure they feel due to AYP. By creating a more informed communities, the state administration, school systems' administration, schools' administration, and schools' faculty will feel less pressure from their communities. Professional development opportunities must be created in order to address the need for additional assessment resources and methods for AMSTI science teachers who work with special needs students. These teachers need working assessment models from AMSTI science teachers who are meeting AYP. This can be accomplished through a round table forum with veteran AMSTI science teachers from school who meet AYP and those that do not. A mentoring program needs to be established in which AMSTI science teachers from schools that meet AYP and have similar student populations mentor other AMSTI science teachers who teach at schools that have not met AYP. This program would be established through AMSTI or if the school systems are large enough to have several schools, then the mentoring program should be developed within these school systems.

The actions needed to create an impact on the assessment processes of AMSTI science teachers would involve the greatest resource available, AMSTI science teachers. All the participants of this study commented on the need for a forum in which AMSTI science teachers could share their best practices for assessing inquiry learning. The most important resource for AMSTI science teachers to address the pressures and frustration felt due to AYP and NCLB is the communication of the experiences of other AMSTI science teachers.

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APPENDIX A: CONSENT FORM

CONSENT FORM

You are invited to take part in a research study on the experiences of fifth through eighth grade AMSTI science teachers as they select and develop assessments for inquiry learning. You were chosen for the study because your participation in AMSTI and your geographic location. Please read this form and ask any questions you have before agreeing to be part of the study.

This study is being conducted by a researcher named Gina Tash, who is a doctoral student at Walden University.

Background Information:
The purpose of this study is to describe the lived experiences of northwest Alabama AMSTI science educators' as they select and develop their classroom assessment methods when implementing inquiry-based learning instructional methods.

Procedures:
If you agree to be in this study, you will be asked to:

- Read and sign this consent form.
- Participate in an individual interview or a focus group discussion lasting approximately 60 minutes at a convenient location.
- Read and make comments on the accuracy of your transcribed interview or focus group discussion.

Voluntary Nature of the Study:
Your participation in this study is voluntary. This means that everyone will respect your decision of whether or not you want to be in the study. No one at your school, within your school system, or at Walden University will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind later. If you feel stressed during the study you may stop at any time. You may skip any questions that you feel are too personal.

Risks and Benefits of Being in the Study:
There are no anticipated physical risks to the participants in this proposed study. The only risk involved with this proposed study is the possibility that your answers to the interview questions may be considered sensitive. Therefore, the researcher will randomly assign a false name to all your responses to maintain your anonymity.

The benefit of participating in this study is the results gather during this study will aid science teacher by providing insights into the experiences of AMSTI science teachers as they select and develop assessment methods in their inquiry-based science classrooms.

Compensation:
There is no compensation for participation in this study.

Confidentiality:
Any information you provide will be kept confidential. The researcher will not use your information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in any reports of the study.

Contacts and Questions:
The researcher's name is Gina Tash. The researcher's faculty advisor is Dr. Gerald Giraud. You may ask any questions you have now. Or if you have questions later, you may contact the researcher via email at ginatash@hughes.net or the advisor at gerald.giraud@waldenu.edu
If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Director of the Research Center at Walden University. Her phone number is 1-800-925-3368, extension 1210.

The researcher will give you a copy of this form to keep.

Statement of Consent:

☐ I have read the above information. I have received answers to any questions I have at this time. I am 18 years of age or older, and I consent to participate in the study.

Printed Name of Participant	
Participant's Written or Electronic* Signature	
Researcher's Written or Electronic* Signature	

Electronic signatures are regulated by the Uniform Electronic Transactions Act. Legally, an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically.

APPENDIX B: INTRODUCTION LETTER

Dear Colleague:

My name is Gina Tash and I am a science teacher at Wilson School located in Florence, Alabama. I am currently conducting a research study for my Educational Doctorate Degree in Teacher Leadership program through Walden University. As a requirement of this degree, I will be conducting a research study on assessing inquiry-based learning. The purpose of this study is to describe the experiences of AMSTI science teachers as they select and develop assessments for inquiry-based learning. Most current research focuses on the types of assessment science teachers' use in their classrooms. However, there is very little research on the experiences of science teachers as they assess inquiry-based learning. This information will provide science teacher leaders with additional insights and knowledge regarding assessment procedures in their inquiry-based learning classrooms and start to fill the gap in current literature regarding AMSTI science teachers' assessment selection and development process.

I am contacting you to see if you would be willing to participate in this study. I need to gather data through interviews with individual teachers and small groups of teachers who instruct science students in grades five through eight. These interviews will take place at your convenience. Also, the interviews will be recorded and will take approximately 45 to 60 minutes. There are no anticipated physical risks for participating in this study. The only risk involved with this study is the possibility that your answers to the interview questions may be considered sensitive. Therefore, I will randomly assign a false name for all your responses to maintain your confidentiality.

I would greatly appreciate your help as I investigate the experiences of AMSTI science teachers regarding their assessment selection and development process while implementing inquiry-based learning methods.

Sincerely,
Gina Tash

3610 County Road 299
Florence, AL 35634
ginatash@hughes.net
gina.tash@lcschools.org

APPENDIX C: INTERVIEW GUIDE

Purpose of Study, Research Question and Subquestions, and Interview Guide Questions

Title of Study:
A Phenomenological Study Of Assessment Methods In The Inquiry-Based Science Classroom: How Do Educators Decide?

Purpose of Study:
The purpose of this proposed study is to describe the experiences science teachers as they determine their assessment methods for inquiry-based learning.

Research Question and Subquestions:
How do fifth through eighth grade Alabama Math, Science, and Technology Initiative science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes? Subquestions include:

1. What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?
2. What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?
3. What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?
4. What do AMSTI science teachers find most helpful when determining assessment methods?

General Information:
Years of teaching experience __________

Years involved in AMSTI training __________

Years AMSTI has been used in science classrooms at your school __________

Interview Guide Questions:

1. Tell me about your AMSTI experiences.

2. Tell me about your experiences with inquiry methods.

3. Tell me about your classroom practices.

4. Tell me about your classroom assessment practices.

5. Tell me about the documents you use to focus classroom assessment.

6. Tell me about the resources that you use to choose your assessments.

Follow-up Questions:

1. Explain the use of your school system's curriculum continuum during your assessment selection and development process.

2. Explain your use of the Alabama State Course of Study during your assessment selection and development process.

3. Explain your use of the National Science Education Standards during your assessment selection and development process.

4. What affect has No Child Left Behind legislation had on your assessment selection and development process?

5. What are the pressures you feel when selecting and developing assessments for inquiry-based learning?

6. What professional development opportunities would help eliminate the problems you face when selecting and developing assessments for inquiry-based learning?

APPENDIX D: INTERVIEW REMINDER

Dear (Place Participant's Name Here):

I just wanted to remind you of our interview date, time, and location.
My records show that we will meet (Place date here) at (Place time here) in (Place location here).

I am attaching a copy of the Study's Purpose, Research Question and Subquestions, and Interview Guide Questions. Please look over each question before our interview. During our interview, I will use the guide as a map to guide us through the interview. I will give you a copy of your answers to each question for you to review before I finish the study. Your ethical rights are very important to me. So that you will feel free to answer the questions, all answers and participant names will be kept confidential.

Thank you for your time and comments.

Sincerely,
Gina Tash

3610 County Road 299
Florence, AL 35634
ginatash@hughes.net
gina.tash@lcschools.org

APPENDIX E: CONFIDENTIALITY AGREEMENT

CONFIDENTIALITY AGREEMENT

Name of Signer: ____

During the course of my activity in collecting data for this research: "A Phenomenological Study Of Assessment Methods In The Inquiry-Based Science Classroom: How Do Science Educators Decide?" I will have access to information, which is confidential and should not be disclosed. I acknowledge that the information must remain confidential, and that improper disclosure of confidential information can be damaging to the participant.

By signing this Confidentiality Agreement I acknowledge and agree that:

1. I will not disclose or discuss any confidential information with others, including friends or family.
2. I will not in any way divulge, copy, release, sell, loan, alter or destroy any confidential information except as properly authorized.
3. I will not discuss confidential information where others can overhear the conversation. I understand that it is not acceptable to discuss confidential information even if the participant's name is not used.
4. I will not make any unauthorized transmissions, inquiries, modification or purging of confidential information.
5. I agree that my obligations under this agreement will continue after termination of the job that I will perform.
6. I understand that violation of this agreement will have legal implications.
7. I will only access or use systems or devices I'm officially authorized to access and I will not demonstrate the operation or function of systems or devices to unauthorized individuals.

Signing this document, I acknowledge that I have read the agreement and I agree to comply with all the terms and conditions stated above.

Signature: ______________________________ **Date:** _________

APPENDIX F: CORRELATIONS

Research Question and Subquestions Correlations to the Interview Guide

Research Questions
Overarching Research Question:
How do fifth through eighth grade Alabama Math, Science, and Technology Initiative science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes?
Correlating Interview Guide Question(s): Guide Questions 1-6 and Follow-up Questions 1-6
Research Subquestion #1: What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?
Correlating Interview Guide Question(s): Guide Questions 1-4
Research Subquestion #2: What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?
Correlating Interview Guide Question(s): Guide Questions 1-4, 6
Research Subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?
Correlating Interview Guide Question(s): Guide Questions 5-6 and Follow-up Questions 1-5
Research Subquestion #4: What do AMSTI science teachers find most helpful when determining assessment methods?
Correlating Interview Guide Question(s): Guide Questions 1-6 and Follow-up Questions 1-6

APPENDIX G: COLOR CODING

Research Question and Subquestions Color Coding

Research question
Overarching Research Question: How do fifth through eighth grade Alabama Math, Science, and Technology Initiative science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes?
Research Subquestion #1: What is the structural design of AMSTI science teachers' lived experiences with their assessment processes? [Highlighted in yellow]
Key Search Words for Research Subquestion #1: groups, assessment, test, observation, checklist, rubric, readings, notebooking, Science Course of Study, teacher generated, notes, projects, matching, multiple choice, essay, questions
Research Subquestion #2: What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences? [Highlighted in pink]
Key Search Words for Research Subquestion #2: resources, Course of Study, assessments, observations, groups, readings, notebooking, journaling, teacher generated, notes, matching, multiple choice, essay, questions, standardized tests, alternative tests, performance, correlation, textbook, Internet
Research Subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods? [Highlighted in green]
Key Search Words for Research Subquestion #3: Course of Study, NCLB, AYP, pacing guide, continuum, curriculum guide, national standards, pressure
Research Subquestion #4: What do AMSTI science teachers find most helpful when determining assessment methods? [Highlighted in blue]
Key Search Words for Research Subquestion #4: resources, Course of Study, assessments, observations, groups, readings, notebooking, journaling, teacher generated, notes, matching, multiple choice, essay, questions, standardized tests, alternative tests, performance, correlation, textbook, ASA, ARMT, SAT, AHSGE, rubric, checklist, self assess, peer assess, Internet, oral assessments

APPENDIX H: SAMPLE OF RESEARCHER'S NOTES AND MEMOS

Research Subquestion #3-Individual Interviews
What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?

EMILY: We come in, and we[Teacher is referring to students at the beginning of class.] usually have some kind of a bell ringer. There was a new test [Teacher is referring to a new standardized test which will eventually replace the SAT-10 for science in the state of Alabama. this year–the ASA–Alabama Science Assessment, so there are, I believe, eleven standards that they have to meet. And so this year, we focused on this past year. We would do a bell ringer [Assignment given at the beginning of class to get students on task.] based on those eleven standards, so I really tried to drill that all year long. We did multiples with the eleven standards and all that. But then after that [After bell ringer is complete.], the kids come in, and they hand out the notebooks, and they hand out they AMSTI books, and they do any kind of bell ringer or quick phonic, or sometimes it might be just finish up your conclusion from yesterday or something.

TAYLOR: I just flat out told the kids, we have prep for these tests [Teacher is referring to the standardized tests like the ASA or SAT-10.], and I know you enjoy the observations more but we have to do this, and I am just very forward with it, and we are going to do it, and we are going to do the best we can, and the kids typically like the inquiry-based much better, and that makes sense.[Students like alternative assessments rather than standardized assessments with AYP.]

MADISON: I use some of the science–the Alabama Science Assessment–the item specs they gave us last year–as test questions. They are multiple-choice questions. [I don't think all science teachers from seventh grade are aware of the item specs to help prepare their students.]

KAITLYN: Because that is one of the things I am working on this year for my PDP [PDP-professional development plan-each teacher in the state must have a PDP each year.], was to pull in more credible test items and to include higher order thinking questions. Those students who pick up on the application of science concepts, I feel like they will succeed better once they get in high school, and hopefully succeed better when they take the ACT test or whatever they choose. And especially of course, right now we are not testing science for the SAT but I am hoping they will go further with that. But I can see I just think it develops them more as a person, and not just for science! I think it makes them more inquisitive and question, instead of just, "I memorized that. What is next?"

ABIGAIL: Usually, you may go with one, three, and five–[Teacher is referring to the ARMT grading scale.] one attempted, three partial in understanding, and then five is mastery. It just depends on...but as a system, no, we haven't really said, "This is what I am going to do." So, usually, that is the way it is on ARMT.

TAYLOR: I went into the training with Filling the Gap Teacher is referring to the AMSTI resource that addresses the Science Course of Study objectives that are not part of the AMSTI units., and I even have all that now. And so, the pacing guide to me is a pretty good document. A lot of people–I don't know–maybe they don't use it as much, and I don't just sit and just hone over it but it is good, and it is correlated, and you have covered those objectives. So, I use that personal lesson plan but I have to have that Course of Study on everything but we don't use it as a working document necessarily anymore. We just–I don't know that all schools are doing that–but I used to have to fill that out and turn it in. We don't do that anymore. As long as we have our Course of Study, we don't have to fill that whole thing out. I just use it as a guide.

RILEY: We have a Course of Study, and we are expected to get through with every chapter, and everything we cover to meet that standard but as far as a certain order, we do not have to stay on the same pace.[Teacher is referring to the fact that his or her school system does not require them to maintaining a pacing guide or tracking guide throughout the school year.]

MADISON: But as far as something that the school board makes us do or the school makes us do, or our principal, no. We just do our lesson plans. This pretty much guides us as far as where we should be. Yeah, we're not required–our school system doesn't have anything in place. I think when our principal gave us a day to kind of work on this we kind of did it ourselves.[Teacher is referring to the fact that his or her school system does not require the teacher to maintain a pacing guide or tracking guide throughout the school year.]

MADELINE: At our school, we were kind of just told to cover the information. It did not have to be in any particular order. And, I would take the guide and make sure that they have covered everything. It just may not be in that order but I make sure that everything got covered. When we have a test or a lab, I just document where we covered the continuums.[Teacher is referring to a separate document from his or her lesson plans that is maintained for the school system which lists all Science Course of Study objectives and when they were covered in the teacher's class.]

MADELINE: Just all my lesson plans–and I have to write it. And we have to write the grad exam, the SAT–any type of exam that we are covering.

KAITLYN: We definitely use the Course of Study, and I am sure that I go over that, and, of course, on my lesson plans I indicate which Course of Study that we are working on, because we have to do that here with the STI [Lesson planner used by the school.].

EMILY: Early on, I went to my administration, and I've been following this continuum for two years, and now you want me to do AMSTI–so is it AMSTI, or is it continuum? And they said, "AMSTI–as long as you meet the Course of Study objectives, you are fine."

ABIGAIL: Now, the Course of Study–what our science textbook is–and then what our AMSTI is. So it is all correlated for us, and you go through there and see each section that covers our continuum, so it is very nice.

TAYLOR: The Science Course of Study is the "be all; end all." And I do. I want to make sure that the kids can answer that question. I want to know that they can get the big picture, because you can get soaked up in the little things–the fun things–and forget the big picture. So I do, and pretty much I have got my year broken down so that I know by December I have covered a certain point. Once I have covered it, I do go back and check it off for my benefit.

MADELINE: If the Course of Study just wants you to list we would talk about it a little bit–maybe not necessarily go into it in much detail, because looking ahead at the Course of Study, you can tell that there are going to be gaps that will be filled before I get there. You don't necessarily have to go into as much detail as if it were to be demonstrated.

KAITLYN: We definitely use the Course of Study, and I am sure that I go over that, and, of course, on my lesson plans I indicate which Course of Study that we are working on, because we have to do that here with the STI, and it says, even if it has on there some key terms, I make sure that those key terms are (and, of course, they are going to be in their notes), and they are going to be tested on those key words. Like "inertia." I know that, for one, is in the Course of Study–the continuum. So, I just make sure that if anything ever comes up that they can go back and they can find that I covered all those steps.

JORDAN: In my opinion, the sixth grade should be tested on science, because their curriculum has been condensed, and they are supposed to go more in depth in their subject matter, and we are still just getting off the surface on our subject matter and I think that they really needed to look at that when they thought about that, because really and truly, I think it is the sixth grade that starts with the high scored graduated exam. And the material–I am just kind of introducing things and doing a few things with it. I don't get into the depth that the sixth grade does. So I kind of felt like it should have gone–the science assessment –should have gone for the sixth grade.[Teacher is giving an opinion of what grade level should be tested with the ASA-Alabama Science Assessment-a standardized test the state of Alabama is using to replace the SAT-10 for science.]

EMILY: I had to meet the Course of Study objectives.

EMILY: Every single objective was met with AMSTI. Every single one. There are like two that have supplemental material that needs to be given–but I just meet the Course of

Study objectives, document that I met them, and that is it. And I throw this on the ASA, because that was such a big deal this year. But the SATs tend to be more earth science-oriented but the ASA was almost like a pregraduation activity, it felt like!

EMILY: I do not really use the national standards because I feel like if I teach AMSTI and I teach it the way it is supposed to be taught, then they are getting those–they are meeting those standards–or at least those standards are being taught.

ABIGAIL: They (AMSTI) do it for us (correlations with National Standards), which is very nice.

ABIGAIL: We met with curriculum mapping. We did this the past summer, and so we each took a section. We also had an AMSTI map. So, we correlated SAT, ARMT, AMSTI–whatever, and we correlated all of that with our book and the Course of Study.

JORDAN: It has not really changed much. [I would have thought that it had changed.] We are we made our standards, and we are above and beyond where we are supposed to be. Ever since I have been here that I can remember giving SATs, we have always been up there, so we have not really worried so much about hitting AYP–just maybe in attendance–that kind of thing. So it has not really changed a whole lot at all. The only thing we'd say is, "Please be here!"

MADISON: I think that with having AMSTI, the No Child Left Behind, [I thought NCLB would not necessarily benefit special needs students. I know inquiry learning methods are great for special needs students though.
Schools without high populations of special needs students approach No Child Left Behind very differently from those with higher populations.]I think a lot of the needs are being met, because it is hands-on. It is inquiry-based. I don't think it has really changed the way AMSTI has changed the way I teach. I don't think No Child Left Behind has changed a whole lot of the way I teach, and I think because I have your basic generic group of kids. I am not an inclusion classroom. I have some gifted students, and I have some lower-achieving students but we don't have any that are on IEP [Teacher is referring to special needs students' educational plan]right now. We do have some that are going through BBSST [Teacher is referring to the Building Based Student Support Team which addresses at risk students within his or her school and tests students for Special Needs Programs.], and we are doing those strategies. Like for one student, I have to read her test orally but it has not really changed our thinking a whole lot, as far as we are not slipping or anything.

MADELINE: I was very nervous about giving them hands-on assessments. And that is just because I never had hands-on tests. And I see that they get more out of it, and can give me more information about what they have learned doing that than they can from just a pencil/paper test, because they get confused with the wording, and they just get very confused with it. And then, they have been tested so much that when they get tested hands-on, it is almost like a play time, and they will give you all the information you want out of it.[Teacher is referring to a lack of confidence in assessing students with alternative assessments when he or she first started using inquiry learning.]

ABIGAIL: We are in a different area here. Most of our children are at about the same level. We have one or two that are a little bit lower but they usually pick it up, because when they work in the groups, that helps bring up the lower ones, so they work in groups, and they are learning from the higher. I usually grade mine with two higher kids and two lower kids. I usually have it reversed there, so that the lower children are learning from the higher kids.[Teacher is referring to few special needs students at his or her school.]

ABIGAIL: We used to talk about special ed but I don't have any special ed. We don't have any special ed in the sixth grade this year.

ABIGAIL: We worry about it, because eventually it will catch up with us. We are not in that level just yet but it will catch up. But it does make a difference. You start thinking about it a little bit more, and you start trying new things just to see if you can get the deeper have the kids think a little bit more about questions, instead of just a yes or no, and because it says so. [Teacher is referring to AYP. Will AYP really "catch up" with all schools?]

EMILY: I cannot say that it has really changed anything, because I feel like–once again–when I first started teaching, if I had continued that way with the lecture and all that, and "Here are the notes, fill in the blanks as I lecture", it would have changed that, because so many kids were getting left behind, and it would have changed that method but with the inquiry, with AMSTI, and all the other different activities I do–they even become problem solvers, I think. With all of that, I think the kids are getting it more. Do I still have kids that fail? Definitely. But do they fail because they do not understand it, or do they fail because they do not want to do the work? When I talk to them one-on-one, they get it. They just don't want to do the homework, and they don't. Sometimes you give a test, and they just don't want to do it. They leave it blank. But I think this year we only had two students who failed, because there were other issues. So I think AMSTI and all the other inquiry-based activities that I do–the kids are getting it. And I don't feel like they are being left behind. I don't feel like there is anything else that I need to do, because I would have but I think they are okay. I know that nobody has approached me and told me that I need to be doing it differently.[Teacher is referring to NCLB. This school does not have the special needs population of other schools.]

JORDAN: Lots more reteaching! [How much time would all this reteaching take? What do they do with the students who understand the concept on the first try??]In some cases, watering it down, because we are told, "You have got to get them to pass. You have got to do all these accommodations to pass them." And, unfortunately, you can't fix laziness. And I feel like pretty much they are asking us to fix their home life, their academic life, their social life, and everything else, and it is too much. We can't do that. I find that there are too many students who come in now that aren't really ready for fifth grade. They should have been held back, because their math skills are not where they need to be, because we have to let them re-take a test two or three times until they pass it. We have to keep watering things down for some of them until they are able to get through and I know there are some students that are in special ed who are truly not ever going to be able to succeed if we don't do that, and I understand those unusual cases. I have one this year, bless her heart, she can't read on a first grade level, and never will be [able to do so]. She has had radiation all her life, and she is just not ever going to get there. And I have no problem watering everything down–the planets–we are trying to get her to learn the first four planets in their order but she is not there. She can't do that. It is too much. But she has had health concerns and things like that. When you've got another little boy here who has not got any health problems, he is just lazy. He won't try. He won't do his homework. He won't pay attention in class but yet I have got to do something to help him get through fifth grade. [Teacher is referring to NCLB. Do they have assistance from a Sped Ed teacher on these reteach items?]

JORDAN: In some cases it may be fewer problems. A lot of times it is just reteaching them. Or, if it is like a science vocabulary test, it is keeping them in, going back over the words with them, having a peer stay with them and go back over words with them–that kind of thing; providing a word bank. [Teacher is referring to how NCLB has changed his or her methods of assessment.]

JORDAN: It has not really changed much. We are we made our standards, and we are above and beyond where we are supposed to be. Ever since I have been here that I can remember taking SATs–or giving them, I should say, we have always been up there, so we have not really worried so much about hitting AYP–just maybe in attendance–that kind of thing. So it has not really changed a whole lot at all. The only thing we'd say is, "Please be here!"

JORDAN: And on the day of the testing, that is pretty much where we are with that. Our special ed kids–we have a few–like that one there she is on a different form of assessment, because she is not capable of taking anything at all like that. Our problem is–because like there are 34 or 35 students between the two fifth grades–so every one student greatly affects our scores. So if you have got one that comes in and he just blows off the test and just writes anything down, our scores will be lower than they should be, because he chose not to do anything. All right, so that is the only thing we can do. You can't change that. You can't do anything about that for AYP. I know they are shooting for 100% at every school for all this stuff but you are just asking for impossibility. It is not what happens. [Teacher is referring to the need for all students to attend school on the days of standardized testing and that the teacher has little influence on this fact.]

APPENDIX I: INDIVIDUAL INTERVIEWS' SIGNIFICANT STATEMENTS

Research Subquestion #1-Individual Interviews What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?
Significant Statements
JORDAN: This particular test is usually fill-in-the-blank but there are a lot of discussion things, like, as far as the independent and dependent [variables], well, how do you know which one is which? So, I try to get them to apple some things that tell me, what they know and how do they know it. So it is kind of a mixture of things. And sometimes it is matching. Sometimes it may be A/B/C/D or multiple choice. So I kind of mix them in. MADISON: One thing that we just finished, we made Eco Columns, a combination of terrariums and aquariums which correlates with the Alabama [Science] Course of Study. We have to talk about food chains and food webs. We would read some of the material from the student assessment booklet that was provided in the AMSTI kit. MADISON: I use a lot of the AMSTI. Using the student assessment books that they provide with us, it shows pictures and it has one student needs to do [real simple directions] like 1) Students need to place two cupfuls of soil in the terrarium. The first thing I do at the beginning of the year is talk about procedures, safety, and things like that. When we did the terrariums, each group had two books per group. They had jobs assigned to them. There is a team captain. There is a getter [materials manager] who is the person that comes and gets all of the materials. There is a recorder so if there are any papers or questions that need to be answered or anything like that. We get in the groups. They have work stations in the classrooms. You can see where they are set up. The team captain assigns the jobs for the day. The getters come get their materials. It is really student self-sufficient. I really just go around and monitor to make sure that they are staying on task. MADISON: AMSTI has done a good job at having the procedures laid out for the students and they have the procedures ready for the teacher. It is easy once you go through the training. MADISON: They were divided up into their groups. And that was after we had talked about the fish, the snails, the crickets, and pill bugs, they had to become an expert in one of those. This person had to research the mosquito fish and they had to write three of the most important details after reading the selection. MADISON: For some assessments, while they are doing that [researching or conducting lab activities], they can sketch. As long as they draw it, they can tell me what it is. Look at the difference between these two [refers to two students' assessment papers]. I can tell he has got everything in there. These are some of the things [assessments] they [AMSTI] provide us with the teacher materials. TAYLOR: I use the assessments that come with the AMSTI kit. There is always a paper/pencil assessment and an observation test. I do a book [using an AMSTI student book] test along the way and then we have a big assessment over the big topics. We will do the paper/pencil test first. The next day, I will bring in the hands-on and they have to (table continued)

write up their hypothesis and they will
watch me do a demo and they have to write up their conclusion. The hands-on [assessments] are the ones that I love most! It is pretty neat that they can relate all that they saw to a brand-new lab they have never seen and get it! They get why heat rises and that cool air sinks. It is pretty neat!

TAYLOR: Some hands-on [assessments] They [AMSTI] give you a paper/pencil [assessment] and then they give you some alternates [assessments] that you can do. Not every assessment has two or three different ideas but I use the ones that are in there [AMSTI resources] and they are pretty good. I have come up with a few [assessments] of my own with higher order questions. But it [the assessment] can be just anything from them actually doing a new lab, to me doing a demo and them writing up what they saw happen and they relate it back to the storms.

TAYLOR: Paper/pencil [assessment] is always harder and I think that may be one drawback to AMSTI. I don't spend a lot of time reviewing definitions. That is the one thing that I do see different, I don't test the definitions. They can explain it. They can see it happen. That is the part I like the best is the hands-on. But you have to have paper/pencil. You have to have some way of assigning your grade and we [AMSTI science teachers at this school] use rubrics a lot with their projects. When we do bombs, they [the students] have to research a bomb and they bring in a PowerPoint presentation. Then, the rubrics are used to assign a grade and we do a lot of that.

TAYLOR: I set up a composition notebook. We have a table of contents in the front and a glossary in the back just like a regular textbook. As we enter a lab, they enter it in the table of contents. They enter a page number and date and we go in and everything we do like questions, hypotheses, materials, procedures, conclusions, all of that is in their journal. About every two weeks, I make up a ten or fifteen question test with questions like, on such and such date that we did this, what was your conclusion or what did you learn or what new question did you have after that lab? So, it [the assessment] makes them responsible. They are accountable and I can ask questions. After the six weeks is over, I don't go back to that section because some of the kids might have been absent, and I don't want them punished for not getting it. If they are absent, it is their responsibility to get someone's journal and copy the information. If they are absent, then AMSTI is hard. If I do a lab, they [absent students] can't make it up. So usually at the end of six weeks or at the end of the trimester, I do a demo of the main lab that we would have covered so they can at least say they saw them.

TAYLOR: I just flat out told the kids–we have prep for these tests. I know you enjoy the observations [assessments] more but we have to do this. I am just very forward with it and we are going to do it and we are going to do the best we can. The kids [students] typically like the inquiry-based much better and that makes sense. I would, too! I prefer to grade them [paper/pencil assessments]. It is easier to grade paper/pencil [assessments] but to see the kids actually observe and if you see them when they start getting it, that is the fun part. That's my good part.

TAYLOR: Before AMSTI, I did not do a lot of inquiry-based stuff. I just didn't. I was

(table continued)

uncomfortable with how to grade [inquiry learning] and how to be fair [with grades]. Just because the kids didn't have the best vocabulary, I wanted to make sure that they still got points for knowing the content. The first time I gave the first test and I was scared to death. I wanted to make sure that I handled it the right way. But now that I have gone through it a time or two, I just do it and go on. TAYLOR: In earthquake week, they get to choose the way they want to tell me how earthquakes occur. We do one lab where they mimic all the different ways [earthquakes occur] and then I have tectonics and they are able to do that. So I do let them choose [their assessment methods]. They can pick which way they want to tell me how an earthquake occurs. I have not just come up with a lot on my own [assessments]. The kids know about that [choosing the assessment method]. They enjoy it and they know they have options. They have choices to make even if they go for the easy ones. At least they are making a choice. TAYLOR: This week and last, we were getting ready for a chapter test and we ended one [chapter] with a test on the white board. I called out a problem and they wrote on their white board and I went around and checked. I think they do work harder when they have choices. Just like if they have a choice on a project. They can do either a poster or a PowerPoint. Just that choice–as long as they get to make that choice, they will work harder. ABIGAIL: We have notebook quizzes and that may consist of just making sure that the kids are following along, taking notes, doing the components, and answering the components. That [notebook quizzes] may just consist of what was the question for Lesson 2.1, what was your answer, what was your prediction and they have to fill that out. That is one way we check it, just to make sure that they are keeping up their notebook. Another way we assess [notebooks] is just the key terms and that is usually from the teacher's book [AMSTI teachers' resource book] because the student book stays with AMSTI. They can't keep the student book. So, I take the terms from the teacher's book. They can use their notebook [on the notebook quizzes]. On the terms assessments, they do learn the terms [not open notebook]. ABIGAIL: Some matching [question format on terms tests] and then for the notebook, it would be fill-in-the-blank and discussion questions. ABIGAIL: Essentially, each [member of the group] has a job. You make sure that they are participating with the experiment. You give them a job and you make sure that everybody is doing their job. They will tell you, so and so is not doing their job. So that is when you talk to them about that [participating]. I just use a rubric on group assessments. ABIGAIL: Mainly I would pull [assessments] from the AMSTI teacher's book. I also have a science textbook that we [school system] have adopted and I pull from it because AMSTI doesn't touch everything. With them [AMSTI resources and the textbook] together, we hit everything in the Course of Study. So I pull from that [the Science Course of Study] and I also have PowerPoints that I have created for research that I have done and some other teachers throughout the county. We [AMSTI science teachers] (table continued)

usually meet especially when you go to the AMSTI training. They [AMSTI science teachers] share PowerPoints and other materials. So we pull together. ABIGAIL: I may have one or two questions would have a discussion question or open-ended question on every test for them. It may not just consist of that format. All of the tests are not just like that. ABIGAIL: With sixth graders, it is really hard. You have to be very lenient and flexible with their answers because their train of thought is not exactly where mine would be. There are different levels and I just print a rubric and go by that. You have got mastery and partial credit. ABIGAIL: Most of the time, it depends on how much you want each assessment question to be point-wise? What do you want them to be worth? Usually, you may go with one, three, and five where one is attempted, three is partial in understanding, and then five is mastery. This is what I am going to do. That is the way it is on ARMT. I think it is just plain one-to-four; it is easier to figure up. ABIGAIL: Note-taking is one way I assess and either I will give them the notes and they are typed out and I actually give them a piece of paper or I will lecture and make sure they are taking these notes to try to prepare them for in the future because these kids cannot take notes. It is just so hard for them. But note-taking and then I will give them a study guide. Usually the study guide is their preparation for the test but it mainly comes from this book [AMSTI teacher resource book]. It comes from the book inside which is not from their student book. Our book [teacher resource book] is totally different from the student book. We have a lot more details. There is more depth there than in the student book. RILEY: We will start with a demo period–a demonstration. It [the demonstration] can be as small as a match which leads us to talk about kinetic energy. We strike the match, let it burn down, and talk about how the energy was lost. From there, I do PowerPoints, very interactive PowerPoints. We discuss things and I ask questions. We have a review time. Sometimes I use notes so I can judge whether they understand the content. Today, we took our AMSTI lesson we are on and we conducted an inquiry. RILEY: We [in this class] have a composition notebook. At the top [of the first page] is the title of the lab for the day. I give them a question or for the next two-to-three weeks, I will let them formulate the question. I guide their progress and they have to form a hypothesis and they have to use it. Then, they have their plan section and all their materials where they write down all we did in explicit details. With the observations, they will tell me what happened. In their conclusion, they have to give me three important facts, two interesting details, and one question. RILEY: I think it [inquiry learning] is much harder because it takes a lot more time and a lot more energy. EMILY: There was a new test this year [2007-2008 school year], the ASA (Alabama Science Assessment). I believe there are eleven standards that they have to meet [on the ASA]. That is when I try to pull in those item specs [ASA] on my tests. We would do a bell ringer based on those eleven standards. I really tried to drill that [the ASA (table continued)

standards] all year long. We did multiples with the eleven standards. After that [the bell ringer], the kids come in and they hand out the notebooks [science notebooks] and AMSTI [student resource] books. EMILY: They do their conclusions on their own. They do work in groups! They always pair up but they almost always work in groups. I will use a rubric or check list to assess group work. RILEY: I check their notebook. I will have them paste in a reading. They have highlighters and they highlight the hypothesis orange. As I go through, I will check it [hypothesis] off and they get a grade. I may check one lab today and then next week, I may check something else. They always know to be prepared. EMILY: We do have quizzes and we do have tests. I try to make most of them [questions] open-ended. We do a lot of performance-based assessment. I do a lot of notebook grades. I grade them on their conclusions because I want to make sure that they learned what they were supposed to learn. We have all kinds of different quizzes. Sometimes they have even had to identify the organisms that they are supposed to identify [in the lab]. My two major types of assessment other than the quizzes and the tests (I try to make them [test questions] more open-ended) are performance-based and notebooks. EMILY: Sometimes it [an assessment] might be paper/pencil and sometimes it is performance-based. Quizzes and tests to me are kind of the same thing just the quiz tends to be smaller. Some of my grades come from performance-based. I still do paper/pencil tests; if you don't, then you have parents who do not understand how this grade [student's average] came about. They [students] have to know terms and probably the best way to do that is paper/pencil tests. Mostly, the paper/pencil testing is multiple choice. EMILY: I have used rubrics. I do a lot of projects, too. Like on a project, they will be given a rubric beforehand to know what I am going to grade and how I am going to grade. You have guidelines for what they need to do or do not need to do. I don't always use the rubric so much with the notebooks because I've got to read their conclusion. I don't hand out a rubric for every single assignment. Maybe I should but I don't because that would be time consuming. With their conclusion, they pretty much have to tell me what they learned. So, I want them to answer the question and what they learned. I don't really use the rubric with that [lab reports]. MADELINE: For the most part, I just follow the notebook with AMSTI and I just try not to tell them anything about it. I just let them get in there and learn and then at the end, we just all kind of draw a conclusion and talk about what happened. I don't ever tell them anything that is going to go on before it happens. KAITLYN: When it [an assessment or inquiry lab] says explain they give me two words. I try to always put some type of questions not all just matching/multiple-choice on the tests. I usually have just a few of some types that they have to think. KAITLYN: Usually what I do is put the objective [from the Course of Study and standardized tests] in a question type. I may model it [inquiry lab]. Because they don't want to read the directions, I will circulate constantly. I am constantly moving from one (table continued)

table to the other with them, asking them if they have any questions. I always want to get feedback from their group not just depend on me. MADELINE: I use a lot of different assessments. A lot of it [assessments] is with their notebook [student generated journal]. They [students] never know what part of the notebook I am going to grade. One day it may be the hypothesis. One day it may be the conclusion. One day it may just be the parts of the lab. One day it may be I am grading every single thing in their notebook and they have notebook tests which is just me giving them questions and it should be in their notebook and they just write the answer. MADELINE: They always have one project to do out of the six weeks and there are tests built into the AMSTI book. Half of it [each test from the AMSTI resource book] is pencil/paper. So, I will do both [pencil/paper and performance assessments]. What it [performance assessments] is they are given a problem and they can use any of the materials that we have learned and the methods that we have learned and solve their problem. Then, they just have to come up with their own procedure. There is a rubric [that] is already made for you [the teacher by AMSTI]. It [the rubric] tells you to look for this and look for that. Then sometimes you can tell if the kids are getting there. MADELINE: Especially with one project, they can do the PowerPoint. They can do all sorts of things. They can do photo stories. They are so creative! When we just use pencil/paper [assessments], it restricts that [creativity]. Most of them don't know the words to write it for me to assess. So, I just like the other better [alternative assessments]. MADELINE: If I am having trouble choosing an assessment, the end of every lesson in the book [AMSTI teacher resource book] gives you 10 different ways you can assess the lesson. It may be with a worksheet. It may be with bell ringers or just questions that you ask from the seat or class discussion. Everybody learns differently and everybody communicates differently. I try to assess in different ways every day to give everybody an opportunity to know that they are learning. KAITLYN: I still on their AMSTI labs I just count them as daily grades. I still give chapter tests [textbook assessment format].

Research Subquestion #2-Individual Interviews What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?
Significant Statements
MADISON: One thing that we just finished, we made Eco Columns-a combination of terrariums and aquariums, which correlates with the Alabama Course of Study. We have to talk about food chains and food webs. So with the materials that AMSTI sends us, they send us all of the materials that we need and the living organisms come through the mail when we want to order. We would read some of the material from the student assessment booklet that was provided in the AMSTI kit. So, one day we would talk about the mosquito fish, one day we would talk about the snails, and one day we would talk about the cricket. When we were working on the aquarium or terrarium, we would talk about the animals or the plants that would correlate with the aquarium or the (table continued)

terrarium. MADISON: I use a lot of the science AMSTI. MADISON: Using the student assessment books that they provide with us, it shows pictures and it has one student needs to do [real simple directions] like 1) Students need to place two cupfuls of soil in the terrarium. The first thing I do at the beginning of the year is talk about procedures, safety, and things like that. When we did the terrariums, each group had two books per group. They had jobs assigned to them. There is a team captain. There is a getter [materials manager] who is the person that comes and gets all of the materials. There is a recorder so if there are any papers or questions that need to be answered or anything like that. We get in the groups. They have work stations in the classrooms. You can see where they are set up. The team captain assigns the jobs for the day. The getters come get their materials. It is really student self-sufficient. I really just go around and monitor to make sure that they are staying on task using a checklist. MADISON: They get their materials, go back to their work stations, and I will tell them, you need to do #1 through #6. I walk them through it before they go to their work stations. I always have an example set up for them. So, they will know what the test product should look like. With the terrariums, they had to plant three kinds of seeds, alfalfa, rice, and mustard seeds. We talked a little bit about the seeds that day, planted the seeds, covered the seeds up with a little bit of soil, and then started watering them which you wouldn't think that would take a lot of time but we had pipettes and you had to do it just a little at a time and everybody has to take turns. It [the AMSTI resources] is laid out pretty well. AMSTI has done a good job at having the procedures laid out for the students and they have the procedures ready for the teacher. It is easy once you go through the training. It is really easy to follow along. MADISON: They were divided up into their groups. And that was after we had talked about the fish, the snails, the crickets, and pill bugs, they had to become an expert in one of those. This person had to research the mosquito fish and they had to write three of the most important details after reading the selection. MADISON: For some assessments, while they are doing that [researching or conducting lab activities], they can sketch. As long as they draw it, they can tell me what it is. Look at the difference between these two [refers to two students' assessment papers]. I can tell he has got everything in there. These are some of the things [assessments] they [AMSTI] provide us with the teacher materials. MADISON: I went through the Alabama Course of Study and looked at the objectives and one of the objectives was for students to be able to describe food chains or food webs. So, I really hit that hard. The textbook [system adopted science textbook] had some examples. I used that [system adopted science textbook] as a resource. As far as the assessments go, AMSTI didn't have what I considered the assessment that would correlate with the Alabama Course of Study. Considering our accountability [due to AYP] now, I felt like I needed to use those questions [from the Course of Study and the science textbook]. MADISON: They [Alabama Department of Education] have given everybody the items [items specifications for the ASA]. Those are the questions that I would just print off and put up on the screen [using a multimedia projector]. They are multiple choice [types (table continued)

of questions]. They correlate with what we have been talking about in class. I just use those [ASA sample questions] considering it [the ASA] is going to be multiple choice. They are not open-ended or anything. So I just use those questions [from the ASA examples] as my test questions. MADISON: If they [the students] get them [ASA sample questions] right on the test [given by the teacher], then they should do well on the Alabama Science Assessment. I am driven by the Alabama Course of Study and the Alabama Science Assessment right now. MADISON: With the item specs [for the ASA], they [questions on the students' unit tests] are so close. If you use the item specs, they [the students] are going to do well on the test [ASA]. I used those item specs last year [last school year] or this year 2008 and my kids did very well. I think I had seventy-four kids last year and only four scored a two. Everybody else scored three or four and I used those item specs last year. So I am pretty much using the same assessments as I did last year [for this school year, 2008-2009]. MADISON: An AMSTI specialist came by yesterday and told me to go on the website [AMSTI website]. They [AMSTI] have a new thing posted. It is called Filling in the Gaps. So, we [fifth grade AMSTI science teachers at this school] have been looking into that [Filling in the Gaps] but we [fifth grade AMSTI science teachers at this school] pretty much use our own [teacher generated assessments] and it is working [students' ASA scores are high]. JORDAN: The best way to do that [assessments] is [AMSTI] paper/pencil tests. Mostly, they [my students] will do multiple-choice paper/pencil testing. JORDAN: They've [students] got to see a style of questioning [standardized test format] and I think that [using sample questions from the standardized tests of AYP] is the best way to do those [unit tests in the classroom]. JORDAN: Sometimes I just use the exact question [from the sample standardized test questions] because there is just no other way around it [because of wording]. I will use a lot of the same questions or question types and reword it [the question] a little bit. JORDAN: The ARMT thing [is stressed by school and system administration] because I have to do the ARMT part, too [ARMT does not cover science. It is covered in the ASA but elementary teachers all teach reading and they will use AMSTI as a resource for reading material]. So I pull questions from there [ARMT] but most of what I use for the AMSTI [tests] comes from what it is we experienced in class. I make the tests and change them. I keep my copy but I will look at it and say, we didn't really get that one [test question], so I will take that one [test question] out and not use it. I usually use what I see in class and what I feel like the kids can do. You have some groups you can challenge more than others. There are some things you just have to pull back with on those groups [ones you cannot challenge]. TAYLOR: I use the assessments that come with the AMSTI kit. There is always a paper/pencil assessment and an observation test. We are getting ready to do our storm assessment and I usually give the study guide before. They have a journal for everything

(table continued)

that we do and from the very beginning of the year until the very end, they keep the journal. I do a book [using an AMSTI student book] test along the way and then we have a big assessment over the big topics because my kit I keep from August until December. It is a big box of stuff and it is set up in three sets. I have storms, earthquakes, and volcanoes that I teach. So at the end of about 8 to 12 weeks, we do an assessment and it is all over storms first. We will do the paper/pencil test first. The next day, I will bring in the hands-on and they have to write up their hypothesis and they will watch me do a demo and they have to write up their conclusion. The hands-on [assessments] are the ones that I love most! It is pretty neat that they can relate all that they saw to a brand new lab they have never seen and get it! They get why heat rises and that cool air sinks. It is pretty neat! TAYLOR: Paper/pencil [assessment] is always harder and I think that may be one drawback to AMSTI. I don't spend a lot of time reviewing definitions. That is the one thing that I do see different, I don't test the definitions. They can explain it. They can see it happen. That is the part I like the best is the hands-on. But you have to have paper/pencil. You have to have some way of assigning your grade and we [AMSTI science teachers at this school] use rubrics a lot with their projects. When we do bombs, they [the students] have to research a bomb and they bring in a PowerPoint presentation. Then, the rubrics are used to assign a grade and we do a lot of that. TAYLOR: I set up a composition notebook. We have a table of contents in the front and a glossary in the back just like a regular textbook. As we enter a lab, they enter it in the table of contents. They enter a page number and date and we go in and everything we do like questions, hypotheses, materials, procedures, conclusions, all of that is in their journal. About every two weeks, I make up a ten or fifteen question test with questions like, on such and such date that we did this, what was your conclusion or what did you learn or what new question did you have after that lab? So, it [the assessment] makes them responsible. They are accountable and I can ask questions. After the six weeks is over, I don't go back to that section because some of the kids might have been absent, and I don't want them punished for not getting it. If they are absent, it is their responsibility to get someone's journal and copy the information. If they are absent, then AMSTI is hard. If I do a lab, they [absent students] can't make it up. So usually at the end of six weeks or at the end of the trimester, I do a demo of the main lab that we would have covered so they can at least say they saw them. TAYLOR: I just flat out told the kids–we have prep for these tests. I know you enjoy the observations [assessments] more but we have to do this. I am just very forward with it and we are going to do it and we are going to do the best we can. The kids [students] typically like the inquiry-based much better and that makes sense. I would, too! I prefer to grade them [paper/pencil assessments]. It is easier to grade paper/pencil [assessments] but to see the kids actually observe and if you see them when they start getting it, that is the fun part. That's my good part. TAYLOR: Before AMSTI, I did not do a lot of inquiry-based stuff. I just didn't. I was uncomfortable with how to grade [inquiry learning] and how to be fair [with grades]. Just because the kids didn't have the best vocabulary, I wanted to make sure that they (table continued)

still got points for knowing the content. The first time I gave the first test and I was scared to death. I wanted to make sure that I handled it the right way. But now that I have gone through it a time or two, I just do it and go on. TAYLOR: In earthquake week, they get to choose the way they want to tell me how earthquakes occur. We do one lab where they mimic all the different ways [earthquakes occur] and then I have tectonics and they are able to do that. So I do let them choose [their assessment methods]. They can pick which way they want to tell me how an earthquake occurs. I have not just come up with a lot on my own [assessments]. The kids know about that [choosing the assessment method]. They enjoy it and they know they have options. They have choices to make even if they go for the easy ones. At least they are making a choice. TAYLOR: This week and last, we were getting ready for a chapter test and we ended one [chapter] with a test on the white board. I called out a problem and they wrote on their white board and I went around and checked. I think they do work harder when they have choices. Just like if they have a choice on a project. They can do either a poster or a PowerPoint. Just that choice–as long as they get to make that choice, they will work harder. ABIGAIL: We have notebook quizzes and that may consist of just making sure that the kids are following along, taking notes, doing the components, and answering the components. That [notebook quizzes] may just consist of what was the question for Lesson 2.1, what was your answer, what was your prediction and they have to fill that out. That is one way we check it, just to make sure that they are keeping up their notebook. Another way we assess [notebooks] is just the key terms and that is usually from the teacher's book [AMSTI teachers' resource book] because the student book stays with AMSTI. They can't keep the student book. So, I take the terms from the teacher's book. They can use their notebook [on the notebook quizzes]. On the terms assessments, they do learn the terms [not open notebook]. ABIGAIL: Some matching [question format on terms tests] and then for the notebook, it would be fill-in-the-blank and discussion questions. ABIGAIL: Essentially, each [member of the group] has a job. You make sure that they are participating with the experiment. You give them a job and you make sure that everybody is doing their job. They will tell you, so and so is not doing their job. So that is when you talk to them about that [participating]. I use a rubric on group assessments. ABIGAIL: Mainly, I would pull [assessments] from the AMSTI teacher's book. ABIGAIL: I also have a science textbook that we [school system] have adopted and I pull from it because AMSTI doesn't touch everything. With them [AMSTI resources and the textbook] together, we hit everything in the Course of Study. So I pull from that [the Science Course of Study] and I also have PowerPoints that I have created for research that I have done and some other teachers throughout the county. We [AMSTI science teachers] usually meet especially when you go to the AMSTI training. They [AMSTI science teachers] share PowerPoints and other materials. So we pull together. ABIGAIL: I may have one or two questions would have a discussion question or open- (table continued)

ended question on every test for them. It may not just consist of that format. All of the tests are not just like that. ABIGAIL: With sixth graders, it is really hard. You have to be very lenient and flexible with their answers because their train of thought is not exactly where mine would be. There are different levels and I just print a rubric and go by that. You have got mastery and partial credit. ABIGAIL: Most of the time, it depends on how much you want each assessment question to be point wise? What do you want them to be worth? Usually, you may go with one, three, and five where one is attempted, three is partial in understanding, and then five is mastery. This is what I am going to do. That is the way it is on ARMT. I think it is just plain one to four; it is easier to figure up. ABIGAIL: Note taking is one way I assess and either I will give them the notes and they are typed out and I actually give them a piece of paper or I will lecture and make sure they are taking these notes to try to prepare them for in the future because these kids cannot take notes. It is just so hard for them. But note taking and then I will give them a study guide. Usually the study guide is their preparation for the test but it mainly comes from this book [AMSTI teacher resource book]. It comes from the book inside which is not from their student book. Our book [teacher resource book] is totally different from the student book. We have a lot more details. There is more depth there than in the student book. ABIGAIL: I have Exam View [science textbook software with assessment data banks] with them [system adopted science textbook] and that is really beneficial, too. ABIGAIL: But AMSTI is just sort of you make your own on that [teacher generated assessments]. To me, sometimes I need that extra help to make sure I am covering and assessing everything that I need to. So, it would be better to have the assessments [provided]. We [AMSTI science teachers] talk to other teachers and we get their ideas. I give them my ideas. That helps [sharing of resources]. ABIGAIL: We also have transparencies and other tools that come with the AMSTI kits. You may have some videos and you have questions with that video to ask. You make sure that they are watching the videos. TAYLOR: Now I use Ed Helper [Internet resource] and I pull reading passages, things that might clarify a concept that might be hard. United Streaming [Internet resource]–we do those little videos and the quizzes and study guides. We do that [use Internet resources]. AMSTI, to me, does a pretty good job of including some pretty good assessments. TAYLOR: I don’t have time to go back and recreate but the Ed Helper and the United Streaming does help and there are some really good videos. They [students] can see the things and then take a quiz on it right then. TAYLOR: They [AMSTI] made me a CD at my last training. I guess when I went to the teacher training, so I have got all of that [inquiry resources] on a disk and I can just pop that in. We have compiled a lot of the reading guides with the comprehension tests that come through there [the disc of resources]. We [AMSTI teachers at this school] have all made up questions and (table continued)

we compiled all of those and made fifteen or twenty-five questions for each learning guide. So that helps to get grades because you can't do everything. I get a lot of grades from that [the reading guides and comprehension tests]. I do a lab grade and I keep up with behavior based on them being on task and that's a grade. TAYLOR: We do a lot of diagramming in peer groups. We are always completing a KWL diagram. There is some kind of chart on my board all the time and the kids know they can look at it and tell you what they need. They can figure it out. RILEY: We will start with a demo period–a demonstration. It [the demonstration] can be as small as a match which leads us to talk about kinetic energy. We strike the match, let it burn down, and talk about how the energy was lost. From there, I do PowerPoints, very interactive PowerPoints. We discuss things and I ask questions. We have a review time. Sometimes I use notes so I can judge whether they understand the content. Today, we took our AMSTI lesson we are on and we conducted an inquiry. RILEY: We [in this class] have a composition notebook. At the top [of the first page] is the title of the lab for the day. I give them a question or for the next two to three weeks, I will let them formulate the question. I guide their progress and they have to form a hypothesis and they have to use it. Then, they have their plan section and all their materials where they write down all we did in explicit details. With the observations, they will tell me what happened. In their conclusion, they have to give me three important facts, two interesting details, and one question. EMILY: There was a new test this year [2007-2008 school year], the ASA (Alabama Science Assessment). I believe there are eleven standards that they have to meet [on the ASA]. That is when I try to pull in those item specs [standardized tests] on my assessments. We would do a bell ringer based on those eleven standards. I really tried to drill that [the ASA standards] all year long. We did multiples with the eleven standards. After that [the bell ringer], the kids come in and they hand out the notebooks [science notebooks] and AMSTI [student resource] books. EMILY: They do their conclusions on their own. They do work in groups! They always pair up but they almost always work in groups. I will use a rubric or checklist to assess groups. RILEY: I check their notebook. I will have them paste in a reading. They have highlighters and they highlight the hypothesis orange. As I go through, I will check it [hypothesis] off and they get a grade. I may check one lab today and then next week, I may check something else. They always know to be prepared. EMILY: We do have quizzes and we do have tests. I try to make most of them [questions] open-ended. We do a lot of performance-based assessment. I do a lot of notebook grades. I grade them on their conclusions because I want to make sure that they learned what they were supposed to learn. We have all kinds of different quizzes. Sometimes they have even had to identify the organisms that they are supposed to identify [in the lab]. My two major types of assessment other than the quizzes and the tests (I try to make them [test questions] more open-ended) are performance-based and notebooks. EMILY: Sometimes it [an AMSTI assessment] might be paper/pencil and sometimes it (table continued)

is performance-based. Quizzes and tests to me are kind of the same thing just the quiz tends to be smaller. Some of my grades come from performance-based. I still do paper/pencil tests; if you don't, then you have parents who do not understand how this grade [student's average] came about. They [students] have to know terms and probably the best way to do that is paper/pencil tests. Mostly, the paper/pencil testing is multiple choice. EMILY: I have used rubrics. I do a lot of projects, too. Like on a project, they will be given a rubric beforehand to know what I am going to grade and how I am going to grade. You have guidelines for what they need to do or do not need to do. I don't always use the rubric so much with the notebooks because I've got to read their conclusion. I don't hand out a rubric for every single assignment. Maybe I should but I don't because that would be time-consuming. With their conclusion, they pretty much have to tell me what they learned. So, I want them to answer the question and what they learned. I don't really use the rubric with that [lab reports]. MIA: We do a lot of the notebooking. With our short periods, we do stuff the first day and I try to have a weekly objective in the Course of Study. Then I try to take those student objectives and give them a daily objective from the lab just to try to keep them on track. It keeps me on track and makes sure they [students] know what they are doing. We will do our question or purpose. I have started doing some purpose for these kids this year just to get them kind of on the right step with this more difficult concept. We will set up, we will talk about procedures, and we will set up our data tables the day before because they won't do it if you don't do it the day before. We will write our data questions the day before and we will talk a little bit about what we are going to do. But on the second day, we usually run the lab and then as a group, we go through the data together. At this age, they just don't know how to do [deal with] data very well. I do PowerPoint and everything and I walk through the steps with them. If there is a chart, I try to pull the screen up and do it on the white board and we fill it out together and talk about it. Then, we talk about the data questions together because they are just not ready yet [to complete all the inquiries on their own]. And then, we do vocabulary. I used to do conclusions in sort of a wrap up but I have started shifting more to the notes because we are so short on time and they need something to study. MIA: They [her students] need notes. Because they [students] cannot take the AMSTI student resource books out of the classroom, I have tried to supplement with more notes that I have put together from the AMSTI student book and their science textbook. MIA: That [assessments] is the hardest thing in AMSTI. I am getting better each year. I am trying to do a lot of questions during class to just kind of feel around [figure out student comprehension]. I try to go with the groups and sort of check what they are writing. I'm trying to do more 3, 2, 1s those quick writes at the end to sort of see where they are. Then, we try to do a quiz or short test after about three or four labs. That way, they are not doing [taking a test] eight labs of digestive system all at once. It is just too much information. I am kind of struggling with some of my things [assessments] right now and working in more little quick assessments because I don't have time in 50 minutes to give them one every day. So I try to give them something at the end of each (table continued)

lab and have them to write or tell me what they did. I think if we have a longer period next year, I will have more time to make them tell [what they learned] me in their groups. I am also trying to do thinking jobs. Along with their other roles [in groups], they have to be the hypothesis grader that tells the class [what happened in the lab] or someone has to summarize what they did or if it [the lab] didn't work, why did it not work or what they think went wrong. I am trying to do a little bit more of an oral assessment type thing. I am trying to just check more if they got it [the concept]. MIA: It [assessment] is one of those things. Even three years in, you keep tweaking as you go and trying things. MIA: I use a lot of the ones [assessments] from the AMSTI book. The seventh grade has really good, practical type questions where they have to apply what they have learned. They have to look at a diagram and tell me the function of the liver or look at a diagram and tell me what is happening molecule wise. There are a lot of graphs they have to interpret or data tables they have to look at and tell you what happened. We also try to do some vocabulary. I try to mix it where they can have vocabulary questions with the AMSTI assessments. That way, I am getting not just some vocabulary background but I am getting what they actually learn [about] the concept. Actually, the seventh grade [AMSTI resource books] really has good assessments and we use a lot of those. We do short ones [assessments] and sometimes, we will just pull out five questions and do a little short quiz on one [inquiry] just to see if they have the concept. If they don't, I can go back and reteach it. That is usually what I use. EMILY: We have a teacher guide with AMSTI and it is awesome. We have a study guide that I will pull questions from. Most of them are teacher generated, though. I'll be working on that [an assessment data base with AMSTI] this January or February. All day training on evaluation. AMSTI teachers are going to generate questions. They are going to put it on the AMSTI.org and you [AMSTI teachers] can pull questions from that. EMILY: I have not used it [AMSTI assessment database] because I am not at work right now [on maternity leave] but still it is teacher generated. Most of mine [assessments] have been teacher generated and using the teacher guide and the student guide and projects. Rubrics, I have created my own. EMILY: The students have to do research. Then, they had to come up with their own plan [for the project] and try to follow it. There again, I graded it [the project] with a rubric. EMILY: I have done debates before. I loved those. I would divide the class in half and tell them you are on which side of the topic. They did not have a choice. We had a rubric and certain guidelines for the debate and there are all kinds of stuff online for how to do a debate. RILEY: I have that [the AMSTI resource books] and I have also made up my own questions to go with each standard [on the SAT-10 and ASA]. When I have seventh grade [teacher instructs both seventh and eighth grade AMSTI science], I am going to have cards and use them as practice questions every day. MADELINE: For the most part, I just follow the notebook with AMSTI and I just try (table continued)

not to tell them anything about it. I just let them get in there and learn and then at the end, we just all kind of draw a conclusion and talk about what happened. I don't ever tell them anything that is going to go on before it happens. KAITLYN: When it [an assessment or inquiry lab] says explain they give me two words. I try to always put some type of questions not all just matching/multiple-choice on the tests. I usually have just a few of some types that they have to think. KAITLYN: Usually what I do is put the objective [from the Course of Study and standardized tests] in a question type. I may model it [inquiry lab]. Because they don't want to read the directions, I will circulate constantly. I am constantly moving from one table to the other with them, asking them if they have any questions. I always want to get feedback from their group not just depend on me. MADELINE: I use a lot of different assessments. MADELINE: A lot of it [assessments] is with their notebook [student generated journal]. They [students] never know what part of the notebook I am going to grade. One day it may be the hypothesis. One day it may be the conclusion. One day it may just be the parts of the lab. One day it may be I am grading every single thing in their notebook and they have notebook tests which is just me giving them questions and it should be in their notebook and they just write the answer. MADELINE: They always have one project to do out of the six weeks and there are tests built into the AMSTI book. Half of it [each test from the AMSTI resource book] is pencil/paper. So, I will do both [pencil/paper and performance assessments]. What it [performance assessments] is they are given a problem and they can use any of the materials that we have learned and the methods that we have learned and solve their problem. Then, they just have to come up with their own procedure. There is a rubric [that] is already made for you [the teacher by AMSTI]. It [the rubric] tells you to look for this and look for that. Then sometimes you can tell if the kids are getting there. MADELINE: Especially with one project, they can do the PowerPoint. They can do all sorts of things. They can do photo stories. They are so creative! When we just use pencil/paper [assessments], it restricts that [creativity]. Most of them don't know the words to write it for me to assess. So, I just like the other better [alternative assessments]. MADELINE: If I am having trouble choosing an assessment, the end of every lesson in the book [AMSTI teacher resource book] gives you 10 different ways you can assess the lesson. It may be with a worksheet. It may be with bell ringers or just questions that you ask from the seat or class discussion. Everybody learns differently and everybody communicates differently. I try to assess in different ways every day to give everybody an opportunity to know that they are learning. KAITLYN: I still on their AMSTI labs I just count them as daily grades. I still give chapter tests [textbook assessment format]. KAITLYN: Some of it [assessments] is out of textbooks [system adopted science textbooks] which my notes come from the textbooks. We [science teachers at this school] will pull some from the computer if we have done some computer activities. KAITLYN: We [this teacher's classes] have done some computer activities [as (table continued)

resources for assessments] at the beginning of the year on the scientific method. If they [students] are describing something, they would know if their hypothesis would go with a procedure, and so on. They [students] have got to do a poster that goes along with their experiment with the scientific method, the question, the hypothesis, the experiments and data, and then a conclusion. MADELINE: The resources I use of assessments are the [AMSTI] website for the most part and I will use my textbook [system adopted science textbook] to cover the objectives [from the Science Course of Study] that are not covered by AMSTI. There are two objectives [on the Science Course of Study not covered in the AMSTI objectives]. If I do not think they [Science Course of Study objectives] are covered well enough, I will bring out the book [system adopted science textbook] and then sometimes I just use my chemistry books from college or go talk to my chemistry teacher from high school and she will help me. MADELINE: If I see that the kids just really aren’t getting it [the science concept], I will pull some more [resources], a book or my own learning. The majority of what I use [for resources] is just the AMSTI teacher’s manual and then I have to go and pull other resources.

Research Subquestion #3-Individual Interviews What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?
Significant Statements
MADISON: I went through the Alabama Course of Study and looked at the objectives and one of the objectives was for students to be able to describe food chains or food webs. So, I really hit that hard. The textbook [system adopted science textbook] had some examples. I used that [system adopted science textbook] as a resource. As far as the assessments go, AMSTI didn’t have what I considered the assessment that would correlate with the Alabama Course of Study. Considering our accountability [due to AYP] now, I felt like I needed to use those questions [from the Course of Study and the science textbook]. MADISON: If they [the students] get them [ASA sample questions] right on the test [given by the teacher], then they should do well on the Alabama Science Assessment. I am driven by the Alabama Course of Study and the Alabama Science Assessment right now. JORDAN: They’ve [students] got to see a style of questioning [standardized test format] and I think that [using sample questions from the standardized tests of AYP] is the best way to do those [unit tests in the classroom]. MADISON: We don’t have any type of guide [curriculum guide or continuum] as far as something that the school board makes us do or the school makes us do or our principal. We just do our lesson plans. This [pacing guide] pretty much guides us as far as where we should be. We’re not required or our school system doesn’t have anything in place. I think when our principal gave us a day to kind of work on this [pacing guide] we kind of did it ourselves. (table continued)

JORDAN: I wouldn't say that it [system continuum] really affects how I select assessments. I guess it is what I focus more on the assessment a little bit. Because I know if it is the order of the planets, then I will spend a little more time on the order of the planets than based on the size of the planets. Along with the characteristics because that is what we just tested on obviously. If we weren't really in the continuum, it really doesn't talk about the characteristics of the planets. It talks about where they are located and things like that. It is really not about the planets so much as other things. My focus wasn't on characteristics as much. Now, I did give them. For example, we did a foldable in which they listed characteristics of a planet. They got to use that foldable for a quiz and I gave them that kind of open note kind of thing. JORDAN: I go back to the other [Course of Study and standardized tests specifications] more than I do [the continuum]. I go back to the ARMT and the SATs because ultimately that is what we are most responsible for. Now the continuum if we do it on there [check off the objectives], it should cover most of these [Course of Study objectives] but as far as my assessments I go back and look at those things more than anything. JORDAN: Unfortunately, they don't get to play [cover interesting topics not on the Course of Study] in much. If it doesn't really tie in with our curriculum and the item specs [from standardized tests] that are on there [the Course of Study], we don't really even get to look at them. So, your hands are kind of tied in a lot of things. Just from our school system, in my opinion. It has gotten to where there is too much that they are trying to get us to cover in a very short period of time. I think there are too many people up in the state department that are trying to say that their stuff is more important and the other ones need to back off. Therefore, we are focused in on too many things. JORDAN: In my opinion, the sixth grade should be tested on science because their curriculum [from the Course of Study] has been condensed and they are supposed to go more in depth in their subject matter, We are still just getting off the surface on our subject matter and I think that they really needed to look at that when they thought about that. Because really and truly, I think it is the sixth grade that starts with the High School Graduation Exam. I am just introducing things [concepts] and doing a few things with it. I don't get into the depth that the sixth grade does. So I kind of felt like it, the science assessment [ASA], should have gone for the sixth grade. MADISON: I think that with having AMSTI, the No Child Left Behind, I think a lot of the needs are being met because it is hands-on. It is inquiry-based. I don't think it has really changed the way [I teach] but AMSTI has changed the way I teach. I don't think No Child Left Behind has changed a whole lot of the way I teach because I have your basic generic group of kids. I am not an inclusion classroom [no special needs students]. I have some gifted students and I have some lower achieving students but we don't have any that are on IEP [Individual Education Plan] right now. We do have some that are going through BBSST [Building Based Student Support Team which addresses at risk students] and we are doing those strategies. Like for one student, I have to read her test orally but it [NCLB] has not really changed our thinking a whole lot, as far as we are not (table continued)

slipping or anything. JORDAN: Lots more reteaching! In some cases, watering it down because we are told, You have got to get them to pass. You have got to do all these accommodations to pass them. Unfortunately, you can't fix laziness. I feel like pretty much they are asking us to fix their home life, their academic life, their social life, and everything else. It is too much. We can't do that. I find that there are too many students who come in now that aren't really ready for fifth grade. They should have been held back because their math skills are not where they need to be because we have to let them retake a test two or three times until they pass it. We have to keep watering things down for some of them until they are able to get through and I know there are some students that are in special ed who are truly not ever going to be able to succeed if we don't do that, and I understand those unusual cases. When you've got another little boy here who has not got any health problems, he is just lazy. He won't try. He won't do his homework. He won't pay attention in class but yet I have got to do something to help him get through fifth grade. JORDAN: In some cases it [assessments] may be fewer problems. A lot of times it is just reteaching them. If it is a science vocabulary test, it is keeping them in, going back over the words with them, or having a peer stay with them and go back over words with them, and providing a word bank. JORDAN: It [classroom assessments since NCLB] has not really changed much. We met our standards and we are above and beyond where we are supposed to be. We [this teacher's school] have always been up there. We have not really worried so much about hitting AYP just maybe in attendance. JORDAN: Our problem is there are 34 or 35 students between the two fifth grade classes. Every student greatly affects our scores. If you have one [student] that comes in and he just blows off the test and just writes anything down, our scores will be lower than they should be because he chose not to do anything. You can't change that. You can't do anything about that for AYP. I know they are shooting for 100% at every school for all this stuff but you are just asking for impossibility. It is not what happens. ABIGAIL: Now, the Course of Study–what our science textbook is–and then what our AMSTI is. So it is all correlated for us and you go through there and see each section that covers our continuum. So it is very nice. ABIGAIL: They [AMSTI] do it for us [correlations with National Standards], which is very nice. ABIGAIL: They test [referring to standardized testing for AYP] in science for fifth grade [SAT-10 and ASA]. We do social studies in fifth grade but now ARMT is for reading and math. ABIGAIL: They [Alabama Department of Education] tested our kids actually just to set the standard for when they start the Alabama Science Assessment. They tested our kids last year. So, they haven't come into state use yet [referring to the ASA replacing the SAT-10 for AYP]. The items specs [for the ASA] just tell you how many multiple choice questions, open-ended questions, and they may give you examples of them. So, (table continued)

you just make sure that you are hitting those.
ABIGAIL: It [correlation between AMSTI units and the Science Course of Study] is really nice because someone went through and filled all that out for you. So, it is all correlated for us and you go through there and see each section that covers our continuum [school system document]. So, it is very nice.
ABIGAIL: We met with curriculum mapping. We did this the past summer and so we each took a section. We also had an AMSTI map. So, we correlated SAT, ARMT, and AMSTI. We correlated all of that with our book [system adopted science textbook] and the Course of Study.
ABIGAIL: Well, we are in a different area [socioeconomic] here. Most of our children are at about the same level [achievement level]. We have one or two that are a little bit lower but they usually pick it up because when they work in a group that helps bring up the lower ones. They work in groups and they are learning from the higher [achievers]. I usually group mine with two higher [achievers] kids and two lower [lower achievers] kids. I usually see the lower [achieving] children are learning from the higher [achieving] kids.
ABIGAIL: We used to talk about special ed but I don’t have any special ed. We don’t have any special ed in the sixth grade this year.
ABIGAIL: We worry about it [NCLB] because eventually it will catch up with us. We are not in that level just yet but it will catch up. It [NCLB] does make a difference. You start thinking about it a little bit more and you start trying new things just to see if you can get the deeper [content] have the kids think a little bit more about questions, instead of just a yes or no and because it says so.
TAYLOR: They [school system] have done a good job of taking my AMSTI lessons and correlating them to the textbook. Then, they [school system] gave me a good timeline. I basically just go right with it. It just kind of lends itself, so I just start at the beginning. The only thing that AMSTI doesn’t cover with me is volume and I went into the training with Filling the Gap [new AMSTI resource designed to help fill in the gaps between AMSTI units and the Course of Study] and I even have all that now. The pacing guide [school system document] to me is a pretty good document. I don’t just sit and hone over it but it is good and it is correlated so you know you have covered those objectives. I use that personal lesson plan [school lesson plan document or resource] but I have to have the Course of Study on everything. We don’t use it [pacing guide] as a working document necessarily anymore. I don’t know that all schools are doing that but I used to have to fill that [curriculum guide or curriculum map] out and turn it in. We don’t do that anymore. As long as we have our Course of Study, we don’t have to fill that whole thing [curriculum guide or map] out. I just use it as a guide.
TAYLOR: The Course of Study is the, be all; end all. I want to make sure that the kids can answer that question [referring to questions that address Course of Study objectives]. I want to know that they can get the big picture because you can get soaked up in the little things, the fun things, and forget the big picture. I have got my year broken down so that I know by December I have covered a certain point. Once I have covered it, I do go back and check it [Course of Study objective] off for my benefit.

(table continued)

TAYLOR: The pacing guide [school system document] to me is a pretty good document. So, I use that personal lesson plan but I have to have that Course of Study on everything but we don't use it [Pacing Guide] as a working document necessarily anymore. TAYLOR: I have honestly not looked at it [national standards] that much. I guess maybe it is because I am 1 to 6 certified [teacher certificate is for grades 1 to 6 only]. I have never had any formal science classes. For seven years I taught third grade and we barely could get science in. When I came to sixth, I was able to focus on the science but still, I did not use that [national standards] a lot. We have a copy of it [National Science Education Standards] and I know where it is at and I could go get it if I need it but I just use the pacing tool [school system document] a lot. TAYLOR: I have special ed kids. That is just my lot in life. Truthfully, it has not changed at all with AMSTI, because my low end [low achieving] kids get it before my high end [high achieving] kids because they see it, touch it, taste it, feel it. Those kids [low achieving] really do better in my science class than the kids [high achieving] that need the concrete black and white words. TAYLOR: Before [NCLB] we just did the paper/pencil and afterwards it was more of the big picture, it was more of how can you apply it? I see that more. I really have not been affected tremendously by it [NCLB] because I have always had those kids. Now before when I had third grade, I know one year I had the regular kids and I had three special ed kids on three different levels. When I gave them [special needs students] the social studies tests, I had the main tests that I gave and I had to give them [the special needs students] three other tests because I had one child that could only have two choices and I had one child that everything had to be pictures because she was on preprimer, and then I had one who could have three choices. So. I had to accommodate for all that but I think the AMSTI has made a huge difference because even if they don't understand the definition of some things, they get it. They can draw me a picture and they can explain it. I don't have to have the words. So, I guess that would be a change. I feel like there is more room for the kids to tell me what they have learned at their level. TAYLOR: AYP is the sticker. We were on school improvement for a while. I guess it was year two because we had a huge population [special needs students] that takes all of the room for the other kids [regular ed students]. So those kids that small percentage, that you don't count, everybody else is counting. Because of that [a large special needs population], it is big. There is pressure. I don't know that I look at it every day. I try to as, oh, I've got a meeting [IEP] I have to go to and I have to prove that I retaught [content]. So that is the big thing, I think. It is also good thing. We need checks and balances but we can go overboard, too. So, I think there is some pressure there to feel. TAYLOR: I put pressure on myself, number one. That is just how I am but I do think that my [school] system [adds pressure] too. You want to impress people. You want to do what is expected and the people of the community are looking and they are anxious to see [the AYP report card published in the paper]. They [parents] want to go from the city to the county [and vice versa] for the best schools. That's big. I think just being in the community, you go to church with those people, you teach in that community, your (table continued)

kids play ball in that community, and you feel a little more pressure to produce better than maybe what you would if you didn't live in that area. I am assuming it would come even higher up than the school system. As far as for me, I do not feel like I have a board in my face and I've got to do this and I've got to do that. I think it is conscientious for teachers. They do feel pressure. I think they put pressure on themselves. I think that is a lot of it. I feel like I do more of that than anybody else puts on me. You can blame the school system. You can blame everybody else but when it comes down to it and you are expected to do it, you feel like you should meet that goal. Apparently, I do. I think most teachers are conscientious. ABIGAIL: From the state [pressure to show progress academically]. I think it is like image because we have standards here and they are higher. ABIGAIL: I try to pressure the kids to a certain point. I have high expectations of them. But when their parents don't have those high expectations; it is really hard to get that from them. ABIGAIL: It is a big part. This is a small community, and everyone knows the history or what this school has done in the past. It is just reality that gradually you are not seeing the over achievers that you used to. I don't know why. But it is a lot of pressure because as younger teachers, we always are worried about it because if the grades [scores on achievement tests] go down or if we don't meet AYP they are going to look at these younger teachers. They are not doing what they are supposed to. So it is very hard and stressful. There is more that they put on us every day. RILEY: Right now, I am using a lot of things [assessment resources] that AMSTI has given us. I use AMSTI material and the Course of Study, for sure. We have to worry about the Alabama Science Assessment, so we use that [assessment researches for the ASA] as a research tool. Some of those tests [teacher generated assessments] are generated by including that material. RILEY: As far as a certain order [pacing guide], we do not have to stay on the same pace. Right now, the other science teacher [seventh grade science at this school] is not even on the same thing. We really have more of an option–more leeway. RILEY: We have a Course of Study. We are expected to get through with every objective and everything we cover to meet that standard. EMILY: Don't use it [system continuum]! Early on, I went to my administration and I've been following this continuum for two years and now you want me to do AMSTI–so is it AMSTI or is it continuum? They [school administrators] said AMSTI, as long as you meet the Course of Study objectives, you are fine. EMILY: With seventh grade, every single objective was met with AMSTI. Every single one. EMILY: There are like two that have supplemental material that needs to be given–viruses, Down's syndrome, genetic disorders. [On these topics], AMSTI really touches the surface but it doesn't just dive into it and give students the information. With those, I give supplementary materials that might need to be given. They might do reading and discussion. Of course, we can't do experiments with viruses obviously or Down's Syndrome or anything like that. Now there is an AMSTI genetics lesson which goes into (table continued)

planning squares and genotypes and it is intensive and it is easy to put in Down's syndrome and other genetic disorders. I just meet the Course of Study objectives, document that I met them, and that is it. I throw in the ASA because that was such a big deal this year. The SATs tend to be more earth science oriented but the ASA was almost like a pregraduation activity, it felt like [AHSGE is a biology content standardized assessment]. So that big stuff for me this year.

EMILY: I do not really use the national standards. I do not go to the websites and print them [national standards] off and evaluate them every day because I feel like if I teach AMSTI and I teach it the way it is supposed to be taught, then they [students] are getting those standards or at least those standards are being taught. We look at all of these different modules like organisms and the human body for seventh grade or properties of matter for eighth grade and we look at them and we think AMSTI and we think Alabama [Course of Study].

EMILY: I cannot say that it [NCLB] has really changed anything. I feel like when I first started teaching, if I had continued that way with the lecture and all that, it would have changed that because so many kids were getting left behind and it would have changed that method. With the inquiry, with AMSTI, and all the other different activities I do, they even become problem solvers. With all of that, I think the kids are getting it more. Do I still have kids that fail, definitely? But do they fail because they do not understand it [science concept] or do they fail because they do not want to do the work? When I talk to them one-on-one, they get it. They just don't want to do the homework and they don't. Sometimes you give a test and they just don't want to do it. They leave it blank. I think this year we only had two students who failed because there were other issues. I think [with] AMSTI and all the other inquiry-based activities that I do, the kids are getting it [science concepts]. I don't feel like they [students] are being left behind. I don't feel like there is anything else that I need to do because I think they are okay. I know that nobody has approached me and told me that I need to be doing it differently.

EMILY: My feeling about the SAT is that we can't meet courses as well. It is difficult to meet Course of Study objectives, do AMSTI (well, AMSTI does all that) but meet the Course of Study objectives, meet the ASA standards, and try to meet the SAT standards, when SATs are so much more earth science than they are life science. I definitely feel the pressure because I feel like I am being in a class that is being judged and being scored for the SAT, and that is based more on what they learned in sixth grade not in seventh grade when I get them! So that bothers me a little bit. As far as the ASA, I think my kids did well on. I never heard back from the counselors but I did feel that pressure. I am judged. The kids are judged. The school is judged by it.

RILEY: Well, our school brings pressure. Every year, we have like three or four faculty people discuss what we need to do to meet standards. They feel like it is extremely difficult. I feel like it was a choice that they are held to our standard. I feel pressured. One thing about AMSTI I am seeing right now, is that it is relating lessons and information back [to Course of Study objectives and standardized tests objectives].

MADELINE: The resources I use of assessments are the [AMSTI] website for the most part and I will use my textbook [system adopted science textbook] to cover the

(table continued)

objectives [from the Science Course of Study] that are not covered by AMSTI. There are two objectives [on the Science Course of Study not covered in the AMSTI objectives]. If I do not think they [Science Course of Study objectives] are covered well enough, I will bring out the book [system adopted science textbook] and then sometimes I just use my chemistry books from college or go talk to my chemistry teacher from high school and she will help me. KAITLYN: We use the Course of Study and on my lesson plans I indicate which Course of Study that we are working on because we have to do that here with the STI [software grade book system]. If it [the Science Course of Study] has some key terms, I make sure that those key terms are in their notes and they are tested on those key words. Like [the word] inertia, I know that it is in the Course of Study and my system continuum [school system generated document of Science Course of Study objectives and when they are covered in the classroom]. So, I just make sure that if anything ever comes up, they [school administration] can go back and can find that I covered all those steps [objectives]. MADELINE: At our school, we were told to cover the information. It did not have to be in any particular order. I would take the guide [school system generated pacing guide of when teachers should cover each objective on the Science Course of Study] and make sure that they have covered everything. It just may not be in that order [order on the pacing guide] but I make sure that everything got covered. When we have a test or a lab, I just document where we covered the [objectives] on the continuum. With all my lesson plans, I have to write it [Science Course of Study objectives] and we have to write the grad exam [Alabama High School Graduation Exam objectives], the SAT [objectives] and any other type of exam that we are covering. MADELINE: I mean, if it [Course of Study] just wants you to list, then we would talk about it a little bit maybe not necessarily go into it in much detail. Looking ahead at the Course of Study, you can tell that there are going to be gaps that will be filled before I get there. You don’t necessarily have to go into as much detail as if it were to be demonstrated. MADELINE: I do have the national standards. I haven’t used it very much because I have just now really been aware that they are there! I just really haven’t talked about them that much. I can see where they are just built in with AMSTI. You don’t have to worry a whole lot about them. KAITLYN: For the ones [students] that I have who are really [low achieving], I have to change how I assess them [with NCLB]. If I ask five critical thinking questions, I may tell them to choose two out of five. So I want them to be exposed to that but I don’t want to make them have to do all of them. Plus, the special ed teachers tell me that it takes too long for them to do it. MADELINE: Well, the only thing that I don’t like [due to NCLB] is if they are based on special ed, you have to pass them–is what we are told. I just don’t think that is fair. I understand that every child is different and yes, I change my grading for them because they are not going to perform at the level that your A students are. An A for them is just a little bit different. I do adjust my grading to them but I do give them the same things (table continued)

and most of the time, they do fine. If they don't, I just redo it. MADELINE: I was very nervous [after NCLB] about giving them [special needs students] hands-on assessments. I see that they [special needs students] get more out of it [inquiry learning] and can give me more information about what they have learned doing that than they can from just a pencil/paper test because they get confused with the wording. They have been tested so much that when they get tested hands-on, it is almost like a play time and they will give you all the information you want out of it. KAITLYN: I feel no pressures! I don't! I want them [students] to succeed. Maybe I am just too old to feel the pressures but I am not [pressured].

Research Subquestion #4-Individual Interviews What do AMSTI science teachers find most helpful when determining assessment methods?
Significant Statements
MADISON: One thing that we just finished, we made Eco Columns a combination of terrariums and aquariums, which correlates with the Alabama Course of Study. We have to talk about food chains and food webs. So with the materials that AMSTI sends us, they send us all of the materials that we need and the living organisms come through the mail when we want to order. We would read some of the material from the student assessment booklet that was provided in the AMSTI kit. So, one day we would talk about the mosquito fish, one day we would talk about the snails, and one day we would talk about the cricket. When we were working on the aquarium or terrarium, we would talk about the animals or the plants that would correlate with the aquarium or the terrarium. MADISON: I use a lot of the science AMSTI. So every year little by little, I start working on the activities. MADISON: We started out with the terrariums first. Instead of the aquariums, we did the terrariums first. Using the student assessment books that they provide with us, it shows pictures and it has one student needs to do [real simple directions] like 1) Students need to place two cupfuls of soil in the terrarium. The first thing I do at the beginning of the year is talk about procedures, safety, and things like that. When we did the terrariums, each group had two books per group. They had jobs assigned to them. There is a team captain. There is a getter [materials manager] who is the person that comes and gets all of the materials. There is a recorder so if there are any papers or questions that need to be answered or anything like that. We get in the groups. They have work stations in the classrooms. You can see where they are set up. The team captain assigns the jobs for the day. The getters come get their materials. It is really student self sufficient. I really just go around and monitor to make sure that they are staying on task. MADISON: They get their materials, go back to their work stations, and I will tell them, You need to do #1 to #6. I walk them through it before they go to their work stations. I always have an example set up for them. So, they will know what the test product should look like. With the terrariums, they had to plant three kinds of seeds, alfalfa, rice, (table continued)

and mustard seeds. We talked a little bit about the seeds that day, planted the seeds, covered the seeds up with a little bit of soil, and then started watering them which you wouldn't think that would take a lot of time but we had pipettes and you had to do it just a little at a time and everybody has to take turns. It [the AMSTI resources] is laid out pretty well. AMSTI has done a good job at having the procedures laid out for the students and they have the procedures ready for the teacher. It is easy once you go through the training. It is really easy to follow along. MADISON: They were divided up into their groups. And that was after we had talked about the fish, the snails, the crickets, and pill bugs, they had to become an expert in one of those. This person had to research the mosquito fish and they had to write three of the most important details after reading the selection. MADISON: For some assessments, while they are doing that [researching or conducting lab activities], they can sketch. As long as they draw it, they can tell me what it is. Look at the difference between these two [refers to two students' assessment papers]. I can tell he has got everything in there. These are some of the things [assessments] they [AMSTI] provide us with the teacher materials. MADISON: I went through the Alabama Course of Study and looked at the objectives and one of the objectives was for students to be able to describe food chains or food webs. So, I really hit that hard. The textbook [system adopted science textbook] had some examples. I used that [system adopted science textbook] as a resource. As far as the assessments go, AMSTI didn't have what I considered the assessment that would correlate with the Alabama Course of Study. Considering our accountability [due to AYP] now, I felt like I needed to use those questions [from the Course of Study and the science textbook]. MADISON: They [Alabama Department of Education] have given everybody the items [items specifications for the ASA]. Those are the questions that I would just print off and put up on the screen [using a multimedia projector]. They are multiple choice [types of questions]. They correlate with what we have been talking about in class. I just use those [ASA sample questions] considering it [the ASA] is going to be multiple choice. They are not open-ended or anything. So I just use those questions [from the ASA examples] as my test questions. MADISON: If they [the students] get them [ASA sample questions] right on the test [given by the teacher], then they should do well on the Alabama Science Assessment. I am driven by the Alabama Course of Study and the Alabama Science Assessment right now. MADISON: With the item specs [for the ASA], they [questions on the students' unit tests] are so close. If you use the item specs, they [the students] are going to do well on the test [ASA]. I used those item specs last year [last school year] or this year 2008 and my kids did very well. I think I had seventy-four kids last year and only four scored a two. Everybody else scored three or four and I used those item specs last year. So I am pretty much using the same assessments as I did last year [for this school year, 2008-2009]. MADISON: An AMSTI specialist came by yesterday and told me to go on the website (table continued)

[AMSTI website]. They [AMSTI] have a new thing posted. It is called Filling in the Gaps. So, we [fifth grade AMSTI science teachers at this school] have been looking into that [Filling in the Gaps] but we [fifth grade AMSTI science teachers at this school] pretty much use our own [teacher generated assessments] and it is working [students' ASA scores are high]. JORDAN: They've [students] got to see a style of questioning [standardized test format] and I think that [using sample questions from the standardized tests of AYP] is the best way to do those [unit tests in the classroom]. JORDAN: Sometimes I just use the exact question [from the sample standardized test questions] because there is just no other way around it [because of wording]. I will use a lot of the same questions or question types and reword it [the question] a little bit. JORDAN: The ARMT thing [is stressed by school and system administration] because I have to do the ARMT part, too [ARMT does not cover science. It is covered in the ASA but elementary teachers all teach reading and they will use AMSTI as a resource for reading material]. So I pull questions from there [ARMT] but most of what I use for the AMSTI [tests] comes from what it is we experienced in class. I make the tests and change them. I keep my copy but I will look at it and say, We didn't really get that one [test question], so I will take that one [test question] out and not use it. I usually use what I see in class and what I feel like the kids can do. You have some groups you can challenge more than others. There are some things you just have to pull back with on those groups [ones you cannot challenge]. MADISON: I went through the Alabama Course of Study and looked at the objectives and one of the objectives was for students to be able to describe food chains or food webs. So, I really hit that hard. The textbook [system adopted science textbook] had some examples. I used that [system adopted science textbook] as a resource. As far as the assessments go, AMSTI didn't have what I considered the assessment that would correlate with the Alabama Course of Study. Considering our accountability [due to AYP] now, I felt like I needed to use those questions [from the Course of Study and the science textbook]. MADISON: They [Alabama Department of Education] have given everybody the items [items specifications for the ASA]. Those are the questions that I would just print off and put up on the screen [using a multimedia projector]. They are multiple choice [types of questions]. They correlate with what we have been talking about in class. I just use those [ASA sample questions] considering it [the ASA] is going to be multiple choice. They are not open-ended or anything. So I just use those questions [from the ASA examples] as my test questions. MADISON: If they [the students] get them [ASA sample questions] right on the test [given by the teacher], then they should do well on the Alabama Science Assessment. I am driven by the Alabama Course of Study and the Alabama Science Assessment right now. MADISON: With the item specs [for the ASA], they [questions on the students' unit tests] are so close. If you use the item specs, they [the students] are going to do well on the test [ASA]. I used those item specs last year [last school year] or this year 2008 and (table continued)

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ultimately that is what we are most responsible for. Now the continuum if we do it on there [check off the objectives], it should cover most of these [Course of Study objectives] but as far as my assessments I go back and look at those things more than anything. JORDAN: Unfortunately, they don't get to play [cover interesting topics not on the Course of Study] in much. If it doesn't really tie in with our curriculum and the item specs [from standardized tests] that are on there [the Course of Study], we don't really even get to look at them. So, your hands are kind of tied in a lot of things. Just from our school system, in my opinion. It has gotten to where there is too much that they are trying to get us to cover in a very short period of time. I think there are too many people up in the state department that are trying to say that their stuff is more important and the other ones need to back off. Therefore, we are focused in on too many things. JORDAN: The reading with ARI [Alabama Reading Initiative] is becoming overwhelming and it is taking away from the other subjects. I have struggled to get in my science and we have to cut social studies to two days a week, every week pretty much and that is so frustrating. Really and truly, should I cut science every once in a while [in order to get reading time in]. I am tested in science, so I can't do that. Our state department keeps piling more on us. We can't cut language because they are tested on the writing assessment. They have got too many things. They should have cut one or the other. There is no reason to pile science on top of fifth grade as well as the writing assessment test and SATs and ARMT. It is just too much on these kids. JORDAN: In my opinion, the sixth grade should be tested on science because their curriculum [from the Course of Study] has been condensed and they are supposed to go more in depth in their subject matter, We are still just getting off the surface on our subject matter and I think that they really needed to look at that when they thought about that. Because really and truly, I think it is the sixth grade that starts with the High School Graduation Exam. I am just introducing things [concepts] and doing a few things with it. I don't get into the depth that the sixth grade does. So I kind of felt like it, the science assessment [ASA], should have gone for the sixth grade. JORDAN: I think the material went too much in depth as far as their [ASA] assessment would go. It required them [fifth grade science students] to remember more than what they are capable of. I just think there are certain things [like] the planets they can do. They [students] probably can do (to some degree) the difference between plant and animal cells and things like that. When you start getting into specific things, I know mine [students] did not do as well on the indicators [results of students' ASA scores]. We had done that [ASA and AHSGE item specifications] earlier on in the year and it is just too much like the lens thing, convex and concave lens. The questions I had for samples were unbelievable and that was right before the test, so I guess they did okay on that part. I think they [State Department] are asking them to rationalize too much on that. I don't think this group [his class] or any grade is ready for that. I think that is something that should be passed on [ASA should be taken by the sixth]. MADISON: I think that with having AMSTI, the No Child Left Behind, I think a lot of the needs are being met because it is hands-on. It is inquiry-based. I don't think it has (table continued)

really changed the way [I teach] but AMSTI has changed the way I teach. I don't think No Child Left Behind has changed a whole lot of the way I teach because I have your basic generic group of kids. I am not an inclusion classroom [no special needs students]. I have some gifted students and I have some lower achieving students but we don't have any that are on IEP [Individual Education Plan] right now. We do have some that are going through BBSST [Building Based Student Support Team which addresses at risk students] and we are doing those strategies. Like for one student, I have to read her test orally but it [NCLB] has not really changed our thinking a whole lot, as far as we are not slipping or anything. JORDAN: Lots more reteaching! In some cases, watering it down because we are told, You have got to get them to pass. You have got to do all these accommodations to pass them. Unfortunately, you can't fix laziness. I feel like pretty much they are asking us to fix their home life, their academic life, their social life, and everything else. It is too much. We can't do that. I find that there are too many students who come in now that aren't really ready for fifth grade. They should have been held back because their math skills are not where they need to be because we have to let them retake a test two or three times until they pass it. We have to keep watering things down for some of them until they are able to get through and I know there are some students that are in special ed who are truly not ever going to be able to succeed if we don't do that, and I understand those unusual cases. When you've got another little boy here who has not got any health problems, he is just lazy. He won't try. He won't do his homework. He won't pay attention in class but yet I have got to do something to help him get through fifth grade. JORDAN: In some cases it [assessments] may be fewer problems. A lot of times it is just reteaching them. If it is a science vocabulary test, it is keeping them in, going back over the words with them, or having a peer stay with them and go back over words with them, and providing a word bank. JORDAN: It [classroom assessments since NCLB] has not really changed much. We met our standards and we are above and beyond where we are supposed to be. We [this teacher's school] have always been up there. We have not really worried so much about hitting AYP just maybe in attendance. JORDAN: Our problem is there are 34 or 35 students between the two fifth grade classes. Every student greatly affects our scores. If you have one [student] that comes in and he just blows off the test and just writes anything down, our scores will be lower than they should be because he chose not to do anything. You can't change that. You can't do anything about that for AYP. I know they are shooting for 100% at every school for all this stuff but you are just asking for impossibility. It is not what happens. JORDAN: I would love to see them [AMSTI] do just a whole day in which everyone who is teaching from these units could come in and say, okay, well here's the fifth grade modules. Let's talk about what assessments you can do here. Here are the assessments you can do there. And give us some copies of the things that we can use and relive if we need to. That kind of thing, I think. As a general rule, I think everybody would be more comfortable if we had something that kind of broke it down into segments so we could (table continued)

have something more in our hands. JORDAN: A leader or somebody in the group who could say, here is a copy of something you could use to assess from there. If somebody would just help come up with something and work through it, I think it would make everybody feel more comfortable. MADISON: I am hoping after I see online Filling of Gaps I hope that helps. They do offer us professional development. I have been a trainer [AMSTI], too. One of the main complaints is how do I assess this because you want to have a valid assessment. TAYLOR: I use the assessments that come with the AMSTI kit. There is always a paper/pencil assessment and an observation test. We are getting ready to do our storm assessment and I usually give the study guide before. They have a journal for everything that we do and from the very beginning of the year until the very end, they keep the journal. I do a book [using an AMSTI student book] test along the way and then we have a big assessment over the big topics because my kit I keep from August until December. It is a big box of stuff and it is set up in three sets. I have storms, earthquakes, and volcanoes that I teach. So at the end of about 8 to 12 weeks, we do an assessment and it is all over storms first. We will do the paper/pencil test first. The next day, I will bring in the hands-on and they have to write up their hypothesis and they will watch me do a demo and they have to write up their conclusion. The hands-on [assessments] are the ones that I love most! It is pretty neat that they can relate all that they saw to a brand new lab they have never seen and get it! They get why heat rises and that cool air sinks. It is pretty neat! TAYLOR: Some hands-on [assessments] They [AMSTI] give you a paper/pencil [assessment] and then they give you some alternates [assessments] that you can do. Not every assessment has two or three different ideas but I use the ones that are in there [AMSTI resources] and they are pretty good. I have come up with a few [assessments] of my own with higher order questions. But it [the assessment] can be just anything from them actually doing a new lab, to me doing a demo and them writing up what they saw happen and they relate it back to the storms. TAYLOR: Paper/pencil [assessment] is always harder and I think that may be one drawback to AMSTI. I don’t spend a lot of time reviewing definitions. That is the one thing that I do see different, I don’t test the definitions. They can explain it. They can see it happen. That is the part I like the best is the hands-on. But you have to have paper/pencil. You have to have some way of assigning your grade and we [AMSTI science teachers at this school] use rubrics a lot with their projects. When we do bombs, they [the students] have to research a bomb and they bring in a PowerPoint presentation. Then, the rubrics are used to assign a grade and we do a lot of that. TAYLOR: I set up a composition notebook. We have a table of contents in the front and a glossary in the back just like a regular textbook. As we enter a lab, they enter it in the table of contents. They enter a page number and date and we go in and everything we do like questions, hypotheses, materials, procedures, conclusions, all of that is in their journal. About every two weeks, I make up a ten or fifteen question test with questions like, on such and such date that we did this, what was your conclusion or what did you (table continued)

learn or what new question did you have after that lab? So, it [the assessment] makes them responsible. They are accountable and I can ask questions. After the six weeks is over, I don't go back to that section because some of the kids might have been absent, and I don't want them punished for not getting it. If they are absent, it is their responsibility to get someone's journal and copy the information. If they are absent, then AMSTI is hard. If I do a lab, they [absent students] can't make it up. So usually at the end of six weeks or at the end of the trimester, I do a demo of the main lab that we would have covered so they can at least say they saw them. TAYLOR: I just flat out told the kids–we have prep for these tests. I know you enjoy the observations [assessments] more but we have to do this. I am just very forward with it and we are going to do it and we are going to do the best we can. The kids [students] typically like the inquiry-based much better and that makes sense. I would, too! I prefer to grade them [paper/pencil assessments]. It is easier to grade paper/pencil [assessments] but to see the kids actually observe and if you see them when they start getting it, that is the fun part. That's my good part. TAYLOR: Before AMSTI, I did not do a lot of inquiry-based stuff. I just didn't. I was uncomfortable with how to grade [inquiry learning] and how to be fair [with grades]. Just because the kids didn't have the best vocabulary, I wanted to make sure that they still got points for knowing the content. The first time I gave the first test and I was scared to death. I wanted to make sure that I handled it the right way. But now that I have gone through it a time or two, I just do it and go on. TAYLOR: In earthquake week, they get to choose the way they want to tell me how earthquakes occur. We do one lab where they mimic all the different ways [earthquakes occur] and then I have tectonics and they are able to do that. So I do let them choose [their assessment methods]. They can pick which way they want to tell me how an earthquake occurs. I have not just come up with a lot on my own [assessments]. The kids know about that [choosing the assessment method]. They enjoy it and they know they have options. They have choices to make even if they go for the easy ones. At least they are making a choice. TAYLOR: This week and last, we were getting ready for a chapter test and we ended one [chapter] with a test on the white board. I called out a problem and they wrote on their white board and I went around and checked. They love doing that. I let them give each other a test. They love doing stuff like that. They will perform for their peers a lot better than they will for me. So I do a lot of that and I let them test each other not necessarily for a grade that I might write down in my grade book but to give them practice. I think they do work harder when they have choices. Just like if they have a choice on a project. They can do either a poster or a PowerPoint. Just that choice–as long as they get to make that choice, they will work harder. ABIGAIL: We have notebook quizzes and that may consist of just making sure that the kids are following along, taking notes, doing the components, and answering the components. That [notebook quizzes] may just consist of what was the question for Lesson 2.1, what was your answer, what was your prediction and they have to fill that out. That is one way we check it, just to make sure that they are keeping up their (table continued)

notebook. Another way we assess [notebooks] is just the key terms and that is usually from the teacher's book [AMSTI teachers' resource book] because the student book stays with AMSTI. They can't keep the student book. So, I take the terms from the teacher's book. They can use their notebook [on the notebook quizzes]. On the terms assessments, they do learn the terms [not open notebook]. Some matching [question format on terms tests] and then for the notebook, it would be fill-in-the-blank and discussion questions. ABIGAIL: Essentially, each [member of the group] has a job. You make sure that they are participating with the experiment. You give them a job and you make sure that everybody is doing their job. They will tell you, so and so is not doing their job. So that is when you talk to them about that [participating]. ABIGAIL: Mainly I would pull [assessments] from the AMSTI teacher's book. I also have a science textbook that we [school system] have adopted and I pull from it because AMSTI doesn't touch everything. With them [AMSTI resources and the textbook] together, we hit everything in the Course of Study. So I pull from that [the Science Course of Study] and I also have PowerPoints that I have created for research that I have done and some other teachers throughout the county. We [AMSTI science teachers] usually meet especially when you go to the AMSTI training. They [AMSTI science teachers] share PowerPoints and other materials. So we pull together. ABIGAIL: I may have one or two questions would have a discussion question or open-ended question on every test for them. It may not just consist of that format. All of the tests are not just like that. ABIGAIL: With sixth graders, it is really hard. You have to be very lenient and flexible with their answers because their train of thought is not exactly where mine would be. There are different levels and I just print a rubric and go by that. You have got mastery and partial credit. ABIGAIL: Most of the time, it depends on how much you want each question to be point wise? What do you want them to be worth? Usually, you may go with one, three, and five where one is attempted, three is partial in understanding, and then five is mastery. This is what I am going to do. That is the way it is on ARMT. I think it is just plain one to four; it is easier to figure up. ABIGAIL: Note taking is one way I assess and either I will give them the notes and they are typed out and I actually give them a piece of paper or I will lecture and make sure they are taking these notes to try to prepare them for in the future because these kids cannot take notes. It is just so hard for them. But note taking and then I will give them a study guide. Usually the study guide is their preparation for the test but it mainly comes from this book [AMSTI teacher resource book]. It comes from the book inside which is not from their student book. Our book [teacher resource book] is totally different from the student book. We have a lot more details. There is more depth there than in the student book. ABIGAIL: Mainly, I would pull from the AMSTI teacher's book. I also have a science textbook that we have adopted and I pull from that because AMSTI doesn't touch everything. With them [AMSTI teacher's book and science textbook] together, we hit (table continued)

everything in the Course of Study. So I pull from that [Course of Study] and I also have PowerPoints that I have created for research that I have done and some other teachers [AMSTI science teachers]. Usually, we meet, especially when you go to the AMSTI training and they [other AMSTI science teachers] say, I've got this PowerPoint or I've got this [resource]. So, [AMSTI science teachers] we pull together. And the notebook quizzes worked really well because then they feel like that notebook is very important. If they are going to have a quiz, they are going to keep it in order. The worksheets or whatever we have for that experiment, I have them fold it and they glue it inside their notebook and it is either behind or right beside their notebook components for that lesson and they can always go back and look at their worksheet. ABIGAIL: They test [referring to standardized testing for AYP] in science for fifth grade [SAT-10 and ASA]. We do social studies in fifth grade but now ARMT is for reading and math. ABIGAIL: They [Alabama Department of Education] tested our kids actually just to set the standard for when they start the Alabama Science Assessment. They tested our kids last year. So, they haven't come into state use yet [referring to the ASA replacing the SAT-10 for AYP]. ABIGAIL: The items specs [for the ASA] just tell you how many multiple choice questions, open-ended questions, and they may give you examples of them. So, you just make sure that you are hitting those. TAYLOR: I have Exam View [science textbook software assessment data bank] from my old textbook [school system adopted science textbook] and I pull questions from that. I make up my own questions from the readings in AMSTI textbooks. I pull questions from the paper/pencil assessments that are given [in AMSTI teacher resource book] and a lot of times the kids think up questions. We were talking about el Niño today, and they have to make up five questions with the answers. I usually compile those and I take the best and I put them back out there as questions [on a test]. They [the students] usually come up with harder questions than I can! They are much pickier and want the finite details where I would have put a general question. They will get really specific. ABIGAIL: I have Exam View [science textbook software with assessment data banks] with them [system adopted science textbook] and that is really beneficial, too. But AMSTI is just sort of you make your own on that [teacher generated assessments]. To me, sometimes I need that extra help to make sure I am covering and assessing everything that I need to. So, it would be better to have the assessments [provided]. We [AMSTI science teachers] talk to other teachers and we get their ideas. I give them my ideas. That helps [sharing of resources]. ABIGAIL: We also have transparencies and other tools that come with the AMSTI kits. You may have some videos and you have questions with that video to ask. You make sure that they are watching the videos. TAYLOR: Now I use Ed Helper [Internet resource] and I pull reading passages, things that might clarify a concept that might be hard. United Streaming [Internet resource]–we do those little videos and the quizzes and study guides. We do that [use Internet (table continued)

resources]. AMSTI, to me, does a pretty good job of including some pretty good assessments. I don't have time to go back and recreate but the Ed Helper and the United Streaming does help and there are some really good videos. They [students] can see the things and then take a quiz on it right then. TAYLOR: They [AMSTI] made me a CD at my last training. I guess when I went to the teacher training, so I have got all of that [inquiry resources] on a disk and I can just pop that in. We have compiled a lot of the reading guides with the comprehension tests that come through there [the disc of resources]. We [AMSTI teachers at this school] have all made up questions and we compiled all of those and made fifteen or twenty-five questions for each learning guide. So that helps to get grades because you can't do everything. I get a lot of grades from that [the reading guides and comprehension tests]. I do a lab grade and I keep up with behavior based on them being on task and that's a grade. TAYLOR: We do a lot of diagramming in peer groups. We are always completing a KWL diagram. There is some kind of chart on my board all the time and the kids know they can look at it and tell you what they need. They can figure it out. ABIGAIL: It [correlation between AMSTI units and the Science Course of Study] is really nice because someone went through and filled all that out for you. So, it is all correlated for us and you go through there and see each section that covers our continuum [school system document]. So, it is very nice. ABIGAIL: We met with curriculum mapping. We did this the past summer and so we each took a section. We also had an AMSTI map. So, we correlated SAT, ARMT, and AMSTI. We correlated all of that with our book [system adopted science textbook] and the Course of Study. ABIGAIL: Well, we are in a different area [socioeconomic] here. Most of our children are at about the same level [achievement level]. We have one or two that are a little bit lower but they usually pick it up because when they work in a group that helps bring up the lower ones. They work in groups and they are learning from the higher [achievers]. I usually group mine with two higher [achievers] kids and two lower [lower achievers] kids. I usually see the lower [achieving] children are learning from the higher [achieving] kids. ABIGAIL: We used to talk about special ed but I don't have any special ed. We don't have any special ed in the sixth grade this year. ABIGAIL: We worry about it [NCLB] because eventually it will catch up with us. We are not in that level just yet but it will catch up. It [NCLB] does make a difference. You start thinking about it a little bit more and you start trying new things just to see if you can get the deeper [content] have the kids think a little bit more about questions, instead of just a yes or no and because it says so. TAYLOR: They [school system] have done a good job of taking my AMSTI lessons and correlating them to the textbook. Then, they [school system] gave me a good timeline. I basically just go right with it. It just kind of lends itself, so I just start at the beginning. The only thing that AMSTI doesn't cover with me is volume and I went into the training with Filling the Gap [new AMSTI resource designed to help fill in the gaps (table continued)

between AMSTI units and the Course of Study] and I even have all that now. The pacing guide [school system document] to me is a pretty good document. I don't just sit and hone over it but it is good and it is correlated so you know you have covered those objectives. I use that personal lesson plan [school lesson plan document or resource] but I have to have the Course of Study on everything. We don't use it [pacing guide] as a working document necessarily anymore. I don't know that all schools are doing that but I used to have to fill that [curriculum guide or curriculum map] out and turn it in. We don't do that anymore. As long as we have our Course of Study, we don't have to fill that whole thing [curriculum guide or map] out. I just use it as a guide. TAYLOR: The Course of Study is the, be all; end all. I want to make sure that the kids can answer that question [referring to questions that address Course of Study objectives]. I want to know that they can get the big picture because you can get soaked up in the little things, the fun things, and forget the big picture. I have got my year broken down so that I know by December I have covered a certain point. Once I have covered it, I do go back and check it [Course of Study objective] off for my benefit. TAYLOR: I have honestly not looked at it [national standards] that much. I guess maybe it is because I am 1 to 6 certified [teacher certificate is for grades 1 to 6 only]. I have never had any formal science classes. For 7 years I taught third grade and we barely could get science in. When I came to sixth, I was able to focus on the science but still, I did not use that [national standards] a lot. We have a copy of it [National Science Education Standards] and I know where it is at and I could go get it if I need it but I just use the pacing tool [school system document] a lot. TAYLOR: I have special ed kids. That is just my lot in life. Truthfully, it has not changed at all with AMSTI, because my low end [low achieving] kids get it before my high end [high achieving] kids because they see it, touch it, taste it, feel it. Those kids [low achieving] really do better in my science class than the kids [high achieving] that need the concrete black and white words. TAYLOR: Before [NCLB] we just did the paper/pencil and afterwards it was more of the big picture, it was more of how can you apply it? I see that more. I really have not been affected tremendously by it [NCLB] because I have always had those kids. Now before when I had third grade, I know one year I had the regular kids and I had three special ed kids on three different levels. When I gave them [special needs students] the social studies tests, I had the main tests that I gave and I had to give them [the special needs students] three other tests because I had one child that could only have two choices and I had one child that everything had to be pictures because she was on preprimer, and then I had one who could have three choices. So. I had to accommodate for all that but I think the AMSTI has made a huge difference because even if they don't understand the definition of some things, they get it. They can draw me a picture and they can explain it. I don't have to have the words. So, I guess that would be a change. I feel like there is more room for the kids to tell me what they have learned at their level. TAYLOR: AYP is the sticker. We were on school improvement for a while. I guess it was year two because we had a huge population [special needs students] that takes all of the room for the other kids [regular ed students]. So those kids that small percentage, (table continued)

that you don't count, everybody else is counting. Because of that [a large special needs population], it is big. There is pressure. I don't know that I look at it every day. I try to put it behind me and think they will get it later on. I did feel a little more pressure as far as, oh, I've got a meeting [IEP] I have to go to and I have to prove that I retaught [content]. So that is the big thing, I think. It is also good thing. We need checks and balances but we can go overboard, too. So, I think there is some pressure there to feel. TAYLOR: I put pressure on myself, number one. That is just how I am but I do think that my [school] system [adds pressure] too. You want to impress people. You want to do what is expected and the people of the community are looking and they are anxious to see [the AYP report card published in the paper]. They [parents] want to go from the city to the county [and vice versa] for the best schools. That's big. I think just being in the community, you go to church with those people, you teach in that community, your kids play ball in that community, and you feel a little more pressure to produce better than maybe what you would if you didn't live in that area. I am assuming it would come even higher up than the school system. As far as for me, I do not feel like I have a board in my face and I've got to do this and I've got to do that. I think it is conscientious for teachers. They do feel pressure. I think they put pressure on themselves. I think that is a lot of it. I feel like I do more of that than anybody else puts on me. You can blame the school system. You can blame everybody else but when it comes down to it and you are expected to do it, you feel like you should meet that goal. Apparently, I do. I think most teachers are conscientious. ABIGAIL: From the state [pressure to show progress academically]. I think it is like image because we have standards here and they are higher. ABIGAIL: I try to pressure the kids to a certain point. I have high expectations of them. But when their parents don't have those high expectations; it is really hard to get that from them. ABIGAIL: It is a big part. This is a small community, and everyone knows the history or what this school has done in the past. It is just reality that gradually you are not seeing the over achievers that you used to. I don't know why. But it is a lot of pressure because as younger teachers, we always are worried about it because if the grades [scores on achievement tests] go down or if we don't meet AYP they are going to look at these younger teachers. They are not doing what they are supposed to. So it is very hard and stressful. There is more that they put on us every day. TAYLOR: I think if we get teachers together and let us all come up let the sixth grade teachers across the region get together and ask questions like, how do you assess this, what do you do, and why don't we do it [make resources] together? Then, we could come up with an activity [assessment resource]. I know people from my school because I am a part of its community and I know some teachers from other schools because we have been to a couple of meetings together and that is about it. That is sad. We are a large region and I think they need to put us together more often. There is safety and security in numbers. That would be a big thing for me. Let us get together once a year. TAYLOR: I know with the reading issue [ways to bring the reading initiative and AMSTI together]. Everything we have had training on, we have seen third grade, second (table continued)

grade, and first grade classrooms on but no sixth grade. I want to see a sixth grade classroom in AMSTI for reading. I want to see how teachers are making it work in their classroom. I would love to go to a school that has been teaching AMSTI for six to eight years and get to watch a teacher who has done this and see how she does it. I would really love to see how other classrooms are managed and how they assess, what do they do, do they just use paper/pencil, and do they do inquiry-based? I would love to see that. I am a visual person. I would love to see how their classroom is. How they do it with a video or let us go and see a classroom that is the top AMSTI class or the top reading classroom. I would love to see hands-on/real world not the fake stuff that you have at classes in college. I want to see real things happen. ABIGAIL: I think meeting with other teachers across the region has helped me. Maybe it is PowerPoints or just a few other things to do with your class to get them to that next level of critical thinking because some of them, we can't get them there. The help I get from other teachers that is very helpful. I think finding more professional development opportunities that discuss strategies you can work on in your classroom to get to that next level or to get the kids to that level of critical thinking. ABIGAIL: Just going to the training because when we go to that training, we go through the whole book. We keep our own notebook just like we were the student. So, we keep our notebook and it is all color coded. They give us color codes and you have all of the components in your notebook and every lesson you write in your prediction and we do the lesson and the experiment and we get the results and conclusions. So it is hands on and you are visually seeing it. You are writing it down and that is really beneficial to me. The main assessment is the notebook. It can be as a grading tool, it can be just organizing or keeping them organized because at this age, they are unorganized. Just to keep up with the students' responses to the experiments. But, they don't really give you how you need to grade. They don't say, do it this way. They [AMSTI trainers] give you the option. They tell you this is the notebook for you to take and assess it the way you feel the need. RILEY: I have been through one summer's training for seventh grade. It has been a great experience. It has been an excellent year so far. The kids are learning. One of the main things is a lot of my students have a hard time with what we are studying. They need help with their book work. Once we got started with AMSTI, they have been helped. EMILY: I love it [inquiry learning]. The kids, they get to do hands-on experiments. They do science. They don't just read about it any more. For them to be involved in a science project. For them to be able to come up with a question, decide how we are going to test that question, having it [data] logged [into a report], [writing a] lab report, and everything, they are doing fine. They grow plants instead of reading about how they grow. They actually grew and then looked at a flower instead of just looking at the picture in a book. There is no other way to teach. RILEY: Very day in the classroom whether [we are doing] demonstrations or labs, we practice inquiry type learning. I try to guide the students through questions and a lot of times before the lesson starts, we actually talk about it. Sometimes they have (table continued)

connections. RILEY: I have to worry about Alabama Science Assessment [ASA]. So, I use that as a resource tool. I have also made up my own questions to go with each standard [of the ASA]. EMILY: It is hard to really think preAMSTI because that was only two of my teaching years. I did not have a classroom [teacher moved from room to room each period using rooms that were available that period] so I did not get to do a lot of the labs. When I first started teaching, I would lecture because we would do little experiments but I would give them their notes and they would have all of these different links. They would have to go in there because that is the way that I was taught and I thought they were getting it but they were not having a good time and I wasn't having a good time. So when I started adding in all of these different experiments [AMSTI], the kids got to figure things out. So that is one thing. I enjoyed it [inquiry learning experience] and they enjoyed it. I feel like they learned to work. RILEY: We will start with a demo period–a demonstration. It [the demonstration] can be as small as a match which leads us to talk about kinetic energy. We strike the match, let it burn down, and talk about how the energy was lost. From there, I do PowerPoints, very interactive PowerPoints. We discuss things and I ask questions. We have a review time. Sometimes I use notes so I can judge whether they understand the content. Today, we took our AMSTI lesson we are on and we conducted an inquiry. RILEY: We [in this class] have a composition notebook. At the top [of the first page] is the title of the lab for the day. I give them a question or for the next two to three weeks, I will let them formulate the question. I guide their progress and they have to form a hypothesis and they have to use it. Then, they have their plan section and all their materials where they write down all we did in explicit details. With the observations, they will tell me what happened. In their conclusion, they have to give me three important facts, two interesting details, and one question. RILEY: I think it [inquiry learning] is much harder because it takes a lot more time and a lot more energy. EMILY: We usually have some kind of a bell ringer. There was a new test this year [2007-2008 school year], the ASA (Alabama Science Assessment). I believe there are eleven standards that they have to meet [on the ASA]. We would do a bell ringer based on those eleven standards. I really tried to drill that [the ASA standards] all year long. We did multiples with the eleven standards. After that [the bell ringer], the kids come in and they hand out the notebooks [science notebooks] and AMSTI [student resource] books. The kids will come in and tend to anything that needs to be tended such as watering the plants or aerating the worms, anything that needs to be done. We would focus on whatever inquiry we were doing. The kids would write out the question, write out the hypothesis, write how we were going to test [the hypothesis], or what our plan or procedure was going to be. Most inquiries would take 2 to 3 days. Typically, we did not finish an inquiry a day. The next day, we would go over the follow-up questions, the conclusion, and any kind of data table that needed to be finished up, and then have a discussion. Very open [environment] where the kids are engaged and active. I just liked (table continued)

to be right in the middle of them! EMILY: I will guide them. At the beginning, I will set up a data table or a graph or whatever I want them to do but after probably about three inquiries, they are on their own there. They do their conclusions on their own. They do work in groups! They always pair up but they almost always work in groups. EMILY: My special education kids tend to do well in AMSTI. I think a lot of times you can do a corner where a special education student is helping like a B-C student because that special education student is more hands-on oriented where that B student or A student is more let me read it; let me take the test; let me get it out of my mind because I was one of those. I was more of let me read it, let me study, let me take the test, and it's gone; it is out of my head! It [professional development opportunities] would be helpful if there was an extreme case on how to incorporate or how to make the activities get more from the special education student because some of them are so much content driven. Like genetics, it makes it a little more difficult or like taxonomy, it makes it a little more difficult but I think I have not had too much of a problem with that. Maybe one or two students have come to my classroom where I have had to take more time with them. They were in special education and I had to give them more explanation. Although a lot of times, it depends on who you pair them with and I have learned don't pair them with the straight A student because I don't think the straight A student even understands how that straight A student learns. Get them a C student who has to study and has to focus on how to learn and I think they do better with them most times. RILEY: I check their notebook. I will have them paste in a reading. They have highlighters and they highlight the hypothesis orange. As I go through, I will check it [hypothesis] off and they get a grade. I may check one lab today and then next week, I may check something else. They always know to be prepared. EMILY: We do have quizzes and we do have tests. I try to make most of them [questions] open-ended. We do a lot of performance-based assessment. For instance, on the human body, we might do a sugar/starch test. There is a particular way to do that test. They have to have certain chemicals. They [the chemicals] have to be in there for so long. One of them has to be heated up and one of them does not. After they do that for a couple of different times, I will test them on that. I will give them two substances and I will tell them to try to figure out which one has sugar and which one has starch and they have to be able to do that experiment. It is not so much repetition as do they know how to apply what they learn. They learn how to do this test. Can they do it now without having step by step [instructions] in the lab book? I do a lot of notebook grades. I grade them on their conclusions because I want to make sure that they learned what they were supposed to learn. We have all kinds of different quizzes. Sometimes they have even had to identify the organisms that they are supposed to identify [in the lab]. My two major types of assessment other than the quizzes and the tests. I try to make them [test questions] more open-ended. And I give performance-based and notebooks. EMILY: Sometimes it [an assessment] might be paper/pencil and sometimes it is performance-based. Quizzes and tests to me are kind of the same thing just the quiz tends to be smaller. Some of my grades come from performance-based. I still do (table continued)

paper/pencil tests; if you don't, then you have parents who do not understand how this grade [student's average] came about. They [students] have to know terms and probably the best way to do that is paper/pencil tests. Mostly, the paper/pencil testing is multiple choice. EMILY: I have used rubrics. I do a lot of projects, too. Like on a project, they will be given a rubric beforehand to know what I am going to grade and how I am going to grade. You have guidelines for what they need to do or do not need to do. I don't always use the rubric so much with the notebooks because I've got to read their conclusion. I don't hand out a rubric for every single assignment. Maybe I should but I don't because that would be time consuming. With their conclusion, they pretty much have to tell me what they learned. So, I want them to answer the question and what they learned. I don't really use the rubric with that [lab reports]. EMILY: The AMSTI state specialists really pushed for the Alabama Science Test to be open-ended or at least for part of it to be open-ended but it did not happen. So, it [ASA] is all multiple-choice. That is why a lot of the tests in my classroom do have multiple-choice. Although open-ended is great, open-ended is hard to grade. It is great to make sure that they know what they are doing, they get the concept, and they can apply whatever they learn to something else. It is hard to correct multiple-choice questions that way. I will say that most of our multiple-choice questions just don't quite reach that evaluation level that they should but that is why we are doing multiple-choice. RILEY: Right now, I am using a lot of things [assessment resources] that AMSTI has given us. I use AMSTI material and the Course of Study, for sure. We have to worry about the Alabama Science Assessment, so we use that [assessment researches for the ASA] as a research tool. Some of those tests [teacher generated assessments] are generated by including that material. RILEY: I have my paper/pencil tests because some parents don't seem to think you are doing anything because they don't have tests every day. They don't understand inquiry-based learning. I think five more labs in AMSTI and there are tests where part of the test is where they have to construct things and I will use that grade. As far as the lab, there are questions that show how well they understood it [the science concept]. EMILY: We have a teacher guide with AMSTI and it is awesome. We have a study guide that I will pull questions from. Most of them are teacher generated, though. I'll be working on that [an assessment data base with AMSTI] this January or February. All day training on evaluation. AMSTI teachers are going to generate questions. They are going to put it on the AMSTI.org and you [AMSTI teachers] can pull questions from that. EMILY: I have not used it [AMSTI assessment database] because I am not at work right now [on maternity leave] but still it is teacher generated. Most of mine [assessments] have been teacher generated and using the teacher guide and the student guide and projects. Rubrics, I have created my own. EMILY: The students have to do research. Then, they had to come up with their own plan [for the project] and try to follow it. There again, I graded it [the project] with a rubric. (table continued)

EMILY: I have done debates before. I loved those. I would divide the class in half and tell them you are on which side of the topic. They did not have a choice. We had a rubric and certain guidelines for the debate and there are all kinds of stuff online for how to do a debate. RILEY: I have that [the AMSTI resource books] and I have also made up my own questions to go with each standard [on the SAT-10 and ASA]. When I have seventh grade [teacher instructs both seventh and eighth grade AMSTI science], I am going to have cards and use them as practice questions every day. RILEY: I know a lot of people, who will not want to be trained but they are older teachers who have been here for a while and they just don't want to change. With AMSTI, I can spend more time working on assessment and not have to worry about the materials. RILEY: As far as a certain order, we do not have to stay on the same pace. Right now, the other science teacher [seventh grade science at this school] is not even on the same thing. We really have more of an option–more leeway. RILEY: We have a Course of Study. We are expected to get through with every objective and everything we cover to meet that standard. EMILY: With seventh grade, every single objective was met with AMSTI. Every single one. There are like two that have supplemental material that needs to be given–viruses, Down's syndrome, genetic disorders. [On these topics], AMSTI really touches the surface but it doesn't just dive into it and give students the information. With those, I give supplementary materials that might need to be given. They might do reading and discussion. Of course, we can't do experiments with viruses obviously or Down's Syndrome or anything like that. Now there is an AMSTI genetics lesson which goes into planning squares and genotypes and it is intensive and it is easy to put in Down's syndrome and other genetic disorders. I just meet the Course of Study objectives, document that I met them, and that is it. I throw in the ASA because that was such a big deal this year. The SATs tend to be more earth science oriented but the ASA was almost like a pregraduation activity, it felt like [AHSGE is a biology content standardized assessment]. So that big stuff for me this year. EMILY: I do not really use the national standards. I do not go to the websites and print them [national standards] off and evaluate them every day because I feel like if I teach AMSTI and I teach it the way it is supposed to be taught, then they [students] are getting those standards or at least those standards are being taught. We look at all of these different modules like organisms and the human body for seventh grade or properties of matter for eighth grade and we look at them and we think AMSTI and we think Alabama [Course of Study]. EMILY: I cannot say that it [NCLB] has really changed anything. I feel like when I first started teaching, if I had continued that way with the lecture and all that, it would have changed that because so many kids were getting left behind and it would have changed that method. With the inquiry, with AMSTI, and all the other different activities I do, they even become problem solvers. With all of that, I think the kids are getting it more. Do I still have kids that fail, definitely? But do they fail because they do not understand (table continued)

it [science concept] or do they fail because they do not want to do the work? When I talk to them one-on-one, they get it. They just don't want to do the homework and they don't. Sometimes you give a test and they just don't want to do it. They leave it blank. I think this year we only had two students who failed because there were other issues. I think [with] AMSTI and all the other inquiry-based activities that I do, the kids are getting it [science concepts]. I don't feel like they [students] are being left behind. I don't feel like there is anything else that I need to do because I think they are okay. I know that nobody has approached me and told me that I need to be doing it differently. EMILY: Like the ASA. I mean, I busted myself this year to come up with something because I am so inquiry-based every day. And to be thrown into this new test? The other seventh grade teachers [in area] did not even know about it [ASA]. The only reason that I knew about it [ASA] was because AMSTI told me about it. So, they gave me a heads-up. That is another great thing about it. They are on top of all different types of evaluations and all different types of assessments. They give us the information and the materials that we need to be able to get those kids ready for different kinds of stuff. So, they helped me prepare for [the] ASA. They gave me all of these different kinds of points to show them [students] to try to get them familiar with the eleven different objectives [of ASA] but I was struggling with no inquiry basis, no activity involved, the students are driving the classroom. Now all of a sudden here is a standardized test that my kids are going to be held accountable for [with] sixty-six questions/eleven standards and they [students] have got to meet them. What I did was for each standard, students had to create a foldable and that is about as activity involved as I could do. I definitely feel the pressure in that area. EMILY: My feeling [pressures] about the SAT is that we can't meet courses as well. It is difficult to meet Course of Study objectives, meet the ASA standards, and try to meet the SAT standards, when SATs are so much more earth science than they are life science. I definitely feel the pressure because I feel like I am in a class that is being judged and being scored for the SAT [used for AYP] and that is based more on what they learned in sixth grade not in seventh grade. So that bothers me a little bit. As far as the ASA, I think my kids did well on [it]. I never heard back from the counselors but I did feel that pressure. I am judged. The kids are judged. The school is judged by it. RILEY: Well, our school brings pressure. Every year, we have like three or four faculty members discuss what we need to do to meet standards. They feel like it is extremely difficult. I feel like it was a choice that they are held to our standard. I feel pressured. One thing about AMSTI I am seeing right now, is that it is relating lessons and information back [to Course of Study objectives and standardized tests objectives]. EMILY: I would like to have more help in assessment. As I mentioned earlier the way that I am doing it [class instruction], it is teacher generated and I would love to have help there [with assessment]. AMSTI is working on that but as far as our school system or as far as our state is concerned other than AMSTI, I have not had any other professional development help with inquiry-based. What I have learned [about assessing inquiry learning] has been me [teacher generated] and the little that I have gotten from AMSTI but even that is still minimal. They [AMSTI] don't focus on that [assessment]. (table continued)

They focus on teaching. Assessment [and] different kinds of ways to grade assessment or score [assessments] such as the regroup would be helpful. You probably hear some people say classroom management or things like that. If you truly get the kids involved, there are few problems. In my experience, I have not had problems with management. RILEY: I wish we had inquiry-based instructions on other subjects in middle school. MADELINE: I absolutely love it [AMSTI] and I think if they took it away from me, I might find another profession. The kids love it. I do not have any discipline problems because they are ready to come in there [classroom] and learn. They just get so excited with just little bitty hands-on that may take 10 minutes and they learn so much from it. It is amazing. MADELINE: When I saw how much information they would give me, they really understand what is going on. Where they might have just guessed the right answer before. MADELINE: I was not taught that way [inquiry learning], so I wasn't comfortable. I have always learned more when I have done something and I remembered it more than if I had just read something out of a book and answered questions about it. KAITLYN: Overall, I find it [inquiry learning] positive because the students get so excited. There are some students that I feel like that they feel like it [inquiry learning] is just a fun day and I guess every teacher would have that. Like when I have students that come up with some idea that I didn't come up with, I like it. Overall, I had it a positive experience. I would have more positive [comments] if I had less students. If I could have a class of 20, I would teach it [inquiry learning]. The problem [before AMSTI] was coming up with labs and they [labs] are there for me [provided by AMSTI]. MADELINE: For the most part, I just follow the notebook with AMSTI and I just try not to tell them anything about it. I just let them get in there and learn and then at the end, we just all kind of draw a conclusion and talk about what happened. I don't ever tell them anything that is going to go on before it happens. MADELINE: They [students] wanted me to give them a hint. KAITLYN: We used to have experiment days and a student would do a demonstration for us. Sometimes everybody would do it but sometimes a student would pick out his own experiment and they would have to go through and do the scientific method. Overall, I find it [AMSTI] positive but then again I get frustrated which is probably [their] age group and the apathy of some and then not wanting to give me the effort. They just want to fly through things and even with the AMSTI I get frustrated. When it [an assessment or inquiry lab] says explain they give me two words. I try to always put some type of questions not all just matching/multiple-choice on the tests. I usually have just a few of some types that they have to think. KAITLYN: When they can see it/feel it/touch it is definitely [a positive experience]. MADELINE: We take one day to set up the notebook and then the next day we do the lab and our conclusion. That way, it is not just so much all the time, because I find that if you do a lab every single day a lot of times they will rush through it. They are not thinking about the other and it is easier on me if I know what days you are going to do lab, and what days you are not. That way, you are not pulling out resources for every (table continued)

single day.

KAITLYN: But just seeing them actually doing it [understanding science concepts through inquiry learning] and then that would be clicking. I liked to see the light bulb go off.

KAITLYN: Usually what I do is put the objective [from the Course of Study and standardized tests] in a question type. I may model it [inquiry lab]. Because they don’t want to read the directions, I will circulate constantly. I am constantly moving from one table to the other with them, asking them if they have any questions. I always want to get feedback from their group not just depend on me.

KAITLYN: When they are really into their lab and getting it going, I feel like I am more of a facilitator. Just moving about constantly to be sure they are setting it up right or they may have a little glitch.

MADELINE: I use a lot of different assessments. A lot of it [assessments] is with their notebook [student generated journal]. They [students] never know what part of the notebook I am going to grade. One day it may be the hypothesis. One day it may be the conclusion. One day it may just be the parts of the lab. One day it may be I am grading every single thing in their notebook and they have notebook tests which is just me giving them questions and it should be in their notebook and they just write the answer. Then, I have their parent look at them, where the parents get to talk to the kids about the labs. That is in their notebook with them and they sit with them, and they have to pick a lab and they have to explain it to them and the parents grade [the students’ lab]. The parents really get into that and have a lot of good comments.

MADELINE: They always have one project to do out of the six weeks and there are tests built into the AMSTI book. Half of it [each test from the AMSTI resource book] is pencil/paper. So, I will do both [pencil/paper and performance assessments]. What it [performance assessments] is they are given a problem and they can use any of the materials that we have learned and the methods that we have learned and solve their problem. Then, they just have to come up with their own procedure. There is a rubric [that] is already made for you [the teacher by AMSTI]. It [the rubric] tells you to look for this and look for that. Then sometimes you can tell if the kids are getting there.

MADELINE: Especially with one project, they can do the PowerPoint. They can do all sorts of things. They can do photo stories. They are so creative! When we just use pencil/paper [assessments], it restricts that [creativity]. Most of them don’t know the words to write it for me to assess. So, I just like the other better [alternative assessments].

MADELINE: If I am having trouble choosing an assessment, the end of every lesson in the book [AMSTI teacher resource book] gives you 10 different ways you can assess the lesson. It may be with a worksheet. It may be with bell ringers or just questions that you ask from the seat or class discussion. Everybody learns differently and everybody communicates differently. I try to assess in different ways every day to give everybody an opportunity to know that they are learning.

KAITLYN: I still on their AMSTI labs I just count them as daily grades. I still give chapter tests [textbook assessment format].

(table continued)

KAITLYN: Well, I give them notes. So usually mine are teacher made tests from their notes or every once in a while I get them off the ExamPro [assessment question data bank that is part of the system adopted science textbook]. Usually on a test, I will ask them about some of these labs. The only problem I have run into is when I have students who were out for the day that we did the lab. We [AMSTI science teachers] discussed that when we were having the training but I used either the computer [ExamPro data banks] or just getting questions from my notes. We went through and they highlight [their] notes. This is the first one [assessment] I am not giving them a study guide. I get it [assessment questions] pretty much 90% from my notes and we will also go into the AMSTI questions. MADELINE: I do a lot with the AWA [Alabama Writing Assessment] to help especially the English teachers because any time you get involved writing, it definitely helps. I don't know if that is just seventh and eighth graders. They can verbally communicate the information to you but writing it down is something else and you know they know the information. You just cannot get them to write it in sentence form or get the correct words. So we work a lot on how I can communicate better from verbally to written because I think that is where their age group [eighth grade students] lacks. After every lesson, there are articles in the book [AMSTI resource book and system adopted science textbook] and we read every single article. If they bring articles into class from the newspaper or magazines they find, they bring it and share it with us. KAITLYN: Some of it [assessments] is out of textbooks [system adopted science textbooks] which my notes come from the textbooks. We [science teachers at this school] will pull some from the computer if we have done some computer activities. KAITLYN: We [this teacher's classes] have done some computer activities [as resources for assessments] at the beginning of the year on the scientific method. If they [students] are describing something, they would know if their hypothesis would go with a procedure, and so on. They [students] have got to do a poster that goes along with their experiment with the scientific method, the question, the hypothesis, the experiments and data, and then a conclusion. MADELINE: The resources I use of assessments are the [AMSTI] website for the most part and I will use my textbook [system adopted science textbook] to cover the objectives [from the Science Course of Study] that are not covered by AMSTI. There are two objectives [on the Science Course of Study not covered in the AMSTI objectives]. If I do not think they [Science Course of Study objectives] are covered well enough, I will bring out the book [system adopted science textbook] and then sometimes I just use my chemistry books from college or go talk to my chemistry teacher from high school and she will help me. MADELINE: If I see that the kids just really aren't getting it [the science concept], I will pull some more [resources], a book or my own learning. The majority of what I use [for resources] is just the AMSTI teacher's manual and then I have to go and pull other resources. KAITLYN: We use the Course of Study and on my lesson plans I indicate which Course of Study that we are working on because we have to do that here with the STI [software (table continued)

grade book system]. If it [the Science Course of Study] has some key terms, I make sure that those key terms are in their notes and they are tested on those key words. Like [the word] inertia, I know that it is in the Course of Study and my system continuum [school system generated document of Science Course of Study objectives and when they are covered in the classroom]. So, I just make sure that if anything ever comes up, they [school administration] can go back and can find that I covered all those steps [objectives]. MADELINE: At our school, we were told to cover the information. It did not have to be in any particular order. I would take the guide [school system generated pacing guide of when teachers should cover each objective on the Science Course of Study] and make sure that they have covered everything. It just may not be in that order [order on the pacing guide] but I make sure that everything got covered. When we have a test or a lab, I just document where we covered the [objectives] on the continuum. With all my lesson plans, I have to write it [Science Course of Study objectives] and we have to write the grad exam [Alabama High School Graduation Exam objectives], the SAT [objectives] and any other type of exam that we are covering. MADELINE: I mean, if it [Course of Study] just wants you to list, then we would talk about it a little bit maybe not necessarily go into it in much detail. Looking ahead at the Course of Study, you can tell that there are going to be gaps that will be filled before I get there. You don't necessarily have to go into as much detail as if it were to be demonstrated. MADELINE: I do have the national standards. I haven't used it very much because I have just now really been aware that they are there! I just really haven't talked about them that much. I can see where they are just built in with AMSTI. You don't have to worry a whole lot about them. KAITLYN: For the ones [students] that I have who are really [low achieving], I have to change how I assess them [with NCLB]. If I ask five critical thinking questions, I may tell them to choose two out of five. So I want them to be exposed to that but I don't want to make them have to do all of them. Plus, the special ed teachers tell me that it takes too long for them to do it. MADELINE: Well, the only thing that I don't like [due to NCLB] is if they are based on special ed, you have to pass them–is what we are told. I just don't think that is fair. I understand that every child is different and yes, I change my grading for them because they are not going to perform at the level that your A students are. An A for them is just a little bit different. I do adjust my grading to them but I do give them the same things and most of the time, they do fine. If they don't, I just redo it. MADELINE: I was very nervous [after NCLB] about giving them [special needs students] hands-on assessments. I see that they [special needs students] get more out of it [inquiry learning] and can give me more information about what they have learned doing that than they can from just a pencil/paper test because they get confused with the wording. They have been tested so much that when they get tested hands-on, it is almost like a play time and they will give you all the information you want out of it. KAITLYN: I feel no pressures! I don't! I want them [students] to succeed. Maybe I am (table continued)

just too old to feel the pressures but I am not [pressured].
KAITLYN: I would like to see expert teachers not just people from professional development tell me what it looks like on paper. I would like to go to one [a classroom] where a teacher has actually gone through the inquiry-based learning and it has worked. I would like ideas on what to do with the overactive; ADHD child and I would like to see some real life teachers. I wish we [AMSTI science teachers] had days that we could work together. We would have somebody leading of course because it would be chaotic.
KAITLYN: I would actually like to assess it [inquiry learning] more like the book [AMSTI resource book]. So far I haven't done it. I have yet to do a true test [performance test] and let that count as a true test. I would like help with actually using performance tests.
KAITLYN: I think AMSTI ought to have some updates for teachers. I wish they [AMSTI] would either have some updating in the summer where you could go to a couple days of workshops with other teachers and what they are doing/what has worked for them and maybe add some things in a module. I think that would be nice, also.
MADELINE: They [AMSTI] have started an assessment [database] on their [website] where they are turning AMSTI lessons into questions for the ARMT and different formats. You can go on there and download [assessment questions]. I think the teachers need to know that they can go in there and download it, and they can see how their kids can answer those questions [standardized test questions] quickly after doing labs. I think they [AMSTI teachers] will feel more comfortable doing it [assessing] then.

APPENDIX J: FOCUS GROUPS SIGNIFICANT STATEMENTS

Research Subquestion #1-Focus Groups What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?
Significant Statements
ISABELLA: Daily, they each have a piece of paper that they will fill out while they are waiting on me to come back to that group. They discuss it [the inquiry] and they all come up with an answer and most of the time you will have the same answers. There might be one or two that argue and say, no, that is not why that happened and that is okay if they are different because sometimes we are not always in agreement. It is pretty much just a participation thing and for me to see how much they are learning. I usually have about six of those [assessments] in six weeks. ISABELLA: I don't use the tests from the textbook. I don't like them. I've either made it [assessment] myself or it is AMSTI. SARAH: Assessing inquiry tests–lots of observation. I do have check sheets and rubrics. As far as assessing the inquiries, I usually gather the main points they were supposed to learn and after we have had their own class discussion about what did we accomplish and what did we learn and why do you think that happened, I will do a little quiz on what we did. Then, you have to deal with kids who were absent. So, assessment is tough. You have to find ways to assess AMSTI. SARAH: There is one thing I have to help [with grades for inquiry] because you have to have grades and you have to have something to show on paper. I take all of the readings out of AMSTI's books, and I make a reading diary. All of us [AMSTI science teachers at this school] write along with the reading. They [the students] do that and that is for a daily grade. Then, we [AMSTI science teachers at this school] pull what is the most important stuff from that and I test them. SARAH: I wish we had enough of them [AMSTI student resource books]. I wish when they gave us our kits, they [AMSTI] gave us more copies of the student book because I only got eight books and I have got 25 kids. So I copied what I felt was most important. I share the books [and/or copies] with the other sixth grade AMSTI teachers. MIA: We do a lot of the notebooking. With our short periods, we do stuff the first day and I try to have a weekly objective in the Course of Study. Then I try to take those student objectives and give them a daily objective from the lab just to try to keep them on track. It keeps me on track and makes sure they [students] know what they are doing. We will do our question or purpose. I have started doing some purpose for these kids this year just to get them kind of on the right step with this more difficult concept. We will set up, we will talk about procedures, and we will set up our data tables the day before because they won't do it if you don't do it the day before. We will write our data questions the day before and we will talk a little bit about what we are going to do. But on the second day, we usually run the lab and then as a group, we go through the data together. At this age, they just don't know how to do [deal with] data very well. I do PowerPoint and everything and I walk through the steps with them. If there is a (table continued)

chart, I try to pull the screen up and do it on the white board and we fill it out together and talk about it. Then, we talk about the data questions together because they are just not ready yet [to complete all the inquiries on their own]. And then, we do vocabulary. I used to do conclusions in sort of a wrap up but I have started shifting more to the notes because we are so short on time and they need something to study. That is the only thing in AMSTI that is difficult. They do not know how to study from that notebook [student generated notebook rather than a textbook. Students are not allowed to take the AMSTI student resource books out of the classroom]. MIA: They need notes and so I have tried to supplement with more notes [that I have made]. At the end, I will cut out a diagram, we will glue it in their book [notebook], and they will color or label. I have done some data tables where we cut out and put it in their notebooks and that helps to give them something to study from. MIA: That [assessments] is the hardest thing in AMSTI. I am getting better each year. I am trying to do a lot of questions during class to just kind of feel around [figure out student comprehension]. I try to go with the groups and sort of check what they are writing. I'm trying to do more 3, 2, 1s those quick writes at the end to sort of see where they are. Then, we try to do a quiz or short test after about three or four labs. That way, they are not doing [taking a test] eight labs of digestive system all at once. It is just too much information. I am kind of struggling with some of my things [assessments] right now and working in more little quick assessments because I don't have time in 50 minutes to give them one every day. So I try to give them something at the end of each lab and have them to write or tell me what they did. I think if we have a longer period next year, I will have more time to make them tell [what they learned] me in their groups. I am also trying to do thinking jobs. Along with their other roles [in groups], they have to be the hypothesis grader that tells the class [what happened in the lab] or someone has to summarize what they did or if it [the lab] didn't work, why did it not work or what they think went wrong. I am trying to do a little bit more of an oral assessment type thing. I am trying to just check more if they got it [the concept]. MIA: It [assessment] is one of those things. Even three years in, you keep tweaking as you go and trying things. MIA: I use a lot of the ones [assessments] from the AMSTI book. The seventh grade has really good, practical type questions where they have to apply what they have learned. They have to look at a diagram and tell me the function of the liver or look at a diagram and tell me what is happening molecule wise. There are a lot of graphs they have to interpret or data tables they have to look at and tell you what happened. We also try to do some vocabulary. I try to mix it where they can have vocabulary questions with the AMSTI assessments. That way, I am getting not just some vocabulary background but I am getting what they actually learn [about] the concept. Actually, the seventh grade [AMSTI resource books] really has good assessments and we use a lot of those. We do short ones [assessments] and sometimes, we will just pull out five questions and do a little short quiz on one [inquiry] just to see if they have the concept. If they don't, I can go back and reteach it. That is usually what I use. AVA: Honestly, the biggest asset at first was that I got all this equipment. I actually (table continued)

was able to have some really good equipment for my kids. Then as I got to use it [AMSTI] more, I learned just how valuable letting them do the inquiry-based projects was. It was fantastic. Now, it has been a learning curve because I did not realize how important it was to do the labs first and then talk about with notes and lecture type things. This year, I am hitting it [inquiry learning] more that way and it is working wonderfully. AVA: Our book [AMSTI resource book] correlates but not as smoothly [as the seventh grade AMSTI book]. It is out of sequence with the textbook [system adopted textbook]. If you assign something out of the textbook that is not exactly what you are studying [in AMSTI], the kids completely freak out. AVA: What I tend to do, I have some workbooks [outside resource, not AMSTI and not system adopted textbook resource] that are excellent. They are very basic how do things [work] about movements and [the] first law of motion. It [this workbook] gives diagrams and they [students] have to look at the diagrams to tell what is going on and things like that and those are really good. I keep on my kids about accountability. You are responsible to yourself. I give quizzes. AVA: Today, I gave them a vocabulary quiz over two labs because they have a lot of brand new vocabularies. It is kind of a new section. I always give a unit test. Usually, I give them over four maybe five labs where there is a natural break in the information. I don't give a lot of short tests. I give notebook quizzes It [notebook quiz] is just an accountability thing. It is five questions, you get 30 points for it and that is good. They have a lab quiz. That is how I grade the labs. AVA: One thing I started new this year is I have started a lab performance assessment. I've got three or four kids in a group, depending on the class size. I put their names, their group roles because I have group captains, materials managers, safety, and recorders, and how they perform [on the lab]. Are they following safety rules? Do they have the books that I told them to? Do they have their proper shoes? Is their hair pulled back? All of those kinds of things. I will take a point off for the entire group if one person messes up because the safety person should have gotten it [the violation], the group captain should have gotten it, and the materials person should have gotten it because safety goggles are a materials thing. So the poor little recorder is just along for the ride but that is three accountability things and that is what they are learning this time. At first, I wouldn't get them for it [take off points for safety violations]. I wouldn't take any points off. How they performed in lab, it is making a world of difference because all I have got to say is fix your safety violations for the timed lab [performance assessments]. I will walk around with my clipboard and I will say do you see this? When you talk, you are 1) off task, 2) not following safety procedures, and 3) you are not working cooperatively with your group. I am taking off one point right now for you doing one act of violation and they are starting to get it. I've got to drill it into them. They basically got an assessment, a very important one because if they don't do it now, will I give them fire in class next semester? No! So, I made that a huge part of their assessment right now. The only things I really grade for accuracy are the conclusions on the labs. I really look at it and their unit tests. Those are the big things for accuracy. Everything else is effort. AVA: [A lot of my assessments are] Multiple choice. Some of it is rote memory, what is (table continued)

this vocabulary. On my multiple choice questions, I try to make them thinking questions. That [scenarios] may be ten questions on one test. [I use] some matching [on assessments]. I may have a couple of graphs on there. Reading passages that they have got to figure out and apply. So, I try to put thinking questions. AVA: We [teachers at this school] are encouraged to use Scantron [optical scanning formatted tests like the format of SATs] because it helps them with SATs. But honestly, I like the Scantrons because I can get their work back to them so much more quickly. I have worked on those tests [Scantron format] and I can make some really good test questions. They [students] have terrible writing skills, terrible and I couldn't read it [students' answers]. Honestly! But I always put a couple of short answer [questions] on there [the test] and one long bonus question usually a bell ringer I had up [in class]. AVA: But when we were in AYP [her school did not meet AYP] and using the 7 month plan, we had to do end of the month tests and that made up three days. You had to retest if they [the students] were below a 70 [on an assessment]! You had so much time lost just reteaching the kids who didn't get it the first time and who didn't get it the time before that. It is the ones [students] who won't keep their head off the table or throwing the note across the room that you spend all this time reteaching and reassessing.

Research Subquestion #2-Focus Group Discussions What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?
Significant Statements
SOPHIA: They have their little groups that they work with and they know exactly who is the getter, who is supposed to get what, who is the recorder, how they are supposed to keep everything in their notebook, and they talk while they do it–to each other. They have to share their experiences. They have to figure out the reason why we are doing it [inquiry lab]. And I use a checklist to grade their groups. LILLY: Our unit [AMSTI] is fantastic. It [AMSTI assessments] is related to the Course of Study and everything. ISABELLA: Daily, they each have a piece of paper that they will fill out while they are waiting on me to come back to that group. They discuss it [the inquiry] and they all come up with an answer and most of the time you will have the same answers. There might be one or two that argue and say, no, that is not why that happened and that is okay if they are different because sometimes we are not always in agreement. It is pretty much just a participation thing and for me to see how much they are learning. I usually have about six of those [assessments] in six weeks. SARAH: Assessing inquiry tests–lots of observation. I do have check sheets and rubrics. As far as assessing the inquiries, I usually gather the main points they were supposed to learn and after we have had their own class discussion about what did we accomplish and what did we learn and why do you think that happened, I will do a little quiz on what we did. Then, you have to deal with kids who were absent. So, assessment is tough. You have to find ways to assess AMSTI. SARAH: There is one thing I have to help [with grades for inquiry] because you have to (table continued)

have grades and you have to have something to show on paper. I take all of the readings out of AMSTI's books, and I make a reading diary. All of us [AMSTI science teachers at this school] write along with the reading. They [the students] do that and that is for a daily grade. Then, we [AMSTI science teachers at this school] pull what is the most important stuff from that and I test them. SARAH: I wish we had enough of them [AMSTI student resource books]. I wish when they gave us our kits, they [AMSTI] gave us more copies of the student book because I only got eight books and I have got 25 kids. So I copied what I felt was most important. I share the books [and/or copies] with the other sixth grade AMSTI teachers. ISABELLA: I don't use the tests from the textbook. I don't like them. I've either made it [assessment] myself or it is AMSTI. ELLA: We do a notebook and participation grades, and then we have made our own tests or lessons, and–I mean–it is not really just a test. I mean, it could be just even their partners working together but we use it as grades, and they just build, and everything goes across with us. SOPHIA: I am sure fifth grade is different than sixth, seventh, or eighth, we put them in groups, and they have their little groups that they work with, and they know exactly who is the getter and who is supposed to get what, and who is the recorder, and how they are supposed to keep everything in their notebook, and they talk while they do it–to each other. They have to share their experiences. They have to figure out the reason why we are doing it. ISABELLA: And I am a big journal person, so we write a lot at the beginning of class. We will do–it may be a two-to-three minute jot it down/what do you think/how do you think this works/why do you think this happens this way? I also give journal quizzes throughout the unit. MIA: We do a lot of the notebooking. We will do our question or purpose. I have started doing some purpose for these kids this year just to get them kind of on the right step with this more difficult concept. We will set up, we will talk about procedures, and we will set up our data tables the day before because they won't do it if you don't do it the day before. We will write our data questions the day before and we will talk a little bit about what we are going to do. But on the second day, we usually run the lab and then as a group, we go through the data together. At this age, they just don't know how to do [deal with] data very well. I do PowerPoint and everything and I walk through the steps with them. If there is a chart, I try to pull the screen up and do it on the white board and we fill it out together and talk about it. Then, we talk about the data questions together because they are just not ready yet [to complete all the inquiries on their own]. And then, we do vocabulary. I used to do conclusions in sort of a wrap up but I have started shifting more to the notes because we are so short on time and they need something to study. That is the only thing in AMSTI that is difficult. They do not know how to study from that notebook [student generated notebook rather than a textbook. Students are not allowed to take the AMSTI student resource books out of the classroom]. MIA: With our short periods, we do stuff the first day and I try to have a weekly objective in the Course of Study. Then I try to take those student objectives and give (table continued)

them a daily objective from the lab just to try to keep them on track. It keeps me on track and makes sure they [students] know what they are doing.
MIA: They need notes and so I have tried to supplement with more notes. At the end, I will cut out a diagram, we will glue it in their book, and they will color or label. I have done some data tables where we cut out and put it in their notebooks and that helps to give them something to study from.
MIA: That [assessments] is the hardest thing in AMSTI. I am getting better each year. I am trying to do a lot of questions during class to just kind of feel around [figure out student comprehension]. I try to go with the groups and sort of check what they are writing. I'm trying to do more 3, 2, 1s those quick writes at the end to sort of see where they are. Then, we try to do a quiz or short test after about three or four labs. That way, they are not doing [taking a test] eight labs of digestive system all at once. It is just too much information. I am kind of struggling with some of my things [assessments] right now and working in more little quick assessments because I don't have time in 50 minutes to give them one every day. So I try to give them something at the end of each lab and have them to write or tell me what they did. I think if we have a longer period next year, I will have more time to make them tell [what they learned] me in their groups. I am also trying to do thinking jobs. Along with their other roles [in groups], they have to be the hypothesis grader that tells the class [what happened in the lab] or someone has to summarize what they did or if it [the lab] didn't work, why did it not work or what they think went wrong. I am trying to do a little bit more of an oral assessment type thing. I am trying to just check more if they got it [the concept].
MIA: It [assessment] is one of those things. Even three years in, you keep tweaking as you go and trying things.
MIA: I use a lot of the ones [assessments] from the AMSTI book. The seventh grade has really good, practical type questions where they have to apply what they have learned. They have to look at a diagram and tell me the function of the liver or look at a diagram and tell me what is happening molecule wise. There are a lot of graphs they have to interpret or data tables they have to look at and tell you what happened. We also try to do some vocabulary. I try to mix it where they can have vocabulary questions with the AMSTI assessments. That way, I am getting not just some vocabulary background but I am getting what they actually learn [about] the concept. Actually, the seventh grade [AMSTI resource books] really has good assessments and we use a lot of those. We do short ones [assessments] and sometimes, we will just pull out five questions and do a little short quiz on one [inquiry] just to see if they have the concept. If they don't, I can go back and reteach it. That is usually what I use.
AVA: Honestly, the biggest asset at first was that I got all this equipment. I actually was able to have some really good equipment for my kids. Then as I got to use it [AMSTI] more, I learned just how valuable letting them do the inquiry-based projects was. It was fantastic. Now, it has been a learning curve because I did not realize how important it was to do the labs first and then talk about with notes and lecture type things. This year, I am hitting it [inquiry learning] more that way and it is working wonderfully. It [AMSTI] is doing so much better. So, I am enjoying that. The kids change year to year

(table continued)

but it is a learning process.
AVA: We usually set up our labs together [the AMSTI science 8 teachers at this school]. I will have a bell ringer on the board that says read the first two pages. They [students] start off a lesson with what do you think if and it [AMSTI student resources book] has a picture for them to look at and things like that. I usually say to come up with your own questions and your own hypothesis. Just create them on your own and put them in your bell ringers. They come away and we talk about it. We'll always have a purpose of what your goal is to learn in this lab. Then, we do it [the lab report] together. We do our own lab report all together because this is one of the things that I do a little bit differently from AMSTI to keep them all together because then you have six different labs going. I put it in the bell ringer for them to do that so they get the experience and the practice developing this and then when I put mine up there, they can see how far off they were, what the goal was that they should have been looking at, and they get closer to doing that and it helps keep their lab structured. Step one, start with your AMSTI lab and I turn them loose. My special education students, we usually do it all together step by step. We go through [the inquiry] because it is not purely inquiry learning, it is more guided inquiry.
AVA: It [AMSTI student resource book] takes them step by step in how to set it [the lab] up. This [battery lab] is the first one [inquiry] they really get to do in here is fill the battery. They love that one and it is the best example I know of AMSTI. Fantastic! They go through all of it and at the end of the lab when they are doing their charts, before we write our conclusion, they have to review these reflection questions and they have to think. Once they have done all the reflecting questions and we have talked about it, I have them write their conclusion usually the next day as a bell ringer. Then we talk about the lab again and we set up for the next day. We set up [the lab], do it [the lab], talk about it [the lab and conclusions], and [take] notes.
AVA: We usually spend about two-and-a-half to three-and-a-half days on each lab and it is a break neck speed. It really is. It is very quick. It is moving the kids through it but there is no way we can really cover the Course of Study if we don't do that. The kids it [inquiry learning] works. At the first of the year, it is always difficult. It is very difficult. I don't slack off the scientific method but a lot of times we'll just do a scientific method every other lab just so we can get all of the concepts in. Because in three months, you have got to cover all of it. You have got to cover half of that Course of Study in three months not five [because of the amount of time testing in the spring takes]. So, it [inquiry learning] is very difficult but the kids love it!
AVA: Our book [AMSTI resource book] correlates but not as smoothly [as the seventh grade AMSTI book]. It is out of sequence with the textbook [system adopted textbook]. If you assign something out of the textbook that is not exactly what you are studying [in AMSTI], the kids completely freak out. What I tend to do, I have some workbooks [outside resource, not AMSTI and not system adopted textbook resource] that are excellent. They are very basic how do things [work] about movements and [the] first law of motion. It [this workbook] gives diagrams and they [students] have to look at the diagrams to tell what is going on and things like that and those are really good. I try to

(table continued)

find a couple of those a week. A lot of times, I grade for completion. I can tell by looking at what they did how well they did on it and they get the credit for it. You can always tell the ones who just aren't really trying or don't turn it in because they bomb the tests. I keep on my kids about accountability. You are responsible to yourself. I give quizzes. Today, I gave them a vocabulary quiz over two labs because they have a lot of brand new vocabularies. It is kind of a new section. I always give a unit test. Usually, I give them over four maybe five labs where there is a natural break in the information. I don't give a lot of short tests. AVA: I give notebook quizzes. It [notebook quiz] is just an accountability thing. It is five questions, you get 30 points for it and that is good. AVA: They have a lab quiz. That is how I grade the labs. One thing I started new this year is I have started a lab performance assessment and it is wonderful. I've got three or four kids in a group, depending on the class size. I put their names, their group roles because I have group captains, materials managers, safety, and recorders, and how they perform [on the lab]. Are they following safety rules? Do they have the books that I told them to? Do they have their proper shoes? Is their hair pulled back? All of those kinds of things. I will take a point off for the entire group if one person messes up because the safety person should have gotten it [the violation], the group captain should have gotten it, and the materials person should have gotten it because safety goggles are a materials thing. So the poor little recorder is just along for the ride but that is three accountability things and that is what they are learning this time. At first, I wouldn't get them for it [take off points for safety violations]. I wouldn't take any points off. How they performed in lab, it is making a world of difference because all I have got to say is fix your safety violations for the timed lab [performance assessments]. I will walk around with my clipboard and I will say do you see this? When you talk, you are 1) off task, 2) not following safety procedures, and 3) you are not working cooperatively with your group. I am taking off one point right now for you doing one act of violation and they are starting to get it. I've got to drill it into them. They basically got an assessment, a very important one because if they don't do it now, will I give them fire in class next semester? No! So, I made that a huge part of their assessment right now. The only things I really grade for accuracy are the conclusions on the labs. I really look at it and their unit tests. Those are the big things for accuracy. Everything else is effort. AVA: [A lot of my assessments are] Multiple choice. Some of it is rote memory, what is this vocabulary. On my multiple choice questions, I try to make them thinking questions. That [scenarios] may be ten questions on one test. [I use] some matching [on assessments]. I may have a couple of graphs on there. Reading passages that they have got to figure out and apply. So, I try to put thinking questions. AVA: We [teachers at this school] are encouraged to use Scantron [optical scanning formatted tests like the format of SATs] because it helps them with SATs. But honestly,I like the Scantrons because I can get their work back to them so much more quickly. I have worked on those tests [Scantron format] and I can make some really good test questions. They [students] have terrible writing skills, terrible and I couldn't read it [students' answers]. Honestly! But I always put a couple of short answer [questions] on (table continued)

there [the test] and one long bonus question usually a bell ringer I had up [in class]. AVA: But when we were in AYP [her school did not meet AYP] and using the 7 month plan, we had to do end of the month tests and that made up three days. You had to retest if they [the students] were below a 70 [on an assessment]! You had so much time lost just reteaching the kids who didn't get it the first time and who didn't get it the time before that. It is the ones [students] who won't keep their head off the table or throwing the note across the room that you spend all this time reteaching and reassessing. AVA: Honestly, the biggest asset at first was that I got all this equipment. I actually was able to have some really good equipment for my kids. Then as I got to use it [AMSTI] more, I learned just how valuable letting them do the inquiry-based projects was. It was fantastic. Now, it has been a learning curve because I did not realize how important it was to do the labs first and then talk about with notes and lecture type things. This year, I am hitting it [inquiry learning] more that way and it is working wonderfully. It [AMSTI] is doing so much better. So, I am enjoying that. The kids change year-to-year but it is a learning process. AVA: They [students] are not abstract [critical thinkers] at all. ELLA: Most of our units [AMSTI] don't have tests that come with it. Or they may have a unit test and I just don't feel comfortable waiting until five weeks into it to give one big test. We break it [the units into small assessments] down. BRAYDEN: Most of our [AMSTI] units have a written test and then they have a lot of hands-on [performance tests] where they always have an observation test where they watch how to make it work. The ones [students] that may not do real well on their written tests can do the other [performance test] and then you do the grades together and average them. AVA: I get some stuff out of the book [system adopted science textbook]. I have found that I prefer to make my own tests because a lot of times I don't want the definition out of the book [system adopted textbook or AMSTI resource book]. They [students] have got to do well on those SATs but they have got to understand it. If they understand it, I think they can get through it. You have got to learn to test [take standardized tests]. You have got to use those Scantrons [standardized test formats scored using an optical scanner]. You have to! Then I also have two or three short answer questions [on each test].

Research Subquestion #3-Focus Group Discussions What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?
Significant Statements
ELLA: Those tests [standardized tests for AYP] were based on sixth grade content, too [comment from a fifth grade teacher]. SOPHIA: The fifth grade test [ASA] goes all the way back down to their first, second, and third grade. It encompasses all of the AMSTI units [reading] not just fifth grade units. So we are being tested [held accountable]. Our kids are being tested on what they have learned all the way through AMSTI and if they don't get into the real meat of it in a (table continued)

lower grade. There were questions on bees and I think bees are second grade or third grade [on the ASA]. They [students] had to think back and try to remember. They [test manufacturer] make it tough on us. LILLY: Our unit [AMSTI] is fantastic. It [AMSTI assessments] is related to the Course of Study and everything. It [correlation between AMSTI units and Science Course of Study] does for us. Ours correlates nicely–better than theirs [referring to another grade] does. Ours correlated almost to the T. LILLY: We have a 7 month plan but now that we are out of AYP it is a little more lenient. LILLY: I use the language of the Course of Study. AMSTI actually uses energy conversions. I take that out and I tell my kids energy transformations because that is what my Course of Study says. I expose them to the other word, also. I use the exact things. Literally when I am talking about the stuff, I cover those [exact terminology from Course of Study]. Wherever I can fit in SATs, I do. I do check it [coverage of Course of Study objectives and SAT-10 objectives] off. That [Course of Study] is what I cover and everything else with SATs. I use this language [of the Course of Study and SATs]. The language that you see on [SAT-10] practice tests. I try to use the exact same language that they are going to see. It makes it more difficult but I tell my kids you know the 25 cent word and now you have to learn the five dollar word, you know the fancy word. LILLY: It [Course of Study] just lines up well because it is the national standards and the national standards are a lot like Alabama. They [State Department] have rewritten them to make them more like the national standards. ELLA: AMSTI. That is just about all we do. I'll be honest with you. The national standards, we are getting them, and I know it. SOPHIA: I think they [national standards] are embedded in our Course of Study also. I think our Course of Study was based on the national standards. I mean that is what I am trusting, anyway, that they are based on national standards. SOPHIA: It [NCLB] hasn't affected science for me. It has affected math and reading but not science. Right now, the Alabama Science Test is not part of our accountability, as far as No Child Left Behind. That law doesn't encompass science as yet [referring to AYP being based on SAT-10 scores in the state at this time. The ASA will eventually replace the SAT-10 for AYP in Alabama]. ELLA: It [AYP] is just shown in the newspaper and the pats on the back [schools get when they meet AYP]. It is one of those things right now but it doesn't keep us from making AYP. LILLY: We are holding back [because of NCLB], I feel, and most of the teachers I talk to, feel that we are holding back the upper level, gifted kids so that we can pull up kids who will never get it. Just two years ago, I had kids and there were twenty-two in my special ed class and seven or eight of them read on a second grade level–or lower. I had several nonreaders. What do you do with that? Imagine trying to teach momentum and force and they [students] don't have the math background. I really think we are dumbing it [content] down. I don't feel like I am giving them the content that they need but what are you going to do? We are not supposed to track but honestly, tracking works because (table continued)

I can slow it down. I don't have special ed this year. Another teacher has both classes. When I had special ed the first two years, I aligned the lower kids together because I could slow it down to their level. We went step-by-step-by-step with that class. We went through the data together and we wrote stuff together. We gave them the notes or gave them the tables to speed things up. You just can't treat those kinds the same. You can't test them the same because if I give them a modified test with two questions, as I'm told [by administration] the standardized test has four choices or five. They are going to fail. I don't see why we are setting them up to fail.
SOPHIA: That [AYP] is a pressure.
ELLA: I mean that [AYP] is a pressure. We want to do our job and we want to do it right and we want our kids to succeed in science. They [the community] do look at it [AYP report card] and judge school at the ballgames. So and so is in front of so and so.
SOPHIA: Everybody [in the community] wants to down talk [schools who don't have favorable AYP report cards].
ISABELLA: You have to follow that continuum [school system pacing guide and objective checklist] and the Course of Study. I try to pull in the Alabama High School Graduation Exam as I plan lessons. You've got to do that before you can go further. I have the Alabama Graduation Exam booklet that I use. Now, I do pull questions from if it pertains to me from that booklet [Alabama Graduation Exam booklet]. We [science teachers in this school system] got together a couple of years ago and used that [Alabama Graduation Exam booklet] to pull
some questions and they are already on my tests.
ISABELLA: It [Science Course of Study objectives] is pretty much there. Now there are some objectives that are not covered in AMSTI. So, I will have to go back to the textbook or pull my own [teacher generated resources] but it [Science Course of Study] is pretty much covered. I want to say that 96% of it is covered in AMSTI. The other part that is not covered [by AMSTI]; it is my responsibility to make sure that I cover it through the textbook or through other technology and resources.
ISABELLA: I wasn't even aware of that [National Science Standards]. I mean, I knew [about them] but I don't know that much about the National Science Education Standard. I wouldn't know even where to go pull those up. I guess I could find it.
ISABELLA: It [NCLB] has its good points but I am going to be honest now. I wouldn't leave a child behind in the first place. I feel like I cater more to those children who are achieving at a low level. As a teacher, I don't have the time or the energy to stimulate those who need to be pushed because I am spending so much time accommodating the work for these children [low level achievers]. I feel like it is not a good thing.
ISABELLA: Before No Child Left Behind, my assessments were different for those children [low level achievers] but those children were in my science class. They have always been in my science class but now they are engaged more. I will put it that way. They are engaged more but you have to be very, very careful with what you are doing with them because of the dangers of it. Their assessment, I don't want to say they are different but they are different. Before [NCLB], they would have been very simple probably an A, B, C choice. Now, they write; so they are probably harder in one sense

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but the format would be totally different [with inquiry learning]. Now they have to tell me, instead of an A, B, C, D choice or bubble in an answer. They have to tell me more. They are not going to always choose an A, B, C, D when they get out in the real world. They have got to explain something, so they have got to be taught. They're in here [in the regular classroom]. You don't want to treat them differently than everybody else but they are different from everybody else. An assessment beforehand [before NCLB] would have been choosing A, B, C. Now, it is not like that.

ISABELLA: We have lowered our standards and I am not one to lower a standard but we had to because they [low level achievers] are included and they cannot be discluded. I think No Child Left Behind had a tremendous negative impact. Tremendously [negative]. I love having those children [low level achievers] and I love them being in here and I love them being able to do what we do but it is costly. We are not able to do [cover the content] because they hold us back and that is a sad, sad thing. If I had a child [low level achiever] as a parent, I would not want that child holding back a child who can far exceed what they are normally doing but I am sure I am the minority on that. We were looking back at where we were just last year [in content covered] and I have more [low level achievers] this year to deal with. Last year, we were on lesson #13 and now I am on #8. So, we are not getting any coverage. I find that I spend the majority of my class time with them [low level achievers] rather than where I need to be motivating and pushing [all students].

SARAH: I have been on the continuum alignment committee. We took what AMSTI had given us for how they [Science Course of Study and AMSTI unit objectives] aligned and made a check list for teachers to use. On our continuum [school system course objectives document], we have to fill out and we put which lesson meets that objective.

SARAH: I will have to look at the national standards to document it [for testing] but it [national standards] is embedded in our Course of Study.

ISABELLA: Well, you are held so accountable. You are held accountable for everyone but it seems that you are held to a higher standard with those children [special needs students]. You are held more accountable for them [special needs students] than you are the average C student over here who could be a B student if I were allowed to spend more time with them. It is a tremendous amount of pressure but there is nothing I can do about that. It is not about the average child or the child who excels. It is not about them [special needs students]. They [the average child or the child who excels] are kind of left.

ISABELLA: It [pressure] is society as a whole but it comes from your local and state levels. I mean, it [pressure] is everywhere, your administration and your central office, it is a trickle down effect.

ISABELLA: I think if more parents of regular educated children knew about the pressures and what actually went on in the classroom and how we are spending the majority of our time with those children [special needs students], it would be different. I think it would be a totally different ball game. I don't want to keep calling them those children [special needs students]. I am not trying to show differences here but there are differences. I don't think the real world out there knows how detrimental it is to our average and above average students. They [the public] have no clue. If I were not a

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teacher, I don't know that I would know because I am just assuming that my child is being afforded the opportunities that everybody else is and if I have a child who is gifted or who is very smart I am assuming that they are pushing him or her to all levels. I am assuming that but it is not happening. Because I do not have time. I can't do it. It is impossible. And I go home and stress over it but I can't fix it. You just go on and do the best you can.
SARAH: The parents don't understand those [AYP reports], of course.
SARAH: I think it makes a difference with families moving into the communities. The families that are concerned about their children and their education are going to look at those scores and decide, okay, we are going to build our house or buy our land or move into this community because of the scores that this school can get or we are NOT going to move into this community because of the school's scores. That is a fact of life if you are a concerned parent at all and if you are just moving into an area cold that is all you have to go by. You don't know who to talk to or whatever and that is all you have, just data.
AVA: We don't have one yet [standardized test for eighth grade science for AYP]. It is coming down. I thought it was this year but I think it is next year. It will be benchmarked and piloted. Our school has been selected for the NAPE test this year, so some of my eighth graders are going to be pulled out to be tested for that. They [professional development facilitators] were showing what you need to do to prepare your kids and do an essay. They are going to pull students out and they are going to give them the equipment, and they have to create the question/hypothesis, a planned procedure, and design an experiment and conduct it. There is going to be half lab practical and half written test [for this standardized assessment]. It [this standardized test] is critical thinking and it is AMSTI. And one teacher leaned over to me and he wants AMSTI! He can't get it but he wants it. Because he can't get 80% of his school to do it [AMSTI], he is in a little bitty school. What will his kids on a test based on AMSTI when he can't get AMSTI?
AVA: We try to stick to the 7 month plan [system generated document of when to cover each Science Course of Study objective] but they [students] are not [ready]. They [administration] are a little more flexible because they know we are covering our stuff [and we met AYP].
BRAYDEN: There is [AMSTI] stuff for us. It is lesson by lesson what objective from the Course of Study and everything is labeled for us.
AVA: The Course of Study is my guide. And I throw in the other stuff wherever I can, pretty much. I mean, I can't do it much or I am not going to get that [the Science Course of Study] covered and that is what I am accountable for.
AVA: I focus on this [SATs], and this is in that Course of Study with the national standards.
AVA: I give the short test [with NCLB and inquiry learning]. It is twenty-five questions. It is all the same choices except my autistic kids, they get two choices. But that was at the suggestion of the special ed teacher.
AVA: [Teacher is referring to a comment made regarding students who are not prepared

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for her grade level science class because the student has be socially passed to the next grade level for several years] I do not understand how that is legal under No Child Left Behind because the child is not being retained in the 2nd or 3rd grade where they can’t read and forced to learn that knowledge, then go to the next grade and get that knowledge. Instead, they are pushed on to 4th grade and they didn’t learn 3rd grade [content]! They are not going to learn 4th grade and they are not going to learn fifth grade! It [socially passing students to the next grade at the elementary level] is doing a huge disservice to the student. It is going to hurt these kids and how is that not leaving a child behind? AVA: Standardized testing is killing any joy that these kids have in school. They hate it! I mean, it is horrible and it is hard on us [teachers] because there is stuff I would love to cover besides that stuff from the law [standardized test objectives for AYP]. I mean there is stuff that I feel in science that I really can’t spend a lot of time on because it is not on the item specs for a standardized test and No Child Left Behind says we have to meet AYP and AYP is decided in part based on the standardized tests. BRAYDEN: You don’t know what all was invented [about students’ standardized test scores] in that story [on AYP] that came out in the paper. So, you feel pressure. AVA: Standardized testing because of No Child Left Behind and AYP has taken away the freedom and the joy you can do in sharing. Last year and this is a sin but I didn’t even get to chemical reactions before SATs, and I was moving as fast as I possibly could. Chemistry is cool! Chemistry is everything, so I just want to do some fun stuff, the stuff that really the kids remember but I just don’t have the time. There is so much [standardized] assessment!

Research Subquestion #4-Focus Group Discussions What do AMSTI science teachers find most helpful when determining assessment methods?
Significant Statements
SOPHIA: I personally couldn’t teach science without it! I really do not enjoy science except the AMSTI and the way we teach it [science] with AMSTI because I just don’t enjoy teaching science out of a book. They [students] can understand it [science with inquiry learning]. ELLA: I love having the materials on hand. SOPHIA: I am sure fifth grade is different than sixth, seventh, or eighth but I know Ella and me, we put them [students] in groups. They have their little groups that they work with and they know exactly who is the getter, who is supposed to get what, who is the recorder, how they are supposed to keep everything in their notebook, and they talk while they do it–to each other. They have to share their experiences. They have to figure out the reason why we are doing it [inquiry lab]. ELLA: I love to listen to their reasoning! You can hear their conversations and you know when they get that [comprehension] This shadow is going that way because the sun is over there. That [student comprehension] just gives me a little jump. I love to hear their thought patterns. ELLA: Most of our units [AMSTI units] don’t have tests that come with it. Or they may (table continued)

have a unit test and I just don't feel comfortable waiting until five weeks into it to give one big test. We break it [the units into small assessments] down. If they [AMSTI] have a test at all, it is usually a unit test [covering several weeks of information]. SOPHIA: That [inquiry-based learning] is the way you teach and those standardized tests don't know the way I taught the material. The way I worded things and the way the kids understood things. We don't live in New York City where they are probably generating those tests and some of it [instructional methods and assessments] is just a lot different. ELLA: Those tests [standardized tests for AYP] were based on sixth grade content, too [comment from a fifth grade teacher]. SOPHIA: The fifth grade test [ASA] goes all the way back down to their first, second, and third grade. It encompasses all of the AMSTI units [reading] not just fifth grade units. So we are being tested [held accountable]. Our kids are being tested on what they have learned all the way through AMSTI and if they don't get into the real meat of it in a lower grade. There were questions on bees and I think bees are second grade or third grade [on the ASA]. They [students] had to think back and try to remember. They [test manufacturer] make it tough on us. ELLA: When you get those specs [item specifications for standardized tests], the questions all come from our content. SOPHIA: We didn't last year [use the item specifications for the ASA] because we didn't have much time. Some of the materials were given in August and we didn't those disks until right before the test [in April]. Our test scores were okay last year. I mean I just haven't really stressed over changing [assessments to include more of the item specifications]. SOPHIA: I think about the learning cycle. I think about it when trying to assess and actually AMSTI is based on the learning cycle. You can't teach AMSTI and not assess the learning cycle. When you are training–that is the question you are asked most, how do you assess this? [This teacher is an AMSTI trainer for fifth grade science] ELLA: And I always tell my students [AMSTI teacher trainees], look, I am going to share my stuff [inquiry resources] with you. So please test them on what you taught them. Don't teach them a different way, leave out a section, and then come back and give them my test because that is not fair. If you do not cover this material, please do not use my test. So I always try to tell them that. Of course, it is out of my hands but I do always tell them that is the way you need to be. SOPHIA: You almost always have to supplement [AMSTI units] Our unit right is solar energy. We spent last week and the week before in the science book [system adopted textbook] talking about different forms of energy because that is on the ASA. Our [AMSTI] unit only covers solar energy. We spent the last two weeks working on different types of energy [using] the activities that come out of the science book [system adopted science textbook]. You often have to supplement with United Streaming or with Brain Pops or with other materials because that is almost with every subject area [These are resources that cover a variety of subjects and are easy to use]. You have to supplement every subject area. SOPHIA: We have to put them [Science Course of Study objectives] in our lesson plans (table continued)

now. It really changes making sure that we are covering everything.
LILLY: I had to show them that shorthand is the same thing as text messages [referring to note taking skills].
LILLY: We do more homework options. We will take the extension activities and make those homework options for the week. There may be like five or six things [extension activities from the AMSTI resource book] and they choose two things from the list and that is their homework. They are learning the concept that we had in the lab coming up and they are producing something.
LILLY: Mine [her students] are doing a paper right now on disease because that is a main activity and it is a homework option for two weeks. That way, I know they have covered that material. We have covered that on the Course of Study and we don't have to take time out of class. They did one day in library and then the rest of it is kind of on their own time. They have got their own set of maps [resource on how to complete the assignment] and then they write their paper.
LILLY: I hate concept maps. I do one every once in a while. Now, I do graphic organizers and things like that. The foldables and the stuff, I am trying to incorporate. If I

(table continued)

had more time, I would do more foldables [class period is 50 minutes]. I just don't have time this year. It is like the period just keeps getting shorter and shorter every day for us. We do some foldables and that does help [the students with different concepts].
LILLY: You have got so many people [students] who are resistant [to change their habits and except inquiry learning] and it has been an uphill battle. It is hard to adjust and change your way of thinking and it is a whole lot easier to give them a book and a worksheet. It would make my life so much easier but my kids don't learn like that! They don't learn as much and they hate science.
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daily grade. Then, we [AMSTI science teachers at this school] pull what is the most important stuff from that and I test them.
SARAH: I wish we had enough of them [AMSTI student resource books]. I wish when they gave us our kits, they [AMSTI] gave us more copies of the student book because I only got eight books and I have got 25 kids. So I copied what I felt was most important. I share the books [and/or copies] with the other sixth grade AMSTI teachers.
ISABELLA: I was given these rubrics by a science teacher from Atlanta [Georgia]. When I went to a workshop, she gave me most of them [rubrics for inquiry] which was nice. A lot of them [rubrics] I have come up with just on my own. Some of them are AMSTI rubrics but most of them I got from her and they are pretty generic. You could use them with reading or language, social studies, or math. You could use them anywhere. You might have to change a few things but they are pretty basic. One of them [the rubrics] includes what is your purpose today, what are your main points of interest, what is your main idea. You could use that in math, you could use that in social studies, and you could even use it in English. Another [rubric] is what your outcome was what you learned, what did you hope to find out, what were some things that you were confused on. So, they [teachers] can use that anywhere. One rubric is what questions did you have, what are some questions that didn't get answered, and then it will have a little box with do you need to see the teacher and students check the box if they need to see the teacher. They like doing those because they are easy. They are easy, they are quick, they have gotten into a routine, they can feel them out really fast, and I can look at them quickly. Other rubrics, I score with a one, two, three, or four and it has just got a little key that tells you how well you worked with others because so many of these kids don't work will together. You've got three that do all the work and one that sits back and watches. So, it is amazing when they start scoring themselves and the people in their group they actually see sometimes well, I just didn't do my part. It holds them accountable and they actually see that for themselves. It didn't take somebody else telling them hey, I didn't do what I was supposed to do. They can see it on their own. So, they're [the rubrics] good.
SARAH: Sometimes, we [elementary teachers] have to compact two lessons one day due to library or something else. So it is not just a science class.
SARAH: We got a disk last year with the tests in fifth grade science on it last year and our scores [SAT-10 and ASA]. The scores were shown to us and so we kind of tried to use some of the materials that were from AMSTI to also correlate with some of those questions and tried to introduce the questions at the same time because a lot of the questions that are off that disk come straight from reading it. So, we [sixth grade teachers] have to try each year to pull that material. I mean, fifth grade is so tested [sixth grade teachers are trying to help fifth grade teachers because of their standardized test load]. A lot of the fifth grade standardized test questions are based on sixth grade content. Then last year with the science [ASA] too, we were the guinea pigs but it ended up they were good! I mean, they [ASA scores] were higher than a lot of those. Of course, we didn't get our disks [with ASA item specifications] until probably about a month before our test. You know how it is reviewing–you had to cram. So, we didn't know

(table continued)

what to expect. SARAH: For the SAT tests, we do some computerized science. We found some web site that had some [practice assessments]. SARAH: The only way you can do it [assign grades]–you can have observation grades and have like those checklists that are either on paper or in your mind. What we do with pulling the information and making objective tests out of the information is really the only fair way to do it. ISABELLA: I don't use the tests from the textbook. I don't like them. I've either made it [assessment] myself or it is AMSTI. ISABELLA: You have to follow that continuum [school system pacing guide and objective checklist] and the Course of Study. I try to pull in the Alabama High School Graduation Exam as I plan lessons. You've got to do that before you can go further. I have the Alabama Graduation Exam booklet that I use. Now, I do pull questions from if it pertains to me from that booklet [Alabama Graduation Exam booklet]. We [science teachers in this school system] got together a couple of years ago and used that [Alabama Graduation Exam booklet] to pull some questions and they are already on my tests. ISABELLA: It [Science Course of Study objectives] is pretty much there. Now there are some objectives that are not covered in AMSTI. So, I will have to go back to the textbook or pull my own [teacher generated resources] but it [Science Course of Study] is pretty much covered. I want to say that 96% of it is covered in AMSTI. The other part that is not covered [by AMSTI]; it is my responsibility to make sure that I cover it through the textbook or through other technology and resources. ISABELLA: I wasn't even aware of that [National Science Standards]. I mean, I knew [about them] but I don't know that much about the National Science Education Standard. I wouldn't know even where to go pull those up. I guess I could find it. ISABELLA: It [NCLB] has its good points but I am going to be honest now. I wouldn't leave a child behind in the first place. I feel like I cater more to those children who are achieving at a low level. As a teacher, I don't have the time or the energy to stimulate those who need to be pushed because I am spending so much time accommodating the work for these children [low level achievers]. I feel like it is not a good thing. ISABELLA: Before No Child Left Behind, my assessments were different for those children [low level achievers] but those children were in my science class. They have always been in my science class but now they are engaged more. I will put it that way. They are engaged more but you have to be very, very careful with what you are doing with them because of the dangers of it. Their assessment, I don't want to say they are different but they are different. Before [NCLB], they would have been very simple probably an A, B, C choice. Now, they write; so they are probably harder in one sense but the format would be totally different [with inquiry learning]. Now they have to tell me, instead of an A, B, C, D choice or bubble in an answer. They have to tell me more. They are not going to always choose an A, B, C, D when they get out in the real world. They have got to explain something, so they have got to be taught. They're in here [in the regular classroom]. You don't want to treat them differently than everybody else but they are different from everybody else. An assessment beforehand [before NCLB] would (table continued)

have been choosing A, B, C. Now, it is not like that. ISABELLA: They [low level achievers] are more accountable! They are more accountable because they are doing the same thing everybody else is doing. Where as before, they weren't doing the same things everybody else was doing. They were doing something totally different than everybody else. Where now [with inquiry learning], they are right in here doing the same things. ISABELLA: The upper and middle level [achievers] wants the same assessments as they [low level achievers] have of course. And they aren't afraid to tell you. Well, why do I have to do all this, when they only have to do that? So, it is disturbing and you have to be careful what you say. You can say they are not able to do what you are doing and they [the students] resent it. I am going to be honest. They resent it. It is not fair. These children [low level achievers] are doing the same thing we [high and middle level achievers] are doing. With them [low level achievers] being in here [regular classroom] and doing the same thing is causing us not to progress as a whole group the way that it should be. ISABELLA: We have lowered our standards and I am not one to lower a standard but we had to because they [low level achievers] are included and they cannot be discluded. I think No Child Left Behind had a tremendous negative impact. Tremendously [negative]. I love having those children [low level achievers] and I love them being in here and I love them being able to do what we do but it is costly. We are not able to do [cover the content] because they hold us back and that is a sad, sad thing. If I had a child [low level achiever] as a parent, I would not want that child holding back a child who can far exceed what they are normally doing but I am sure I am the minority on that. We were looking back at where we were just last year [in content covered] and I have more [low level achievers] this year to deal with. Last year, we were on lesson #13 and now I am on #8. So, we are not getting any coverage. I find that I spend the majority of my class time with them [low level achievers] rather than where I need to be motivating and pushing [all students]. SARAH: I have been on the continuum alignment committee. We took what AMSTI had given us for how they [Science Course of Study and AMSTI unit objectives] aligned and made a check list for teachers to use. On our continuum [school system course objectives document], we have to fill out and we put which lesson meets that objective. SARAH: I will have to look at the national standards to document it [for testing] but it [national standards] is embedded in our Course of Study. ISABELLA: Well, you are held so accountable. You are held accountable for everyone but it seems that you are held to a higher standard with those children [special needs students]. You are held more accountable for them [special needs students] than you are the average C student over here who could be a B student if I were allowed to spend more time with them. It is a tremendous amount of pressure but there is nothing I can do about that. It is not about the average child or the child who excels. It is not about them [special needs students]. They [the average child or the child who excels] are kind of left. ISABELLA: It [pressure] is society as a whole but it comes from your local and state levels. I mean, it [pressure] is everywhere, your administration and your central office, it (table continued)

is a trickle down effect. I think if more parents of regular educated children knew about the pressures and what actually went on in the classroom and how we are spending the majority of our time with those children [special needs students], it would be different. I think it would be a totally different ball game. I don't want to keep calling them those children [special needs students]. I am not trying to show differences here but there are differences. I don't think the real world out there knows how detrimental it is to our average and above average students. They [the public] have no clue. If I were not a teacher, I don't know that I would know because I am just assuming that my child is being afforded the opportunities that everybody else is and if I have a child who is gifted or who is very smart I am assuming that they are pushing him or her to all levels. I am assuming that but it is not happening. Because I do not have time. I can't do it. It is impossible. And I go home and stress over it but I can't fix it. You just go on and do the best you can.

SARAH: The parents don't understand those [AYP reports], of course.

SARAH: I think it makes a difference with families moving into the communities. The families that are concerned about their children and their education are going to look at those scores and decide, okay, we are going to build our house or buy our land or move into this community because of the scores that this school can get or we are NOT going to move into this community because of the school's scores. That is a fact of life if you are a concerned parent at all and if you are just moving into an area cold that is all you have to go by. You don't know who to talk to or whatever and that is all you have, just data.

ISABELLA: Any type of professional development would be fantastic. I don't have all the answers. I need somebody to come in and tell me. The thing about it is, the people who have told us so far are not in the classroom, not classroom teachers. We are not getting answers from them. We need somebody who is there, who has done it, and who has done it on a daily basis. Because I go home in the afternoons and I think after I have graded those papers or after I have looked at data that we have worked on for six weeks, I really haven't done anything. What have I done? I haven't helped them at all. You are trying to make them think but they don't know how to think anymore. They don't know how to solve a problem. They just want the answer. It has got to be right there on page 10 in the second paragraph and that is the answer and they think that we should be done. They are going to be in the real world and they are going to have to solve problems but they don't know how.

SARAH: As a [AMSTI] trainer, I always make a CD for each of my students [AMSTI science teachers] with all of my reading assignments.

MIA: I taught labs in college [at the college level before moving to this area]. When I came to this area and was teaching, I did not have any equipment. When I got here and had equipment [AMSTI resources], I was like this is fantastic. If you ask them [students in the eighth grade] about peristalsis from last year, they know what it is because we did the activities and the science notebook. We [students] did the scientific method. We do the labs, then we talk about it, and I am trying to get more notes this year than I have in the past, and they understand what it means. For me, it [AMSTI] is fantastic because they

(table continued)

can remember from even two years ago. Kids come back from 9th grade and say, I remember when we did this and we did that. The 9th grade [science] teacher said this year that she could tell that the kids had two years of AMSTI [before coming to her class] because they [the students] know scientific method, they know lab procedures, they know what they are supposed to do. MIA: Just the fact that you [each student] remembered the word [science content terminology] is phenomenal especially at the pace we [science teachers] have to keep these kids moving at. When they [the students] come in with very little applied knowledge background and they have no critical thinking skills, it is very difficult. We take this stuff [AMSTI resources] right off the bat and I can tell a difference from when they come through the seventh grade and one year of AMSTI. That [AMSTI] experience improves them that much. I don't have to work with them nearly as much. It [working with the students] is more like after two or three weeks instead of after a semester and that is so much better. Just one year of AMSTI makes that much of a difference. It helps them learn how to think. Not what to think but helps them develop those skills that help figure it [problems] out. MIA: I tell them we are creating a question [for this inquiry lab] but students don't know what to write. I ask them to just tell me what you think there is no right or wrong answer. They think there is a wrong answer for everything because before they come to us [before seventh grade]; they are not doing it [inquiry learning]. They [seventh grade students] are still so very concrete. MIA: They don't have critical thinking skills [when they start seventh grade]. They are not learning it [critical thinking skills]. They are not doing science in elementary school enough which I am hoping will get better. It is rough! All three seventh grade teachers [at this teacher's school] go through the same thing and we talk about it every week. Every week comment; please do AMSTI in elementary school. MIA: We do a lot of the notebooking. With our short periods, we do stuff the first day and I try to have a weekly objective in the Course of Study. Then I try to take those student objectives and give them a daily objective from the lab just to try to keep them on track. It keeps me on track and makes sure they [students] know what they are doing. We will do our question or purpose. I have started doing some purpose for these kids this year just to get them kind of on the right step with this more difficult concept. We will set up, we will talk about procedures, and we will set up our data tables the day before because they won't do it if you don't do it the day before. We will write our data questions the day before and we will talk a little bit about what we are going to do. But on the second day, we usually run the lab and then as a group, we go through the data together. At this age, they just don't know how to do [deal with] data very well. I do PowerPoint and everything and I walk through the steps with them. If there is a chart, I try to pull the screen up and do it on the white board and we fill it out together and talk about it. Then, we talk about the data questions together because they are just not ready yet [to complete all the inquiries on their own]. And then, we do vocabulary. I used to do conclusions in sort of a wrap up but I have started shifting more to the notes because we are so short on time and they need something to study. That is the only thing in AMSTI (table continued)

that is difficult. They do not know how to study from that notebook [student generated notebook rather than a textbook. Students are not allowed to take the AMSTI student resource books out of the classroom]. MIA: They need notes and so I have tried to supplement with more notes. At the end, I will cut out a diagram, we will glue it in their book, and they will color or label. I have done some data tables where we cut out and put it in their notebooks and that helps to give them something to study from. MIA: That [assessments] is the hardest thing in AMSTI. I am getting better each year. I am trying to do a lot of questions during class to just kind of feel around [figure out student comprehension]. I try to go with the groups and sort of check what they are writing. I'm trying to do more 3, 2, 1s those quick writes at the end to sort of see where they are. Then, we try to do a quiz or short test after about three or four labs. That way, they are not doing [taking a test] eight labs of digestive system all at once. It is just too much information. I am kind of struggling with some of my things [assessments] right now and working in more little quick assessments because I don't have time in 50 minutes to give them one every day. So I try to give them something at the end of each lab and have them to write or tell me what they did. I think if we have a longer period next year, I will have more time to make them tell [what they learned] me in their groups. I am also trying to do thinking jobs. Along with their other roles [in groups], they have to be the hypothesis grader that tells the class [what happened in the lab] or someone has to summarize what they did or if it [the lab] didn't work, why did it not work or what they think went wrong. I am trying to do a little bit more of an oral assessment type thing. I am trying to just check more if they got it [the concept]. MIA: It [assessment] is one of those things. Even three years in, you keep tweaking as you go and trying things. MIA: I use a lot of the ones [assessments] from the AMSTI book. The seventh grade has really good, practical type questions where they have to apply what they have learned. They have to look at a diagram and tell me the function of the liver or look at a diagram and tell me what is happening molecule wise. There are a lot of graphs they have to interpret or data tables they have to look at and tell you what happened. We also try to do some vocabulary. I try to mix it where they can have vocabulary questions with the AMSTI assessments. That way, I am getting not just some vocabulary background but I am getting what they actually learn [about] the concept. Actually, the seventh grade [AMSTI resource books] really has good assessments and we use a lot of those. We do short ones [assessments] and sometimes, we will just pull out five questions and do a little short quiz on one [inquiry] just to see if they have the concept. If they don't, I can go back and reteach it. That is usually what I use. MIA: AMSTI is great because for us [seventh grade science teachers and students]. The human body is a little rough because it only hits three Course [of] Study objectives hard. A lot of it [AMSTI unit] is more macro than micro. For us having human body first, we kind of have to play catch up. What we [AMSTI science teachers at this school] have done is pull in these different aspects from the different Course of Study objectives and put them in as we go. We [the AMSTI science 7 teachers at this school] try to make sure (table continued)

that weekly objective come from the Course of Study. On the tests, we try to make sure that [assessment questions] fits in the Course of Study. I am lucky that a lot of it [AMSTI objectives and Course of Study objectives] fits. If it [AMSTI unit] doesn't, we will add a few questions that do fit with the Course of Study.
MIA: The kids who can't do it, we need common sense benchmarks. So we could take those kids and let them feel like they succeed in VoTech programs [vocational programs] because they do not feel like they succeed in our classes. That is where I think I am frustrated and a lot of other teachers are frustrated that I talk to in other districts. It is not just us [teachers at this school]. It is everywhere. I find that frustrating.

APPENDIX K: PEER REVIEWERS' COMMENTS

Research Subquestion #1-Peer Reviewers' Comments on Individual Interviews What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?
Peer Reviewer #1 1) Teachers use AMSTI resources and a variety of other resources for assessments. 2) Teachers implement various forms of assessment using the science notebook, lab activities, performance assessment, higher order questions, and the usual paper/pencil type of questions – multiple choice. Peer Reviewer #2 1) Teacher reported using a variety of assessment methods to determine content knowledge: teacher monitoring, AMSTI assessments, paper/pencil tests, rubrics, notebook tests, vocabulary tests 2) Teacher report using a variety of activities to help students learn the content: note taking activities, formulating hypothesis individually and together as a class before labs, cooperative learning groups for lab activities, reflective journaling, using AMSTI book, bell ringers, study guides, graphic organizers, PowerPoints. Easier to assess students with a paper/pencil tests. On other activities they reported using rubrics.
Research Subquestion #2-Peer Reviewers' Comments of Individual Interviews What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?
Peer Reviewer #1 1) Students are allowed to choose their assessment method based on how they learn. 2) Teachers believe AMSTI resources and teacher generated resources are essential. 3) Some teachers consider standardized test specifications and formats essential. 4) Students are allowed to work in cooperative groups with each person being assigned a specific job. Peer Reviewer #2 1) Paper/Pencil Assessments from AMSTI teacher resources 2) Journals/notebook assessments, PowerPoint/poster/project alternative assessments, Paper/pencil assessments using Textbook, Performance/observation assessments, Foldable/graphic organizers, Bell ringers, and Oral assessments 3) Cooperative Learning assessments 4) Teachers use rubrics for assessments. 5) Teachers give students options for assessment methods.
Research Subquestion #3-Peer Reviewers' Comments of Individual Interviews What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?
Peer Reviewer #1 (table continued)

1) Teachers refer to the Alabama Course of Study as a guideline for teaching science. 2) Teachers use pacing guides and curriculum maps as a guideline when assessing. 3) NCLB and BBSST are not making a noticeable difference in the assessment methods being used the classroom because most of the teachers interviewed do not encounter that situation Peer Reviewer #2 1) Teachers rank the Science Course of Study as the most important guideline they use when determining assessments for inquiry learning. 2) System Pacing Guides Curriculum maps are used by teachers as a check list for covering the Science Course of Study. 3) Many AMSTI units correlate with the Course of Study while some do not correlate completely. Therefore, teachers know the Cops is in AMSTI and they do not have to constantly worry about Course of Study objectives. Teachers know that AMSTI includes National Standards and therefore do not worry about these Standards. 4) Teachers use filling in the gaps as a guideline for covering Course of Study objectives not available in their AMSTI units. 5) Teachers worry about NCLB and AYP but feel that NCLB has not affected AMSTI teachers assessment methods.

Research Subquestion #4-Peer Reviewers' Comments on Individual Interviewers What do AMSTI science teachers find most helpful when determining assessment methods?
Peer Reviewer #1 1) Teachers find the AMSTI assessments and rubrics that are related to the lessons helpful. 2) Teachers find standardized testing information helpful. 3) Teachers find textbooks helpful. 4) Teachers find the Course of Study helpful. 5) Teachers find Internet resources helpful. 6) (Not Helpful) Some teachers have encountered problems with absent students and hands-on lab activities that have caused the teacher to modify her assessments by adding a day of demos based on the most important AMSTI lessons. Peer Reviewer #2 1) Teachers find the AMSTI resources including Filling in the Gaps helpful when determining assessment methods. 2) Teachers find the item specifications for standardized tests (ASA and ARMT) helpful when determining assessment methods. (table continued)

3) Teachers find textbook and other outside resources helpful when determining assessment methods. 4) Teachers find the resources generated by other teachers as helpful. 5) Teachers find the objectives in the Science Course of Study helpful when determining assessment methods
Research Subquestion #1-Peer Reviewers' Comments on Focus Groups What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?
Peer Reviewer #1 1) A variety of assessments resources like AMSTI and textbooks 2) Several methods of assessment like notebooking, standardized test formats, performance, observations, and traditional paper/pencil tests 3) Rubrics are used by AMSTI teachers for the performance assessment of the lesson and for a self and peer assessment following the activity. In addition to rubrics, teachers use the 3, 2, 1 and quick writes to draw conclusions and some are doing an oral assessment and other assessment methods. Peer Reviewer #2 1) To supplement AMSTI, teachers reported using notes or note taking procedures so that students will have something with which to study content or vocabulary. 2) PowerPoints as well. 3) Teachers use a variety of assessments methods: self assessment, peer assessments, reflective journaling, oral assessments (individual and group) with teacher, written tests, rubrics. 4) Teachers report using the AMSTI assessment tests as well as using multiple choice Scantron tests. They are easier and quicker for the teacher to return work and it prepares students for standardized tests (SAT) and these are encouraged by administration.
Research Subquestion #2-Peer Reviewers' Comments of Focus Groups What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?
Peer Reviewer #1 1) Teachers consider AMSTI resources essential 2) Teachers consider cooperative learning essential 3) Teachers consider standardized test formats essential 4) Teachers consider teacher generated materials essential Peer Reviewer #2 1) AMSTI teacher resource books and supplies 2) Cooperative learning 3) ARMT/SAT item specifications (Scantron) formatted questions 4) Notebook/journal assessments 5) State adopted textbooks
Research Subquestion #3-Peer Reviewers' Focus Groups (table continued)

What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?
Peer Reviewer #1 1) Teachers utilize the Alabama Course of Study as their main teaching guideline. 2) However, other factors do play a role in what teachers teach and how they use assessment such as schools involved with AYP and state wide testing. 3) AMSTI provides teachers with paperwork displaying the correlation of the AMSTI topics to the state course of study and age appropriate state wide test. Teachers are then required to fill in the gaps to meet objectives not covered by AMSTI lessons. 4) NCLB is hindering the type of instruction and assessment teachers are delivering in the classroom. 5) Special needs children are more engaged than in previous years before NCLB but other students are not as challenged in today's classroom. Peer Reviewer #2 1) Teachers use the Course of study, AHSGE, National Science Education Standards, and the AMSTI objectives to guide them in planning their lessons and testing procedures. 2) Since AMSTI encompasses all of the standards, teachers really don't pull up the other documents to check the accuracy. They are really relying on AMSTI – I hope it is correlated correctly! 3) Teachers report that they have a hard time assessing lower level students as these students are held accountable to the same standards as all other students because of NCLB. Previously, the special needs students could be assessed using multiple choice tests. Now, they have to think and this is just beyond some of their capabilities. 4) Upper level students aren't as challenged as teachers have had to "dumb down" the content so that all students can learn the content because of NCLB.
Research Subquestion #4-Peer Reviewers' Comments on Focus Groups What do AMSTI science teachers find most helpful when determining assessment methods?
Peer Reviewer #1 1) AMSTI provides good and varied assessment methods that go along with each AMSTI lesson. 2) Teachers find using teacher generated assessments allows them to use the language best suited to the student and relates to the lessons the student has performed in the AMSTI lab. 3) ARMT, SAT and other state wide tests are used as a basis for developing classroom assessment in order to incorporate the same test language, style and, format. 4) AMSTI provides readings that go along with each lesson. These supply teachers with additional assessment strategies as students keep a reading diary. 5) Most teachers utilize assessments from varied sources covering AMSTI, the textbook, vocabulary, readings, contents of the science notebooks, state wide testing objectives, etc.

(table continued)

Teachers note that AMSTI is fairly encompassing in all of these areas.
6) Teachers that supplement AMSTI use the textbook, projects and various Internet technologies

Peer Reviewer #2

1) Teachers use AMSTI resources when developing assessments.
2) Teachers use observations as assessments with inquiry learning.
3) Teachers use self made assessments.
4) Teachers use standardized tests (ARMT, SAT, ASA) formats when developing assessments.
5) Teachers use AMSTI readings and develop assessments for them to assist in reading strategies.
6) Teachers use AMSTI rubrics and checklists to help them evaluate students learning.
7) Teachers use textbook resources to developing assessments.

APPENDIX L: GRADE LEVEL SIGNIFICANT STATEMENTS

Research Subquestion #1-Fifth Grade AMSTI Science Teachers What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?
MADISON: One thing that we just finished, we made Eco Columns a combination of terrariums and aquariums, which correlates with the Alabama Course of Study. We have to talk about food chains and food webs. So with the materials that AMSTI sends us, they send us all of the materials that we need and the living organisms come through the mail when we want to order. We would read some of the material from the student assessment booklet that was provided in the AMSTI kit. So, one day we would talk about the mosquito fish, one day we would talk about the snails, and one day we would talk about the cricket. When we were working on the aquarium or terrarium, we would talk about the animals or the plants that would correlate with the aquarium or the terrarium. JORDAN: To be absolutely honest, I hated teaching science before I got AMSTI. But now, it [AMSTI] changed the way I feel about science because I used to avoid it if I could! It was the last thing we did in the afternoons and I didn't spend a whole lot of time on it. Once I kind of got involved in it [AMSTI], it really changed how I thought about it [science]. The kids really enjoyed it. JORDAN: Well, the students seem to respond to it [inquiry learning] fairly well. They like to get out and get dirty with it [AMSTI lab activities]. Basically, they try to find out what is going on [with the inquiry labs] and it has not been a major problem [changing to inquiry-based learning]. It gets easier [planning and conducting the lessons]. Some days, you have to just take a deep breath and remember that they are learning. It is not just noise! It is learning and so that has been a little bit different but it is okay. SOPHIA: I personally couldn't teach science without it! I really do not enjoy science except the AMSTI and the way we teach it [science] with AMSTI because I just don't enjoy teaching science out of a book. They [students] can understand it [science with inquiry learning]. ELLA: I love having the materials on hand. JORDAN: I start off with the write up, the scientific process. Yesterday, we started in with the question of how many times will a pendulum swing in 15 seconds? So, the students had the question, what is a pendulum? We haven't gotten into any of that [discussion of a pendulum]. We are just kind of starting the write up and what the prediction would be. We set up our notebook to get started and with the notebook prediction; we [fifth grade AMSTI science teachers at this school] would have them write down what it [the answer to the question]. I think the pendulum will swing 15 times in 15 seconds. And I have them write, because.... They have to tell me why they think that. Like, it should spin or rock 1 time per second. Because they think of a pendulum with a clock–a lot of them will. So, we kind of go from there and then the plan and procedure. I (table continued)

direct them because I want to go through the process of telling them, this is how you are going to set it up. This is what you are going to do in each step. And then, are there any questions from there. Then I will write down data and observations and I will put a chart up there [referring to a whiteboard]. We talk about the fact that when a scientist is doing an experiment, they are not going to do just one trial. You have got to do several trials and so we will start off with the data and observation and will have trial #1, #2, and #3. The number of seconds it is going to swing is always going to stay 15 and then the length of the string is going to be 38 cm this time. So the only thing you are going to have to worry about will be the number of swings. When we set up that [the pendulum], we will talk about the fact that this is a controlled experiment and why it is a controlled experiment and that the only thing that you ever change is one thing at a time. Otherwise, you don't know what has caused it [the data]. And a lot of times, I bring in the topic of a cat. You've got him [the cat] a new litter box and change the litter. If you change their food and all of a sudden they become very sick, you are not sure why. It is because you have introduced too many things into their environment and we often talk about babies. With babies, you only start one vegetable or fruit at a time. You don't introduce a lot at one time because if there is an allergy you don't know what it is because of what they have just done. So, I bring in little outside things like that and then we [the class] will go and actually complete the experiment and test it three times keeping the times and everything going. Then, I will bring them [students] back together and we'll talk about how many times each group's [pendulum] swing and we would kind of get to an average. They will know that if they got 9 one time and 15 the other time, you did something [wrong] and you need to go back and think about what it was because it shouldn't be that much of a change. And then we will talk about, all right, obviously this is a standard pendulum system, and I introduce what that is and we are going to work on controlled experiments as this unit progresses. So, what are some things that we can change and that is when we introduce the independent and dependent variable and all that stuff from there. JORDAN: After you get through with this particular lesson, we are going to be changing the mass. Then, we'll do the mass change and that is pretty much the question, will mass change? And their conclusion is based on what did they observe in theirs? Did it change it? Was there a change in the number of swings based on what we did the day before? And then I will bring in a content summary and that is when I make sure that even if their experiment showed something it shouldn't have this is what you should have. This will be the independent variable and your dependent variable, so I point out the things (at least through the first unit) that we are kind of looking for. Then, there are graph activities that go along with this particular unit, where they are learning how to graph things. There is one where we test the length [of the pendulum string], so they end up with three different types of graphs. We have a pictorial graph (where they are drawing the little pendulum) and there is one in which we actually put a number line out as far as the number of swings and they tape on or hook on their pendulum to show the same thing that they graph there. So, it is just a different experiment with things where they see more kinds of things that illustrate kind of the same information in different ways. (table continued)

MADISON: I use a lot of the science AMSTI. I don't use as much of the math AMSTI. As much as I should. I am working on that, little by little. I don't think I was really comfortable with it [AMSTI math] when I went through the training. So every year little by little, I start working on the activities. MADISON: We move into science. We are in between kits right now. So, we have just finished the Eco Columns and we got our solar energy kit. We are in the middle of inventorying the solar energy kit. MADISON: We started out with the terrariums first. Instead of the aquariums, we did the terrariums first. Using the student assessment books that they provide with us, it shows pictures and it has one student needs to do [real simple directions] like 1) Students need to place two cupfuls of soil in the terrarium. The first thing I do at the beginning of the year is talk about procedures, safety, and things like that. When we did the terrariums, each group had two books per group. They had jobs assigned to them. There is a team captain. There is a getter [materials manager] who is the person that comes and gets all of the materials. There is a recorder so if there are any papers or questions that need to be answered or anything like that. We get in the groups. They have work stations in the classrooms. You can see where they are set up. The team captain assigns the jobs for the day. The getters come get their materials. It is really student self sufficient. I really just go around and monitor to make sure that they are staying on task. MADISON: They get their materials, go back to their work stations, and I will tell them, you need to do #1 to #6. I walk them through it before they go to their work stations. I always have an example set up for them. So, they will know what the test product should look like. With the terrariums, they had to plant three kinds of seeds, alfalfa, rice, and mustard seeds. We talked a little bit about the seeds that day, planted the seeds, covered the seeds up with a little bit of soil, and then started watering them which you wouldn't think that would take a lot of time but we had pipettes and you had to do it just a little at a time and everybody has to take turns. It [the AMSTI resources] is laid out pretty well. AMSTI has done a good job at having the procedures laid out for the students and they have the procedures ready for the teacher. It is easy once you go through the training. It is really easy to follow along. MADISON: They were divided up into their groups. And that was after we had talked about the fish, the snails, the crickets, and pill bugs, they had to become an expert in one of those. This person had to research the mosquito fish and they had to write three of the most important details after reading the selection. MADISON: For some assessments, while they are doing that [researching or conducting lab activities], they can sketch. As long as they draw it, they can tell me what it is. Look at the difference between these two [refers to two students' assessment papers]. I can tell he has got everything in there. These are some of the things [assessments] they [AMSTI] provide us with the teacher materials. SOPHIA: I am sure fifth grade is different than sixth, seventh, or eighth but I know Ella and me, we put them [students] in groups. They have their little groups that they work with and they know exactly who is the getter, who is supposed to get what, who is the (table continued)

recorder, how they are supposed to keep everything in their notebook, and they talk while they do it–to each other. They have to share their experiences. They have to figure out the reason why we are doing it [inquiry lab]. ELLA: I love to listen to their reasoning! You can hear their conversations and you know when they get that [comprehension] This shadow is going that way because the sun is over there. That [student comprehension] just gives me a little jump. I love to hear their thought patterns.

Research Subquestion #2-Fifth Grade AMSTI Science Teachers What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?
Significant Statements
MADISON: One thing that we just finished, we made Eco Columns a combination of terrariums and aquariums, which correlates with the Alabama Course of Study. We have to talk about food chains and food webs. So with the materials that AMSTI sends us, they send us all of the materials that we need and the living organisms come through the mail when we want to order. We would read some of the material from the student assessment booklet that was provided in the AMSTI kit. So, one day we would talk about the mosquito fish, one day we would talk about the snails, and one day we would talk about the cricket. When we were working on the aquarium or terrarium, we would talk about the animals or the plants that would correlate with the aquarium or the terrarium. JORDAN: To be absolutely honest, I hated teaching science before I got AMSTI. But now, it [AMSTI] changed the way I feel about science because I used to avoid it if I could! It was the last thing we did in the afternoons and I didn't spend a whole lot of time on it. Once I kind of got involved in it [AMSTI], it really changed how I thought about it [science]. The kids really enjoyed it. JORDAN: Well, the students seem to respond to it [inquiry learning] fairly well. They like to get out and get dirty with it [AMSTI lab activities]. Basically, they try to find out what is going on [with the inquiry labs] and it has not been a major problem [changing to inquiry-based learning]. It gets easier [planning and conducting the lessons]. Some days, you have to just take a deep breath and remember that they are learning. It is not just noise! It is learning noise and so that has been a little bit different but it is okay. SOPHIA: I personally couldn't teach science without it! I really do not enjoy science except the AMSTI and the way we teach it [science] with AMSTI because I just don't enjoy teaching science out of a book. They [students] can understand it [science with inquiry learning]. ELLA: I love having the materials on hand. JORDAN: I start off with the write up, the scientific process. Yesterday, we started in with the question of how many times will a pendulum swing in 15 seconds? So, the students had the question, what is a pendulum? We haven't gotten into any of that [discussion of a pendulum]. We are just kind of starting the write up and what the prediction would be. We set up our notebook to get started and with the notebook prediction; we [fifth grade AMSTI science teachers at this school] would have them (table continued)

write down what it [the answer to the question]. I think the pendulum will swing 15 times in 15 seconds. And I have them write, because.... They have to tell me why they think that. Like, it should spin or rock 1 time per second. Because they think of a pendulum with a clock–a lot of them will. So, we kind of go from there and then the plan and procedure. I direct them because I want to go through the process of telling them, this is how you are going to set it up. This is what you are going to do in each step. And then, are there any questions from there. Then I will write down data and observations and I will put a chart up there [referring to a whiteboard]. We talk about the fact that when a scientist is doing an experiment, they are not going to do just one trial. You have got to do several trials and so we will start off with the data and observation and will have trial #1, #2, and #3. The number of seconds it is going to swing is always going to stay 15 and then the length of the string is going to be 38 cm this time. So the only thing you are going to have to worry about will be the number of swings. When we set up that [the pendulum], we will talk about the fact that this is a controlled experiment and why it is a controlled experiment and that the only thing that you ever change is one thing at a time. Otherwise, you don't know what has caused it [the data]. And a lot of times, I bring in the topic of a cat. You've got him [the cat] a new litter box and change the litter. If you change their food and all of a sudden they become very sick, you are not sure why. It is because you have introduced too many things into their environment and we often talk about babies. With babies, you only start one vegetable or fruit at a time. You don't introduce a lot at one time because if there is an allergy you don't know what it is because of what they have just done. So, I bring in little outside things like that and then we [the class] will go and actually complete the experiment and test it three times keeping the times and everything going. Then, I will bring them [students] back together and we'll talk about how many times each group's [pendulum] swing and we would kind of get to an average. They will know that if they got 9 one time and 15 the other time, you did something [wrong] and you need to go back and think about what it was because it shouldn't be that much of a change. And then we will talk about, all right, obviously this is a standard pendulum system and I introduce what that is and we are going to work on controlled experiments as this unit progresses. So, what are some things that we can change and that is when we introduce the independent and dependent variable and all that stuff from there. JORDAN: After you get through with this particular lesson, we are going to be changing the mass. Then, we'll do the mass change and that is pretty much the question, will mass change? And their conclusion is based on what did they observe in theirs? Did it change it? Was there a change in the number of swings based on what we did the day before? And then I will bring in a content summary and that is when I make sure that even if their experiment showed something it shouldn't have this is what you should have. This will be the independent variable and your dependent variable, so I point out the things (at least through the first unit) that we are kind of looking for. Then, there are graph activities that go along with this particular unit, where they are learning how to graph things. There is one where we test the length [of the pendulum string], so they end up (table continued)

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he has got everything in there. These are some of the things [assessments] they [AMSTI] provide us with the teacher materials.
SOPHIA: I am sure fifth grade is different than sixth, seventh, or eighth but I know Ella and me, we put them [students] in groups. They have their little groups that they work with and they know exactly who is the getter, who is supposed to get what, who is the recorder, how they are supposed to keep everything in their notebook, and they talk while they do it–to each other. They have to share their experiences. They have to figure out the reason why we are doing it [inquiry lab].
ELLA: I love to listen to their reasoning! You can hear their conversations and you know when they get that [comprehension] This shadow is going that way because the sun is over there. That [student comprehension] just gives me a little jump. I love to hear their thought patterns.
LILLY: Our unit [AMSTI] is fantastic. It [AMSTI assessments] is related to the Course of Study and everything.
MADISON: I went through the Alabama Course of Study and looked at the objectives and one of the objectives was for students to be able to describe food chains or food webs. So, I really hit that hard. The textbook [system adopted science textbook] had some examples. I used that [system adopted science textbook] as a resource. As far as the assessments go, AMSTI didn't have what I considered the assessment that would correlate with the Alabama Course of Study. Considering our accountability [due to AYP] now, I felt like I needed to use those questions [from the Course of Study and the science textbook].
MADISON: And I served on the ASA committee. They [Alabama Department of Education] have given everybody the items [items specifications for the ASA]. Those are the questions that I would just print off and put up on the screen [using a multimedia projector]. They are multiple choice [types of questions]. They correlate with what we have been talking about in class. I just use those [ASA sample questions] considering it [the ASA] is going to be multiple choice. They are not open-ended or anything. So I just use those questions [from the ASA examples] as my test questions.
MADISON: If they [the students] get them [ASA sample questions] right on the test [given by the teacher], then they should do well on the Alabama Science Assessment. I am driven by the Alabama Course of Study and the Alabama Science Assessment right now.
MADISON: With the item specs [for the ASA], they [questions on the students' unit tests] are so close. If you use the item specs, they [the students] are going to do well on the test [ASA]. I used those item specs last year [last school year] or this year 2008 and my kids did very well. I think I had seventy-four kids last year and only four scored a two. Everybody else scored three or four and I used those item specs last year. So I am pretty much using the same assessments as I did last year [for this school year, 2008-2009].
MADISON: An AMSTI specialist came by yesterday and told me to go on the website [AMSTI website]. They [AMSTI] have a new thing posted. It is called Filling in the Gaps. So, we [fifth grade AMSTI science teachers at this school] have been looking

(table continued)

into that [Filling in the Gaps] but we [fifth grade AMSTI science teachers at this school] pretty much use our own [teacher generated assessments] and it is working [students' ASA scores are high]. JORDAN: They've [students] got to see a style of questioning [standardized test format] and I think that [using sample questions from the standardized tests of AYP] is the best way to do those [unit tests in the classroom]. JORDAN: Sometimes I just use the exact question [from the sample standardized test questions] because there is just no other way around it [because of wording]. I will use a lot of the same questions or question types and reword it [the question] a little bit. JORDAN: The ARMT thing [is stressed by school and system administration] because I have to do the ARMT part, too [ARMT does not cover science. It is covered in the ASA but elementary teachers all teach reading and they will use AMSTI as a resource for reading material]. So I pull questions from there [ARMT] but most of what I use for the AMSTI [tests] comes from what it is we experienced in class. I make the tests and change them. I keep my copy but I will look at it and say, We didn't really get that one [test question], so I will take that one [test question] out and not use it. I usually use what I see in class and what I feel like the kids can do. You have some groups you can challenge more than others. There are some things you just have to pull back with on those groups [ones you cannot challenge].

Research Subquestion #3-Fifth Grade AMSTI Science Teachers What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?
Significant Statements
ELLA: Most of our units [AMSTI units] don't have tests that come with it. Or they may have a unit test and I just don't feel comfortable waiting until five weeks into it to give one big test. We break it [the units into small assessments] down. If they [AMSTI] have a test at all, it is usually a unit test [covering several weeks of information]. SOPHIA: That [inquiry-based learning] is the way you teach and those standardized tests don't know the way I taught the material. The way I worded things and the way the kids understood things. We don't live in New York City where they are probably generating those tests and some of it [instructional methods and assessments] is just a lot different. ELLA: Those tests [standardized tests for AYP] were based on sixth grade content, too [comment from a fifth grade teacher]. SOPHIA: The fifth grade test [ASA] goes all the way back down to their first, second, and third grade. It encompasses all of the AMSTI units [reading] not just fifth grade units. So we are being tested [held accountable]. Our kids are being tested on what they have learned all the way through AMSTI and if they don't get into the real meat of it in a lower grade. There were questions on bees and I think bees are second grade or third grade [on the ASA]. They [students] had to think back and try to remember. They [test manufacturer] make it tough on us. ELLA: When you get those specs [item specifications for standardized tests], the (table continued)

questions all come from our content. SOPHIA: We didn't last year [use the item specifications for the ASA] because we didn't have much time. Some of the materials were given in August and we didn't those disks until right before the test [in April]. Our test scores were okay last year. I mean I just haven't really stressed over changing [assessments to include more of the item specifications]. SOPHIA: I think about the learning cycle. I think about it when trying to assess and actually AMSTI is based on the learning cycle. You can't teach AMSTI and not assess the learning cycle. When you are training–that is the question you are asked most, how do you assess this?[This teacher is an AMSTI trainer for fifth grade science] ELLA: And I always tell my students [AMSTI teacher trainees], look, I am going to share my stuff [inquiry resources] with you. So please test them on what you taught them. Don't teach them a different way, leave out a section, and then come back and give them my test because that is not fair. If you do not cover this material, please do not use my test. So I always try to tell them that. Of course, it is out of my hands but I do always tell them that is the way you need to be. SOPHIA: You almost always have to supplement [AMSTI units] Our unit right is solar energy. We spent last week and the week before in the science book [system adopted textbook] talking about different forms of energy because that is on the ASA. Our [AMSTI] unit only covers solar energy. We spent the last two weeks working on different types of energy [using] the activities that come out of the science book [system adopted science textbook]. You often have to supplement with United Streaming or with Brain Pops or with other materials because that is almost with every subject area [These are resources that cover a variety of subjects and are easy to use]. You have to supplement every subject area. SOPHIA: We have to put them [Science Course of Study objectives] in our lesson plans now. It really changes making sure that we are covering everything. MADISON: I went through the Alabama Course of Study and looked at the objectives and one of the objectives was for students to be able to describe food chains or food webs. So, I really hit that hard. The textbook [system adopted science textbook] had some examples. I used that [system adopted science textbook] as a resource. As far as the assessments go, AMSTI didn't have what I considered the assessment that would correlate with the Alabama Course of Study. Considering our accountability [due to AYP] now, I felt like I needed to use those questions [from the Course of Study and the science textbook]. MADISON: And I served on the ASA committee. They [Alabama Department of Education] have given everybody the items [items specifications for the ASA]. Those are the questions that I would just print off and put up on the screen [using a multimedia projector]. They are multiple choice [types of questions]. They correlate with what we have been talking about in class. I just use those [ASA sample questions] considering it [the ASA] is going to be multiple choice. They are not open-ended or anything. So I just use those questions [from the ASA examples] as my test questions. MADISON: If they [the students] get them [ASA sample questions] right on the test (table continued)

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doesn’t talk about the characteristics of the planets. It talks about where they are located and things like that. It is really not about the planets so much as other things. My focus wasn’t on characteristics as much. Now, I did give them. For example, we did a foldable in which they listed characteristics of a planet. They got to use that foldable for a quiz and I gave them that kind of open note kind of thing.

JORDAN: I go back to the other [Course of Study and standardized tests specifications] more than I do [the continuum]. I go back to the ARMT and the SATs because ultimately that is what we are most responsible for. Now the continuum if we do it on there [check off the objectives], it should cover most of these [Course of Study objectives] but as far as my assessments I go back and look at those things more than anything.

JORDAN: Unfortunately, they don’t get to play [cover interesting topics not on the Course of Study] in much. If it doesn’t really tie in with our curriculum and the item specs [from standardized tests] that are on there [the Course of Study], we don’t really even get to look at them. So, your hands are kind of tied in a lot of things. Just from our school system, in my opinion. It has gotten to where there is too much that they are trying to get us to cover in a very short period of time. I think there are too many people up in the state department that are trying to say that their stuff is more important and the other ones need to back off. Therefore, we are focused in on too many things.

JORDAN: The reading with ARI [Alabama Reading Initiative] is becoming overwhelming and it is taking away from the other subjects. I have struggled to get in my science and we have to cut social studies to two days a week, every week pretty much and that is so frustrating. Really and truly, should I cut science every once in a while [in order to get reading time in]. I am tested in science, so I can’t do that. Our state department keeps piling more on us. We can’t cut language because they are tested on the writing assessment. They have got too many things. They should have cut one or the other. There is no reason to pile science on top of fifth grade as well as the writing assessment test and SATs and ARMT. It is just too much on these kids.

JORDAN: In my opinion, the sixth grade should be tested on science because their curriculum [from the Course of Study] has been condensed and they are supposed to go more in depth in their subject matter, We are still just getting off the surface on our subject matter and I think that they really needed to look at that when they thought about that. Because really and truly, I think it is the sixth grade that starts with the High School Graduation Exam. I am just introducing things [concepts] and doing a few things with it. I don’t get into the depth that the sixth grade does. So I kind of felt like it, the science assessment [ASA], should have gone for the sixth grade.

JORDAN: I think the material went too much in depth as far as their [ASA] assessment would go. It required them [fifth grade science students] to remember more than what they are capable of. I just think there are certain things [like] the planets they can do. They [students] probably can do (to some degree) the difference between plant and animal cells and things like that. When you start getting into specific things, I know mine [students] did not do as well on the indicators [results of students’ ASA scores]. We had done that [ASA and AHSGE item specifications] earlier on in the year and it is

(table continued)

just too much like the lens thing, convex and concave lens. The questions I had for samples were unbelievable and that was right before the test, so I guess they did okay on that part. I think they [State Department] are asking them to rationalize too much on that. I don't think this group [his class] or any grade is ready for that. I think that is something that should be passed on [ASA should be taken by the sixth]. ELLA: AMSTI. That is just about all we do. I'll be honest with you. The national standards, we are getting them, and I know it. SOPHIA: I think they [national standards] are embedded in our Course of Study also. I think our Course of Study was based on the national standards. I mean that is what I am trusting, anyway, that they are based on national standards. SOPHIA: It [NCLB] hasn't affected science for me. It has affected math and reading but not science. Right now, the Alabama Science Test is not part of our accountability, as far as No Child Left Behind. That law doesn't encompass science as yet [referring to AYP being based on SAT-10 scores in the state at this time. The ASA will eventually replace the SAT-10 for AYP in Alabama]. ELLA: It [AYP] is just shown in the newspaper and the pats on the back [schools get when they meet AYP]. It is one of those things right now but it doesn't keep us from making AYP. MADISON: I think that with having AMSTI, the No Chile Left Behind, I think a lot of the needs are being met because it is hands-on. It is inquiry-based. I don't think it has really changed the way [I teach] but AMSTI has changed the way I teach. I don't think No Child Left Behind has changed a whole lot of the way I teach because I have your basic generic group of kids. I am not an inclusion classroom [no special needs students]. I have some gifted students and I have some lower achieving students but we don't have any that are on IEP [Individual Education Plan] right now. We do have some that are going through BBSST [Building Based Student Support Team which addresses at risk students] and we are doing those strategies. Like for one student, I have to read her test orally but it [NCLB] has not really changed our thinking a whole lot, as far as we are not slipping or anything. JORDAN: Lots more reteaching! In some cases, watering it down because we are told, you have got to get them to pass. You have got to do all these accommodations to pass them. Unfortunately, you can't fix laziness. I feel like pretty much they are asking us to fix their home life, their academic life, their social life, and everything else. It is too much. We can't do that. I find that there are too many students who come in now that aren't really ready for fifth grade. They should have been held back because their math skills are not where they need to be because we have to let them re take a test two or three times until they pass it. We have to keep watering things down for some of them until they are able to get through and I know there are some students that are in special ed who are truly not ever going to be able to succeed if we don't do that, and I understand those unusual cases. When you've got another little boy here who has not got any health problems, he is just lazy. He won't try. He won't do his homework. He won't pay attention in class but yet I have got to do something to help him get through fifth grade.
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JORDAN: In some cases it [assessments] may be fewer problems. A lot of times it is just reteaching them. If it is a science vocabulary test, it is keeping them in, going back over the words with them, or having a peer stay with them and go back over words with them, and providing a word bank. JORDAN: It [classroom assessments since NCLB] has not really changed much. We met our standards and we are above and beyond where we are supposed to be. We [this teacher's school] have always been up there. We have not really worried so much about hitting AYP just maybe in attendance. JORDAN: Our problem is there are 34 or 35 students between the two fifth grade classes. Every student greatly affects our scores. If you have one [student] that comes in and he just blows off the test and just writes anything down, our scores will be lower than they should be because he chose not to do anything. You can't change that. You can't do anything about that for AYP. I know they are shooting for 100% at every school for all this stuff but you are just asking for impossibility. It is not what happens. SOPHIA: That [AYP] is a pressure. ELLA: I mean that [AYP] is a pressure. We want to do our job and we want to do it right and we want our kids to succeed in science. They [the community] do look at it [AYP report card] and judge school at the ballgames. So and so is in front of so and so. SOPHIA: Everybody [in the community] wants to down talk [schools that don't have favorable AYP report cards].

Research Subquestion #4-Fifth Grade AMSTI Science Teachers What do AMSTI science teachers find most helpful when determining assessment methods?
Significant Statements
MADISON: One thing that we just finished, we made Eco Columns a combination of terrariums and aquariums, which correlates with the Alabama Course of Study. We have to talk about food chains and food webs. So with the materials that AMSTI sends us, they send us all of the materials that we need and the living organisms come through the mail when we want to order. We would read some of the material from the student assessment booklet that was provided in the AMSTI kit. So, one day we would talk about the mosquito fish, one day we would talk about the snails, and one day we would talk about the cricket. When we were working on the aquarium or terrarium, we would talk about the animals or the plants that would correlate with the aquarium or the terrarium. JORDAN: To be absolutely honest, I hated teaching science before I got AMSTI. But now, it [AMSTI] changed the way I feel about science because I used to avoid it if I could! It was the last thing we did in the afternoons and I didn't spend a whole lot of time on it. Once I kind of got involved in it [AMSTI], it really changed how I thought about it [science]. The kids really enjoyed it. JORDAN: Well, the students seem to respond to it [inquiry learning] fairly well. They like to get out and get dirty with it [AMSTI lab activities]. Basically, they try to find out what is going on [with the inquiry labs] and it has not been a major problem [changing (table continued)

to inquiry-based learning]. It gets easier [planning and conducting the lessons]. Some days, you have to just take a deep breath and remember that they are learning. It is not just noise! It is learning noise and so that has been a little bit different but it is okay. SOPHIA: I personally couldn't teach science without it! I really do not enjoy science except the AMSTI and the way we teach it [science] with AMSTI because I just don't enjoy teaching science out of a book. They [students] can understand it [science with inquiry learning]. ELLA: I love having the materials on hand. JORDAN: I start off with the write up, the scientific process. Yesterday, we started in with the question of hw many times will a pendulum swing in 15 seconds? So, the students had the question, what is a pendulum? We haven't gotten into any of that [discussion of a pendulum]. We are just kind of starting the write up and what the prediction would be. We set up our notebook to get started and with the notebook prediction; we [fifth grade AMSTI science teachers at this school] would have them write down what it [the answer to the question]. I think the pendulum will swing 15 times in 15 seconds. And I have them write, because.... They have to tell me why they think that. Like, it should spin or rock 1 time per second. Because they think of a pendulum with a clock–a lot of them will. So, we kind of go from there and then the plan and procedure. I direct them because I want to go through the process of telling them, this is how you are going to set it up. This is what you are going to do in each step. And then, are there any questions from there. Then I will write down data and observations and I will put a chart up there [referring to a whiteboard]. We talk about the fact that when a scientist is doing an experiment, they are not going to do just one trial. You have got to do several trials and so we will start off with the data and observation and will have trial #1, #2, and #3. The number of seconds it is going to swing is always going to stay 15 and then the length of the string is going to be 38 cm this time. So the only thing you are going to have to worry about will be the number of swings. When we set up that [the pendulum], we will talk about the fact that this is a controlled experiment and why it is a controlled experiment and that the only thing that you ever change is one thing at a time. Otherwise, you don't know what has caused it [the data]. And a lot of times, I bring in the topic of a cat. You've got him [the cat] a new litter box and change the litter. If you change their food and all of a sudden they become very sick, you are not sure why. It is because you have introduced too many things into their environment and we often talk about babies. With babies, you only start one vegetable or fruit at a time. You don't introduce a lot at one time because if there is an allergy you don't know what it is because of what they have just done. So, I bring in little outside things like that and then we [the class] will go and actually complete the experiment and test it three times keeping the times and everything going. Then, I will bring them [students] back together and we'll talk about how many times each group's [pendulum] swing and we would kind of get to an average. They will know that if they got 9 one time and 15 the other time, you did something [wrong] and you need to go back and think about what it was because it shouldn't be that much of a change. And then we will talk about, all right, (table continued)

obviously this is a standard pendulum system, and I introduce what that is and we are going to work on controlled experiments as this unit progresses. So, what are some things that we can change and that is when we introduce the independent and dependent variable and all that stuff from there.
JORDAN: After you get through with this particular lesson, we are going to be changing the mass. Then, we'll do the mass change and that is pretty much the question, will mass change? And their conclusion is based on what did they observe in theirs? Did it change it? Was there a change in the number of swings based on what we did the day before? And then I will bring in a content summary and that is when I make sure that even if their experiment showed something it shouldn't have this is what you should have. This will be the independent variable and your dependent variable, so I point out the things (at least through the first unit) that we are kind of looking for. Then, there are graph activities that go along with this particular unit, where they are learning how to graph things. There is one where we test the length [of the pendulum string], so they end up with three different types of graphs. We have a pictorial graph (where they are drawing the little pendulum) and there is one in which we actually put a number line out as far as the number of swings and they tape on or hook on their pendulum to show the same thing that they graph there. So, it is just a different experiment with things where they see more kinds of things that illustrate kind of the same information in different ways.
MADISON: I use a lot of the science AMSTI. I don't use as much of the math AMSTI. As much as I should. I am working on that, little by little. I don't think I was really comfortable with it [AMSTI math] when I went through the training. So every year little by little, I start working on the activities.
MADISON: We move into science. We are in between kits right now. So, we have just finished the Eco Columns and we got our solar energy kit. We are in the middle of inventorying the solar energy kit.
MADISON: We started out with the terrariums first. Instead of the aquariums, we did the terrariums first. Using the student assessment books that they provide with us, it shows pictures and it has one student needs to do [real simple directions] like 1) Students need to place two cupfuls of soil in the terrarium. The first thing I do at the beginning of the year is talk about procedures, safety, and things like that. When we did the terrariums, each group had two books per group. They had jobs assigned to them. There is a team captain. There is a getter [materials manager] who is the person that comes and gets all of the materials. There is a recorder so if there are any papers or questions that need to be answered or anything like that. We get in the groups. They have work stations in the classrooms. You can see where they are set up. The team captain assigns the jobs for the day. The getters come get their materials. It is really student self sufficient. I really just go around and monitor to make sure that they are staying on task.
MADISON: They get their materials, go back to their work stations, and I will tell them, You need to do #1 to #6. I walk them through it before they go to their work stations. I always have an example set up for them. So, they will know what the test product

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should look like. With the terrariums, they had to plant three kinds of seeds, alfalfa, rice, and mustard seeds. We talked a little bit about the seeds that day, planted the seeds, covered the seeds up with a little bit of soil, and then started watering them which you wouldn't think that would take a lot of time but we had pipettes and you had to do it just a little at a time and everybody has to take turns. It [the AMSTI resources] is laid out pretty well. AMSTI has done a good job at having the procedures laid out for the students and they have the procedures ready for the teacher. It is easy once you go through the training. It is really easy to follow along. MADISON: They were divided up into their groups. And that was after we had talked about the fish, the snails, the crickets, and pill bugs, they had to become an expert in one of those. This person had to research the mosquito fish and they had to write three of the most important details after reading the selection. MADISON: For some assessments, while they are doing that [researching or conducting lab activities], they can sketch. As long as they draw it, they can tell me what it is. Look at the difference between these two [refers to two students' assessment papers]. I can tell he has got everything in there. These are some of the things [assessments] they [AMSTI] provide us with the teacher materials. SOPHIA: I am sure fifth grade is different than sixth, seventh, or eighth but I know Ella and me, we put them [students] in groups. They have their little groups that they work with and they know exactly who is the getter, who is supposed to get what, who is the recorder, how they are supposed to keep everything in their notebook, and they talk while they do it–to each other. They have to share their experiences. They have to figure out the reason why we are doing it [inquiry lab]. ELLA: I love to listen to their reasoning! You can hear their conversations and you know when they get that [comprehension] This shadow is going that way because the sun is over there. That [student comprehension] just gives me a little jump. I love to hear their thought patterns. ELLA: Most of our units [AMSTI units] don't have tests that come with it. Or they may have a unit test and I just don't feel comfortable waiting until five weeks into it to give one big test. We break it [the units into small assessments] down. If they [AMSTI] have a test at all, it is usually a unit test [covering several weeks of information]. SOPHIA: That [inquiry-based learning] is the way you teach and those standardized tests don't know the way I taught the material. The way I worded things and the way the kids understood things. We don't live in New York City where they are probably generating those tests and some of it [instructional methods and assessments] is just a lot different. ELLA: Those tests [standardized tests for AYP] were based on sixth grade content, too [comment from a fifth grade teacher]. SOPHIA: The fifth grade test [ASA] goes all the way back down to their first, second, and third grade. It encompasses all of the AMSTI units [reading] not just fifth grade units. So we are being tested [held accountable]. Our kids are being tested on what they have learned all the way through AMSTI and if they don't get into the real meat of it in a lower grade. There were questions on bees and I think bees are second grade or third (table continued)

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SOPHIA: I think about the learning cycle. I think about it when trying to assess and actually AMSTI is based on the learning cycle. You can't teach AMSTI and not assess the learning cycle. When you are training–that is the question you are asked most, how do you assess this? [This teacher is an AMSTI trainer for fifth grade science]
ELLA: And I always tell my students [AMSTI teacher trainees], look, I am going to share my stuff [inquiry resources] with you. So please test them on what you taught them. Don't teach them a different way, leave out a section, and then come back and give them my test because that is not fair. If you do not cover this material, please do not use my test. So I always try to tell them that. Of course, it is out of my hands but I do always tell them that is the way you need to be.
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JORDAN: The ARMT thing [is stressed by school and system administration] because I have to do the ARMT part, too [ARMT does not cover science. It is covered in the ASA but elementary teachers all teach reading and they will use AMSTI as a resource for reading material]. So I pull questions from there [ARMT] but most of what I use for the AMSTI [tests] comes from what it is we experienced in class. I make the tests and change them. I keep my copy but I will look at it and say, we didn't really get that one [test question], so I will take that one [test question] out and not use it. I usually use what I see in class and what I feel like the kids can do. You have some groups you can challenge more than others. There are some things you just have to pull back with on those groups [ones you cannot challenge].

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LILLY: We have a 7 month plan but now that we are out of AYP it is a little more lenient. MADISON: We don't have any type of guide [curriculum guide or continuum] as far as something that the school board makes us do or the school makes us do or our principal. We just do our lesson plans. This [pacing guide] pretty much guides us as far as where we should be. We're not required or our school system doesn't have anything in place. I think when our principal gave us a day to kind of work on this [pacing guide] we kind of did it ourselves. JORDAN: I wouldn't say that it [system continuum] really affects how I select assessments. I guess it is what I focus more on the assessment a little bit. Because I know if it is the order of the planets, then I will spend a little more time on the order of the planets than based on the size of the planets. Along with the characteristics because that is what we just tested on obviously. If we weren't really in the continuum, it really doesn't talk about the characteristics of the planets. It talks about where they are located and things like that. It is really not about the planets so much as other things. My focus wasn't on characteristics as much. Now, I did give them. For example, we did a foldable in which they listed characteristics of a planet. They got to use that foldable for a quiz and I gave them that kind of open note kind of thing. JORDAN: I go back to the other [Course of Study and standardized tests specifications] more than I do [the continuum]. I go back to the ARMT and the SATs because ultimately that is what we are most responsible for. Now the continuum if we do it on there [check off the objectives], it should cover most of these [Course of Study objectives] but as far as my assessments I go back and look at those things more than anything. JORDAN: Unfortunately, they don't get to play [cover interesting topics not on the Course of Study] in much. If it doesn't really tie in with our curriculum and the item specs [from standardized tests] that are on there [the Course of Study], we don't really even get to look at them. So, your hands are kind of tied in a lot of things. Just from our school system, in my opinion. It has gotten to where there is too much that they are trying to get us to cover in a very short period of time. I think there are too many people up in the state department that are trying to say that their stuff is more important and the other ones need to back off. Therefore, we are focused in on too many things. JORDAN: The reading with ARI [Alabama Reading Initiative] is becoming overwhelming and it is taking away from the other subjects. I have struggled to get in my science and we have to cut social studies to two days a week, every week pretty much and that is so frustrating. Really and truly, should I cut science every once in a while [in order to get reading time in]. I am tested in science, so I can't do that. Our state department keeps piling more on us. We can't cut language because they are tested on the writing assessment. They have got too many things. They should have cut one or the other. There is no reason to pile science on top of fifth grade as well as the writing assessment test and SATs and ARMT. It is just too much on these kids. JORDAN: In my opinion, the sixth grade should be tested on science because their curriculum [from the Course of Study] has been condensed and they are supposed to go (table continued)

more in depth in their subject matter, We are still just getting off the surface on our subject matter and I think that they really needed to look at that when they thought about that. Because really and truly, I think it is the sixth grade that starts with the High School Graduation Exam. I am just introducing things [concepts] and doing a few things with it. I don't get into the depth that the sixth grade does. So I kind of felt like it, the science assessment [ASA], should have gone for the sixth grade.

JORDAN: I think the material went too much in depth as far as their [ASA] assessment would go. It required them [fifth grade science students] to remember more than what they are capable of. I just think there are certain things [like] the planets they can do. They [students] probably can do (to some degree) the difference between plant and animal cells and things like that. When you start getting into specific things, I know mine [students] did not do as well on the indicators [results of students' ASA scores]. We had done that [ASA and AHSGE item specifications] earlier on in the year and it is just too much like the lens thing, convex and concave lens. The questions I had for samples were unbelievable and that was right before the test, so I guess they did okay on that part. I think they [State Department] are asking them to rationalize too much on that. I don't think this group [his class] or any grade is ready for that. I think that is something that should be passed on [ASA should be taken by the sixth].

ELLA: AMSTI. That is just about all we do. I'll be honest with you. The national standards, we are getting them, and I know it.

SOPHIA: I think they [national standards] are embedded in our Course of Study also. I think our Course of Study was based on the national standards. I mean that is what I am trusting, anyway, that they are based on national standards.

SOPHIA: It [NCLB] hasn't affected science for me. It has affected math and reading but not science. Right now, the Alabama Science Test is not part of our accountability, as far as No Child Left Behind. That law doesn't encompass science as yet [referring to AYP being based on SAT-10 scores in the state at this time. The ASA will eventually replace the SAT-10 for AYP in Alabama].

ELLA: It [AYP] is just shown in the newspaper and the pats on the back [schools get when they meet AYP]. It is one of those things right now but it doesn't keep us from making AYP.

MADISON: I think that with having AMSTI, the No Child Left Behind, I think a lot of the needs are being met because it is hands-on. It is inquiry-based. I don't think it has really changed the way [I teach] but AMSTI has changed the way I teach. I don't think No Child Left Behind has changed a whole lot of the way I teach because I have your basic generic group of kids. I am not an inclusion classroom [no special needs students]. I have some gifted students and I have some lower achieving students but we don't have any that are on IEP [Individual Education Plan] right now. We do have some that are going through BBSST [Building Based Student Support Team which addresses at risk students] and we are doing those strategies. Like for one student, I have to read her test orally but it [NCLB] has not really changed our thinking a whole lot, as far as we are not slipping or anything.

JORDAN: Lots more reteaching! In some cases, watering it down because we are told,

(table continued)

You have got to get them to pass. You have got to do all these accommodations to pass them. Unfortunately, you can't fix laziness. I feel like pretty much they are asking us to fix their home life, their academic life, their social life, and everything else. It is too much. We can't do that. I find that there are too many students who come in now that aren't really ready for fifth grade. They should have been held back because their math skills are not where they need to be because we have to let them retake a test two or three times until they pass it. We have to keep watering things down for some of them until they are able to get through and I know there are some students that are in special ed who are truly not ever going to be able to succeed if we don't do that, and I understand those unusual cases. When you've got another little boy here who has not got any health problems, he is just lazy. He won't try. He won't do his homework. He won't pay attention in class but yet I have got to do something to help him get through fifth grade. JORDAN: In some cases it [assessments] may be fewer problems. A lot of times it is just reteaching them. If it is a science vocabulary test, it is keeping them in, going back over the words with them, or having a peer stay with them and go back over words with them, and providing a word bank. JORDAN: It [classroom assessments since NCLB] has not really changed much. We met our standards and we are above and beyond where we are supposed to be. We [this teacher's school] have always been up there. We have not really worried so much about hitting AYP just maybe in attendance. JORDAN: Our problem is there are 34 or 35 students between the two fifth grade classes. Every student greatly affects our scores. If you have one [student] that comes in and he just blows off the test and just writes anything down, our scores will be lower than they should be because he chose not to do anything. You can't change that. You can't do anything about that for AYP. I know they are shooting for 100% at every school for all this stuff but you are just asking for impossibility. It is not what happens. SOPHIA: That [AYP] is a pressure. ELLA: I mean that [AYP] is a pressure. We want to do our job and we want to do it right and we want our kids to succeed in science. They [the community] do look at it [AYP report card] and judge school at the ballgames. So and so is in front of so and so. SOPHIA: Everybody [in the community] wants to down talk [schools that don't have favorable AYP report cards]. JORDAN: I would love to see them [AMSTI] do just a whole day in which everyone who is teaching from these units could come in and say, okay, well here's the fifth grade modules. Let's talk about what assessments you can do here. Here are the assessments you can do there. And give us some copies of the things that we can use and relive if we need to. That kind of thing, I think. As a general rule, I think everybody would be more comfortable if we had something that kind of broke it down into segments so we could have something more in our hands. JORDAN: A leader or somebody in the group who could say, here is a copy of something you could use to assess from there. If somebody would just help come up with something and work through it, I think it would make everybody feel more (table continued)

comfortable. MADISON: I am hoping after I see online Filling of Gaps I hope that helps. They do offer us professional development. I have been a trainer [AMSTI], too. One of the main complaints is how do I assess this because you want to have a valid assessment.

Research Subquestion #1-Sixth Grade AMSTI Science Teachers What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?
Significant Statements
TAYLOR: I use the assessments that come with the AMSTI kit. There is always a paper/pencil assessment and an observation test. We are getting ready to do our storm assessment and I usually give the study guide before. They have a journal for everything that we do and from the very beginning of the year until the very end, they keep the journal. I do a book [using an AMSTI student book] test along the way and then we have a big assessment over the big topics because my kit I keep from August until December. It is a big box of stuff and it is set up in three sets. I have storms, earthquakes, and volcanoes that I teach. So at the end of about 8 to 12 weeks, we do an assessment and it is all over storms first. We will do the paper/pencil test first. The next day, I will bring in the hands-on and they have to write up their hypothesis and they will watch me do a demo and they have to write up their conclusion. The hands-on [assessments] are the ones that I love most! It is pretty neat that they can relate all that they saw to a brand new lab they have never seen and get it! They get why heat rises and that cool air sinks. It is pretty neat! TAYLOR: Some hands-on [assessments] They [AMSTI] give you a paper/pencil [assessment] and then they give you some alternates [assessments] that you can do. Not every assessment has two or three different ideas but I use the ones that are in there [AMSTI resources] and they are pretty good. I have come up with a few [assessments] of my own with higher order questions. But it [the assessment] can be just anything from them actually doing a new lab, to me doing a demo and them writing up what they saw happen and they relate it back to the storms. We do land breezes and sea breezes and I do a paper helix. I hold it over a big lamp and I just hold it up and the helix starts moving. They have to tell why it is moving and the direction it is moving when I turn the lamp on and when I turn it off. We have not even looked at that but they get it! And so that is the thing I love about it [inquiry learning]. Some kids have never had that before. They have no clue why all that happens and so it is pretty neat. They actually get it. TAYLOR: Paper/pencil [assessment] is always harder and I think that may be one drawback to AMSTI. I don't spend a lot of time reviewing definitions. That is the one thing that I do see different, I don't test the definitions. They can explain it. They can see it happen. That is the part I like the best is the hands-on. But you have to have paper/pencil. You have to have some way of assigning your grade and we [AMSTI science teachers at this school] use rubrics a lot with their projects. When we do bombs, they [the students] have to research a bomb and they bring in a PowerPoint presentation. (table continued)

Then, the rubrics are used to assign a grade and we do a lot of that. TAYLOR: I set up a composition notebook. We have a table of contents in the front and a glossary in the back just like a regular textbook. As we enter a lab, they enter it in the table of contents. They enter a page number and date and we go in and everything we do like questions, hypotheses, materials, procedures, conclusions, all of that is in their journal. About every two weeks, I make up a ten or fifteen question test with questions like, on such and such date that we did this, what was your conclusion or what did you learn or what new question did you have after that lab? So, it [the assessment] makes them responsible. They are accountable and I can ask questions. After the six weeks is over, I don't go back to that section because some of the kids might have been absent, and I don't want them punished for not getting it. If they are absent, it is their responsibility to get someone's journal and copy the information. If they are absent, then AMSTI is hard. If I do a lab, they [absent students] can't make it up. So usually at the end of six weeks or at the end of the trimester, I do a demo of the main lab that we would have covered so they can at least say they saw them. TAYLOR: I just flat out told the kids–we have prep for these tests. I know you enjoy the observations [assessments] more but we have to do this. I am just very forward with it and we are going to do it and we are going to do the best we can. The kids [students] typically like the inquiry-based much better and that makes sense. I would, too! I prefer to grade them [paper/pencil assessments]. It is easier to grade paper/pencil [assessments] but to see the kids actually observe and if you see them when they start getting it, that is the fun part. That's my good part. TAYLOR: Before AMSTI, I did not do a lot of inquiry-based stuff. I just didn't. I was uncomfortable with how to grade [inquiry learning] and how to be fair [with grades]. Just because the kids didn't have the best vocabulary, I wanted to make sure that they still got points for knowing the content. The first time I gave the first test and I was scared to death. I wanted to make sure that I handled it the right way. But now that I have gone through it a time or two, I just do it and go on. TAYLOR: In earthquake week, they get to choose the way they want to tell me how earthquakes occur. We do one lab where they mimic all the different ways [earthquakes occur] and then I have tectonics and they are able to do that. So I do let them choose [their assessment methods]. They can pick which way they want to tell me how an earthquake occurs. I have not just come up with a lot on my own [assessments]. The kids know about that [choosing the assessment method]. They enjoy it and they know they have options. They have choices to make even if they go for the easy ones. At least they are making a choice. TAYLOR: This week and last, we were getting ready for a chapter test and we ended one [chapter] with a test on the white board. I called out a problem and they wrote on their white board and I went around and checked. They love doing that. I let them give each other a test. They love doing stuff like that. They will perform for their peers a lot better than they will for me. So I do a lot of that and I let them test each other not necessarily for a grade that I might write down in my grade book but to give them practice. I think they do work harder when they have choices. Just like if they have a (table continued)

choice on a project. They can do either a poster or a PowerPoint. Just that choice–as long as they get to make that choice, they will work harder.
ABIGAIL: We have notebook quizzes and that may consist of just making sure that the kids are following along, taking notes, doing the components, and answering the components. That [notebook quizzes] may just consist of what was the question for Lesson 2.1, what was your answer, what was your prediction and they have to fill that out. That is one way we check it, just to make sure that they are keeping up their notebook. Another way we assess [notebooks] is just the key terms and that is usually from the teacher's book [AMSTI teachers' resource book] because the student book stays with AMSTI. They can't keep the student book. So, I take the terms from the teacher's book. They can use their notebook [on the notebook quizzes]. On the terms assessments, they do learn the terms [not open notebook].
ABIGAIL: Some matching [question format on terms tests] and then for the notebook, it would be fill-in-the-blank and discussion questions.
ABIGAIL: Essentially, each [member of the group] has a job. You make sure that they are participating with the experiment. You give them a job and you make sure that everybody is doing their job. They will tell you, so and so is not doing their job. So that is when you talk to them about that [participating].
ABIGAIL: Mainly I would pull [assessments] from the AMSTI teacher's book. I also have a science textbook that we [school system] have adopted and I pull from it because AMSTI doesn't touch everything. With them [AMSTI resources and the textbook] together, we hit everything in the Course of Study. So I pull from that [the Science Course of Study] and I also have PowerPoints that I have created for research that I have done and some other teachers throughout the county. We [AMSTI science teachers] usually meet especially when you go to the AMSTI training. They [AMSTI science teachers] share PowerPoints and other materials. So we pull together.
ABIGAIL: I may have one or two questions would have a discussion question or open-ended question on every test for them. It may not just consist of that format. All of the tests are not just like that.
ABIGAIL: With sixth graders, it is really hard. You have to be very lenient and flexible with their answers because their train of thought is not exactly where mine would be. There are different levels and I just print a rubric and go by that. You have got mastery and partial credit.
ABIGAIL: Most of the time, it depends on how much you want each question to be point wise? What do you want them to be worth? Usually, you may go with one, three, and five where one is attempted, three is partial in understanding, and then five is mastery. This is what I am going to do. That is the way it is on ARMT. I think it is just plain one-to-four; it is easier to figure up.
ABIGAIL: Note taking is one way I assess and either I will give them the notes and they are typed out and I actually give them a piece of paper or I will lecture and make sure they are taking these notes to try to prepare them for in the future because these kids cannot take notes. It is just so hard for them. But note taking and then I will give them a study guide. Usually the study guide is their preparation for the test but it mainly comes

(table continued)

from this book [AMSTI teacher resource book]. It comes from the book inside which is not from their student book. Our book [teacher resource book] is totally different from the student book. We have a lot more details. There is more depth there than in the student book. ISABELLA: Daily, they each have a piece of paper that they will fill out while they are waiting on me to come back to that group. They discuss it [the inquiry] and they all come up with an answer and most of the time you will have the same answers. There might be one or two that argue and say, no, that is not why that happened and that is okay if they are different because sometimes we are not always in agreement. It is pretty much just a participation thing and for me to see how much they are learning. I usually have about six of those [assessments] in six weeks. SARAH: Assessing inquiry tests–lots of observation. I do have check sheets and rubrics. As far as assessing the inquiries, I usually gather the main points they were supposed to learn and after we have had their own class discussion about what did we accomplish and what did we learn and why do you think that happened, I will do a little quiz on what we did. Then, you have to deal with kids who were absent. So, assessment is tough. You have to find ways to assess AMSTI. SARAH: There is one thing I have to help [with grades for inquiry] because you have to have grades and you have to have something to show on paper. I take all of the readings out of AMSTI's books, and I make a reading diary. All of us [AMSTI science teachers at this school] write along with the reading. They [the students] do that and that is for a daily grade. Then, we [AMSTI science teachers at this school] pull what is the most important stuff from that and I test them. SARAH: I wish we had enough of them [AMSTI student resource books]. I wish when they gave us our kits, they [AMSTI] gave us more copies of the student book because I only got eight books and I have got 25 kids. So I copied what I felt was most important. I share the books [and/or copies] with the other sixth grade AMSTI teachers.

Research Subquestion #2-Sixth Grade AMSTI Science Teachers What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?
Significant Statements
TAYLOR: I use the assessments that come with the AMSTI kit. There is always a paper/pencil assessment and an observation test. We are getting ready to do our storm assessment and I usually give the study guide before. They have a journal for everything that we do and from the very beginning of the year until the very end, they keep the journal. I do a book [using an AMSTI student book] test along the way and then we have a big assessment over the big topics because my kit I keep from August until December. It is a big box of stuff and it is set up in three sets. I have storms, earthquakes, and volcanoes that I teach. So at the end of about 8 to 12 weeks, we do an assessment and it is all over storms first. We will do the paper/pencil test first. The next day, I will bring in the hands-on and they have to write up their hypothesis and they will watch me do a demo and they have to write up their conclusion. The hands-on (table continued)

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ABIGAIL: With sixth graders, it is really hard. You have to be very lenient and flexible with their answers because their train of thought is not exactly where mine would be. There are different levels and I just print a rubric and go by that. You have got mastery and partial credit.

(table continued)

ABIGAIL: Most of the time, it depends on how much you want each question to be point wise? What do you want them to be worth? Usually, you may go with one, three, and five where one is attempted, three is partial in understanding, and then five is mastery. This is what I am going to do. That is the way it is on ARMT. I think it is just plain one to four; it is easier to figure up. ABIGAIL: Note taking is one way I assess and either I will give them the notes and they are typed out and I actually give them a piece of paper or I will lecture and make sure they are taking these notes to try to prepare them for in the future because these kids cannot take notes. It is just so hard for them. But note taking and then I will give them a study guide. Usually the study guide is their preparation for the test but it mainly comes from this book [AMSTI teacher resource book]. It comes from the book inside which is not from their student book. Our book [teacher resource book] is totally different from the student book. We have a lot more details. There is more depth there than in the student book. ISABELLA: Daily, they each have a piece of paper that they will fill out while they are waiting on me to come back to that group. They discuss it [the inquiry] and they all come up with an answer and most of the time you will have the same answers. There might be one or two that argue and say, no, that is not why that happened and that is okay if they are different because sometimes we are not always in agreement. It is pretty much just a participation thing and for me to see how much they are learning. I usually have about six of those [assessments] in six weeks. SARAH: Assessing inquiry tests–lots of observation. I do have check sheets and rubrics. As far as assessing the inquiries, I usually gather the main points they were supposed to learn and after we have had their own class discussion about what did we accomplish and what did we learn and why do you think that happened, I will do a little quiz on what we did. Then, you have to deal with kids who were absent. So, assessment is tough. You have to find ways to assess AMSTI. SARAH: There is one thing I have to help [with grades for inquiry] because you have to have grades and you have to have something to show on paper. I take all of the readings out of AMSTI's books, and I make a reading diary. All of us [AMSTI science teachers at this school] write along with the reading. They [the students] do that and that is for a daily grade. Then, we [AMSTI science teachers at this school] pull what is the most important stuff from that and I test them. SARAH: I wish we had enough of them [AMSTI student resource books]. I wish when they gave us our kits, they [AMSTI] gave us more copies of the student book because I only got eight books and I have got 25 kids. So I copied what I felt was most important. I share the books [and/or copies] with the other sixth grade AMSTI teachers. ISABELLA: I don't use the tests from the textbook. I don't like them. I've either made it [assessment] myself or it is AMSTI. ABIGAIL: I have Exam View [science textbook software with assessment data banks] with them [system adopted science textbook] and that is really beneficial, too. But AMSTI is just sort of you make your own on that [teacher generated assessments]. To me, sometimes I need that extra help to make sure I am covering and assessing (table continued)

everything that I need to. So, it would be better to have the assessments [provided]. We [AMSTI science teachers] talk to other teachers and we get their ideas. I give them my ideas. That helps [sharing of resources]. ABIGAIL: We also have transparencies and other tools that come with the AMSTI kits. You may have some videos and you have questions with that video to ask. You make sure that they are watching the videos. TAYLOR: Now I use Ed Helper [Internet resource] and I pull reading passages, things that might clarify a concept that might be hard. United Streaming [Internet resource]–we do those little videos and the quizzes and study guides. We do that [use Internet resources]. AMSTI, to me, does a pretty good job of including some pretty good assessments. TAYLOR: I don't have time to go back and recreate but the Ed Helper and the United Streaming does help and there are some really good videos. They [students] can see the things and then take a quiz on it right then. TAYLOR: They [AMSTI] made me a CD at my last training. I guess when I went to the teacher training, so I have got all of that [inquiry resources] on a disk and I can just pop that in. We have compiled a lot of the reading guides with the comprehension tests that come through there [the disc of resources]. We [AMSTI teachers at this school] have all made up questions and we compiled all of those and made fifteen or twenty five questions for each learning guide. So that helps to get grades because you can't do everything. I get a lot of grades from that [the reading guides and comprehension tests]. I do a lab grade and I keep up with behavior based on them being on task and that's a grade. TAYLOR: We do a lot of diagramming in peer groups. We are always completing a KWL diagram. There is some kind of chart on my board all the time and the kids know they can look at it and tell you what they need. They can figure it out.

Research Subquestion #3-Sixth Grade AMSTI Science Teachers What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?
Significant Statements
ISABELLA: I was given these rubrics by a science teacher from Atlanta [Georgia]. When I went to a workshop, she gave me most of them [rubrics for inquiry] which was nice. A lot of them [rubrics] I have come up with just on my own. Some of them are AMSTI rubrics but most of them I got from her and they are pretty generic. You could use them with reading or language, social studies, or math. You could use them anywhere. You might have to change a few things but they are pretty basic. One of them [the rubrics] includes what is your purpose today, what are your main points of interest, what is your main idea. You could use that in math, you could use that in social studies, and you could even use it in English. Another [rubric] is what was your outcome, what did you learn, what did you hope to find out, what were some things that you were confused on. So, they [teachers] can use that anywhere. One rubric is what questions did you have, what are some questions that didn't get answered, and then it (table continued)

will have a little box with do you need to see the teacher and students check the box if they need to see the teacher. They like doing those because they are easy. They are easy, they are quick, they have gotten into a routine, they can feel them out really fast, and I can look at them quickly. Other rubrics, I score with a one, two, three, or four and it has just got a little key that tells you how well you worked with others because so many of these kids don't work will together. You've got three that do all the work and one that sits back and watches. So, it is amazing when they start scoring themselves and the people in their group they actually see sometimes well, I just didn't do my part. It holds them accountable and they actually see that for themselves. It didn't take somebody else telling them hey, I didn't do what I was supposed to do. They can see it on their own. So, they're [the rubrics] good.
SARAH: Just information from the lessons [resource for assessments].
SARAH: Sometimes, we [elementary teachers] have to compact two lessons one day due to library or something else. So it is not just a science class.
SARAH: We got a disk last year with the tests in fifth grade science on it last year and our scores [SAT-10 and ASA]. The scores were shown to us and so we kind of tried to use some of the materials that were from AMSTI to also correlate with some of those questions and tried to introduce the questions at the same time because a lot of the questions that are off that disk come straight from reading it. So, we [sixth grade teachers] have to try each year to pull that material. I mean, fifth grade is so tested [sixth grade teachers are trying to help fifth grade teachers because of their standardized test load]. A lot of the fifth grade standardized test questions are based on sixth grade content. Then last year with the science [ASA] too, we were the guinea pigs but it ended up they were good! I mean, they [ASA scores] were higher than a lot of those. Of course, we didn't get our disks [with ASA item specifications] until probably about a month before our test. You know how it is reviewing–you had to cram. So, we didn't know what to expect.
SARAH: For the SAT tests, we do some computerized science. We found some web site that had some [practice assessments].
SARAH: The only way you can do it [assign grades]–you can have observation grades and have like those checklists that are either on paper or in your mind. What we do with pulling the information and making objective tests out of the information is really the only fair way to do it.
ABIGAIL: Mainly, I would pull from the AMSTI teacher's book. I also have a science textbook that we have adopted and I pull from that because AMSTI doesn't touch everything. With them [AMSTI teacher's book and science textbook] together, we hit everything in the Course of Study. So I pull from that [Course of Study] and I also have PowerPoints that I have created for research that I have done and some other teachers [AMSTI science teachers]. Usually, we meet, especially when you go to the AMSTI training and they [other AMSTI science teachers] say, I've got this PowerPoint or I've got this [resource]. So, [AMSTI science teachers] we pull together.
And the notebook quizzes worked really well because then they feel like that notebook is very important. If they are going to have a quiz, they are going to keep it in order. The

(table continued)

worksheets or whatever we have for that experiment, I have them fold it and they glue it inside their notebook and it is either behind or right beside their notebook components for that lesson and they can always go back and look at their worksheet. ABIGAIL: They test [referring to standardized testing for AYP] in science for fifth grade [SAT-10 and ASA]. We do social studies in fifth grade but now ARMT is for reading and math. ABIGAIL: They [Alabama Department of Education] tested our kids actually just to set the standard for when they start the Alabama Science Assessment. They tested our kids last year. So, they haven't come into state use yet [referring to the ASA replacing the SAT-10 for AYP]. The items specs [for the ASA] just tell you how many multiple choice questions, open-ended questions, and they may give you examples of them. So, you just make sure that you are hitting those. TAYLOR: I have Exam View [science textbook software assessment data bank] from my old textbook [school system adopted science textbook] and I pull questions from that. I make up my own questions from the readings in AMSTI textbooks. I pull questions from the paper/pencil assessments that are given [in AMSTI teacher resource book] and a lot of times the kids think up questions. We were talking about el Niño today, and they have to make up five questions with the answers. I usually compile those and I take the best and I put them back out there as questions [on a test]. They [the students] usually come up with harder questions than I can! They are much pickier and want the finite details where I would have put a general question. They will get really specific. ISABELLA: I don't use the tests from the textbook. I don't like them. I've either made it [assessment] myself or it is AMSTI. ABIGAIL: I have Exam View [science textbook software with assessment data banks] with them [system adopted science textbook] and that is really beneficial, too. But AMSTI is just sort of you make your own on that [teacher generated assessments]. To me, sometimes I need that extra help to make sure I am covering and assessing everything that I need to. So, it would be better to have the assessments [provided]. We [AMSTI science teachers] talk to other teachers and we get their ideas. I give them my ideas. That helps [sharing of resources]. ABIGAIL: We also have transparencies and other tools that come with the AMSTI kits. You may have some videos and you have questions with that video to ask. You make sure that they are watching the videos. TAYLOR: Now I use Ed Helper [Internet resource] and I pull reading passages, things that might clarify a concept that might be hard. United Streaming [Internet resource]–we do those little videos and the quizzes and study guides. We do that [use Internet resources]. AMSTI, to me, does a pretty good job of including some pretty good assessments. TAYLOR: I don't have time to go back and recreate but the Ed Helper and the United Streaming does help and there are some really good videos. They [students] can see the things and then take a quiz on it right then. They [AMSTI] made me a CD at my last training. I guess when I went to the teacher training, so I have got all of that [inquiry (table continued)

resources] on a disk and I can just pop that in. We have compiled a lot of the reading guides with the comprehension tests that come through there [the disc of resources]. We [AMSTI teachers at this school] have all made up questions and we compiled all of those and made fifteen or twenty five questions for each learning guide. So that helps to get grades because you can't do everything. I get a lot of grades from that [the reading guides and comprehension tests]. I do a lab grade and I keep up with behavior based on them being on task and that's a grade. TAYLOR: We do a lot of diagramming in peer groups. We are always completing a KWL diagram. There is some kind of chart on my board all the time and the kids know they can look at it and tell you what they need. They can figure it out. ISABELLA: You have to follow that continuum [school system pacing guide and objective checklist] and the Course of Study. I try to pull in the Alabama High School Graduation Exam as I plan lessons. You've got to do that before you can go further. I have the Alabama Graduation Exam booklet that I use. Now, I do pull questions from if it pertains to me from that booklet [Alabama Graduation Exam booklet]. We [science teachers in this school system] got together a couple of years ago and used that [Alabama Graduation Exam booklet] to pull some questions and they are already on my tests. ISABELLA: It [Science Course of Study objectives] is pretty much there. Now there are some objectives that are not covered in AMSTI. So, I will have to go back to the textbook or pull my own [teacher generated resources] but it [Science Course of Study] is pretty much covered. I want to say that 96% of it is covered in AMSTI. The other part that is not covered [by AMSTI]; it is my responsibility to make sure that I cover it through the textbook or through other technology and resources. ISABELLA: I wasn't even aware of that [National Science Standards]. I mean, I knew [about them] but I don't know that much about the National Science Education Standard. I wouldn't know even where to go pull those up. I guess I could find it. ISABELLA: It [NCLB] has its good points but I am going to be honest now. I wouldn't leave a child behind in the first place. I feel like I cater more to those children who are achieving at a low level. As a teacher, I don't have the time or the energy to stimulate those who need to be pushed because I am spending so much time accommodating the work for these children [low level achievers]. I feel like it is not a good thing. ISABELLA: Before No Child Left Behind, my assessments were different for those children [low level achievers] but those children were in my science class. They have always been in my science class but now they are engaged more. I will put it that way. They are engaged more but you have to be very, very careful with what you are doing with them because of the dangers of it. Their assessment, I don't want to say they are different but they are different. Before [NCLB], they would have been very simple probably an A, B, C choice. Now, they write; so they are probably harder in one sense but the format would be totally different [with inquiry learning]. Now they have to tell me, instead of an A, B, C, D choice or bubble in an answer. They have to tell me more. They are not going to always choose an A, B, C, D when they get out in the real world. They have got to explain something, so they have got to be taught. They're in here [in (table continued)

the regular classroom]. You don't want to treat them differently than everybody else but they are different from everybody else. An assessment beforehand [before NCLB] would have been choosing A, B, C. Now, it is not like that. ISABELLA: They [low level achievers] are more accountable! They are more accountable because they are doing the same thing everybody else is doing. Where as before, they weren't doing the same things everybody else was doing. They were doing something totally different than everybody else. Where now [with inquiry learning], they are right in here doing the same things. ISABELLA: The upper and middle level [achievers] wants the same assessments as they [low level achievers] have of course. And they aren't afraid to tell you. Well, why do I have to do all this, when they only have to do that? So, it is disturbing and you have to be careful what you say. You can say, well, you know they are not able to do what you are doing and they [the students] resent it. I am going to be honest. They resent it. It is not fair. These children [low level achievers] are doing the same thing we [high and middle level achievers] are doing. With them [low level achievers] being in here [regular classroom] and doing the same thing is causing us not to progress as a whole group the way that it should be. ISABELLA: We have lowered our standards and I am not one to lower a standard but we had to because they [low level achievers] are included and they cannot be discluded. I think No Child Left Behind had a tremendous negative impact. Tremendously [negative]. I love having those children [low level achievers] and I love them being in here and I love them being able to do what we do but it is costly. We are not able to do [cover the content] because they hold us back and that is a sad, sad thing. If I had a child [low level achiever] as a parent, I would not want that child holding back a child who can far exceed what they are normally doing but I am sure I am the minority on that. We were looking back at where we were just last year [in content covered] and I have more [low level achievers] this year to deal with. Last year, we were on lesson #13 and now I am on #8. So, we are not getting any coverage. I find that I spend the majority of my class time with them [low level achievers] rather than where I need to be motivating and pushing [all students]. SARAH: I have been on the continuum alignment committee. We took what AMSTI had given us for how they [Science Course of Study and AMSTI unit objectives] aligned and made a check list for teachers to use. On our continuum [school system course objectives document], we have to fill out and we put which lesson meets that objective. SARAH: I will have to look at the national standards to document it [for testing] but it [national standards] is embedded in our Course of Study. ABIGAIL: It [correlation between AMSTI units and the Science Course of Study] is really nice because someone went through and filled all that out for you. So, it is all correlated for us and you go through there and see each section that covers our continuum [school system document]. So, it is very nice. ABIGAIL: We met with curriculum mapping. We did this the past summer and so we each took a section. We also had an AMSTI map. So, we correlated SAT, ARMT, and AMSTI. We correlated all of that with our book [system adopted science textbook] and (table continued)

the Course of Study. ABIGAIL: Well, we are in a different area [socioeconomic] here. Most of our children are at about the same level [achievement level]. We have one or two that are a little bit lower but they usually pick it up because when they work in a group that helps bring up the lower ones. They work in groups and they are learning from the higher [achievers]. I usually group mine with two higher [achievers] kids and two lower [lower achievers] kids. I usually see the lower [achieving] children are learning from the higher [achieving] kids. ABIGAIL: We used to talk about special ed but I don't have any special ed. We don't have any special ed in the sixth grade this year. ABIGAIL: We worry about it [NCLB] because eventually it will catch up with us. We are not in that level just yet but it will catch up. It [NCLB] does make a difference. You start thinking about it a little bit more and you start trying new things just to see if you can get the deeper [content] have the kids think a little bit more about questions, instead of just a yes or no and because it says so. TAYLOR: They [school system] have done a good job of taking my AMSTI lessons and correlating them to the textbook. Then, they [school system] gave me a good timeline. I basically just go right with it. It just kind of lends itself, so I just start at the beginning. The only thing that AMSTI doesn't cover with me is volume and I went into the training with Filling the Gap [new AMSTI resource designed to help fill in the gaps between AMSTI units and the Course of Study] and I even have all that now. The pacing guide [school system document] to me is a pretty good document. I don't just sit and hone over it but it is good and it is correlated so you know you have covered those objectives. I use that personal lesson plan [school lesson plan document or resource] but I have to have the Course of Study on everything. We don't use it [pacing guide] as a working document necessarily anymore. I don't know that all schools are doing that but I used to have to fill that [curriculum guide or curriculum map] out and turn it in. We don't do that anymore. As long as we have our Course of Study, we don't have to fill that whole thing [curriculum guide or map] out. I just use it as a guide. TAYLOR: The Course of Study is the, be all; end all. I want to make sure that the kids can answer that question [referring to questions that address Course of Study objectives]. I want to know that they can get the big picture because you can get soaked up in the little things, the fun things, and forget the big picture. I have got my year broken down so that I know by December I have covered a certain point. Once I have covered it, I do go back and check it [Course of Study objective] off for my benefit. TAYLOR: I have honestly not looked at it [national standards] that much. I guess maybe it is because I am 1 to 6 certified [teacher certificate is for grades 1 to 6 only]. I have never had any formal science classes. For seven years I taught third grade and we barely could get science in. When I came to sixth, I was able to focus on the science but still, I did not use that [national standards] a lot. We have a copy of it [National Science Education Standards] and I know where it is at and I could go get it if I need it but I just use the pacing tool [school system document] a lot. TAYLOR: I have special ed kids. That is just my lot in life. Truthfully, it has not (table continued)

changed at all with AMSTI, because my low end [low achieving] kids get it before my high end [high achieving] kids because they see it, touch it, taste it, feel it. Those kids [low achieving] really do better in my science class than the kids [high achieving] that need the concrete black and white words. TAYLOR: Before [NCLB] we just did the paper/pencil and afterwards it was more of the big picture, it was more of how can you apply it? I see that more. I really have not been affected tremendously by it [NCLB] because I have always had those kids. Now before when I had third grade, I know one year I had the regular kids and I had three special ed kids on three different levels. When I gave them [special needs students] the social studies tests, I had the main tests that I gave and I had to give them [the special needs students] three other tests because I had one child that could only have two choices and I had one child that everything had to be pictures because she was on preprimer, and then I had one who could have three choices. So. I had to accommodate for all that but I think the AMSTI has made a huge difference because even if they don't understand the definition of some things, they get it. They can draw me a picture and they can explain it. I don't have to have the words. So, I guess that would be a change. I feel like there is more room for the kids to tell me what they have learned at their level. ISABELLA: Well, you are held so accountable. You are held accountable for everyone but it seems that you are held to a higher standard with those children [special needs students]. You are held more accountable for them [special needs students] than you are the average C student over here who could be a B student if I were allowed to spend more time with them. It is a tremendous amount of pressure but there is nothing I can do about that. It is not about the average child or the child who excels. It is not about them [special needs students]. They [the average child or the child who excels] are kind of left. ISABELLA: It [pressure] is society as a whole but it comes from your local and state levels. I mean, it [pressure] is everywhere, your administration and your central office, it is a trickle down effect. I think if more parents of regular educated children knew about the pressures and what actually went on in the classroom and how we are spending the majority of our time with those children [special needs students], it would be different. I think it would be a totally different ball game. I don't want to keep calling them those children [special needs students]. I am not trying to show differences here but there are differences. I don't think the real world out there knows how detrimental it is to our average and above average students. They [the public] have no clue. If I were not a teacher, I don't know that I would know because I am just assuming that my child is being afforded the opportunities that everybody else is and if I have a child who is gifted or who is very smart I am assuming that they are pushing him or her to all levels. I am assuming that but it is not happening. Because I do not have time. I can't do it. It is impossible. And I go home and stress over it but I can't fix it. You just go on and do the best you can. SARAH: The parents don't understand those [AYP reports], of course. SARAH: I think it makes a difference with families moving into the communities. The families that are concerned about their children and their education are going to look at (table continued)

those scores and decide, okay, we are going to build our house or buy our land or move into this community because of the scores that this school can get or we are NOT going to move into this community because of the school's scores. That is a fact of life if you are a concerned parent at all and if you are just moving into an area cold that is all you have to go by. You don't know who to talk to or whatever and that is all you have, just data.

TAYLOR: AYP is the sticker. We were on school improvement for a while. I guess it was year two because we had a huge population [special needs students] that takes all of the room for the other kids [regular ed students]. So those kids that small percentage, that you don't count, everybody else is counting. Because of that [a large special needs population], it is big. There is pressure. I don't know that I look at it every day. I try to put it behind me but I think they will get it later on. I did feel a little more pressure as far as, oh, I've got a meeting [IEP] I have to go to and I have to prove that I retaught [content]. So that is the big thing, I think. It is also good thing. We need checks and balances but we can go overboard, too. So, I think there is some pressure there to feel.

TAYLOR: I put pressure on myself, number one. That is just how I am but I do think that my [school] system [adds pressure] too. You want to impress people. You want to do what is expected and the people of the community are looking and they are anxious to see [the AYP report card published in the paper]. They [parents] want to go from the city to the county [and vice versa] for the best schools. That's big. I think just being in the community, you go to church with those people, you teach in that community, your kids play ball in that community, and you feel a little more pressure to produce better than maybe what you would if you didn't live in that area. I am assuming it would come even higher up than the school system. As far as for me, I do not feel like I have a board in my face and I've got to do this and I've got to do that. I think it is conscientious for teachers. They do feel pressure. I think they put pressure on themselves. I think that is a lot of it. I feel like I do more of that than anybody else puts on me. You can blame the school system. You can blame everybody else but when it comes down to it and you are expected to do it, you feel like you should meet that goal. Apparently, I do. I think most teachers are conscientious.

ABIGAIL: From the state [pressure to show progress academically]. I think it is like image because we have standards here and they are higher.

ABIGAIL: I try to pressure the kids to a certain point. I have high expectations of them. But when their parents don't have those high expectations; it is really hard to get that from them.

ABIGAIL: It is a big part. This is a small community, and everyone knows the history or what this school has done in the past. It is just reality that gradually you are not seeing the over achievers that you used to. I don't know why. But it is a lot of pressure because as younger teachers, we always are worried about it because if the grades [scores on achievement tests] go down or if we don't meet AYP they are going to look at these younger teachers. They are not doing what they are supposed to. So it is very hard and stressful. There is more that they put on us every day.

(table continued)

Research Subquestion #4-Sixth Grade AMSTI Science Teachers What do AMSTI science teachers find most helpful when determining assessment methods?
Significant Statements
TAYLOR: I use the assessments that come with the AMSTI kit. There is always a

(table continued)

paper/pencil assessment and an observation test. We are getting ready to do our storm assessment and I usually give the study guide before. They have a journal for everything that we do and from the very beginning of the year until the very end, they keep the journal. I do a book [using an AMSTI student book] test along the way and then we have a big assessment over the big topics because my kit I keep from August until December. It is a big box of stuff and it is set up in three sets. I have storms, earthquakes, and volcanoes that I teach. So at the end of about 8 to 12 weeks, we do an assessment and it is all over storms first. We will do the paper/pencil test first. The next day, I will bring in the hands-on and they have to write up their hypothesis and they will watch me do a demo and they have to write up their conclusion. The hands-on [assessments] are the ones that I love most! It is pretty neat that they can relate all that they saw to a brand new lab they have never seen and get it! They get why heat rises and that cool air sinks. It is pretty neat!
TAYLOR: Some hands-on [assessments] They [AMSTI] give you a paper/pencil [assessment] and then they give you some alternates [assessments] that you can do. Not every assessment has two or three different ideas but I use the ones that are in there [AMSTI resources] and they are pretty good. I have come up with a few [assessments] of my own with higher order questions. But it [the assessment] can be just anything from them actually doing a new lab, to me doing a demo and them writing up what they saw happen and they relate it back to the storms. We do land breezes and sea breezes and I do a paper helix. I hold it over a big lamp and I just hold it up and the helix starts moving. They have to tell why it is moving and the direction it is moving when I turn the lamp on and when I turn it off. We have not even looked at that but they get it! And so that is the thing I love about it [inquiry learning]. Some kids have never had that before. They have no clue why all that happens and so it is pretty neat. They actually get it.
TAYLOR: Paper/pencil [assessment] is always harder and I think that may be one drawback to AMSTI. I don't spend a lot of time reviewing definitions. That is the one thing that I do see different, I don't test the definitions. They can explain it. They can see it happen. That is the part I like the best is the hands-on. But you have to have paper/pencil. You have to have some way of assigning your grade and we [AMSTI science teachers at this school] use rubrics a lot with their projects. When we do bombs, they [the students] have to research a bomb and they bring in a PowerPoint presentation. Then, the rubrics are used to assign a grade and we do a lot of that.
TAYLOR: I set up a composition notebook. We have a table of contents in the front and a glossary in the back just like a regular textbook. As we enter a lab, they enter it in the table of contents. They enter a page number and date and we go in and everything we do

(table continued)

like questions, hypotheses, materials, procedures, conclusions, all of that is in their journal. About every two weeks, I make up a ten or fifteen question test with questions like, on such and such date that we did this, what was your conclusion or what did you learn or what new question did you have after that lab? So, it [the assessment] makes them responsible. They are accountable and I can ask questions. After the six weeks is over, I don't go back to that section because some of the kids might have been absent, and I don't want them punished for not getting it. If they are absent, it is their responsibility to get someone's journal and copy the information. If they are absent, then AMSTI is hard. If I do a lab, they [absent students] can't make it up. So usually at the end of six weeks or at the end of the trimester, I do a demo of the main lab that we would have covered so they can at least say they saw them. TAYLOR: I just flat out told the kids–we have prep for these tests. I know you enjoy the observations [assessments] more but we have to do this. I am just very forward with it and we are going to do it and we are going to do the best we can. The kids [students] typically like the inquiry-based much better and that makes sense. I would, too! I prefer to grade them [paper/pencil assessments]. It is easier to grade paper/pencil [assessments] but to see the kids actually observe and if you see them when they start getting it, that is the fun part. That's my good part. TAYLOR: Before AMSTI, I did not do a lot of inquiry-based stuff. I just didn't. I was uncomfortable with how to grade [inquiry learning] and how to be fair [with grades]. Just because the kids didn't have the best vocabulary, I wanted to make sure that they still got points for knowing the content. The first time I gave the first test and I was scared to death. I wanted to make sure that I handled it the right way. But now that I have gone through it a time or two, I just do it and go on. TAYLOR: In earthquake week, they get to choose the way they want to tell me how earthquakes occur. We do one lab where they mimic all the different ways [earthquakes occur] and then I have tectonics and they are able to do that. So I do let them choose [their assessment methods]. They can pick which way they want to tell me how an earthquake occurs. I have not just come up with a lot on my own [assessments]. The kids know about that [choosing the assessment method]. They enjoy it and they know they have options. They have choices to make even if they go for the easy ones. At least they are making a choice. TAYLOR: This week and last, we were getting ready for a chapter test and we ended one [chapter] with a test on the white board. I called out a problem and they wrote on their white board and I went around and checked. They love doing that. I let them give each other a test. They love doing stuff like that. They will perform for their peers a lot better than they will for me. So I do a lot of that and I let them test each other not necessarily for a grade that I might write down in my grade book but to give them practice. I think they do work harder when they have choices. Just like if they have a choice on a project. They can do either a poster or a PowerPoint. Just that choice–as long as they get to make that choice, they will work harder. ABIGAIL: We have notebook quizzes and that may consist of just making sure that the kids are following along, taking notes, doing the components, and answering the (table continued)

components. That [notebook quizzes] may just consist of what was the question for Lesson 2.1, what was your answer, what was your prediction and they have to fill that out. That is one way we check it, just to make sure that they are keeping up their notebook. Another way we assess [notebooks] is just the key terms and that is usually from the teacher's book [AMSTI teachers' resource book] because the student book stays with AMSTI. They can't keep the student book. So, I take the terms from the teacher's book. They can use their notebook [on the notebook quizzes]. On the terms assessments, they do learn the terms [not open notebook]. Some matching [question format on terms tests] and then for the notebook, it would be fill-in-the-blank and discussion questions. ABIGAIL: Essentially, each [member of the group] has a job. You make sure that they are participating with the experiment. You give them a job and you make sure that everybody is doing their job. They will tell you, so and so is not doing their job. So that is when you talk to them about that [participating]. ABIGAIL: Mainly I would pull [assessments] from the AMSTI teacher's book. I also have a science textbook that we [school system] have adopted and I pull from it because AMSTI doesn't touch everything. With them [AMSTI resources and the textbook] together, we hit everything in the Course of Study. So I pull from that [the Science Course of Study] and I also have PowerPoints that I have created for research that I have done and some other teachers throughout the county. We [AMSTI science teachers] usually meet especially when you go to the AMSTI training. They [AMSTI science teachers] share PowerPoints and other materials. So we pull together. ABIGAIL: I may have one or two questions would have a discussion question or open-ended question on every test for them. It may not just consist of that format. All of the tests are not just like that. ABIGAIL: With sixth graders, it is really hard. You have to be very lenient and flexible with their answers because their train of thought is not exactly where mine would be. There are different levels and I just print a rubric and go by that. You have got mastery and partial credit. ABIGAIL: Most of the time, it depends on how much you want each question to be point wise? What do you want them to be worth? Usually, you may go with one, three, and five where one is attempted, three is partial in understanding, and then five is mastery. This is what I am going to do. That is the way it is on ARMT. I think it is just plain one to four; it is easier to figure up. ABIGAIL: Note taking is one way I assess and either I will give them the notes and they are typed out and I actually give them a piece of paper or I will lecture and make sure they are taking these notes to try to prepare them for in the future because these kids cannot take notes. It is just so hard for them. But note taking and then I will give them a study guide. Usually the study guide is their preparation for the test but it mainly comes from this book [AMSTI teacher resource book]. It comes from the book inside which is not from their student book. Our book [teacher resource book] is totally different from the student book. We have a lot more details. There is more depth there than in the student book. (table continued)

ISABELLA: Daily, they each have a piece of paper that they will fill out while they are waiting on me to come back to that group. They discuss it [the inquiry] and they all come up with an answer and most of the time you will have the same answers. There might be one or two that argue and say, no, that is not why that happened and that is okay if they are different because sometimes we are not always in agreement. It is pretty much just a participation thing and for me to see how much they are learning. I usually have about six of those [assessments] in six weeks. SARAH: Assessing inquiry tests–lots of observation. I do have check sheets and rubrics. As far as assessing the inquiries, I usually gather the main points they were supposed to learn and after we have had their own class discussion about what did we accomplish and what did we learn and why do you think that happened, I will do a little quiz on what we did. Then, you have to deal with kids who were absent. So, assessment is tough. You have to find ways to assess AMSTI. SARAH: There is one thing I have to help [with grades for inquiry] because you have to have grades and you have to have something to show on paper. I take all of the readings out of the AMSTI books, and I make a reading diary. All of us [AMSTI science teachers at this school] write along with the reading. They [the students] do that and that is for a daily grade. Then, we [AMSTI science teachers at this school] pull what is the most important stuff from that and I test them. SARAH: I wish we had enough of them [AMSTI student resource books]. I wish when they gave us our kits, they [AMSTI] gave us more copies of the student book because I only got eight books and I have got 25 kids. So I copied what I felt was most important. I share the books [and/or copies] with the other sixth grade AMSTI teachers. ISABELLA: I was given these rubrics by a science teacher from Atlanta [Georgia]. When I went to a workshop, she gave me most of them [rubrics for inquiry] which was nice. A lot of them [rubrics] I have come up with just on my own. Some of them are AMSTI rubrics but most of them I got from her and they are pretty generic. You could use them with reading or language, social studies, or math. You could use them anywhere. You might have to change a few things but they are pretty basic. One of them [the rubrics] includes what is your purpose today, what are your main points of interest, what is your main idea. You could use that in math, you could use that in social studies, and you could even use it in English. Another [rubric] is what your outcome was what you learned, what did you hope to find out, what were some things that you were confused on. So, they [teachers] can use that anywhere. One rubric is what questions did you have, what are some questions that didn't get answered, and then it will have a little box with do you need to see the teacher and students check the box if they need to see the teacher. They like doing those because they are easy. They are easy, they are quick, they have gotten into a routine, they can feel them out really fast, and I can look at them quickly. Other rubrics, I score with a one, two, three, or four and it has just got a little key that tells you how well you worked with others because so many of these kids don't work will together. You've got three that do all the work and one that sits back and watches. So, it is amazing when they start scoring themselves and the people in their group they actually see sometimes well, I just didn't do my part. It (table continued)

holds them accountable and they actually see that for themselves. It didn't take somebody else telling them hey, I didn't do what I was supposed to do. They can see it on their own. So, they're [the rubrics] good.
SARAH: Sometimes, we [elementary teachers] have to compact two lessons one day due to library or something else. So it is not just a science class.
SARAH: We got a disk last year with the tests in fifth grade science on it last year and our scores [SAT-10 and ASA]. The scores were shown to us and so we kind of tried to use some of the materials that were from AMSTI to also correlate with some of those questions and tried to introduce the questions at the same time because a lot of the questions that are off that disk come straight from reading it. So, we [sixth grade teachers] have to try each year to pull that material. I mean, fifth grade is so tested [sixth grade teachers are trying to help fifth grade teachers because of their standardized test load]. A lot of the fifth grade standardized test questions are based on sixth grade content. Then last year with the science [ASA] too, we were the guinea pigs but it ended up they were good! I mean, they [ASA scores] were higher than a lot of those. Of course, we didn't get our disks [with ASA item specifications] until probably about a month before our test. You know how it is reviewing–you had to cram. So, we didn't know what to expect.
SARAH: For the SAT tests, we do some computerized science. We found some web site that had some [practice assessments].
SARAH: The only way you can do it [assign grades]–you can have observation grades and have like those checklists that are either on paper or in your mind. What we do with pulling the information and making objective tests out of the information is really the only fair way to do it.
ABIGAIL: Mainly, I would pull from the AMSTI teacher's book. I also have a science textbook that we have adopted and I pull from that because AMSTI doesn't touch everything. With them [AMSTI teacher's book and science textbook] together, we hit everything in the Course of Study. So I pull from that [Course of Study] and I also have PowerPoints that I have created for research that I have done and some other teachers [AMSTI science teachers]. Usually, we meet, especially when you go to the AMSTI training and they [other AMSTI science teachers] say, I've got this PowerPoint or I've got this [resource]. So, [AMSTI science teachers] we pull together.
And the notebook quizzes worked really well because then they feel like that notebook is very important. If they are going to have a quiz, they are going to keep it in order. The worksheets or whatever we have for that experiment, I have them fold it and they glue it inside their notebook and it is either behind or right beside their notebook components for that lesson and they can always go back and look at their worksheet.
ABIGAIL: They test [referring to standardized testing for AYP] in science for fifth grade [SAT-10 and ASA]. We do social studies in fifth grade but now ARMT is for reading and math.
ABIGAIL: They [Alabama Department of Education] tested our kids actually just to set the standard for when they start the Alabama Science Assessment. They tested our kids last year. So, they haven't come into state use yet [referring to the ASA replacing the

(table continued)

SAT-10 for AYP]. ABIGAIL: The items specs [for the ASA] just tell you how many multiple choice questions, open-ended questions, and they may give you examples of them. So, you just make sure that you are hitting those. TAYLOR: I have Exam View [science textbook software assessment data bank] from my old textbook [school system adopted science textbook] and I pull questions from that. I make up my own questions from the readings in AMSTI textbooks. I pull questions from the paper/pencil assessments that are given [in AMSTI teacher resource book] and a lot of times the kids think up questions. We were talking about el Niño today, and they have to make up five questions with the answers. I usually compile those and I take the best and I put them back out there as questions [on a test]. They [the students] usually come up with harder questions than I can! They are much pickier and want the finite details where I would have put a general question. They will get really specific. ISABELLA: I don’t use the tests from the textbook. I don’t like them. I’ve either made it [assessment] myself or it is AMSTI. ABIGAIL: I have Exam View [science textbook software with assessment data banks] with them [system adopted science textbook] and that is really beneficial, too. But AMSTI is just sort of you make your own on that [teacher generated assessments]. To me, sometimes I need that extra help to make sure I am covering and assessing everything that I need to. So, it would be better to have the assessments [provided]. We [AMSTI science teachers] talk to other teachers and we get their ideas. I give them my ideas. That helps [sharing of resources]. ABIGAIL: We also have transparencies and other tools that come with the AMSTI kits. You may have some videos and you have questions with that video to ask. You make sure that they are watching the videos. TAYLOR: Now I use Ed Helper [Internet resource] and I pull reading passages, things that might clarify a concept that might be hard. United Streaming [Internet resource]–we do those little videos and the quizzes and study guides. We do that [use Internet resources]. AMSTI, to me, does a pretty good job of including some pretty good assessments. I don’t have time to go back and recreate but the Ed Helper and the United Streaming does help and there are some really good videos. They [students] can see the things and then take a quiz on it right then. TAYLOR: They [AMSTI] made me a CD at my last training. I guess when I went to the teacher training, so I have got all of that [inquiry resources] on a disk and I can just pop that in. We have compiled a lot of the reading guides with the comprehension tests that come through there [the disc of resources]. We [AMSTI teachers at this school] have all made up questions and we compiled all of those and made fifteen or twenty-five questions for each learning guide. So that helps to get grades because you can’t do everything. I get a lot of grades from that [the reading guides and comprehension tests]. I do a lab grade and I keep up with behavior based on them being on task and that’s a grade. TAYLOR: We do a lot of diagramming in peer groups. We are always completing a (table continued)

KWL diagram. There is some kind of chart on my board all the time and the kids know they can look at it and tell you what they need. They can figure it out. ISABELLA: You have to follow that continuum [school system pacing guide and objective checklist] and the Course of Study. I try to pull in the Alabama High School Graduation Exam as I plan lessons. You've got to do that before you can go further. I have the Alabama Graduation Exam booklet that I use. Now, I do pull questions from if it pertains to me from that booklet [Alabama Graduation Exam booklet]. We [science teachers in this school system] got together a couple of years ago and used that [Alabama Graduation Exam booklet] to pull some questions and they are already on my tests. ISABELLA: It [Science Course of Study objectives] is pretty much there. Now there are some objectives that are not covered in AMSTI. So, I will have to go back to the textbook or pull my own [teacher generated resources] but it [Science Course of Study] is pretty much covered. I want to say that 96% of it is covered in AMSTI. The other part that is not covered [by AMSTI]; it is my responsibility to make sure that I cover it through the textbook or through other technology and resources. ISABELLA: I wasn't even aware of that [National Science Standards]. I mean, I knew [about them] but I don't know that much about the National Science Education Standard. I wouldn't know even where to go pull those up. I guess I could find it. ISABELLA: It [NCLB] has its good points but I am going to be honest now. I wouldn't leave a child behind in the first place. I feel like I cater more to those children who are achieving at a low level. As a teacher, I don't have the time or the energy to stimulate those who need to be pushed because I am spending so much time accommodating the work for these children [low level achievers]. I feel like it is not a good thing. ISABELLA: Before No Child Left Behind, my assessments were different for those children [low level achievers] but those children were in my science class. They have always been in my science class but now they are engaged more. I will put it that way. They are engaged more but you have to be very, very careful with what you are doing with them because of the dangers of it. Their assessment, I don't want to say they are different but they are different. Before [NCLB], they would have been very simple probably an A, B, C choice. Now, they write; so they are probably harder in one sense but the format would be totally different [with inquiry learning]. Now they have to tell me, instead of an A, B, C, D choice or bubble in an answer. They have to tell me more. They are not going to always choose an A, B, C, D when they get out in the real world. They have got to explain something, so they have got to be taught. They're in here [in the regular classroom]. You don't want to treat them differently than everybody else but they are different from everybody else. An assessment beforehand [before NCLB] would have been choosing A, B, C. Now, it is not like that. ISABELLA: They [low level achievers] are more accountable! They are more accountable because they are doing the same thing everybody else is doing. Where as before, they weren't doing the same things everybody else was doing. They were doing something totally different than everybody else. Where now [with inquiry learning], they are right in here doing the same things. (table continued)

ISABELLA: The upper and middle level [achievers] wants the same assessments as they [low level achievers] have of course. And they aren't afraid to tell you. Well, why do I have to do all this, when they only have to do that? So, it is disturbing and you have to be careful what you say. You can say they are not able to do what you are doing and they [the students] resent it. I am going to be honest. They resent it. It is not fair. These children [low level achievers] are doing the same thing we [high and middle level achievers] are doing. With them [low level achievers] being in here [regular classroom] and doing the same thing is causing us not to progress as a whole group the way that it should be. ISABELLA: We have lowered our standards and I am not one to lower a standard but we had to because they [low level achievers] are included and they cannot be discluded. I think No Child Left Behind had a tremendous negative impact. Tremendously [negative]. I love having those children [low level achievers] and I love them being in here and I love them being able to do what we do but it is costly. We are not able to do [cover the content] because they hold us back and that is a sad, sad thing. If I had a child [low level achiever] as a parent, I would not want that child holding back a child who can far exceed what they are normally doing but I am sure I am the minority on that. We were looking back at where we were just last year [in content covered] and I have more [low level achievers] this year to deal with. Last year, we were on lesson #13 and now I am on #8. So, we are not getting any coverage. I find that I spend the majority of my class time with them [low level achievers] rather than where I need to be motivating and pushing [all students]. SARAH: I have been on the continuum alignment committee. We took what AMSTI had given us for how they [Science Course of Study and AMSTI unit objectives] aligned and made a check list for teachers to use. On our continuum [school system course objectives document], we have to fill out and we put which lesson meets that objective. SARAH: I will have to look at the national standards to document it [for testing] but it [national standards] is embedded in our Course of Study. ABIGAIL: It [correlation between AMSTI units and the Science Course of Study] is really nice because someone went through and filled all that out for you. So, it is all correlated for us and you go through there and see each section that covers our continuum [school system document]. So, it is very nice. ABIGAIL: We met with curriculum mapping. We did this the past summer and so we each took a section. We also had an AMSTI map. So, we correlated SAT, ARMT, and AMSTI. We correlated all of that with our book [system adopted science textbook] and the Course of Study. ABIGAIL: Well, we are in a different area [socioeconomic] here. Most of our children are at about the same level [achievement level]. We have one or two that are a little bit lower but they usually pick it up because when they work in a group that helps bring up the lower ones. They work in groups and they are learning from the higher [achievers]. I usually group mine with two higher [achievers] kids and two lower [lower achievers] kids. I usually see the lower [achieving] children are learning from the higher [achieving] kids. (table continued)

ABIGAIL: We used to talk about special ed but I don’t have any special ed. We don’t have any special ed in the sixth grade this year. ABIGAIL: We worry about it [NCLB] because eventually it will catch up with us. We are not in that level just yet but it will catch up. It [NCLB] does make a difference. You start thinking about it a little bit more and you start trying new things just to see if you can get the deeper [content] have the kids think a little bit more about questions, instead of just a yes or no and because it says so. TAYLOR: They [school system] have done a good job of taking my AMSTI lessons and correlating them to the textbook. Then, they [school system] gave me a good timeline. I basically just go right with it. It just kind of lends itself, so I just start at the beginning. The only thing that AMSTI doesn’t cover with me is volume and I went into the training with Filling the Gap [new AMSTI resource designed to help fill in the gaps between AMSTI units and the Course of Study] and I even have all that now. The pacing guide [school system document] to me is a pretty good document. I don’t just sit and hone over it but it is good and it is correlated so you know you have covered those objectives. I use that personal lesson plan [school lesson plan document or resource] but I have to have the Course of Study on everything. We don’t use it [pacing guide] as a working document necessarily anymore. I don’t know that all schools are doing that but I used to have to fill that [curriculum guide or curriculum map] out and turn it in. We don’t do that anymore. As long as we have our Course of Study, we don’t have to fill that whole thing [curriculum guide or map] out. I just use it as a guide. TAYLOR: The Course of Study is the, be all; end all. I want to make sure that the kids can answer that question [referring to questions that address Course of Study objectives]. I want to know that they can get the big picture because you can get soaked up in the little things, the fun things, and forget the big picture. I have got my year broken down so that I know by December I have covered a certain point. Once I have covered it, I do go back and check it [Course of Study objective] off for my benefit. TAYLOR: I have honestly not looked at it [national standards] that much. I guess maybe it is because I am 1 to 6 certified [teacher certificate is for grades 1 to 6 only]. I have never had any formal science classes. For seven years I taught third grade and we barely could get science in. When I came to sixth, I was able to focus on the science but still, I did not use that [national standards] a lot. We have a copy of it [National Science Education Standards] and I know where it is at and I could go get it if I need it but I just use the pacing tool [school system document] a lot. TAYLOR: I have special ed kids. That is just my lot in life. Truthfully, it has not changed at all with AMSTI, because my low end [low achieving] kids get it before my high end [high achieving] kids because they see it, touch it, taste it, feel it. Those kids [low achieving] really do better in my science class than the kids [high achieving] that need the concrete black and white words. TAYLOR: Before [NCLB] we just did the paper/pencil and afterwards it was more of the big picture, it was more of how can you apply it? I see that more. I really have not been affected tremendously by it [NCLB] because I have always had those kids. Now before when I had third grade, I know one year I had the regular kids and I had three

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special ed kids on three different levels. When I gave them [special needs students] the social studies tests, I had the main tests that I gave and I had to give them [the special needs students] three other tests because I had one child that could only have two choices and I had one child that everything had to be pictures because she was on preprimer, and then I had one who could have three choices. So. I had to accommodate for all that but I think the AMSTI has made a huge difference because even if they don't understand the definition of some things, they get it. They can draw me a picture and they can explain it. I don't have to have the words. So, I guess that would be a change. I feel like there is more room for the kids to tell me what they have learned at their level. ISABELLA: Well, you are held so accountable. You are held accountable for everyone but it seems that you are held to a higher standard with those children [special needs students]. You are held more accountable for them [special needs students] than you are the average C student over here who could be a B student if I were allowed to spend more time with them. It is a tremendous amount of pressure but there is nothing I can do about that. It is not about the average child or the child who excels. It is not about them [special needs students]. They [the average child or the child who excels] are kind of left. ISABELLA: It [pressure] is society as a whole but it comes from your local and state levels. I mean, it [pressure] is everywhere, your administration and your central office, it is a trickle down effect. I think if more parents of regular educated children knew about the pressures and what actually went on in the classroom and how we are spending the majority of our time with those children [special needs students], it would be different. I think it would be a totally different ball game. I don't want to keep calling them those children [special needs students]. I am not trying to show differences here but there are differences. I don't think the real world out there knows how detrimental it is to our average and above average students. They [the public] have no clue. If I were not a teacher, I don't know that I would know because I am just assuming that my child is being afforded the opportunities that everybody else is and if I have a child who is gifted or who is very smart I am assuming that they are pushing him or her to all levels. I am assuming that but it is not happening. Because I do not have time. I can't do it. It is impossible. And I go home and stress over it but I can't fix it. You just go on and do the best you can. SARAH: The parents don't understand those [AYP reports], of course. SARAH: I think it makes a difference with families moving into the communities. The families that are concerned about their children and their education are going to look at those scores and decide, okay, we are going to build our house or buy our land or move into this community because of the scores that this school can get or we are NOT going to move into this community because of the school's scores. That is a fact of life if you are a concerned parent at all and if you are just moving into an area cold that is all you have to go by. You don't know who to talk to or whatever and that is all you have, just data. TAYLOR: AYP is the sticker. We were on school improvement for a while. I guess it was year two because we had a huge population [special needs students] that takes all of

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the room for the other kids [regular ed students]. So those kids that small percentage, that you don't count, everybody else is counting. Because of that [a large special needs population], it is big. There is pressure. I don't know that I look at it every day. I try to put it behind me and think they will get it later on. I did feel a little more pressure as far as, oh, I've got a meeting [IEP] I have to go to and I have to prove that I retaught [content]. So that is the big thing, I think. It is also good thing. We need checks and balances but we can go overboard, too. So, I think there is some pressure there to feel.
TAYLOR: I put pressure on myself, number one. That is just how I am but I do think that my [school] system [adds pressure] too. You want to impress people. You want to do what is expected and the people of the community are looking and they are anxious to see [the AYP report card published in the paper]. They [parents] want to go from the city to the county [and vice versa] for the best schools. That's big. I think just being in the community, you go to church with those people, you teach in that community, your kids play ball in that community, and you feel a little more pressure to produce better than maybe what you would if you didn't live in that area. I am assuming it would come even higher up than the school system. As far as for me, I do not feel like I have a board in my face and I've got to do this and I've got to do that. I think it is conscientious for teachers. They do feel pressure. I think they put pressure on themselves. I think that is a lot of it. I feel like I do more of that than anybody else puts on me. You can blame the school system. You can blame everybody else but when it comes down to it and you are expected to do it, you feel like you should meet that goal. Apparently, I do. I think most teachers are conscientious.
ABIGAIL: From the state [pressure to show progress academically]. I think it is like image because we have standards here and they are higher.
ABIGAIL: I try to pressure the kids to a certain point. I have high expectations of them. But when their parents don't have those high expectations; it is really hard to get that from them.
ABIGAIL: It is a big part. This is a small community, and everyone knows the history or what this school has done in the past. It is just reality that gradually you are not seeing the over achievers that you used to. I don't know why. But it is a lot of pressure because as younger teachers, we always are worried about it because if the grades [scores on achievement tests] go down or if we don't meet AYP they are going to look at these younger teachers. They are not doing what they are supposed to. So it is very hard and stressful. There is more that they put on us every day.
ISABELLA: Any type of professional development would be fantastic. I don't have all the answers. I need somebody to come in and tell me. The thing about it is, the people who have told us so far are not in the classroom, not classroom teachers. We are not getting answers from them. We need somebody who is there, who has done it, and who has done it on a daily basis. Because I go home in the afternoons and I think after I have graded those papers or after I have looked at data that we have worked on for six weeks, I really haven't done anything. What have I done? I haven't helped them at all. You are trying to make them think but they don't know how to think anymore. They don't know how to solve a problem. They just want the answer. It has got to be right there on

(table continued)

page 10 in the second paragraph and that is the answer and they think that we should be done. They are going to be in the real world and they are going to have to solve problems but they don't know how.
SARAH: As a [AMSTI] trainer, I always make a CD for each of my students [AMSTI science teachers] with all of my reading assignments.
TAYLOR: I think if we get teachers together and let us all come up let the sixth grade teachers across the region get together and ask questions like, how do you assess this, what do you do, and why don't we do it [make resources] together? Then, we could come up with an activity [assessment resource]. I know people from my school because I am a part of its community and I know some teachers from other schools because we have been to a couple of meetings together and that is about it. That is sad. We are a large region and I think they need to put us together more often. There is safety and security in numbers. That would be a big thing for me. Let us get together once a year.
TAYLOR: I know with the reading issue [ways to bring the reading initiative and AMSTI together]. Everything we have had training on, we have seen third grade, second grade, and first grade classrooms on but no sixth grade. I want to see a sixth grade classroom in AMSTI for reading. I want to see how teachers are making it work in their classroom. I would love to go to a school that has been teaching AMSTI for six-to-eight years and get to watch a teacher who has done this and see how she does it. I would really love to see how other classrooms are managed and how they assess, what do they do, do they just use paper/pencil, and do they do inquiry-based? I would love to see that. I am a visual person. I would love to see how their classroom is. How they do it with a video or let us go and see a classroom that is the top AMSTI class or the top reading classroom. I would love to see hands-on/real world not the fake stuff that you have at classes in college. I want to see real things happen.
ABIGAIL: I think meeting with other teachers across the region has helped me. Maybe it is PowerPoints or just a few other things to do with your class to get them to that next level of critical thinking because some of them, we can't get them there. The help I get from other teachers that is very helpful. I think finding more professional development opportunities that discuss strategies you can work on in your classroom to get to that next level or to get the kids to that level of critical thinking.
ABIGAIL: Just going to the training because when we go to that training, we go through the whole book. We keep our own notebook just like we were the student. So, we keep our notebook and it is all color coded. They give us color codes and you have all of the components in your notebook and every lesson you write in your prediction and we do the lesson and the experiment and we get the results and conclusions. So it is hands on and you are visually seeing it. You are writing it down and that is really beneficial to me. The main assessment is the notebook. It can be as a grading tool, it can be just organizing or keeping them organized because at this age, they are unorganized. Just to keep up with the students' responses to the experiments. But, they don't really give you how you need to grade. They don't say, do it this way. They [AMSTI trainers] give you the option. They tell you this is the notebook for you to take and assess it the way you feel the need.

(table continued)

Research Subquestion #1-Seventh Grade AMSTI Science Teachers What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?
Significant Statements
RILEY: We will start with a demo period–a demonstration. It [the demonstration] can be as small as a match which leads us to talk about kinetic energy. We strike the match, let it burn down, and talk about how the energy was lost. From there, I do PowerPoints, very interactive PowerPoints. We discuss things and I ask questions. We have a review time. Sometimes I use notes so I can judge whether they understand the content. Today, we took our AMSTI lesson we are on and we conducted an inquiry. RILEY: We [in this class] have a composition notebook. At the top [of the first page] is the title of the lab for the day. I give them a question or for the next 2-to-3 weeks, I will let them formulate the question. I guide their progress and they have to form a hypothesis and they have to use it. Then, they have their plan section and all their materials where they write down all we did in explicit details. With the observations, they will tell me what happened. In their conclusion, they have to give me three important facts, two interesting details, and one question. EMILY: There was a new test this year [2007-2008 school year], the ASA (Alabama Science Assessment). I believe there are eleven standards that they have to meet [on the ASA]. We would do a bell ringer based on those eleven standards. I really tried to drill that [the ASA standards] all year long. We did multiples with the eleven standards. After that [the bell ringer], the kids come in and they hand out the notebooks [science notebooks] and AMSTI [student resource] books. The kids will come in and tend to anything that needs to be tended such as watering the plants or aerating the worms, anything that needs to be done. We would focus on whatever inquiry we were doing. The kids would write out the question, write out the hypothesis, write how we were going to test [the hypothesis], or what our plan or procedure was going to be. Most inquiries would take 2 to 3 days. Typically, we did not finish an inquiry a day. The next day, we would go over the follow-up questions, the conclusion, and any kind of data table that needed to be finished up, and then have a discussion. Very open [environment] where the kids are engaged and active. I just liked to be right in the middle of them! EMILY: I will guide them. At the beginning, I will set up a data table or a graph or whatever I want them to do but after probably about three inquiries, they are on their own there. They do their conclusions on their own. They do work in groups! They always pair up but they almost always work in groups. EMILY: My special education kids tend to do well in AMSTI. I think a lot of times you can do a corner where a special education student is helping like a B-C student because that special education student is more hands-on oriented where that B student or A student is more let me read it; let me take the test; let me get it out of my mind because I was one of those. MIA: We do a lot of the notebooking. With our short periods, we do stuff the first day and I try to have a weekly objective in the Course of Study. Then I try to take those (table continued)

student objectives and give them a daily objective from the lab just to try to keep them on track. It keeps me on track and makes sure they [students] know what they are doing. MIA: But on the second day, we usually run the lab and then as a group, we go through the data together. At this age, they just don't know how to do [deal with] data very well. I do PowerPoint and everything and I walk through the steps with them. And then, we do vocabulary. I used to do conclusions in sort of a wrap-up but I have started shifting more to the notes because we are so short on time and they need something to study. That is the only thing in AMSTI that is difficult. They do not know how to study from that notebook [student generated notebook rather than a textbook. Students are not allowed to take the AMSTI student resource books out of the classroom]. MIA: They need notes and so I have tried to supplement with more notes. At the end, I will cut out a diagram, we will glue it in their book, and they will color or label. I have done some data tables where we cut out and put it in their notebooks and that helps to give them something to study from. RILEY: I check their notebook. I will have them paste in a reading. They have highlighters and they highlight the hypothesis orange. As I go through, I will check it [hypothesis] off and they get a grade. I may check one lab today and then next week, I may check something else. They always know to be prepared. EMILY: We do have quizzes and we do have tests. I try to make most of them [questions] open-ended. We do a lot of performance-based assessment. I do a lot of notebook grades. I grade them on their conclusions because I want to make sure that they learned what they were supposed to learn. We have all kinds of different quizzes. Sometimes they have even had to identify the organisms that they are supposed to identify [in the lab]. My two major types of assessment other than the quizzes and the tests (I try to make them [test questions] more open-ended) are performance-based and notebooks. EMILY: Sometimes it [an assessment] might be paper/pencil and sometimes it is performance-based. Quizzes and tests to me are kind of the same thing just the quiz tends to be smaller. Some of my grades come from performance-based. I still do paper/pencil tests; if you don't, then you have parents who do not understand how this grade [student's average] came about. They [students] have to know terms and probably the best way to do that is paper/pencil tests. Mostly, the paper/pencil testing is multiple choice. EMILY: I have used rubrics. I do a lot of projects, too. Like on a project, they will be given a rubric beforehand to know what I am going to grade and how I am going to grade. You have guidelines for what they need to do or do not need to do. I don't always use the rubric so much with the notebooks because I've got to read their conclusion. I don't hand out a rubric for every single assignment. Maybe I should but I don't because that would be time consuming. With their conclusion, they pretty much have to tell me what they learned. So, I want them to answer the question and what they learned. I don't really use the rubric with that [lab reports]. MIA: That [assessments] is the hardest thing in AMSTI. I am getting better each year. I am trying to do a lot of questions during class to just kind of feel around [figure out (table continued)

student comprehension]. I try to go with the groups and sort of check what they are writing. I'm trying to do more 3, 2, 1s those quick writes at the end to sort of see where they are. Then, we try to do a quiz or short test after about three or four labs. That way, they are not doing [taking a test] eight labs of digestive system all at once. It is just too much information. I am kind of struggling with some of my things [assessments] right now and working in more little quick assessments because I don't have time in 50 minutes to give them one every day. So I try to give them something at the end of each lab and have them to write or tell me what they did. I think if we have a longer period next year, I will have more time to make them tell [what they learned] me in their groups. I am also trying to do thinking jobs. Along with their other roles [in groups], they have to be the hypothesis grader that tells the class [what happened in the lab] or someone has to summarize what they did or if it [the lab] didn't work, why did it not work or what they think went wrong. I am trying to do a little bit more of an oral assessment type thing. I am trying to just check more if they got it [the concept]. MIA: It [assessment] is one of those things. Even three years in, you keep tweaking as you go and trying things. MIA: I use a lot of the ones [assessments] from the AMSTI book. The seventh grade has really good, practical type questions where they have to apply what they have learned. They have to look at a diagram and tell me the function of the liver or look at a diagram and tell me what is happening molecule wise. There are a lot of graphs they have to interpret or data tables they have to look at and tell you what happened. We also try to do some vocabulary. I try to mix it where they can have vocabulary questions with the AMSTI assessments. That way, I am getting not just some vocabulary background but I am getting what they actually learn [about] the concept. Actually, the seventh grade [AMSTI resource books] really has good assessments and we use a lot of those. We do short ones [assessments] and sometimes, we will just pull out five questions and do a little short quiz on one [inquiry] just to see if they have the concept. If they don't, I can go back and reteach it. That is usually what I use.

Research Subquestion #2-Seventh Grade AMSTI Science Teachers What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?
Significant Statements
LILLY: Our unit [AMSTI] is fantastic. It [AMSTI assessments] is related to the Course of Study and everything. RILEY: I have been through one summer's training for seventh grade. It has been a great experience. It has been an excellent year so far. The kids are learning. One of the main things is a lot of my students have a hard time with what we are studying. They need help with their book work. Once we got started with AMSTI, they have been helped. RILEY: We will start with a demo period–a demonstration. It [the demonstration] can be as small as a match which leads us to talk about kinetic energy. We strike the match, let it burn down, and talk about how the energy was lost. From there, I do PowerPoints, (table continued)

very interactive PowerPoints. We discuss things and I ask questions. We have a review time. Sometimes I use notes so I can judge whether they understand the content. Today, we took our AMSTI lesson we are on and we conducted an inquiry. RILEY: We [in this class] have a composition notebook. At the top [of the first page] is the title of the lab for the day. I give them a question or for the next 2 to 3 weeks, I will let them formulate the question. I guide their progress and they have to form a hypothesis and they have to use it. Then, they have their plan section and all their materials where they write down all we did in explicit details. With the observations, they will tell me what happened. In their conclusion, they have to give me three important facts, two interesting details, and one question. And I grade the conclusion. EMILY: There was a new test this year [2007-2008 school year], the ASA (Alabama Science Assessment). I believe there are eleven standards that they have to meet [on the ASA]. We would do a bell ringer based on those eleven standards. I really tried to drill that [the ASA standards] all year long. We did multiples with the eleven standards on different tests. After that [the bell ringer], the kids come in and they hand out the notebooks [science notebooks] and AMSTI [student resource] books. EMILY: I will guide them. At the beginning, I will set up a data table or a graph or whatever I want them to do but after probably about three inquiries, they are on their own there. They do their conclusions on their own. They do work in groups! They always pair up but they almost always work in groups. I use a checklist to grade the groups. EMILY: My special education kids tend to do well in AMSTI. I think a lot of times you can do a corner where a special education student is helping like a B-C student because that special education student is more hands-on oriented where that B student or A student is more let me read it; let me take the test; let me get it out of my mind because I was one of those. I was more of let me read it, let me study, let me take the test, and it's gone; it is out of my head! It [professional development opportunities] would be helpful if there was an extreme case on how to incorporate or how to make the activities get more from the special education student because some of them are so much content driven. Like genetics, it makes it a little more difficult or like taxonomy, it makes it a little more difficult but I think I have not had too much of a problem with that. Maybe one or two students have come to my classroom where I have had to take more time with them. They were in special education and I had to give them more explanation. Although a lot of times, it depends on who you pair them with and I have learned don't pair them with the straight A student because I don't think the straight A student even understands how that straight A student learns. Get them a C student who has to study and has to focus on how to learn and I think they do better with them most times. MIA: We do a lot of the notebooking. With our short periods, we do stuff the first day and I try to have a weekly objective in the Course of Study. Then I try to take those student objectives and give them a daily objective from the lab just to try to keep them on track. It keeps me on track and makes sure they [students] know what they are doing. We will do our question or purpose. It's an easy way to grade labs [notebooking]. MIA: I have started doing some purpose for these kids this year just to get them kind of (table continued)

on the right step with this more difficult concept. But on the second day, we usually run the lab and then as a group, we go through the data together. At this age, they just don't know how to do [deal with] data very well. I do PowerPoint and everything and I walk through the steps with them. If there is a chart, I try to pull the screen up and do it on the white board and we fill it out together and talk about it. Then, we talk about the data questions together because they are just not ready yet [to complete all the inquiries on their own]. And then, we do vocabulary. I used to do conclusions in sort of a wrap up but I have started shifting more to the notes because we are so short on time and they need something to study. That is the only thing in AMSTI that is difficult. They do not know how to study from that notebook [student generated notebook rather than a textbook. Students are not allowed to take the AMSTI student resource books out of the classroom]. MIA: They need notes and so I have tried to supplement with more notes. At the end, I will cut out a diagram, we will glue it in their book, and they will color or label. I have done some data tables where we cut out and put it in their notebooks and that helps to give them something to study from. RILEY: I check their notebook. I will have them paste in a reading. They have highlighters and they highlight the hypothesis orange. As I go through, I will check it [hypothesis] off and they get a grade. I may check one lab today and then next week, I may check something else. They always know to be prepared. EMILY: We do have quizzes and we do have tests. I try to make most of them [questions] open-ended. We do a lot of performance-based assessment. I do a lot of notebook grades. I grade them on their conclusions because I want to make sure that they learned what they were supposed to learn. We have all kinds of different quizzes. Sometimes they have even had to identify the organisms that they are supposed to identify [in the lab]. My two major types of assessment other than the quizzes and the tests (I try to make them [test questions] more open-ended) are performance-based and notebooks. EMILY: Sometimes it [an assessment] might be paper/pencil and sometimes it is performance-based. Quizzes and tests to me are kind of the same thing just the quiz tends to be smaller. Some of my grades come from performance-based. I still do paper/pencil tests; if you don't, then you have parents who do not understand how this grade [student's average] came about. They [students] have to know terms and probably the best way to do that is paper/pencil tests. Mostly, the paper/pencil testing is multiple choice. EMILY: I have used rubrics. I do a lot of projects, too. Like on a project, they will be given a rubric beforehand to know what I am going to grade and how I am going to grade. You have guidelines for what they need to do or do not need to do. I don't always use the rubric so much with the notebooks because I've got to read their conclusion. I don't hand out a rubric for every single assignment. Maybe I should but I don't because that would be time consuming. With their conclusion, they pretty much have to tell me what they learned. So, I want them to answer the question and what they learned. I don't really use the rubric with that [lab reports]. (table continued)

MIA: That [assessments] is the hardest thing in AMSTI. I am getting better each year. I am trying to do a lot of questions during class to just kind of feel around [figure out student comprehension]. I try to go with the groups and sort of check what they are writing. I'm trying to do more 3, 2, 1s those quick writes at the end to sort of see where they are. Then, we try to do a quiz or short test after about three or four labs. That way, they are not doing [taking a test] eight labs of digestive system all at once. It is just too much information. I am kind of struggling with some of my things [assessments] right now and working in more little quick assessments because I don't have time in 50 minutes to give them one every day. So I try to give them something at the end of each lab and have them to write or tell me what they did. I think if we have a longer period next year, I will have more time to make them tell [what they learned] me in their groups. I am also trying to do thinking jobs. Along with their other roles [in groups], they have to be the hypothesis grader that tells the class [what happened in the lab] or someone has to summarize what they did or if it [the lab] didn't work, why did it not work or what they think went wrong. I am trying to do a little bit more of an oral assessment type thing. I am trying to just check more if they got it [the concept].

MIA: It [assessment] is one of those things. Even three years in, you keep tweaking as you go and trying things.

MIA: I use a lot of the ones [assessments] from the AMSTI book. The seventh grade has really good, practical type questions where they have to apply what they have learned. They have to look at a diagram and tell me the function of the liver or look at a diagram and tell me what is happening molecule wise. There are a lot of graphs they have to interpret or data tables they have to look at and tell you what happened. We also try to do some vocabulary. I try to mix it where they can have vocabulary questions with the AMSTI assessments. That way, I am getting not just some vocabulary background but I am getting what they actually learn [about] the concept. Actually, the seventh grade [AMSTI resource books] really has good assessments and we use a lot of those. We do short ones [assessments] and sometimes, we will just pull out five questions and do a little short quiz on one [inquiry] just to see if they have the concept. If they don't, I can go back and reteach it. That is usually what I use.

EMILY: We have a teacher guide with AMSTI and it is awesome. We have a study guide that I will pull questions from. Most of them are teacher generated, though. I'll be working on that [an assessment data base with AMSTI] this January or February. All day training on evaluation. AMSTI teachers are going to generate questions. They are going to put it on the AMSTI.org and you [AMSTI teachers] can pull questions from that.

EMILY: I have not used it [AMSTI assessment database] because I am not at work right now [on maternity leave] but still it is teacher generated. Most of mine [assessments] have been teacher generated and using the teacher guide and the student guide and projects. Rubrics, I have created my own.

EMILY: The students have to do research. Then, they had to come up with their own plan [for the project] and try to follow it. There again, I graded it [the project] with a rubric.

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EMILY: I have done debates before. I loved those. I would divide the class in half and tell them you are on which side of the topic. They did not have a choice. We had a rubric and certain guidelines for the debate and there are all kinds of stuff online for how to do a debate. RILEY: I have that [the AMSTI resource books] and I have also made up my own questions to go with each standard [on the SAT-10 and ASA]. When I have seventh grade [teacher instructs both seventh and eighth grade AMSTI science], I am going to have cards and use them as practice questions every day.

Research Subquestion #3-Seventh Grade AMSTI Science Teachers What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?
Significant Statements
EMILY: The AMSTI state specialists really pushed for the Alabama Science Test to be open-ended or at least for part of it to be open-ended but it did not happen. So, it [ASA] is all multiple-choice. That is why a lot of the tests in my classroom do have multiple-choice. Although open-ended is great, open-ended is hard to grade. It is great to make sure that they know what they are doing, they get the concept, and they can apply whatever they learn to something else. It is hard to correct multiple-choice questions that way. I will say that most of our multiple-choice questions just don't quite reach that evaluation level that they should but that is why we are doing multiple-choice. LILLY: I had to show them that shorthand is the same thing as text messages [referring to note taking skills]. LILLY: We do more homework options. We will take the extension activities and make those homework options for the week. There may be like five or six things [extension activities from the AMSTI resource book] and they choose two things from the list and that is their homework. They are learning the concept that we had in the lab coming up and they are producing something. LILLY: Mine [her students] are doing a paper right now on disease because that is a main activity and it is a homework option for two weeks. That way, I know they have covered that material. We have covered that on the Course of Study and we don't have to take time out of class. They did one day in library and then the rest of it is kind of on their own time. They have got their own set of maps [resource on how to complete the assignment] and then they write their paper. LILLY: I hate concept maps. I do one every once in a while. Now, I do graphic organizers and things like that. The foldables and the stuff, I am trying to incorporate. If I had more time, I would do more foldables [class period is 50 minutes]. I just don't have time this year. It is like the period just keeps getting shorter and shorter every day for us. We do some foldables and that does help [the students with different concepts]. LILLY: You have got so many people [students] who are resistant [to change their habits and except inquiry learning] and it has been an uphill battle. It is hard to adjust and change your way of thinking and it is a whole lot easier to give them a book and a worksheet. It would make my life so much easier but my kids don't learn like that! They (table continued)

don’t learn as much and they hate science.
LILLY: Our unit [AMSTI] is fantastic. It [AMSTI assessments] is related to the Course of Study and everything.
LILLY: We have a 7 month plan but now that we are out of AYP it is a little more lenient.
LILLY: It [correlation between AMSTI units and Science Course of Study] does for us. Ours correlates nicely–better than theirs [referring to another grade] does. Ours correlated almost to the T.
LILLY: I use the language of the Course of Study. AMSTI actually uses energy conversions. I take that out and I tell my kids energy transformations because that is what my Course of Study says. I expose them to the other word, also. I use the exact things. Literally when I am talking about the stuff, I cover those [exact terminology from Course of Study]. Wherever I can fit in SATs, I do. I do check it [coverage of Course of Study objectives and SAT-10 objectives] off. That [Course of Study] is what I cover and everything else with SATs. I use this language [of the Course of Study and SATs]. The language that you see on [SAT-10] practice tests. I try to use the exact same language that they are going to see. It makes it more difficult but I tell my kids that you know the 25 cent word and now you have to learn the five dollar word, you know the fancy word.
LILLY: It [Course of Study] just lines up well because it is the national standards and the national standards are a lot like Alabama. They [State Department] have rewritten them to make them more like the national standards.
LILLY: It [NCLB] has changed the way I teach. We are holding back [because of NCLB], I feel, and most of the teachers I talk to, feel that we are holding back the upper level, gifted kids so that we can pull up kids who will never get it. Just two years ago, I had kids and there were twenty-two in my special ed class and seven or eight of them read on a second grade level–or lower. I had several nonreaders. What do you do with that? Imagine trying to teach momentum and force and they [students] don’t have the math background.
LILLY: I really think we are dumbing it [content] down [with NCLB]. I don’t feel like I am giving them the content that they need but what are you going to do? We are not supposed to track but honestly, tracking works because I can slow it down. I don’t have special ed this year. Another teacher has both classes. When I had special ed the first two years, I aligned the lower kids together because I could slow it down to their level. We went step by step by step with that class. We went through the data together and we wrote stuff together. We gave them the notes or gave them the tables to speed things up. You just can’t treat those kinds the same. You can’t test them the same because if I give them a modified test with two questions, as I’m told [by administration] the standardized test has four choices or five. They are going to fail. I don’t see why we are setting them up to fail.
RILEY: Right now, I am using a lot of things [assessment resources] that AMSTI has given us. I use AMSTI material and the Course of Study, for sure. We have to worry about the Alabama Science Assessment, so we use that [assessment researches for the

(table continued)

ASA] as a research tool. Some of those tests [teacher generated assessments] are generated by including that material. RILEY: I have my paper/pencil tests because some parents don't seem to think you are doing anything because they don't have tests every day. They don't understand inquiry-based learning. I think five more labs in AMSTI and there are tests where part of the test is where they have to construct things and I will use that grade. As far as the lab, there are questions that show how well they understood it [the science concept]. RILEY: I do more inquiry-based [assessments] but I do understand that some students need different options. Some [students] just learn differently and must verbally answer questions. EMILY: We have a teacher guide with AMSTI and it is awesome. We have a study guide that I will pull questions from. Most of them are teacher generated, though. I'll be working on that [an assessment data base with AMSTI] this January or February. All day training on evaluation. AMSTI teachers are going to generate questions. They are going to put it on the AMSTI.org and you [AMSTI teachers] can pull questions from that. EMILY: I have not used it [AMSTI assessment database] because I am not at work right now [on maternity leave] but still it is teacher generated. Most of mine [assessments] have been teacher generated and using the teacher guide and the student guide and projects. Rubrics, I have created my own. EMILY: The students have to do research. Then, they had to come up with their own plan [for the project] and try to follow it. There again, I graded it [the project] with a rubric. EMILY: I have done debates before. I loved those. I would divide the class in half and tell them you are on which side of the topic. They did not have a choice. We had a rubric and certain guidelines for the debate and there are all kinds of stuff online for how to do a debate. RILEY: I have that [the AMSTI resource books] and I have also made up my own questions to go with each standard [on the SAT-10 and ASA]. When I have seventh grade [teacher instructs both seventh and eighth grade AMSTI science], I am going to have cards and use them as practice questions every day. RILEY: I know a lot of people, who will not want to be trained but they are older teachers who have been here for a while and they just don't want to change. With AMSTI, I can spend more time working on assessment and not have to worry about the materials. RILEY: As far as a certain order, we do not have to stay on the same pace. Right now, the other science teacher [seventh grade science at this school] is not even on the same thing. We really have more of an option–more leeway. RILEY: We have a Course of Study. We are expected to get through with every objective and everything we cover to meet that standard. EMILY: With seventh grade, every single objective was met with AMSTI. Every single one. There are like two that have supplemental material that needs to be given–viruses, Down's syndrome, genetic disorders. [On these topics], AMSTI really touches the (table continued)

surface but it doesn't just dive into it and give students the information. With those, I give supplementary materials that might need to be given. They might do reading and discussion. Of course, we can't do experiments with viruses obviously or Down's Syndrome or anything like that. Now there is an AMSTI genetics lesson which goes into planning squares and genotypes and it is intensive and it is easy to put in Down's syndrome and other genetic disorders. I just meet the Course of Study objectives, document that I met them, and that is it. I throw in the ASA because that was such a big deal this year. The SATs tend to be more earth science oriented but the ASA was almost like a pregraduation activity, it felt like [AHSGE is a biology content standardized assessment]. So that big stuff for me this year. MIA: AMSTI is great because for us [seventh grade science teachers and students]. The human body is a little rough because it only hits three Course [of] Study objectives hard. A lot of it [AMSTI unit] is more macro than micro. For us having human body first, we kind of have to play catch up. What we [AMSTI science teachers at this school] have done is pull in these different aspects from the different Course of Study objectives and put them in as we go. We [the AMSTI science 7 teachers at this school] try to make sure that weekly objective come from the Course of Study. On the tests, we try to make sure that [assessment questions] fits in the Course of Study. I am lucky that a lot of it [AMSTI objectives and Course of Study objectives] fits. If it [AMSTI unit] doesn't, we will add a few questions that do fit with the Course of Study. EMILY: I do not really use the national standards. I do not go to the websites and print them [national standards] off and evaluate them every day because I feel like if I teach AMSTI and I teach it the way it is supposed to be taught, then they [students] are getting those standards or at least those standards are being taught. We look at all of these different modules like organisms and the human body for seventh grade or properties of matter for eighth grade and we look at them and we think AMSTI and we think Alabama [Course of Study]. EMILY: I cannot say that it [NCLB] has really changed anything. I feel like when I first started teaching, if I had continued that way with the lecture and all that, it would have changed that because so many kids were getting left behind and it would have changed that method. With the inquiry, with AMSTI, and all the other different activities I do, they even become problem solvers. With all of that, I think the kids are getting it more. Do I still have kids that fail, definitely? But do they fail because they do not understand it [science concept] or do they fail because they do not want to do the work? When I talk to them one on one, they get it. They just don't want to do the homework and they don't. Sometimes you give a test and they just don't want to do it. They leave it blank. I think this year we only had two students who failed because there were other issues. I think [with] AMSTI and all the other inquiry-based activities that I do, the kids are getting it [science concepts]. I don't feel like they [students] are being left behind. I don't feel like there is anything else that I need to do because I think they are okay. I know that nobody has approached me and told me that I need to be doing it differently. EMILY: Like the ASA. I mean, I busted myself this year to come up with something because I am so inquiry-based every day. And to be thrown into this new test? The (table continued)

other seventh grade teachers [in area] did not even know about it [ASA]. The only reason that I knew about it [ASA] was because AMSTI told me about it. So, they gave me a heads-up. That is another great thing about it. They are on top of all different types of evaluations and all different types of assessments. They give us the information and the materials that we need to be able to get those kids ready for different kinds of stuff. So, they helped me prepare for [the] ASA. They gave me all of these different kinds of points to show them [students] to try to get them familiar with the eleven different objectives [of ASA] but I was struggling with no inquiry basis, no activity involved, the students are driving the classroom. Now all of a sudden here is a standardized test that my kids are going to be held accountable for [with] sixty-six questions/eleven standards and they [students] have got to meet them. What I did was for each standard, students had to create a foldable and that is about as activity involved as I could do. I definitely feel the pressure in that area. EMILY: My feeling about the SAT is that we can't meet courses as well. It is difficult to meet Course of Study objectives, do AMSTI (well, AMSTI does all that) but meet the Course of Study objectives, meet the ASA standards, and try to meet the SAT standards, when SATs are so much more earth science than they are life science. I definitely feel the pressure because I feel like I am being in a class that is being judged and being scored for the SAT, and that is based more on what they learned in sixth grade not in seventh grade when I get them! So that bothers me a little bit. As far as the ASA, I think my kids did well on. I never heard back from the counselors but I did feel that pressure. I am judged. The kids are judged. The school is judged by it. RILEY: Well, our school brings pressure. Every year, we have like three or four faculty people discuss what we need to do to meet standards. They feel like it is extremely difficult. I feel like it was a choice that they are held to our standard. I feel pressured. One thing about AMSTI I am seeing right now, is that it is relating lessons and information back [to Course of Study objectives and standardized tests objectives]. MIA: You know the kids who can't do it, we need common sense benchmarks. So we could take those kids and let them feel like they succeed in VoTech programs [vocational programs], because they do not feel like they succeed in our classes. And that is where I think I am frustrated, and a lot of other teachers are frustrated that I talk to in other districts. It is not just us. It is everywhere. I find that frustrating.

Research Subquestion #4-Seventh Grade AMSTI Science Teachers What do AMSTI science teachers find most helpful when determining assessment methods?
Significant Statements
RILEY: I have been through one summer's training for seventh grade. It has been a great experience. It has been an excellent year so far. The kids are learning. One of the main things is a lot of my students have a hard time with what we are studying. They need help with their book work. Once we got started with AMSTI, they have been helped. LILLY: We do more homework options. We will take the extension activities and make

(table continued)

those homework options for the week. There may be like five or six things [extension activities from the AMSTI resource book] and they choose two things from the list and that is their homework. They are learning the concept that we had in the lab coming up and they are producing something. LILLY: Mine [her students] are doing a paper right now on disease because that is a main activity and it is a homework option for two weeks. That way, I know they have covered that material. We have covered that on the Course of Study and we don't have to take time out of class. They did one day in library and then the rest of it is kind of on their own time. They have got their own set of maps [resource on how to complete the assignment] and then they write their paper. LILLY: I hate concept maps. I do one every once in a while. Now, I do graphic organizers and things like that. The foldables and the stuff, I am trying to incorporate. If I had more time, I would do more foldables [class period is 50 minutes]. I just don't have time this year. It is like the period just keeps getting shorter and shorter every day for us. We do some foldables and that does help [the students with different concepts]. LILLY: Our unit [AMSTI] is fantastic. It [AMSTI assessments] is related to the Course of Study and everything. LILLY: It [correlation between AMSTI units and Science Course of Study] does for us. Ours correlates nicely–better than theirs [referring to another grade] does. Ours correlated almost to the T. LILLY: I use the language of the Course of Study. AMSTI actually uses energy conversions. I take that out and I tell my kids energy transformations because that is what my Course of Study says. I expose them to the other word, also. I use the exact things. Literally when I am talking about the stuff, I cover those [exact terminology from Course of Study]. Wherever I can fit in SATs, I do. I do check it [coverage of Course of Study objectives and SAT-10 objectives] off. That [Course of Study] is what I cover and everything else with SATs. I use this language [of the Course of Study and SATs]. The language that you see on [SAT-10] practice tests. I try to use the exact same language that they are going to see. It makes it more difficult but I tell my kids, You know the 25 cent word. Now you have to learn the five dollar word. You know the fancy word. LILLY: It [Course of Study] just lines up well because it is the national standards and the national standards are a lot like Alabama. They [State Department] have rewritten them to make them more like the national standards. LILLY: We are holding back, I feel, and most of the teachers I talk to, feel that we are holding back the upper level, gifted kids so that we can pull up kids who will never get it. Just two years ago, I had kids and there were twenty-two in my special ed class and seven or eight of them read on a second grade level–or lower. I had several nonreaders. What do you do with that? Imagine trying to teach momentum and force and they [students] don't have the math background. I really think we are dumbing it [content] down. I don't feel like I am giving them the content that they need but what are you going to do? We are not supposed to track but honestly, tracking works because I can slow it down. I don't have special ed this year. Another teacher has both classes. When I (table continued)

had special ed the first two years, I aligned the lower kids together because I could slow it down to their level. We went step by step by step with that class. We went through the data together and we wrote stuff together. We gave them the notes or gave them the tables to speed things up. You just can't treat those kinds the same. You can't test them the same because if I give them a modified test with two questions, as I'm told [by administration] the standardized test has four choices or five. They are going to fail. I don't see why we are setting them up to fail.

LILLY: Network [teachers sharing ideas] that is the best thing.

MIA: I taught labs in college [at the college level before moving to this area]. When I came to this area and was teaching, I did not have any equipment. When I got here and had equipment [AMSTI resources], I was like this is fantastic. If you ask them [students in the eighth grade] about peristalsis from last year, they know what it is because we did the activities and the science notebook. We [students] did the scientific method. We do the labs, then we talk about it, and I am trying to get more notes this year than I have in the past, and they understand what it means. For me, it [AMSTI] is fantastic because they can remember from even two years ago. Kids come back from 9th grade and say, I remember when we did this and we did that. The 9th grade [science] teacher said this year that she could tell that the kids had two years of AMSTI [before coming to her class] because they [the students] know scientific method, they know lab procedures, they know what they are supposed to do.

MIA: Just the fact that you [each student] remembered the word [science content terminology] is phenomenal especially at the pace we [science teachers] have to keep these kids moving at. When they [the students] come in with very little applied knowledge background and they have no critical thinking skills, it is very difficult. We take this stuff [AMSTI resources] right off the bat and I can tell a difference from when they come through the seventh grade and one year of AMSTI. That [AMSTI] experience improves them that much. I don't have to work with them nearly as much. It [working with the students] is more like after two or three weeks instead of after a semester and that is so much better. Just one year of AMSTI makes that much of a difference. It helps them learn how to think. Not what to think but helps them develop those skills that help figure it [problems] out.

RILEY: We will start with a demo period–a demonstration. It [the demonstration] can be as small as a match which leads us to talk about kinetic energy. We strike the match, let it burn down, and talk about how the energy was lost. From there, I do PowerPoints, very interactive PowerPoints. We discuss things and I ask questions. We have a review time. Sometimes I use notes so I can judge whether they understand the content. Today, we took our AMSTI lesson we are on and we conducted an inquiry.

RILEY: We [in this class] have a composition notebook. At the top [of the first page] is the title of the lab for the day. I give them a question or for the next two to three weeks, I will let them formulate the question. I guide their progress and they have to form a hypothesis and they have to use it. Then, they have their plan section and all their materials where they write down all we did in explicit details. With the observations, they will tell me what happened. In their conclusion, they have to give me three

(table continued)

important facts, two interesting details, and one question. EMILY: There was a new test this year [2007-2008 school year], the ASA (Alabama Science Assessment). I believe there are eleven standards that they have to meet [on the ASA]. We would do a bell ringer based on those eleven standards. I really tried to drill that [the ASA standards] all year long. We did multiples with the eleven standards. EMILY: I will guide them. At the beginning, I will set up a data table or a graph or whatever I want them to do but after probably about three inquiries, they are on their own there. They do their conclusions on their own. They do work in groups! They always pair up but they almost always work in groups. MIA: We do a lot of the notebooking. With our short periods, we do stuff the first day and I try to have a weekly objective in the Course of Study. Then I try to take those student objectives and give them a daily objective from the lab just to try to keep them on track. It keeps me on track and makes sure they [students] know what they are doing. We will do our question or purpose. I have started doing some purpose for these kids this year just to get them kind of on the right step with this more difficult concept. We will set up, we will talk about procedures, and we will set up our data tables the day before because they won't do it if you don't do it the day before. We will write our data questions the day before and we will talk a little bit about what we are going to do. But on the second day, we usually run the lab and then as a group, we go through the data together. At this age, they just don't know how to do [deal with] data very well. I do PowerPoint and everything and I walk through the steps with them. If there is a chart, I try to pull the screen up and do it on the white board and we fill it out together and talk about it. Then, we talk about the data questions together because they are just not ready yet [to complete all the inquiries on their own]. And then, we do vocabulary. I used to do conclusions in sort of a wrap up but I have started shifting more to the notes because we are so short on time and they need something to study. That is the only thing in AMSTI that is difficult. They do not know how to study from that notebook [student generated notebook rather than a textbook. Students are not allowed to take the AMSTI student resource books out of the classroom]. MIA: They need notes and so I have tried to supplement with more notes. At the end, I will cut out a diagram, we will glue it in their book, and they will color or label. I have done some data tables where we cut out and put it in their notebooks and that helps to give them something to study from. EMILY: My special education kids tend to do well in AMSTI. I think a lot of times you can do a corner where a special education student is helping like a B-C student because that special education student is more hands-on oriented where that B student or A student is more let me read it; let me take the test; let me get it out of my mind because I was one of those. I was more of let me read it, let me study, let me take the test, and it's gone; it is out of my head! It [professional development opportunities] would be helpful if there was an extreme case on how to incorporate or how to make the activities get more from the special education student because some of them are so much content driven. Like genetics, it makes it a little more difficult or like taxonomy, it makes it a little more difficult but I think I have not had too much of a problem with that. Maybe (table continued)

one or two students have come to my classroom where I have had to take more time with them. They were in special education and I had to give them more explanation. Although a lot of times, it depends on who you pair them with and I have learned don't pair them with the straight A student because I don't think the straight A student even understands how that straight A student learns. Get them a C student who has to study and has to focus on how to learn and I think they do better with them most times.
RILEY: I check their notebook. I will have them paste in a reading. They have highlighters and they highlight the hypothesis orange. As I go through, I will check it [hypothesis] off and they get a grade. I may check one lab today and then next week, I may check something else. They always know to be prepared.
EMILY: We do have quizzes and we do have tests. I try to make most of them [questions] open-ended. We do a lot of performance-based assessment. I do a lot of notebook grades. I grade them on their conclusions because I want to make sure that they learned what they were supposed to learn. We have all kinds of different quizzes. Sometimes they have even had to identify the organisms that they are supposed to identify [in the lab]. My two major types of assessment other than the quizzes and the tests. I try to make them [test questions] more open-ended. And I give performance-based and notebooks.
EMILY: Sometimes it [an assessment] might be paper/pencil and sometimes it is performance-based. Quizzes and tests to me are kind of the same thing just the quiz tends to be smaller. Some of my grades come from performance-based. I still do paper/pencil tests; if you don't, then you have parents who do not understand how this grade [student's average] came about. They [students] have to know terms and probably the best way to do that is paper/pencil tests. Mostly, the paper/pencil testing is multiple choice.
EMILY: I have used rubrics. I do a lot of projects, too. Like on a project, they will be given a rubric beforehand to know what I am going to grade and how I am going to grade. You have guidelines for what they need to do or do not need to do. I don't always use the rubric so much with the notebooks because I've got to read their conclusion. I don't hand out a rubric for every single assignment. Maybe I should but I don't because that would be time consuming. With their conclusion, they pretty much have to tell me what they learned. So, I want them to answer the question and what they learned. I don't really use the rubric with that [lab reports].
MIA: That [assessments] is the hardest thing in AMSTI. I am getting better each year. I am trying to do a lot of questions during class to just kind of feel around [figure out student comprehension]. I try to go with the groups and sort of check what they are writing. I'm trying to do more 3, 2, 1s those quick writes at the end to sort of see where they are. Then, we try to do a quiz or short test after about three or four labs. That way, they are not doing [taking a test] eight labs of digestive system all at once. It is just too much information. I am kind of struggling with some of my things [assessments] right now and working in more little quick assessments because I don't have time in 50 minutes to give them one every day. So I try to give them something at the end of each lab and have them to write or tell me what they did. I think if we have a longer period

(table continued)

next year, I will have more time to make them tell [what they learned] me in their groups. I am also trying to do thinking jobs. Along with their other roles [in groups], they have to be the hypothesis grader that tells the class [what happened in the lab] or someone has to summarize what they did or if it [the lab] didn't work, why did it not work or what they think went wrong. I am trying to do a little bit more of an oral assessment type thing. I am trying to just check more if they got it [the concept]. MIA: It [assessment] is one of those things. Even three years in, you keep tweaking as you go and trying things. MIA: I use a lot of the ones [assessments] from the AMSTI book. The seventh grade has really good, practical type questions where they have to apply what they have learned. They have to look at a diagram and tell me the function of the liver or look at a diagram and tell me what is happening molecule wise. There are a lot of graphs they have to interpret or data tables they have to look at and tell you what happened. We also try to do some vocabulary. I try to mix it where they can have vocabulary questions with the AMSTI assessments. That way, I am getting not just some vocabulary background but I am getting what they actually learn [about] the concept. Actually, the seventh grade [AMSTI resource books] really has good assessments and we use a lot of those. We do short ones [assessments] and sometimes, we will just pull out five questions and do a little short quiz on one [inquiry] just to see if they have the concept. If they don't, I can go back and reteach it. That is usually what I use. EMILY: The AMSTI state specialists really pushed for the Alabama Science Test to be open-ended or at least for part of it to be open-ended but it did not happen. So, it [ASA] is all multiple-choice. That is why a lot of the tests in my classroom do have multiple-choice. Although open-ended is great, open-ended is hard to grade. It is great to make sure that they know what they are doing, they get the concept, and they can apply whatever they learn to something else. It is hard to correct multiple-choice questions that way. I will say that most of our multiple-choice questions just don't quite reach that evaluation level that they should but that is why we are doing multiple-choice. RILEY: Right now, I am using a lot of things [assessment resources] that AMSTI has given us. I use AMSTI material and the Course of Study, for sure. We have to worry about the Alabama Science Assessment, so we use that [assessment researches for the ASA] as a research tool. Some of those tests [teacher generated assessments] are generated by including that material. RILEY: I have my paper/pencil tests because some parents don't seem to think you are doing anything because they don't have tests every day. They don't understand inquiry-based learning. I think five more labs in AMSTI and there are tests where part of the test is where they have to construct things and I will use that grade. As far as the lab, there are questions that show how well they understood it [the science concept]. EMILY: We have a teacher guide with AMSTI and it is awesome. EMILY: We have a study guide that I will pull questions from. Most of them are teacher generated, though. I'll be working on that [an assessment data base with AMSTI] this January or February. All day training on evaluation. AMSTI teachers are going to generate questions. They are going to put it on the AMSTI.org and you [AMSTI (table continued)

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will add a few questions that do fit with the Course of Study.
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EMILY: My feeling [pressures] about the SAT is that we can't meet courses as well. It is difficult to meet Course of Study objectives, meet the ASA standards, and try to meet the SAT standards, when SATs are so much more earth science than they are life science. I definitely feel the pressure because I feel like I am in a class that is being judged and being scored for the SAT [used for AYP] and that is based more on what they learned in sixth grade not in seventh grade. So that bothers me a little bit. As far as the ASA, I think my kids did well on [it]. I never heard back from the counselors but I did feel that pressure. I am judged. The kids are judged. The school is judged by it.
RILEY: Well, our school brings pressure. Every year, we have like three or four faculty members discuss what we need to do to meet standards. They feel like it is extremely difficult. I feel like it was a choice that they are held to our standard. I feel pressured. One thing about AMSTI I am seeing right now, is that it is relating lessons and information back [to Course of Study objectives and standardized tests objectives].
EMILY: I would like to have more help in assessment. As I mentioned earlier the way that I am doing it [class instruction], it is teacher generated and I would love to have help there [with assessment]. AMSTI is working on that but as far as our school system or as far as our state is concerned other than AMSTI, I have not had any other professional development help with inquiry-based. What I have learned [about assessing inquiry learning] has been me [teacher generated] and the little that I have gotten from AMSTI but even that is still minimal. They [AMSTI] don't focus on that [assessment]. They focus on teaching. Assessment [and] different kinds of ways to grade assessment or score [assessments] such as the regroup would be helpful. You probably hear some people say classroom management or things like that. If you truly get the kids involved, there are few problems. In my experience, I have not had problems with management.
RILEY: I wish we had inquiry-based instructions on other subjects in middle school.

(table continued)

Research Subquestion #1-Eighth Grade AMSTI Science Teachers What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?
Significant Statements
AVA: Honestly, the biggest asset at first was that I got all this [AMSTI] equipment. I actually was able to have some really good equipment for my kids. Then as I got to use it [AMSTI] more, I learned just how valuable letting them do the inquiry-based projects was. It was fantastic. Now, it has been a learning curve because I did not realize how important it was to do the labs first and then talk about with notes and lecture type things. This year, I am hitting it [inquiry learning] more that way and it is working wonderfully. It [AMSTI] is doing so much better. So, I am enjoying that. The kids change year to year but it is a learning process. MADELINE: For the most part, I just follow the notebook with AMSTI and I just try not to tell them anything about it. I just let them get in there and learn and then at the end, we just all kind of draw a conclusion and talk about what happened. I don't ever tell them anything that is going to go on before it happens. MADELINE: If I see that the kids just really aren't getting it [the science concept], I will pull some more [resources], a book or my own learning. The majority of what I use [for resources] is just the AMSTI teacher's manual and then I have to go and pull other resources. KAITLYN: Some of it [assessments] is out of textbooks [system adopted science textbooks] which my notes come from the textbooks. We [science teachers at this school] will pull some from the computer if we have done some computer activities. KAITLYN: We [this teacher's classes] have done some computer activities [as resources for assessments] at the beginning of the year on the scientific method. If they [students] are describing something, they would know if their hypothesis would go with a procedure, and so on. They [students] have got to do a poster that goes along with their experiment with the scientific method, the question, the hypothesis, the experiments and data, and then a conclusion. MADELINE: The resources I use of assessments are the [AMSTI] website for the most part and I will use my textbook [system adopted science textbook] to cover the objectives [from the Science Course of Study] that are not covered by AMSTI. There are two objectives [on the Science Course of Study not covered in the AMSTI objectives]. If I do not think they [Science Course of Study objectives] are covered well enough, I will bring out the book [system adopted science textbook] and then sometimes I just use my chemistry books from college or go talk to my chemistry teacher from high school and she will help me. MADELINE: If I see that the kids just really aren't getting it [the science concept], I will pull some more [resources], a book or my own learning. The majority of what I use [for resources] is just the AMSTI teacher's manual and then I have to go and pull other resources. BRAYDEN: Most of our [AMSTI] units have a written test and then they have a lot of hands-on [performance tests] where they always have an observation test where they (table continued)

watch how to make it work. The ones [students] that may not do real well on their written tests can do the other [performance test] and then you do the grades together and average them.
AVA: I get some stuff out of the book [system adopted science textbook]. I have found that I prefer to make my own tests because a lot of times I don't want the definition out of the book [system adopted textbook or AMSTI resource book]. They [students] have got to do well on those SATs but they have got to understand it. If they understand it, I think they can get through it. You have got to learn to test [take standardized tests]. You have got to use those Scantrons [standardized test formats scored using an optical scanner]. You have to! Then I also have two or three short answer questions [on each test]. You have to! Then I also have two or three short answer questions [on each test].
KAITLYN: We used to have experiment days and a student would do a demonstration for us. Sometimes everybody would do it but sometimes a student would pick out his own experiment and they would have to go through and do the scientific method. Overall, I find it [AMSTI] positive but then again I get frustrated which is probably [their] age group and the apathy of some and then not wanting to give me the effort. They just want to fly through things and even with the AMSTI I get frustrated. When it [an assessment or inquiry lab] says explain they give me two words. I try to always put some type of questions not all just matching/multiple-choice on the tests. I usually have just a few of some types that they have to think.
MADELINE: We take one day to set up the notebook and then the next day we do the lab and our conclusion. That way, it is not just so much all the time, because I find that if you do a lab every single day a lot of times they will rush through it. They are not thinking about the other and it is easier on me if I know what days you are going to do lab, and what days you are not. That way, you are not pulling out resources for every single day.
KAITLYN: Usually what I do is put the objective [from the Course of Study and standardized tests] in a question type. I may model it [inquiry lab]. Because they don't want to read the directions, I will circulate constantly. I am constantly moving from one table to the other with them, asking them if they have any questions. I always want to get feedback from their group not just depend on me.
BRAYDEN: In the eighth grade, they start with a question, and they go through the science, put down the question, then go to the hypothesis, and then we start the inquiry and go through it. It [the AMSTI lessons] builds one lesson goes on another and so once they have done it in lesson one and lesson six and use the data you collected in lesson on, to work problems and figure out what you are doing. It is amazing to see how they retain the knowledge of what to do and then to be able to apply it.
AVA: We usually set up our labs together [the AMSTI science 8 teachers at this school]. I will have a bell ringer on the board that says read the first two pages. They [students] start off a lesson with what do you think if and it [AMSTI student resources book] has a picture for them to look at and things like that. I usually say to come up with your own questions and your own hypothesis. Just create them on your own and put them in your bell ringers. They come away and we talk about it. We'll always have a purpose of what

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your goal is to learn in this lab. Then, we do it [the lab report] together. We do our own lab report all together because this is one of the things that I do a little bit differently from AMSTI to keep them all together because then you have six different labs going. I put it in the bell ringer for them to do that so they get the experience and the practice developing this and then when I put mine up there, they can see how far off they were, what the goal was that they should have been looking at, and they get closer to doing that and it helps keep their lab structured. Step one, start with your AMSTI lab and I turn them loose. My special education students, we usually do it all together step by step. We go through [the inquiry] because it is not purely inquiry learning, it is more guided inquiry.

AVA: It [AMSTI student resource book] takes them step by step in how to set it [the lab] up. This [battery lab] is the first one [inquiry] they really get to do in here is fill the battery. They love that one and it is the best example I know of AMSTI. Fantastic! They go through all of it and at the end of the lab when they are doing their charts, before we write our conclusion, they have to review these reflection questions and they have to think. Once they have done all the reflecting questions and we have talked about it, I have them write their conclusion usually the next day as a bell ringer. Then we talk about the lab again and we set up for the next day. We set up [the lab], do it [the lab], talk about it [the lab and conclusions], and [take] notes. We usually spend about two-and-a-half to three-and-a-half days on each lab and it is a break neck speed. It really is. It is very quick. It is moving the kids through it but there is no way we can really cover the Course of Study if we don't do that.

AVA: It is very difficult. I don't slack off the scientific method but a lot of times we'll just do a scientific method every other lab just so we can get all of the concepts in. Because in three months, you have got to cover all of it. You have got to cover half of that Course of Study in three months not five [because of the amount of time testing in the spring takes]. So, it [inquiry learning] is very difficult but the kids love it!

MADELINE: I use a lot of different assessments. A lot of it [assessments] is with their notebook [student generated journal]. They [students] never know what part of the notebook I am going to grade. One day it may be the hypothesis. One day it may be the conclusion. One day it may just be the parts of the lab. One day it may be I am grading every single thing in their notebook and they have notebook tests which is just me giving them questions and it should be in their notebook and they just write the answer. Then, I have their parent look at them, where the parents get to talk to the kids about the labs. That is in their notebook with them and they sit with them, and they have to pick a lab and they have to explain it to them and the parents grade [the students' lab]. The parents really get into that and have a lot of good comments.

MADELINE: They always have one project to do out of the six weeks and there are tests built into the AMSTI book. Half of it [each test from the AMSTI resource book] is pencil/paper. So, I will do both [pencil/paper and performance assessments]. What it [performance assessments] is they are given a problem and they can use any of the materials that we have learned and the methods that we have learned and solve their problem. Then, they just have to come up with their own procedure. There is a rubric

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[that] is already made for you [the teacher by AMSTI]. It [the rubric] tells you to look for this and look for that. Then sometimes you can tell if the kids are getting there. MADELINE: Especially with one project, they can do the PowerPoint. They can do all sorts of things. They can do photo stories. They are so creative! When we just use pencil/paper [assessments], it restricts that [creativity]. Most of them don't know the words to write it for me to assess. So, I just like the other better [alternative assessments]. MADELINE: If I am having trouble choosing an assessment, the end of every lesson in the book [AMSTI teacher resource book] gives you 10 different ways you can assess the lesson. It may be with a worksheet. It may be with bell ringers or just questions that you ask from the seat or class discussion. Everybody learns differently and everybody communicates differently. I try to assess in different ways every day to give everybody an opportunity to know that they are learning. KAITLYN: I still on their AMSTI labs I just count them as daily grades. I still give chapter tests [textbook assessment format]. AVA: Our book [AMSTI resource book] correlates but not as smoothly [as the seventh grade AMSTI book]. It is out of sequence with the textbook [system adopted textbook]. If you assign something out of the textbook that is not exactly what you are studying [in AMSTI], the kids completely freak out. What I tend to do, I have some workbooks [outside resource, not AMSTI and not system adopted textbook resource] that are excellent. They are very basic how do things [work] about movements and [the] first law of motion. It [this workbook] gives diagrams and they [students] have to look at the diagrams to tell what is going on and things like that and those are really good. I try to find a couple of those a week. A lot of times, I grade for completion. I can tell by looking at what they did how well they did on it and they get the credit for it. You can always tell the ones who just aren't really trying or don't turn it in because they bomb the tests. I keep on my kids about accountability. You are responsible to yourself. I give quizzes. Today, I gave them a vocabulary quiz over two labs because they have a lot of brand new vocabularies. It is kind of a new section. I always give a unit test. Usually, I give them over four maybe five labs where there is a natural break in the information. I don't give a lot of short tests. I give notebook quizzes It [notebook quiz] is just an accountability thing. It is five questions, you get 30 points for it and that is good. They have a lab quiz. That is how I grade the labs. AVA: One thing I started new this year is I have started a lab performance assessment and MIA gave me the sheet for it and it is wonderful. I've got three or four kids in a group, depending on the class size. I put their names, their group roles because I have group captains, materials managers, safety, and recorders, and how they perform [on the lab]. Are they following safety rules? Do they have the books that I told them to? Do they have their proper shoes? Is their hair pulled back? All of those kinds of things. I will take a point off for the entire group if one person messes up because the safety person should have gotten it [the violation], the group captain should have gotten it, and the materials person should have gotten it because safety goggles are a materials thing. So the poor little recorder is just along for the ride but that is three accountability things (table continued)

and that is what they are learning this time. At first, I wouldn't get them for it [take off points for safety violations]. I wouldn't take any points off. How they performed in lab, it is making a world of difference because all I have got to say is fix your safety violations for the timed lab [performance assessments]. I will walk around with my clipboard and I will say do you see this? When you talk, you are 1) off task, 2) not following safety procedures, and 3) you are not working cooperatively with your group. I am taking off one point right now for you doing one act of violation and they are starting to get it. I've got to drill it into them. They basically got an assessment, a very important one because if they don't do it now, will I give them fire in class next semester? No! So, I made that a huge part of their assessment right now. The only things I really grade for accuracy are the conclusions on the labs. I really look at it and their unit tests. Those are the big things for accuracy. Everything else is effort. AVA: [A lot of my assessments are] Multiple choice. Some of it is rote memory, what is this vocabulary. On my multiple choice questions, I try to make them thinking questions. I will give them a situation like if you are adding fertilizer to plant A and none to plant B, That [scenarios] may be ten questions on one test. [I use] some matching [on assessments]. I may have a couple of graphs on there. Reading passages that they have got to figure out and apply. So, I try to put thinking questions. AVA: We [teachers at this school] are encouraged to use Scantron [optical scanning formatted tests like the format of SATs] because it helps them with SATs. But honestly, I like the Scantrons because I can get their work back to them so much more quickly. I have worked on those tests [Scantron format] and I can make some really good test questions. They [students] have terrible writing skills, terrible and I couldn't read it [students' answers]. Honestly! But I always put a couple of short answer [questions] on there [the test] and one long bonus question usually a bell ringer I had up [in class]. AVA: But when we were in AYP [her school did not meet AYP] and using the 7 month plan, we had to do end of the month tests and that made up three days. You had to retest if they [the students] were below a 70 [on an assessment]! You had so much time lost just reteaching the kids who didn't get it the first time and who didn't get it the time before that. It is the ones [students] who won't keep their head off the table or throwing the note across the room that you spend all this time reteaching and reassessing.

Research Subquestion #2-Eighth Grade AMSTI Science Teachers What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?
Significant Statements
AVA: Honestly, the biggest asset at first was that I got all this equipment. I actually was able to have some really good equipment for my kids. Then as I got to use it [AMSTI] more, I learned just how valuable letting them do the inquiry-based projects was. It was fantastic. Now, it has been a learning curve because I did not realize how important it was to do the labs first and then talk about with notes and lecture type things. This year, I am hitting it [inquiry learning] more that way and it is working wonderfully. It [AMSTI] is doing so much better. So, I am enjoying that. The kids change year to year (table continued)

but it is a learning process. MADELINE: For the most part, I just follow the notebook with AMSTI. I just let them get in there and learn and then at the end, we just all kind of draw a conclusion and talk about what happened. I don't ever tell them anything that is going to go on before it happens. KAITLYN: When it [an assessment or inquiry lab] says explain they give me two words. I try to always put some type of questions not all just matching/multiple-choice on the tests. I usually have just a few of some types that they have to think. MADELINE: We take one day to set up the notebook and then the next day we do the lab and our conclusion. That way, it is not just so much all the time, because I find that if you do a lab every single day a lot of times they will rush through it. They are not thinking about the other and it is easier on me if I know what days you are going to do lab, and what days you are not. That way, you are not pulling out resources for every single day. KAITLYN: Usually what I do is put the objective [from the Course of Study and standardized tests] in a question type. I may model it [inquiry lab]. Because they don't want to read the directions, I will circulate constantly. I am constantly moving from one table to the other with them, asking them if they have any questions. I always want to get feedback from their group not just depend on me. BRAYDEN: In the eighth grade, they start with a question, and they go through the science, put down the question, then go to the hypothesis, and then we start the inquiry and go through it. It [the AMSTI lessons] builds one lesson goes on another and so once they have done it in lesson one and lesson six and use the data you collected in lesson on, to work problems and figure out what you are doing. It is amazing to see how they retain the knowledge of what to do and then to be able to apply it. AVA: We usually set up our labs together [the AMSTI science 8 teachers at this school]. I will have a bell ringer on the board that says read the first two pages. They [students] start off a lesson with what do you think if and it [AMSTI student resources book] has a picture for them to look at and things like that. I usually say to come up with your own questions and your own hypothesis. Just create them on your own and put them in your bell ringers. They come away and we talk about it. We'll always have a purpose of what your goal is to learn in this lab. Then, we do it [the lab report] together. We do our own lab report all together because this is one of the things that I do a little bit differently from AMSTI to keep them all together because then you have six different labs going. I put it in the bell ringer for them to do that so they get the experience and the practice developing this and then when I put mine up there, they can see how far off they were, what the goal was that they should have been looking at, and they get closer to doing that and it helps keep their lab structured. Step one, start with your AMSTI lab and I turn them loose. My special education students, we usually do it all together step by step. We go through [the inquiry] because it is not purely inquiry learning, it is more guided inquiry. AVA: It [AMSTI student resource book] takes them step by step in how to set it [the lab] up. This [battery lab] is the first one [inquiry] they really get to do in here is fill the (table continued)

battery. They love that one and it is the best example I know of AMSTI. Fantastic! They go through all of it and at the end of the lab when they are doing their charts, before we write our conclusion, they have to review these reflection questions and they have to think. Once they have done all the reflecting questions and we have talked about it, I have them write their conclusion usually the next day as a bell ringer. Then we talk about the lab again and we set up for the next day. We set up [the lab], do it [the lab], talk about it [the lab and conclusions], and [take] notes. We usually spend about two-and-a-half to three-and-a-half days on each lab and it is a break neck speed. It really is. It is very quick. It is moving the kids through it but there is no way we can really cover the Course of Study if we don't do that. The kids it [inquiry learning] works. I don't slack off the scientific method but a lot of times we'll just do a scientific method every other lab just so we can get all of the concepts in. Because in three months, you have got to cover all of it. You have got to cover half of that Course of Study in three months not five [because of the amount of time testing in the spring takes]. So, it [inquiry learning] is very difficult but the kids love it! MADELINE: I use a lot of different assessments. A lot of it [assessments] is with their notebook [student generated journal]. They [students] never know what part of the notebook I am going to grade. One day it may be the hypothesis. One day it may be the conclusion. One day it may just be the parts of the lab. One day it may be I am grading every single thing in their notebook and they have notebook tests which is just me giving them questions and it should be in their notebook and they just write the answer. MADELINE: They always have one project to do out of the six weeks and there are tests built into the AMSTI book. Half of it [each test from the AMSTI resource book] is pencil/paper. So, I will do both [pencil/paper and performance assessments]. What it [performance assessments] is they are given a problem and they can use any of the materials that we have learned and the methods that we have learned and solve their problem. Then, they just have to come up with their own procedure. There is a rubric [that] is already made for you [the teacher by AMSTI]. It [the rubric] tells you to look for this and look for that. Then sometimes you can tell if the kids are getting there. MADELINE: Especially with one project, they can do the PowerPoint. They can do all sorts of things. They can do photo stories. They are so creative! When we just use pencil/paper [assessments], it restricts that [creativity]. Most of them don't know the words to write it for me to assess. So, I just like the other better [alternative assessments]. MADELINE: If I am having trouble choosing an assessment, the end of every lesson in the book [AMSTI teacher resource book] gives you 10 different ways you can assess the lesson. It may be with a worksheet. It may be with bell ringers or just questions that you ask from the seat or class discussion. Everybody learns differently and everybody communicates differently. I try to assess in different ways every day to give everybody an opportunity to know that they are learning. KAITLYN: I still on their AMSTI labs I just count them as daily grades. I still give chapter tests [textbook assessment format]. AVA: Our book [AMSTI resource book] correlates but not as smoothly [as the seventh (table continued)

grade AMSTI book]. It is out of sequence with the textbook [system adopted textbook]. If you assign something out of the textbook that is not exactly what you are studying [in AMSTI], the kids completely freak out. What I tend to do, I have some workbooks [outside resource, not AMSTI and not system adopted textbook resource] that are excellent. They are very basic how do things [work] about movements and [the] first law of motion. It [this workbook] gives diagrams and they [students] have to look at the diagrams to tell what is going on and things like that and those are really good. I try to find a couple of those a week. A lot of times, I grade for completion. I can tell by looking at what they did how well they did on it and they get the credit for it. You can always tell the ones who just aren't really trying or don't turn it in because they bomb the tests. I keep on my kids about accountability. You are responsible to yourself. I give quizzes. Today, I gave them a vocabulary quiz over two labs because they have a lot of brand new vocabularies. It is kind of a new section. I always give a unit test. Usually, I give them over four maybe five labs where there is a natural break in the information. I don't give a lot of short tests. I give notebook quizzes. It [notebook quiz] is just an accountability thing. It is five questions, you get 30 points for it and that is good [way to grade lab activities]. They have a lab quiz. That is how I grade the labs. One thing I started new this year is I have started a lab performance assessment and MIA gave me the sheet for it and it is wonderful. I've got three or four kids in a group, depending on the class size. I put their names, their group roles because I have group captains, materials managers, safety, and recorders, and how they perform [on the lab]. Are they following safety rules? Do they have the books that I told them to? Do they have their proper shoes? Is their hair pulled back? All of those kinds of things. I will take a point off for the entire group if one person messes up because the safety person should have gotten it [the violation], the group captain should have gotten it, and the materials person should have gotten it because safety goggles are a materials thing. So the poor little recorder is just along for the ride but that is three accountability things and that is what they are learning this time. At first, I wouldn't get them for it [take off points for safety violations]. I wouldn't take any points off. How they performed in lab, it is making a world of difference because all I have got to say is fix your safety violations for the timed lab [performance assessments]. I will walk around with my clipboard and I will say do you see this? When you talk, you are 1) off task, 2) not following safety procedures, and 3) you are not working cooperatively with your group. I am taking off one point right now for you doing one act of violation and they are starting to get it. I've got to drill it into them. They basically got an assessment, a very important one because if they don't do it now, will I give them fire in class next semester? No! So, I made that a huge part of their assessment right now. The only things I really grade for accuracy are the conclusions on the labs. I really look at it and their unit tests. Those are the big things for accuracy. Everything else is effort. AVA: [A lot of my assessments are] Multiple choice. Some of it is rote memory, what is this vocabulary. On my multiple choice questions, I try to make them thinking questions. That [scenarios] may be ten questions on one test. [I use] some matching [on assessments]. I may have a couple of graphs on there. Reading passages that they have (table continued)

got to figure out and apply. So, I try to put thinking questions.
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AVA: But when we were in AYP [her school did not meet AYP] and using the 7 month plan, we had to do end of the month tests and that made up three days. You had to retest if they [the students] were below a 70 [on an assessment]! You had so much time lost just reteaching the kids who didn't get it the first time and who didn't get it the time before that. It is the ones [students] who won't keep their head off the table or throwing the note across the room that you spend all this time reteaching and reassessing.
KAITLYN: Some of it [assessments] is out of textbooks [system adopted science textbooks] which my notes come from the textbooks. We [science teachers at this school] will pull some from the computer if we have done some computer activities.
KAITLYN: We [this teacher's classes] have done some computer activities [as resources for assessments] at the beginning of the year on the scientific method. If they [students] are describing something, they would know if their hypothesis would go with a procedure, and so on. They [students] have got to do a poster that goes along with their experiment with the scientific method, the question, the hypothesis, the experiments and data, and then a conclusion.
KAITLYN: We use the Course of Study and on my lesson plans I indicate which Course of Study that we are working on because we have to do that here with the STI [software grade book system]. If it [the Science Course of Study] has some key terms, I make sure that those key terms are in their notes and they are tested on those key words. Like [the word] inertia, I know that it is in the Course of Study and my system continuum [school system generated document of Science Course of Study objectives and when they are covered in the classroom]. So, I just make sure that if anything ever comes up, they [school administration] can go back and can find that I covered all those steps [objectives].
AVA: The Course of Study is my guide. And I throw in the other stuff wherever I can, pretty much. I mean, I can't do it much or I am not going to get that [the Science Course of Study] covered and that is what I am accountable for.
MADELINE: I mean, if it [Course of Study] just wants you to list, then we would talk about it a little bit maybe not necessarily go into it in much detail. Looking ahead at the Course of Study, you can tell that there are going to be gaps that will be filled before I get there. You don't necessarily have to go into as much detail as if it were to be demonstrated.
MADELINE: The resources I use of assessments are the [AMSTI] website for the most part and I will use my textbook [system adopted science textbook] to cover the objectives [from the Science Course of Study] that are not covered by AMSTI. There

(table continued)

are two objectives [on the Science Course of Study not covered in the AMSTI objectives]. If I do not think they [Science Course of Study objectives] are covered well enough, I will bring out the book [system adopted science textbook] and then sometimes I just use my chemistry books from college or go talk to my chemistry teacher from high school and she will help me. MADELINE: If I see that the kids just really aren't getting it [the science concept], I will pull some more [resources], a book or my own learning. The majority of what I use [for resources] is just the AMSTI teacher's manual and then I have to go and pull other resources. BRAYDEN: Most of our [AMSTI] units have a written test and then they have a lot of hands-on [performance tests] where they always have an observation test where they watch how to make it work. The ones [students] that may not do real well on their written tests can do the other [performance test] and then you do the grades together and average them. BRAYDEN: I used the vocabulary and I have vocabulary tests. I have generated just about a worksheet for every lesson. It goes is like a lab sheet. When we [this school] got cut to 50 to 55 minutes a class, it's hard to write down everything in the notebook. So, I generated a lab sheet to work out questions and hypotheses. It [teacher generated worksheet] has got all of that on there where all they have got to do is fill it in. BRAYDEN: I have even come up with questions on the reading [in the AMSTI resource book] that are on there like the reflection on what you have done or questions at the end. Then, it [AMSTI resource book] has got a section of the readings at the end of each lesson where they have got questions and they go through and answer. That is how I get a lot of the grade because I will just take up a lesson here and there and grade the lesson lab sheet for grades. I give vocabulary tests and of course the tests that come with AMSTI. BRAYDEN: There are lots of other books and stuff that you can get [to use as a resource]. I have got one that is a physical science workbook and it has got everything in it. It has got little worksheets that you can pull out and supplement in with it that you can take grades and stuff also. AVA: My notes. After each lab, my kids do notes [teacher generated using the AMSTI resources] and that is the test! We talk about it. So they [students] have got something concrete to go back to [when they study for tests] and here is the terminology. I do this for the ones who were absent a little simple quiz [from the teacher generated notes of the AMSTI labs]. This is something that they actually learned in the lab and I made notes on. I give worksheets which the worksheets reflect back to the notes and the notes are based on the labs. Because I tried with the notebook, I did the composition book and it didn't work [Students keep a notebook rather than a journal.]. The kids can't extrapolate that knowledge. They can't digest it. They just can't. They have got to have something written that they have copied. They take it [the notes] and we make vocabulary foldables with it and things like that. I had to show them how to write notes because they are coming to us with no [writing] skills and it is not just our school but kids from private schools, county schools and other city schools in north Alabama. It [the lack of writing (table continued)

skills] is *everywhere!* It is everywhere! It is no one school system. They don't do penmanship. You can't read their handwriting. And so, I have found that this is a necessity [to teach writing]. So now, we do the lab and we talk about the lab and take notes because they remember when you stretched it [coverage of material]. It was clicking so much better and it is working better. MADELINE: I do a lot with the AWA [Alabama Writing Assessment] to help especially the English teachers because any time you get involved writing, it definitely helps. I don't know if that is just seventh and eighth graders. They can verbally communicate the information to you but writing it down is something else and you know they know the information. You just cannot get them to write it in sentence form or get the correct words. So we work a lot on how I can communicate better from verbally to written because I think that is where their age group [eighth grade students] lacks. After every lesson, there are articles in the book [AMSTI resource book and system adopted science textbook] and we read every single article. If they bring articles into class from the newspaper or magazines they find, they bring it and share it with us. AVA: We don't have one yet [standardized test for eighth grade science for AYP]. It is coming down. I thought it was this year but I think it is next year. It will be benchmarked and piloted. Our school has been selected for the NAPE test this year, so some of my eighth graders are going to be pulled out to be tested for that. They [professional development facilitators] were showing what you need to do to prepare your kids and do an essay. They are going to pull students out and they are going to give them the equipment, and they have to create the question/hypothesis, a planned procedure, and design an experiment and conduct it. There is going to be half lab practical and half written test [for this standardized assessment]. It [this standardized test] is critical thinking and it is AMSTI. MADELINE: At our school, we were told to cover the information. It did not have to be in any particular order. I would take the guide [school system generated pacing guide of when teachers should cover each objective on the Science Course of Study] and make sure that they have covered everything. It just may not be in that order [order on the pacing guide] but I make sure that everything got covered. When we have a test or a lab, I just document where we covered the [objectives] on the continuum. With all my lesson plans, I have to write it [Science Course of Study objectives] and we have to write the grad exam [Alabama High School Graduation Exam objectives], the SAT [objectives] and any other type of exam that we are covering. AVA: I focus on this [SATs], and this is in that Course of Study with the national standards. AVA: I get some stuff out of the book [system adopted science textbook]. I have found that I prefer to make my own tests because a lot of times I don't want the definition out of the book [system adopted textbook or AMSTI resource book]. They [students] have got to do well on those SATs but they have got to understand it. If they understand it, I think they can get through it. You have got to learn to test [take standardized tests]. You have got to use those Scantrons [standardized test formats scored using an optical scanner]. You have to! Then I also have two or three short answer questions [on each (table continued)

test].

Research Subquestion #3-Eighth Grade AMSTI Science Teachers What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?
Significant Statements
KAITLYN: We use the Course of Study and on my lesson plans I indicate which Course of Study that we are working on because we have to do that here with the STI [software grade book system]. If it [the Science Course of Study] has some key terms, I make sure that those key terms are in their notes and they are tested on those key words. Like [the word] inertia, I know that it is in the Course of Study and my system continuum [school system generated document of Science Course of Study objectives and when they are covered in the classroom]. So, I just make sure that if anything ever comes up, they [school administration] can go back and can find that I covered all those steps [objectives]. MADELINE: At our school, we were told to cover the information. It did not have to be in any particular order. I would take the guide [school system generated pacing guide of when teachers should cover each objective on the Science Course of Study] and make sure that they have covered everything. It just may not be in that order [order on the pacing guide] but I make sure that everything got covered. When we have a test or a lab, I just document where we covered the [objectives] on the continuum. With all my lesson plans, I have to write it [Science Course of Study objectives] and we have to write the grad exam [Alabama High School Graduation Exam objectives], the SAT [objectives] and any other type of exam that we are covering. AVA: We try to stick to the 7 month plan [system generated document of when to cover each Science Course of Study objective] but they [students] are not [ready]. They [administration] are a little more flexible because they know we are covering our stuff. It should be pushed back [allowing more time to cover objectives]. They [students] are not abstract enough. We are flying through this stuff [Science Course of Study objectives] just trying to cover it with the kids. We try to hit the high points. MADELINE: I mean, if it [Course of Study] just wants you to list, then we would talk about it a little bit maybe not necessarily go into it in much detail. Looking ahead at the Course of Study, you can tell that there are going to be gaps that will be filled before I get there. You don't necessarily have to go into as much detail as if it were to be demonstrated. BRAYDEN: There is [AMSTI] stuff for us. It is lesson by lesson what objective from the Course of Study and everything is labeled for us. AVA: The Course of Study is my guide. And I throw in the other stuff wherever I can, pretty much. I mean, I can't do it much or I am not going to get that [the Science Course of Study] covered and that is what I am accountable for. MADELINE: I do have the national standards. I haven't used it very much because I have just now really been aware that they are there! I just really haven't talked about them that much. I can see where they are just built in with AMSTI. You don't have to (table continued)

worry a whole lot about them. AVA: I focus on this the Course of Study with the national standards [included in it]. KAITLYN: For the ones [students] that I have who are really [low achieving], I have to change how I assess them [with NCLB]. If I ask five critical thinking questions, I may tell them to choose two out of five. So I want them to be exposed to that but I don't want to make them have to do all of them. Plus, the special ed teachers tell me that it takes too long for them to do it. MADELINE: Well, the only thing that I don't like [due to NCLB] is if they are based on special ed, you have to pass them–is what we are told. I just don't think that is fair. I understand that every child is different and yes, I change my grading for them because they are not going to perform at the level that your A students are. An A for them is just a little bit different. I do adjust my grading to them but I do give them the same things and most of the time, they do fine. If they don't, I just redo it. MADELINE: I was very nervous [after NCLB] about giving them [special needs students] hands on assessments. I see that they [special needs students] get more out of it [inquiry learning] and can give me more information about what they have learned doing that than they can from just a pencil/paper test because they get confused with the wording. They have been tested so much that when they get tested hands on, it is almost like a play time and they will give you all the information you want out of it. AVA: I give the short test [with NCLB and inquiry learning]. It is twenty five questions. It is all the same choices except my autistic kids, they get two choices. But that was at the suggestion of the special ed teacher. AVA: My autistic students are not going to college. I love them but they are not going to succeed in that environment because they are not going to have those things to help them along. They can't function on that level. They just can't. I don't think it is helping them forcing them to learn this [the objectives of other students] when they can be learning practical chemistry that is going to relate to their lives after school. AVA: [Teacher is referring to a comment made by another teacher in the group regarding students who are not prepared for her grade level science class because the student has be socially passed to the next grade level for several years] I do not understand how that is legal under No Child Left Behind because the child is not being retained in the 2nd or 3rd grade where they can't read and forced to learn that knowledge, then go to the next grade and get that knowledge. Instead, they are pushed on to 4th grade and they didn't learn 3rd grade [content]! They are not going to learn 4th grade and they are not going to learn fifth grade! It [socially passing students to the next grade at the elementary level] is doing a huge disservice to the student. It is going to hurt these kids and how is that not leaving a child behind? AVA: Standardized testing is killing any joy that these kids have in school. They hate it! I mean, it is horrible and it is hard on us [teachers] because there is stuff I would love to cover besides that stuff from the law [standardized test objectives for AYP]. I mean there is stuff that I feel [is important] in science that I really can't spend a lot of time on because it is not on the item specs for a standardized test and NCLB says we have to meet AYP and AYP is decided in part based on the standardized tests. (table continued)

KAITLYN: I feel no pressures! I don't! I want them [students] to succeed. Maybe I am just too old to feel the pressures but I am not [pressured]. BRAYDEN: You don't know what all was invented [about students' standardized test scores] in that story [on AYP] that came out in the paper.

Research Subquestion #4-Eighth Grade AMSTI Science Teachers What do AMSTI science teachers find most helpful when determining assessment methods?
Significant Statements
KAITLYN: The problem [before AMSTI] was coming up with labs and they [labs] are there for me [provided by AMSTI]. AVA: Honestly, the biggest asset at first was that I got all this equipment. I actually was able to have some really good equipment for my kids. Then as I got to use it [AMSTI] more, I learned just how valuable letting them do the inquiry-based projects was. It was fantastic. MADELINE: For the most part, I just follow the notebook with AMSTI and I just try not to tell them anything about it. I just let them get in there and learn and then at the end, we just all kind of draw a conclusion and talk about what happened. KAITLYN: They just want to fly through things and even with the AMSTI I get frustrated. When it [an assessment or inquiry lab] says explain they give me two words. I try to always put some type of questions not all just matching/multiple choice on the tests. I usually have just a few of some types that they have to think. MADELINE: We take one day to set up the notebook and then the next day we do the lab and our conclusion. That way, it is not just so much all the time because I find that if you do a lab every single day a lot of times they will rush through it. They are not thinking about the other and it is easier on me if I know what days you are going to do lab, and what days you are not. That way, you are not pulling out resources for every single day. KAITLYN: Usually what I do is put the objective [from the Course of Study and standardized tests] in a question type. I may model it [inquiry lab]. Because they don't want to read the directions, I will circulate constantly. I am constantly moving from one table to the other with them, asking them if they have any questions. I always want to get feedback from their group not just depend on me. BRAYDEN: In the eighth grade, they start with a question, and they go through the science, put down the question, then go to the hypothesis, and then we start the inquiry and go through it. It [the AMSTI lessons] builds one lesson goes on another and so once they have done it in lesson one and lesson six and use the data you collected in lesson on, to work problems and figure out what you are doing. AVA: It [AMSTI student resource book] takes them step by step in how to set it [the lab] up. We set up [the lab], do it [the lab], talk about it [the lab and conclusions], and [take] notes. We usually spend about two-and-a-half to three-and-a-half days on each lab and it is a break neck speed. It is moving the kids through it but there is no way we can really cover the Course of Study if we don't do that. It is very difficult. I don't slack (table continued)

off the scientific method, but a lot of times we'll just do a scientific method every other lab just so we can get all of the concepts in. Because in three months, you have got to cover all of it. You have got to cover half of that Course of Study in three months not five [because of the amount of time testing in the spring takes]. So, it [inquiry learning] is very difficult, but the kids love it! MADELINE: I use a lot of different assessments. A lot of it [assessments] is with their notebook [student generated journal]. They [students] never know what part of the notebook I am going to grade. One day it may be the hypothesis. One day it may be the conclusion. One day it may just be the parts of the lab. One day it may be I am grading every single thing in their notebook. And they have notebook tests which is just me giving them questions and it should be in their notebook and they just write the answer. MADELINE: They always have one project to do out of the six weeks and there are tests built into the AMSTI book. Half of it [each test from the AMSTI resource book] is pencil/paper. So, I will do both [pencil/paper and performance assessments]. What it [performance assessments] is they are given a problem and they can use any of the materials that we have learned and the methods that we have learned and solve their problem. Then, they just have to come up with their own procedure. There is a rubric [that] is already made for you [the teacher by AMSTI]. It [the rubric] tells you to look for this and look for that. Then sometimes you can tell if the kids are getting there. MADELINE: Especially with one project, they can do the PowerPoint. They can do all sorts of things. They can do photo stories. They are so creative! When we just use pencil/paper [assessments], it restricts that [creativity]. Most of them don't know the words to write it for me to assess. So, I just like the other better [performance assessments]. MADELINE: If I am having trouble choosing an assessment, the end of every lesson in the book [AMSTI teacher resource book] gives you 10 different ways you can assess the lesson. It may be with a worksheet. It may be with bell ringers or just questions that you ask from the seat or class discussion. Everybody learns differently and everybody communicates differently. I try to assess in different ways every day to give everybody an opportunity to know that they are learning. KAITLYN: I still on their AMSTI labs I just count them as daily grades. I still give chapter tests [textbook assessment format]. AVA: Our book [AMSTI resource book] correlates, but not as smoothly [as the seventh grade AMSTI book]. It is out of sequence with the textbook [system adopted textbook]. What I tend to do, I have some workbooks [outside resource, not AMSTI and not system adopted textbook resource] that are excellent. They are very basic how do things [work] about movements and [the] first law of motion. It [this workbook] gives diagrams and they [students] have to look at the diagrams to tell what is going on and things like that and those are really good. I try to find a couple of those a week. I keep on my kids about accountability. You are responsible to yourself. I give quizzes. Today, I gave them a vocabulary quiz over two labs because they have a lot of brand new vocabularies. It is kind of a new section. I always give a unit test. Usually, I give them over four maybe five labs where there is a natural break in the information. I don't give a lot of short (table continued)

tests. I give notebook quizzes. It [notebook quiz] is just an accountability thing. It is five questions, you get 30 points for it and that is good. They have a lab quiz. That is how I grade the labs. One thing I started new this year is I have started a lab performance assessment and MIA gave me the sheet for it and it is wonderful. I've got three or four kids in a group, depending on the class size. I put their names and their group roles because I have group captains, materials managers, safety, and recorders, and how they perform [on the lab]. I will take a point off for the entire group if one person messes up because the safety person should have gotten it [the violation], the group captain should have gotten it, and the materials person should have gotten it because safety goggles are a materials thing. At first, I wouldn't get them for it [take off points for safety violations]. I wouldn't take any points off. How they performed in lab, it is making a world of difference because all I have got to say is fix your safety violations for the timed lab [performance assessments]. I will walk around with my clipboard and I will say do you see this? When you talk, you are 1) off task, 2) not following safety procedures, and 3) you are not working cooperatively with your group. I am taking off one point right now for you doing one act of violation and they are starting to get it. I've got to drill it into them. They basically got an assessment, a very important one because if they don't do it now, will I give them fire in class next semester? No! So, I made that a huge part of their assessment right now. The only things I really grade for accuracy are the conclusions on the labs. I really look at it and their unit tests. Those are the big things for accuracy. Everything else is effort. AVA: [A lot of my assessments are] Multiple choice. Some of it is rote memory, what is this vocabulary. On my multiple choice questions, I try to make them thinking questions. That [scenarios] may be ten questions on one test. [I use] some matching [on assessments]. I may have a couple of graphs on there. Reading passages that they have got to figure out and apply. So, I try to put thinking questions. AVA: We [teachers at this school] are encouraged to use Scantron [optical scanning formatted tests like the format of SATs] because it helps them with SATs. But honestly, I like the Scantrons because I can get their work back to them so much more quickly. I have worked on those tests [Scantron format] and I can make some really good test questions. They [students] have terrible writing skills, terrible and I couldn't read it [students' answers]. Honestly! But I always put a couple of short answer [questions] on there [the test] and one long bonus question usually a bell ringer I had up [in class]. KAITLYN: Well, I give them notes. So usually mine are teacher made tests from their notes or every once in a while I get them off the ExamPro [assessment question data bank that is part of the system adopted science textbook]. Usually on a test, I will ask them about some of these labs. The only problem I have run into is when I have students who were out for the day that we did the lab. We [AMSTI science teachers] discussed that when we were having the training, but I used either the computer [ExamPro data banks] or just getting questions from my notes. We went through and they highlight [their] notes. This is the first one [assessment] I am not giving them a study guide. I get it [assessment questions] pretty much 90% from my notes and we will also go into the AMSTI questions. (table continued)

MADELINE: I do a lot with the AWA [Alabama Writing Assessment] to help especially the English teachers because any time you get involved writing, it definitely helps. I don't know if that is just seventh and eighth graders. They can verbally communicate the information to you, but writing it down is something else and you know they know the information. You just cannot get them to write it in sentence form or get the correct words. So we work a lot on how I can communicate better from verbally to written because I think that is where their age group [eighth grade students] lacks. After every lesson, there are articles in the book [AMSTI resource book and system adopted science textbook] and we read every single article.
BRAYDEN: I used the vocabulary and I have vocabulary tests. I have generated just about a worksheet for every lesson. It goes is like a lab sheet. When we [this school] got cut to 50 to 55 minutes a class, it's hard to write down everything in the notebook. So, I generated a lab sheet to work out questions and hypotheses. It [teacher generated worksheet] has got all of that on there where all they have got to do is fill it in.
BRAYDEN: I have even come up with questions on the reading [in the AMSTI resource book] that are on there like the reflection on what you have done or questions at the end. Then, it [AMSTI resource book] has got a section of the readings at the end of each lesson where they have got questions and they go through and answer. That is how I get a lot of the grade because I will just take up a lesson here and there and grade the lesson lab sheet for grades. I give vocabulary tests and of course the tests that come with AMSTI.
BRAYDEN: There are lots of other books and stuff that you can get [to use as a resource]. I have got one that is a physical science workbook and it has got everything in it. It has got little worksheets that you can pull out and supplement in with it that you can take grades and stuff also.
AVA: My notes. After each lab, my kids do notes [teacher generated using the AMSTI resources] and that is the test! We talk about it. So they [students] have got something concrete to go back to [when they study for tests] and here is the terminology. I do this for the ones who were absent a little simple quiz [from the teacher generated notes of the AMSTI labs]. This is something that they actually learned in the lab and I made notes on. I give worksheets which the worksheets reflect back to the notes and the notes are based on the labs. Because I tried with the notebook, I did the composition book and it didn't work. The kids can't extrapolate that knowledge. They can't digest it. They just can't. They have got to have something written that they have copied. They take it [the notes] and we make vocabulary foldables with it and things like that. I had to show them how to write notes because they are coming to us with no [writing] skills and it is not just our school but kids from private schools, county schools and other city schools in north Alabama. It [the lack of writing skills] is *everywhere!* It is everywhere! It is no one school system. They don't do penmanship. You can't read their handwriting. And so, I have found that this is a necessity [to teach writing]. So now, we do the lab and we talk about the lab and take notes because they remember when you stretched it [coverage of material]. It was clicking so much better and it is working better.
AVA: We don't have one yet [standardized test for eighth grade science for AYP]. It is

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coming down. I thought it was this year, but I think it is next year. It will be benchmarked and piloted. Our school has been selected for the NAPE test this year, so some of my eighth graders are going to be pulled out to be tested for that. They [professional development facilitators] were showing what you need to do to prepare your kids and do an essay. They are going to pull students out and they are going to give them the equipment, and they have to create the question/hypothesis, a planned procedure, and design an experiment and conduct it. There is going to be half lab practical and half written test [for this standardized assessment]. It [this standardized test] is critical thinking and it is AMSTI.

KAITLYN: Some of it [assessments] is out of textbooks [system adopted science textbooks] which my notes come from the textbooks. We [science teachers at this school] will pull some from the computer if we have done some computer activities.

KAITLYN: We [this teacher's classes] have done some computer activities [as resources for assessments] at the beginning of the year on the scientific method. If they [students] are describing something, they would know if their hypothesis would go with a procedure, and so on. They [students] have got to do a poster that goes along with their experiment with the scientific method, the question, the hypothesis, the experiments and data, and then a conclusion.

MADELINE: The resources I use of assessments are the [AMSTI] website for the most part and I will use my textbook [system adopted science textbook] to cover the objectives [from the Science Course of Study] that are not covered by AMSTI. There are two objectives [on the Science Course of Study not covered in the AMSTI objectives]. If I do not think they [Science Course of Study objectives] are covered well enough, I will bring out the book [system adopted science textbook] and then sometimes I just use my chemistry books from college or go talk to my chemistry teacher from high school and she will help me.

MADELINE: If I see that the kids just really aren't getting it [the science concept], I will pull some more [resources], a book or my own learning. The majority of what I use [for resources] is just the AMSTI teacher's manual and then I have to go and pull other resources.

BRAYDEN: Most of our [AMSTI] units have a written test and then they have a lot of hands on [performance tests] where they always have an observation test where they watch how to make it work. The ones [students] that may not do real well on their written tests can do the other [performance test] and then you do the grades together and average them.

AVA: I get some stuff out of the book [system adopted science textbook]. I have found that I prefer to make my own tests because a lot of times I don't want the definition out of the book [system adopted textbook or AMSTI resource book]. They [students] have got to do well on those SATs, but they have got to understand it. If they understand it, I think they can get through it. You have got to learn to test [take standardized tests]. You have got to use those Scantrons [standardized test formats scored using an optical scanner]. You have to! Then I also have two or three short answer questions [on each test].

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KAITLYN: If it [the Science Course of Study] has some key terms, I make sure that those key terms are in their notes and they are tested on those key words. Like [the word] inertia, I know that it is in the Course of Study and my system continuum [school system generated document of Science Course of Study objectives and when they are covered in the classroom]. So, I just make sure that if anything ever comes up, they [school administration] can go back and can find that I covered all those steps [objectives].
MADELINE: When we have a test or a lab, I just document where we covered the [objectives] on the continuum. With all my lesson plans, I have to write it [Science Course of Study objectives] and we have to write the grad exam [Alabama High School Graduation Exam objectives], the SAT [objectives] and any other type of exam that we are covering.
AVA: We try to stick to the 7 month plan [system generated document of when to cover each Science Course of Study objective], but they [students] are not [ready]. They [administration] are a little more flexible because they know we are covering our stuff. It should be pushed back [allowing more time to cover objectives]. They [students] are not abstract enough. We are flying through this stuff [Science Course of Study objectives] just trying to cover it with the kids. We try to hit the high points.
MADELINE: I mean, if it [Course of Study] just wants you to list, then we would talk about it a little bit maybe not necessarily go into it in much detail. Looking ahead at the Course of Study, you can tell that there are going to be gaps that will be filled before I get there. You don't necessarily have to go into as much detail as if it were to be demonstrated.
BRAYDEN: There is [AMSTI] stuff for us. It is lesson by lesson what objective from the Course of Study and everything is labeled for us.
AVA: The Course of Study is my guide. And I throw in the other stuff wherever I can, pretty much. I mean, I can't do it much or I am not going to get that [the Science Course of Study] covered and that is what I am accountable for.
AVA: I focus on this [SATs], and this is in that Course of Study with the national standards.
KAITLYN: I would like to see expert teachers not just people from professional development tell me what it looks like on paper. I would like to go to one [a classroom] where a teacher has actually gone through the inquiry-based learning and it has worked. I would like ideas on what to do with the overactive; ADHD child and I would like to see some real life teachers. I wish we [AMSTI science teachers] had days that we could work together. We would have somebody leading of course because it would be chaotic.
KAITLYN: I would actually like to assess it [inquiry learning] more like the book [AMSTI resource book]. So far I haven't done it. I have yet to do a true test [performance test] and let that count as a true test. I would like help with actually using performance tests.
KAITLYN: I think AMSTI ought to have some updates for teachers. I wish they [AMSTI] would either have some updating in the summer where you could go to a couple days of workshops with other teachers and what they are doing/what has worked

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for them and maybe add some things in a module. I think that would be nice, also.
MADELINE: They [AMSTI] have started an assessment [database] on their [website] where they are turning AMSTI lessons into questions for the ARMT and different formats. You can go on there and download [assessment questions]. I think the teachers need to know that they can go in there and download it, and they can see how their kids can answer those questions [standardized test questions] quickly after doing labs. I think they [AMSTI teachers] will feel more comfortable doing it [assessing] then.
BRAYDEN: With AMSTI, they have come up with an assessment module where last year was the first year and you came up with questions and submitted them. They are making a test bank and you will be able to go in and pull questions out to make your own tests. I know in seventh and eighth grade, and I think they are doing it [the assessment data base] for all grades. I know in seventh and eighth grade because we actually got to help them write the questions and pull from each lesson. You could go in and pull questions and make your own tests. So, teacher would benefit from training on the data base.

APPENDIX M: INDIVIDUAL INTERVIEWS' THEMES AND UNITS

Overarching Research Question-Individual Interviews How do fifth through eighth grade Alabama Math, Science, and Technology Initiative science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes?
Units of Meaning
The lived experiences of AMSTI science teachers during their assessment selection and development processes includes: 1. the use of a variety of inquiry-based and traditional assessment resources and methods including the item specifications for the ASA, SAT-10, AHSGE, and ARMT which are used in determining AYP and nontraditional assessments like performance and oral assessments. 2. the feeling pressure from several sources such as their school, community, school system, and state to meet AYP. 3. Five out of the eight AMSTI science teachers stated they had not changed their assessment selection or development processes due to NCLB.
Research Subquestion #1-Individual Interviews 1. What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?
Themes
1. Teachers use a variety of resources for assessing inquiry learning. 2. Teachers use a variety of assessment methods when assessing inquiry learning.
Research Subquestion #2-Individual Interviews What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?
Themes
1. AMSTI science teachers consider the AMSTI resources as essential components of their assessment process. 2. AMSTI science teachers consider teacher generated resources as essential components of their assessment process. 3. AMSTI science teachers consider standardized test specifications, notebooking, cooperative learning, and alternative assessments as essential components of their assessment process. 4. AMSTI science teachers consider science textbooks, the Science Course of Study, and Internet resources as essential components of their assessment process.
Research Subquestion #3-Individual Interviews What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?
Themes
1. AMSTI science teachers ranked the Science Course of Study as the most important guideline they use when determining assessments for inquiry learning. (table continued)

2. AMSTI science teachers used system pacing guides/curriculum maps as a check list for covering the objectives of the Science Course of Study. 3. AMSTI science teachers know that AMSTI includes National Science Education Standards and therefore do not worry about these Standards. 4. Teachers worry about NCLB and AYP but feel that NCLB has not affected AMSTI teachers'assessment methods.
Research Subquestion #4-Individual Interviews What do AMSTI science teachers find most helpful when determining assessment methods?
Themes
1. AMSTI science teachers found the Science Course of Study helpful when determining assessment methods. 2. AMSTI science teachers found curriculum continuums/pacing guides helpful when determining assessment methods. 3. Teachers find textbook and other outside resources helpful when determining assessment methods. 4. Teachers find the resources generated by other teachers as helpful. 5. Teachers find the objectives in the Science Course of Study helpful when determining assessment methods.

APPENDIX N: FOCUS GROUP DISCUSSIONS' THEMES AND UNITS

Overarching Research Question-Focus Group Discussions How do fifth through eighth grade Alabama Math, Science, and Technology Initiative science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes?
Units of Meaning
The lived experiences of AMSTI science teachers during their assessment selection and development processes includes: 1. the use of a variety of inquiry-based and traditional assessment resources and methods including the item specifications for the ASA, SAT-10, and ARMT which are used in determining AYP and nontraditional assessments like performance and oral assessments. 2. the feeling pressure from several sources such as their school, community, school system, and state to meet AYP. 3. five out of the eight AMSTI science teachers stated they had not changed their assessment selection or development processes due to NCLB.
Research Subquestion #1-Focus Groups 1. What is the structural design of AMSTI science teachers' lived experiences with their assessment processes?
Themes
1. AMSTI science teachers used a variety of resources for assessments such as textbooks, AMSTI laboratory and inquiry resources, and teacher generated resources. 2. AMSTI science teachers used a variety of assessment methods.
Research Subquestion #2-Focus Group Discussions What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences?
Themes
1. AMSTI science teachers considered teacher generated resources and AMSTI resources as essential components of their assessment methods. 2. AMSTI science teachers considered cooperative learning as essential components of their assessment methods. 3. AMSTI science teachers considered notebooking or journaling as essential components of their assessment methods. 4. AMSTI science teachers considered the Science Course of Study as an essential Component of their assessment methods.
Research Subquestion #3-Focus Group Discussions What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods?
Themes
1. AMSTI science teachers felt the Science Course of Study as the most important Guideline they used when determining their assessment methods. 2. AMSTI science teachers used curriculum continuums/pacing guides as checklists for (table continued)

the Science Course of Study objectives. 3. AMSTI science teachers held varied opinions on the guidelines for NCLB. 4. AMSTI science teachers believed the National Science Education Standards were embedded into the Science Course of Study and the AMSTI objectives. 5. AMSTI science teachers felt pressure from varies sources to meet AYP.
Research Subquestion #4-Focus Group Discussions What do AMSTI science teachers find most helpful when determining assessment methods?
Themes
1. AMSTI science teachers considered AMSTI resources as helpful when determining assessments. 2. AMSTI science teachers considered teacher generated resources as helpful when determining assessments 3. AMSTI science teachers considered standardized tests specifications as helpful when determining assessments. 4. AMSTI science teachers considered Internet and other supplemental resources helpful When determining assessments.

APPENDIX O: PATTERNS

Patterns of Individual Interviews, Focus Groups, and Peer Reviewers' Emerging Themes
Overarching Research Question: How do fifth through eighth grade Alabama Math, Science, and Technology Initiative science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes? Individual Interviews The lived experiences of AMSTI science teachers during their assessment selection and development processes includes: 1. the use of a variety of assessment resources and methods including the item specifications for the ASA, SAT-10, and ARMT which are used in determining AYP. 2. the feeling pressure from several sources such as their school, community, school system, and state to meet AYP but they did not describe changing their assessment selection or development processes due to NCLB. Focus Groups The lived experiences of AMSTI science teachers during their assessment selection and development processes includes: 1. the use of a variety of assessment resources and methods including the item specifications for the ASA, SAT-10, and ARMT which are used in determining AYP. 2. the feeling pressure from several sources such as their school, community, school system, and state to meet AYP but they did not describe changing their assessment selection or development processes due to NCLB. Peer Reviewers The lived experiences of AMSTI science teachers during their assessment selection and development processes includes: 1. the use of varied assessment resources and methods including the use of ARMT, SAT and other state wide tests are used as a basis for developing classroom assessment in order to incorporate the same test language, style and, format. 2. NCLB is not making a noticeable difference in the assessment methods being used the classroom. However, teachers express frustration when addressing AYP.
Research Subquestion #1: What is the structural design of AMSTI science teachers' lived experiences with their assessment processes? Individual Interviews During their assessment process, fifth through eighth grade AMSTI science teachers: 1. employed a variety of resources. 2. employed a variety of methods and formats. Focus Groups During their assessment process, AMSTI science teachers: 1. discussed the use of AMSTI laboratories and inquiry resources and teacher generated (table continued)

resources. 2. used a variety of assessment methods. Peer Reviewers During their assessment process, AMSTI science teachers: 1. used a variety of assessment methods. 2. used a variety of assessment methods.
Research Subquestion #2: What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences? Individual Interviews For their assessment methods, AMSTI science teachers communicated several essential components: 1. AMSTI assessment resources 2. Teacher generated assessment resources 3. Standardized test specifications, notebook assessments, cooperative learning assessments, and alternative assessments 4. System adopted science textbooks, the Science Course of Study, and Internet resources. Focus Groups For their assessment methods, AMSTI science teachers communicated several essential components: 1. Teacher generated resources and AMSTI resources 2. Cooperative learning and its assessment 3. Notebooking or journaling 4. The correlation of all AMSTI materials to the Science Course of Study. Peer Reviewers For their assessment methods, AMSTI science teachers communicated several essential components: 1. The use cooperative learning with rubrics or check sheets 2. Teacher made resources, AMSTI materials, and supplement materials 3. Course of Study 4. Science journals or notebooks.
Research Subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods? Individual Interviews When determining their assessment methods, AMSTI science teachers placed these meanings on their guidelines: 1. Science Course of Study as the most important guideline. 2. System Pacing Guides/Curriculum Maps/Continuums were regarded as check lists for covering the Science Course of Study or they did not regard them as a guideline for assessments at all. 3. Because the National Science Education Standards were included embedded into the (table continued)

Science Course of Study and AMSTI objectives, teachers expressed a minimal concern for them. 4. Five of the eight teachers expressed no changes in their assessment methods since NCLB while seven of the eight worry and experience pressure due to NCLB and meeting AYP. Focus Groups When determining their assessment methods, AMSTI science teachers placed these meanings on their guidelines: 1. They believed the Science Course of Study is the most important guideline for assessing inquiry learning. 2. They felt their systems' curriculum/pacing guides were only used as a checklist for Science Course of Study objectives and standardized tests specifications. 3. Five felt that NCLB had not affect on their assessment while three thy felt NCLB had tremendously affected their assessments. 4. They did not consider the National Science Education Standards because they were embedded into the Science Course of Study and the AMSTI objectives. 5. They felt pressure from their communities, schools, school systems, and the state due to the guidelines of NCLB and AYP. Peer Reviewers When determining their assessment methods, AMSTI science teachers placed these meanings on their guidelines: 1. The Science Course of Study is the most important document and they rely on AMSTI's correlation to the Science Course of Study and the national standards 2. They felt pressure due to AYP so they use standardized tests' specifications to supplement assessments. 3. They felt NCLB had a negative and positive impacts.
Research Subquestion #4: What do AMSTI science teachers find most helpful when determining assessment methods?
Individual Interviews When determining assessment methods, AMSTI science teachers found these most helpful: 1. Standardized tests' specifications. 2. Science textbooks. 3. Supplemental resources such as workbooks, Internet resources, and teacher generated resources. Focus Groups When determining assessment methods, AMSTI science teachers found these most helpful: 1. AMSTI resources fairly helpful but additional assessment resources are needed for fifth and sixth grades. 2.Teacher generated resources because AMSTI resources for fifth and sixth grade are limited. (table continued)

3. Item specifications for standardized tests.
4. Internet resources and supplemental resources such as workbooks.

Peer Reviewers

When determining assessment methods, AMSTI science teachers found these most helpful:

1) AMSTI provides good and varied assessment methods that go along with each AMSTI lesson.
2) Teachers find using teacher generated assessments allows them to use the language best suited to the student and relates to the lessons the student has performed in the AMSTI lab.
3) ARMT, SAT and other state wide tests are used as a basis for developing classroom assessment in order to incorporate the same test language, style and, format.
4) AMSTI provides readings that go along with each lesson. These supply teachers with additional assessment strategies as students keep a reading diary.
5) Most teachers utilize assessments from varied sources covering AMSTI, the textbook, vocabulary, readings, contents of the science notebooks, state wide testing objectives, etc. Teachers note that AMSTI is fairly encompassing in all of these areas.
6) Teachers that supplement AMSTI use the textbook, projects and various Internet technologies.

APPENDIX P: GRADE LEVEL PATTERNS

Patterns of Fifth Grade, Sixth Grade, Seventh Grade, and Eighth Grade Emerging Themes
Overarching Research Question: How do fifth through eighth grade Alabama Math, Science, and Technology Initiative science teachers who implement inquiry instructional methods describe their experiences in assessment selection and assessment development processes? Fifth Grade The lived experiences of AMSTI fifth grade science teachers during their assessment selection and development processes includes: 1. the use of a variety of assessment resources and methods including the item specifications for the ASA, SAT-10, and ARMT which are used in determining AYP. 2. teaches expressed feeling pressures from several sources such as their school, community, school system, and state to meet AYP but they did not describe changing their assessment selection or development processes due to NCLB. Sixth Grade The lived experiences of AMSTI sixth grade science teachers during their assessment selection and development processes includes: 1. the use of a variety of assessment resources and methods including the item specifications for the ARMT which are used in determining AYP. Sixth grade science students are not tested in science for AYP. 2. half the sixth grade science teachers discussed the way in which they had changed their assessment selection and development processes due to NCLB while the other half did not describe changing their assessment selection or development processes due to NCLB while all the sixth grade teachers expressed feeling pressures from several sources such as their school, community, school system, and state to meet AYP. Seventh Grade The lived experiences of AMSTI seventh grade science teachers during their assessment selection and development processes includes: 1. the use of a variety of assessment resources and methods including the item specifications for the ASA and SAT-10 which are used in determining AYP. 2. half the seventh grade science teachers discussed the way in which they had changed their assessment selection and development processes due to NCLB while the other half did not describe changing their assessment selection or development processes due to NCLB. All the seventh grade teachers expressed feeling pressures from several sources such as their school, community, school system, and state to meet AYP. Eighth Grade The lived experiences of AMSTI eighth grade science teachers during their assessment selection and development processes includes: 1. the use of a variety of assessment resources and methods including the item specifications for the SAT-10 which are used in determining AYP. Eighth grade science (table continued)

students are not tested in science for AYP. 2. three out of the four eighth grade science teachers discussed how they had changed their assessment selection and development processes due to NCLB while all the eighth grade teachers expressed feeling pressures from several sources such as their school, community, school system, and state to meet AYP.
Research Subquestion #2: What are the essential components of the assessment methods for inquiry learning used by science educators participating in AMSTI that result in their assessment experiences? Fifth Grade For their assessment methods, fifth grade AMSTI science teachers communicated several essential components: 1. Use of the Science Course of Study 2. Use of supplemental resources such as science textbooks and Internet resources 3. Use of standardized test specifications for the ARMT and ASA Sixth Grade For their assessment methods, sixth grade AMSTI science teachers communicated several essential components: 1. Use of AMSTI resources 2. Use of alternative assessments such as notebook tests, reading dairies, projects, PowerPoint presentations, and lab activities 3. Use of cooperative learning Seventh Grade For their assessment methods, seventh grade AMSTI science teachers communicated several essential components: 1. Use of AMSTI and teacher generated resources 2. Use of cooperative learning assessments 3. Use of notebook assessments 4. Use of standardized test specifications for the ASA and SAT-10 assessments of AYP Eighth Grade For their assessment methods, eighth grade AMSTI science teachers communicated several essential components: 1. Use to AMSTI resources 2. Use of cooperative learning assessments 3. Use of teacher generated resources 4. Use of notebook assessments 5. Use of the Science Course of Study Objectives 6. Use of standardized test formats for the AWA, SAT-10, and AHSGE
Research Subquestion #3: What meanings do AMSTI science teachers place on the guidelines they use to determine their assessment methods? When determining their assessment methods, fifth grade AMSTI science teachers placed these meanings on their guidelines: Fifth Grade (table continued)

1. Science Course of Study as the most important guideline. 2. NCLB had not changed their assessment methods but these teachers feel pressure from a variety of sources to meet AYP. 3. Because the National Science Education Standards were included embedded into the Science Course of Study and AMSTI objectives, teachers expressed a minimal concern for them. Sixth Grade When determining their assessment methods, sixth grade AMSTI science teachers placed these meanings on their guidelines: 1. They believed the Science Course of Study is the most important guideline for assessing inquiry learning. 3. Two felt that NCLB had no affect on their assessment methods while two felt NCLB had a tremendously affected their assessments. 4. They did not consider the National Science Education Standards because they were embedded into the Science Course of Study and the AMSTI objectives. 5. They felt pressure from their communities, schools, school systems, and the state due to the guidelines of NCLB and AYP. Seventh Grade When determining their assessment methods, seventh grade AMSTI science teachers placed these meanings on their guidelines: 1. The Science Course of Study is the most important document and they rely on AMSTI’s correlation to the Science Course of Study. 2. They felt pressure due to AYP so they use standardized tests’ specifications to supplement assessments but only half described actually changing their assessment methods due to NCLB. 3. They did not consider the National Science Education Standards because they were embedded into the Science Course of Study and the AMSTI objectives. Eighth Grade When determining their assessment methods, eighth grade AMSTI science teachers placed these meanings on their guidelines: 1. The Science Course of Study is the most important document and they rely on AMSTI’s correlation to the Science Course of Study 2. System generated pacing guides or continuums were only used as a checklist for covering the Science Course of Study 2. Three of the four felt pressure due to AYP and three of the four described actually changing their assessment methods due to NCLB. 3. They did not consider the National Science Education Standards because they were embedded into the Science Course of Study and the AMSTI objectives.
Research Subquestion #4: What do AMSTI science teachers find most helpful when determining assessment methods? Fifth Grade When determining assessment methods, fifth grade AMSTI science teachers found these (table continued)

most helpful: 1. Standardized tests' specifications for the ASA, SAT-10, and ARMT. 2. Supplemental resources such as workbooks, Internet resources, and teacher generated resources. Sixth Grade When determining assessment methods, sixth grade AMSTI science teachers found these most helpful: 1. AMSTI resources 2.Supplemental resources such as science textbooks, Internet resources, and teacher generated resources like rubrics, PowerPoint presentations, and tests. Seventh Grade When determining assessment methods, seventh grade AMSTI science teachers found these most helpful: 1. AMSTI resources 2. Teacher generated assessments and resources 3. Standardized test specifications for the ASA and SAT-10 4. Notebook assessments 5. Science Course of Study Eighth Grade When determining assessment methods, eighth grade AMSTI science teachers found these most helpful: 1. AMSTI resources 2. Science Course of Study 3. Teacher generated assessments and resources 4. Science textbooks 5. Notebook assessments 6. Standardized test specifications for the ASA and SAT-10 and science workbooks marginally helpful