# A DESCRIPTIVE CASE STUDY OF TEACHING AND LEARNING IN AN INNOVATIVE MIDDLE SCHOOL PROGRAM

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ABSTRACT

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The roles that students and teachers play in the classroom have everything to do with the way in which teaching and learning are approached. In programs with stakeholders from multiple educational perspectives, some of which may be in conflict with one another, the approach to teaching and learning may not be clear-cut. The purpose of this study was to create a description of how learning and teaching were conducted in a program that operated under such conditions.

The TILE program was bound by four main components: the middle school philosophy, technology integration, student achievement (in particular Arizona's Instrument to Measure Standards (AIMS)), and the National Aeronautics and Space Administration (NASA) Explorer Schools (NES). Going into the study there was some evidence, based on test scores, that the program was effective in helping students be successful on AIMS, but how the program approached teaching and learning to be successful on this was unclear. Furthermore, the role of other three components of the program had not been addressed at all.

In order to develop a description of teaching and learning in a program where these four components were the core ingredients, the researcher implemented a case study design. This case study focused on fifty-seven students, two teachers, one student teacher, and the learning environment in which they interacted. To fully develop the intricacies of the program, the researcher gathered data from a number of

sources utilizing multiple methods. The sources of the data were the teachers, the students, teacher documentation, and the learning environment. The methods for gathering data were face-to-face interviews, observations, and a questionnaire.

Although how the data of this study is connected or disconnected from the current literature concerning the four components of the TILE program are considered, an evaluation is not the purpose. The findings are to be generalized in a naturalistic manner where the reader finds personal meaning in the data. This data is "then intuitively combined with their previous experiences" (Stake & Trumbull, 1982) to be used for use in their own future experiences. The findings of this case study, therefore, cannot be determined by the researcher, but by the individual reader through the change brought to their educational practice.

# ACKNOWLEDGMENTS

These are my words
That I've never said before
I think I'm doing ok
And this is the smile
That I've never shown before
Somebody shake me 'cause I, I must be sleeping
(Lewis, 2003, track 3)

It is hard to say when I began this journey but it is fair to say that I could not have accomplished this without the many family members, supporters, and friends who have been there along the way.

Let me start by thanking the three people closest to me. Jennifer, thank you for continually supporting me, and sometimes pushing me, to finish. This has been a difficult journey, which I often wanted to quit, but you kept me going. Willow and Justice, thank you for helping me keep in mind what is truly important in life. The two of you continually inspire me to keep my idealistic vision of what public education can be.

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TABLE OF CONTENTS

**CHAPTER I: INTRODUCTION ..... 1**

Overview ..... 1
Statement of the Problem ..... 2
Purpose of the Study ..... 10
Significance of the Study ..... 11
Research Questions ..... 12
Design of the Study ..... 13
Limitations ..... 14
Definitions of Terms ..... 15
Summary ..... 16

**CHAPTER II: REVIEW OF LITERATURE ..... 17**

Introduction ..... 17
Behaviorism and Humanism ..... 18
Middle Schools ..... 29
Learning with Technology ..... 36
Student Achievement ..... 44
NASA Explorer Schools ..... 51
Intersections Among Components ..... 53
Levels of Thinking in the Classroom ..... 56
Summary ..... 62

**CHAPTER III: METHODOLOGY ..... 63**

Introduction ..... 63
Purpose of the Study ..... 63
Restatement of the Research Questions ..... 64
Case Study ..... 65
Research Design ..... 67
Summary ..... 87

**CHAPTER IV: FINDINGS ..... 89**

Introduction ..... 89
Findings Concerning the Researcher ..... 89
Restatement of the Research Questions ..... 91
Data Collection and Sources ..... 92
Planning, Implementation, and Assessment ..... 93
Classroom Activities and Interactions ..... 118
Use of Technology ..... 156
Conclusion ..... 164

**CHAPTER V: SUMMARY AND CONCLUSIONS ..... 166**

Introduction ..... 166
Summary of the Study and its Purpose ..... 167
Summary of Research Design ..... 168

Researcher as a Stakeholder ..... 171
Limitations of the Study ..... 192
Need for Further Study ..... 194
Conclusion ..... 196
Researcher Reflection and Speculation ..... 197

**REFERENCES ..... 199**

**APPENDICIES ..... 219**

Appendix A: Informed Consent and Assent ..... 219
Appendix B: Interview Protocol ..... 228
Appendix C: Class Activities Questionnaire ..... 237
Appendix D: Observation Protocol ..... 242
Appendix E: Example Lesson Plans ..... 245
Appendix F: VICS and MACI Data by Subject ..... 256
Appendix G: Bracketing Interview ..... 259
Appendix H: External Review ..... 265

LIST OF TABLES

Table 1.1. Differences Between the Behaviorist and Humanist Philosophies ..... 9

Table 2.1. The Seven Thought Processes of Bloom's Taxonomy ..... 57

Table 3.1. Research Design Plan ..... 69

Table 4.1: Comparison of Actual and Intended Focus on Testing and Grade Stress 108

Table 4.2: Comparison of Actual and Intended Focus on Enthusiasm ..... 115

Table 4.3: Comparison of Actual and Intended Focus on Independence ..... 116

Table 4.4: Comparison of Actual and Intended Focus on Divergence ..... 117

Table 4.5: Instances and Percentages of Classroom Talk and Behavior ..... 129

Table 4.6: Seconds and Percentages of Time in Classroom Talk and Behavior ..... 130

Table 4.7: Instances and Percentages of Teacher Talk using the VICS ..... 132

Table 4.8: Instances and Percentages of Teacher Behavior using the MACI ..... 132

Table 4.9: Instances and Percentages of Student Talk using the VICS ..... 134

Table 4.10: Instances and Percentages of Student Behaviors using the MACI ..... 135

Table 4.11: Types of Questions Asked in the TILE Program ..... 140

Table 4.12: Comparison of Actual and Intended Focus on Knowledge ..... 143

Table 4.13: Comparison of Actual and Intended Focus on Translation ..... 145

Table 4.14: Comparison of Actual and Intended Focus on Interpretation ..... 147

Table 4.15: Comparison of Actual and Intended Focus on Application ..... 149

Table 4.16: Comparison of Actual and Intended Focus on Analysis ..... 151

Table 4.17: Comparison of Actual and Intended Focus on Synthesis ..... 153

Table 4.18: Comparison of Actual and Intended Focus on Evaluation ..... 155

Table 4.18: Audit of Technologies available for the TILE program ..... 158

DEDICATION

To my three loves:

Jennifer, Willow, and Justice

# CHAPTER I

# INTRODUCTION

## Overview

In the fall of 2003 two middle school teachers and approximately fifty-five students in the Technology Integrated Learning Environment (TILE, a pseudonym) at Sentinel Middle School (SMS, a pseudonym) began a new program. This program was the "brain child" of one of them, and was designed to maintain a middle school philosophy (a view of education that promotes integrative and exploratory activities within a nurturing and social environment), integrate technology into the curriculum, and promote student achievement on the Arizona Instrument to Measure Standards (AIMS). At the outset, the program had applied to the National Aeronautics and Space Administration (NASA) to become one of the first fifty NASA Explorer Schools (NES). Within months of starting this new program the two teachers received word that they had been accepted.

Since its creation the program has grown to twelve teachers and three hundred thirty students. This school has been set up with the teaming structure of a middle school. Each instructional team consists of two teachers paired with fifty-five students. At the beginning of the 2005 – 2006 school year there will be three teams at both the seventh and eighth grade levels. Each teams maintains the same teachers and students for two years.

The continued growth of the program and the positive media attention it has garnered suggest that the program appears to be meeting all or part of its goals of

maintaining the middle school philosophy, integrating technology into the curriculum, promoting student achievement on AIMS, and incorporating the NES framework into the curriculum. It might be argued that the growth and media attention received have been due to the publication of higher scores on national standardized tests (Kincaid, 2004a, 2005). It appears that the program is on its way to meeting the goal of improving student achievement on the AIMS, but it is unclear whether or not the program has maintained the middle school philosophy, integrated technology into the curriculum, and/or incorporated the NES framework into classroom activities.

## Statement of the Problem

In recent decades educators, legislators, and the general public have demanded assessment at all levels when looking for ways to understand and reform the educational experience. At the national level legislation has been approved that requires states to define the standards that all students should attain by the end of their senior year in high school. Along with these standards, a tool is to be created for measuring them. It has been argued that such tools change the goal of learning within the classroom; placing the primary focus on students acquiring specific material in order to pass such tests (House, 1996). Behaviorists would argue that the purpose of such tests is to identify whether or not students have attained the specific information in their educational experiences; thus the teacher's job is to teach to the test for measured success. Educators aligning themselves with the humanistic philosophy of education, on the other hand, would question why such a goal would be desired in the

first place; they would argue that such tools have left out the most important part of the educational experience: the individual.

The fact that these two philosophies seem diametrically opposed has not stopped teachers from working toward classroom environments that support both. This study will be a description of teaching and learning in the TILE program, a program which appears to support both. This description will develop one example of how classrooms are affected by the various philosophies at work within them.

### *Background*

In the latter half of the 20th century two philosophical ideologies, among other possibilities, have influenced approaches to teaching and learning. They were born in the field of psychology, but have been adapted by educators to fit instructional strategies and outcomes. At one end of the continuum are the behaviorists. This group of philosophers believes that the goal of education is to create environments which bring about desired behaviors while stifling others (Elias & Merriam, 1995). At the other end of the continuum are the humanists. Humanists believe that there is more to the individual then the behaviors that they exhibit. They promote an educational system that promotes an individual's internal understandings as well as external behaviors (Milhollan & Forisha, 1972).

In the following section definitions of behaviorist and humanist philosophy as they relate to education will be expanded and the discussion will reveal how each of the stakeholders in the TILE program may fit into one of these two educational philosophies.

*Behaviorism*

The world view of behaviorism posits that one can only know that which has been demonstrated through behavior and that such behavior may be manipulated through proper control of stimuli (Hitt, 1969). Thus, the behaviorist goal within education is to bring about specific behaviors. These behaviors are evidence that precisely defined objectives have been accomplished. The objectives do not explain the motivation or action of teachers in the classroom, but what students do as a result of the classroom experience (Elias & Merriam, 1995). Steinberg (1980) states that an objective "does not define instruction, it defines the test of instruction" (p. 86). He goes on to point out that such language has created an association between behaviorism and standardized testing. The tests become the objectives which in turn define the manner in which teaching and learning will occur.

*Standardized tests.*

The test used to measure student achievement throughout Arizona, including those in the TILE program, is AIMS (Arizona Instrument to Measure Standards). The implementation of the AIMS test has had the effect of having all schools in the state align their instruction with the Arizona state standards in content areas (i.e. English and mathematics). By the end of the 2002-2003 school year all districts throughout the state declared that their educational assessments were in alignment with their state standards (Arizona Department of Education, 2004). Principals in the state were required to:

- provide teachers with access to the standards
- provide the teachers with instructional material aligned to the standards

- provide standards related training
- and evaluate whether standards were integrated into instructional practices

Individual classroom activities were open to personal preference as long as standards were aligned.

However, in behaviorist terms, it is not the practice of the teacher that is important; it is the behavior of the students. Students at the 3rd, 5th, 8th and high school grade levels have taken the AIMS test annually since 2000. The results have yet to show an acceptable passing rate (behavior change) among students (Kossan & Gonig, 2004).

Steinberg (1980) suggests that "if success is to be evaluated and school marks are to be given by grades on these exams, then students who care about succeeding at school and getting high marks will demand greater emphasis in their class work on preparation for such exams" (p. 92). This is supported by research describing teachers teaching to the test (Stecher & Barron, 2001), or, in other words, working with students toward the production of specific behaviors.

*Technology.*

Although AIMS seems most clearly aligned to behaviorism among the stakeholders, the use of technology in the classroom may also be aligned. Technology's original use within educational environments was for behavioral purposes. B. F. Skinner (1968) began the early work of incorporating technology into the learning environment with the introduction of programmed instruction. The purpose of programmed instruction was to lead the student through a series of activities producing a desired behavior. The benefit of such instruction was that

students could work at their own pace and that teachers were “freed from much of the mechanical and tedious classroom work” (Milhollan & Forisha, 1972, p. 76). Although the tools have changed, such instruction is still available and widely used in schools under the term of computer-assisted instruction (Lever-Duffy, McDonald, & Mizell, 2005). Computer-assisted instruction tends to focus on activities that promote specific knowledge (i.e. drill and practice).

### *Humanism*

Humanists approach the world with the view that people are in control of what they do. They are free to choose the behaviors they exhibit (Hitt, 1969). Because it is the individual and not the environment that controls the behavior, humanist put great emphasis on the subjective, conscious experiences of the individual for the synthesis of information. Whereas, behaviorists work to foster specific behaviors, humanists approach the same situation with the belief that each individual will react uniquely. Thus, “helping the learner in a personal-social definition of problems with personally relevant resolutions is the primary concern of the instructor” (Swaim, 1972, p. 24). In the humanist philosophy, instructors are considered facilitators. Their role is not to teach, but to guide the individual through the discovery process to learning. The components of the TILE program that align with this view of teaching and learning will be addressed in the following paragraphs.

#### *Middle school philosophy.*

The middle school movement has specified goals for schools working with adolescents. *This We Believe* (National Middle School Association, 2003), and

Turning Point: Preparing Americas Youth for the 21st Century (Jackson & Davis, revised 2000) are two widely referenced sources for middle school designers. They note that middle schools must have the following characteristics:

- curriculum must challenge students to meet standards while participating in integrative and exploratory activities
- should organize themselves in a manner promoting positive and supportive relationships that encourage intellectual as well as social development
- must be designed to advance student safety, health, and wellbeing
- must be staffed with educators who are experts in the field of adolescent education

The school that has these characteristics focuses on the individual student. As the humanistic philosophy suggests, the students are involved in creating personal understandings through explorations that foster individual and social development. The inclusion of experts in the field of adolescent education promotes guidance in a learning environment that is both structured and open, nurturing the child while preparing the adult.

*Technology and learning.*

Although specific uses of technology may fit in the behaviorist philosophy, more recent understanding of the successful integration of technology in teaching and learning may situate it in the humanist philosophy. Those in the field of educational technology have been working to develop appropriate strategies to introduce and utilize technology tools in the educational environment. In the field many believe that what is important is to think of technologies not as tools to supplement what we

have always done, but to think of technologies as tools to allow us to do things that we have never done (Thornburg, 1999). This viewpoint combined with the constructivist theory of learning promotes learning with technology. The constructivist theory suggests that students actively create knowledge based on past and current experiences. In learning with technology, it is suggested that students have the opportunity to interact with content, and with other individuals using the technology, and it is in this process of interaction that students develop a connection to the learning. It is argued that this connection promotes in-depth understanding and an intrinsic desire to learn (Semple, 2000). This ideology falls in line with the humanistic philosophy which promotes personal definition of problems and social interaction throughout the learning experience. In this experience the teacher acts as a facilitator and partner in learning stimulating and provoking critical thinking.

*NASA Explorer Schools.*

The NASA Explorer Schools are new to the educational stage. This program was created and is funded by NASA. The first iteration of the program began in 2003. The main goal of the program is to make mathematics, science, and technology more effective in the lives of students and teachers. The program is offered to fifty middle and elementary schools per year helping them to promote these principles through hands/minds on activities, collaborative activities, and the integration of technology (NASA Explorer Schools, 2004). Such activities promote the humanistic view of teacher as facilitator and student as the center of the learning experience.

*Conclusion*

TILE has brought together four unique entities into one program in order to create a learning environment that meets the needs of the external community (state and federal government) as well as the design of the school (middle school philosophy). The previous discussion has shared that these stakeholders hail from different and often conflicting educational philosophies. Table 1 demonstrates basic differences between the behaviorist and humanist philosophies that may emerge in educational settings. This table has been adapted from another source (see note below the table) which used alternative headings. The heading Traditional Learning Environments coincides with the behaviorist philosophy used here, while the heading New Learning Environments coincides with the term humanist philosophy.

Table 1.1.

*Differences Between the Behaviorist and Humanist Philosophies*

| **Traditional Learning Environments** | **New Learning Environments** |
|---|---|
| Teacher-centered instruction | Student – centered instruction |
| Single-sense stimulation | Multisensory stimulation |
| Single-path progression | Multipath progression |
| Single media | Multimedia |
| Isolated work | Collaborative work |
| Information delivery | Information exchange |
| Passive learning | Active/exploratory/inquiry-based |

| | |
|---|---|
| | learning |
| Factual, knowledge-based learning | Critical thinking and informed decision-making |
| Reactive response | Proactive/planned action |
| Isolated, artificial context | Authentic, real-world context |

Note. From National Educational Technology Standards for Students: Connecting Curriculum and Technology (p. 5), by the International Society for Technology in Education, 2000. Adapted with permission.

## Purpose of the Study

Each of the four components that make up the TILE program is supported by specific stakeholders. AIMS is supported by both federal and state lawmakers, the middle school philosophy is buoyed by the district administration, the school administration, and the teachers within the school, technology integration is backed by the teachers within the TILE program, and the NASA explorer Schools are sponsored by individuals within NASA and the teachers within the TILE program. These stakeholders bring with them unique ideas as to the purpose of education. Because these purposes are the result of two unique philosophies, they may be viewed as conflicting. Conflicting concepts brought together within a classroom environment have been shown on one hand to direct the focus of classroom activities toward the ideals of one stakeholder (Stecher & Barron, 2001), but in other instances have produced environments that promote a more well rounded educational experience for the students and the teachers (Vogler, 2002). Either way, learning environments are affected in one way or another by the various philosophical forces at work within

them. The purpose of this study then, is to describe teaching and learning in the TILE program.

## Significance of the Study

Research on achievement in the classroom is often relegated to the positivist approach: there are singular truths to all questions, and these truths can be verified and validated. In many cases, the truths can be verified and validated through statistical analysis. This data tends to draw clear and unmistakable conclusions. Data used for positivist research on student achievement, therefore, is taken from student performance on standardized tests (Amrein & Berliner, 2002, 2003; Braun, 2004; Carnoy & Loeb, 2002; Raymond & Hanushek, 2003). There are many within the field of educational research who contend that, although thought provoking, the data and conclusions drawn by positivist research fails to acknowledge key aspects of the achievement process. The interpretivist paradigm asserts that in complex fields such as education, the world cannot be completely determined, and that the particular setting or context in which individuals or groups are functioning is of more interest than the world at large" (Crocker, 1998, p. 6). Because interpretivists view the world in this manner, some have suggested that what truly needs to be understood is how teaching and learning are affected by all of the forces which act upon them (O'Connell Rust & Freidus, 2001, p. 9).

Each year the school district within which the TILE program operates publishes school achievement through the lens of standardized test scores (Kincaid, 2005). The individual student scores are combined to create an average. This average is presented as the school's achievement. These scores serve the purpose of

demonstrating the result of behavioral change, but fail to describe the classroom activities that brought about this change. Understanding this program is more than just accepting student success on standardized tests. This study proposes to comprehensively describe the activities, environment, and population of the TILE program.

## Research Questions

The purpose of this study is to describe teaching and learning in the TILE program. There are three primary questions that will be used as guidelines in order to answer the main research question. They are:

1. How are teaching and learning experiences planned, implemented, and assessed?
    a. Who is involved in the planning of learning objectives, methods, and assessments?
    b. How is learning assessed in the program?
    c. What are the roles of teachers and students within the TILE community? What do they look like?
2. How is the TILE environment affecting levels of thinking? (Relevant to Bloom's Taxonomy)
    a. What assignments are students expected to complete? What must they do to be successful on the assignments?
    b. What are the roles of teachers and students in discussions? What types of questions are asked?
3. How is technology used in the teaching and learning process?

a. What technologies are available within the learning environment?

b. How is technology utilized for teaching and learning by the teachers?

c. How is technology utilized for teaching and learning by the students?

## Design of the Study

Researchers approach a topic with a particular methodology, not because they necessarily prefer the methodology, but because the methodology is the best one for that instance. For this study, the case study methodology has emerged as the appropriate tool. Case study is a broad term used to identify research that includes quantitative, qualitative, and mixed-method studies. A case study is a methodology utilized when the researcher wants to fully understand a particular bounded unit (Stake, 2000) that must be explained, described, illustrated, or explored (Yin, 2003). Yin states that the case study is the best methodology to use when the question to be answered is how or why, when there is no necessary control of behavioral events, and when the study is a focus on contemporary events. How and why questions are more explanatory than other types of questions and often deal with issues that need to be explored over time. The case study allows for both the explanation and the time needed to accomplish such exploration.

The descriptive case study methodology will be used to conduct this research. Yin (1981) notes that a descriptive case study strives to document the procedures of a particular event or events. Stenhouse (1988) shares that this is an appropriate measure to employ when the researcher is working "to enrich the thinking and discourse of educators either by the development of educational theory or by the

refinement of prudence through the systematic and reflective documentation of experience" (p. 50).

In order to fully define the TILE program and answer the research questions, data will be collected from teachers, students, and assessment documents. Classrooms and the activities that occur within them will be observed, teachers and students will be interviewed, and students will be administered a questionnaire that aims to define levels of thinking in the classroom. The data from each of these items will be analyzed based on its content. The content then will be used to define the TILE program through the lens of the study questions.

## Limitations

This study has a number of limitations that will affect the data to be collected. First, the participants in this study are teachers and students in a unique program taking place at only one middle school. Because the program is in existence at the one site, the collection of data is limited to that site. Second, the participants who have agreed to take part in the study are all members of one team in the program, therefore, the description of teaching and learning may not represent the entire program. Third, the data will be collected during a three month period. This may result in the omission of particular teaching and learning activities that do not occur during that time. Finally, all observations and interviews will be conducted and analyzed by one researcher. This may limit the understanding of the data to the researchers own biases.

## Definitions of Terms

Behaviorism: This philosophical belief argues that humans are reactive organism controlled by their surrounding environment. In the field of education this often plays out as teacher directed curriculum that focuses on students demonstrating specific behaviors in the form of correct responses to stimuli given.

Case: The case in this study is the teaching and learning which occur within the learning environments of one team from the Technology Integrated Learning Environment at Sentinel Middle School.

Humanism: This philosophical belief maintains that behavior is merely the observable manifestation and product of personal internal reflection. Adapted to the field of education, this philosophy puts the student at the center of the learning experience by suggesting that the individual's personal, conscious experiences are the crux of knowledge.

Learning environment: For this study this term is used to describe the physical location(s) where teaching and learning play out.

Participants: These are the individual teachers and students of one team from the Technology Integrated Learning Environment at Sentinel Middle School

Student-centered: This is the belief that the responsibility for learning lies on the shoulders of the students. Teacher may act as facilitators, but the focus remains on the activity of learning and not teaching (Elias and Merriam, 1995).

Teacher-centered: Within this view the teacher is fully responsible for the creation of well designed lessons that promote specific knowledge and skills. The teacher is also

responsible for the creation of assessment tools that will define a change in behavior (Izumi, 2001).

Technology integration: This is the view that technology is seamlessly enmeshed within learning activities. The technology becomes a pathway to understanding; it helps to foster creativity and collaboration. The technology should be part of the overarching curriculum, not its own curriculum.

Standardized testing: National and/or state assessments used to communicate achievement levels of students.

## Summary

The TILE program has brought together two powerful yet seemingly opposing educational philosophies. The teachers and students have set out to successfully merge behaviorism and humanism and integrate technology into the learning environment. It appears they are meeting the behaviorist needs: students are demonstrating changed behavior in the form of higher scores on tests. What is not known is how teaching and learning happen in this environment. This researcher will observe and describe this aspect of the program.

The following chapter, Chapter II, will present a historical overview of behaviorism, humanism, and the components of the TILE program along with previous research that shares successes and failures of each of the components. Chapter III will be the culminating chapter and will define the research design, methodology, and tools to be used in this study.

# CHAPTER II

# REVIEW OF LITERATURE

## Introduction

Harlen and Schlapp (1998) noted that of the role of literature reviews is to inform and guide research and to provide the researcher with a background by which to interpret data. Thus, the literature review is an essential part of the research process both before and during the research. The purpose of this study is to describe the teaching and learning experiences in the TILE program. As a result, this review of literature will explore issues significant to the TILE program. Based on an understanding of the TILE program's components it is the argument of the researcher that it has created itself around the philosophical beliefs of behaviorism and humanism. The review of literature will begin with an overview of the foundational perspectives and the educational implications of the behaviorist and humanist philosophies and will be followed by the philosophical, methodological, and theoretical foundations for each of the four components that make up program: the middle school philosophy, technology integration, student achievement (in particular Arizona's Instrument to Measure Standards (AIMS)), and the National Aeronautics and Space Administration (NASA) Explorer Schools (NES).

The philosophical, methodological, and theoretical foundations will be unpacked by examining the historical roots, the underpinnings, and the research conducted on the four components of the TILE program. Once each of the components has been fleshed out, the review of literature will then examine what research has to say about the intersection of components. The review will be

completed with an examination of Bloom's Taxonomy and how it is used to understand levels of thinking in the learning environment.

## Behaviorism and Humanism

As the field of psychology has evolved into a science, multiple philosophical stances have emerged. Two of these perspectives represent models of human learning that have been the focus of deep thought and great debate for philosophers throughout the ages. One model, behaviorism, represents human beings as passive and controlled by the constant stimuli from their environment. The other model, humanism, portrays humans as fully cognizant of their surroundings and in control of their experiences (Milhollan & Forisha, 1972; Swaim, 1972). This fundamental disagreement about human nature has worked its way from psychology into the field of education.

Before moving into the following sections which explore the recent history of both the behaviorist and humanist positions and clarify how they have been incorporated in the educational environment, it is important to make clear that these two beliefs are not the definitive explanation of the field of education. Pinar, W. F., Reynolds, W. M., Slattery, P., & Taubman, P. M., (2000) contend that "school curricula are discursive formations and configurations of facts, feelings, etc., which reflect the temporality, historicity, and provisionality of knowledge" (p. 859). What this means is that the students and teachers do not work in either of the idealized educational environments described below, but rather somewhere on a continuum between these two; a continuum deeply affected by the past and presents of those in the environment.

## *Behaviorism*

### *Foundational Perspectives*

The foundations for the behaviorist philosophy appear in the works of Aristotle, and the Renaissance philosophers Hobbes, Locke, and Hume. This short history will focus on the development of behavioral psychology from the late nineteenth century forward, when the behaviorist theory became prominent in psychology through the work of Ivan Pavlov (1960), Edward Thorndike (1942), and John Watson (1930).

Behavioral psychology began with the view that an organism is controlled by its immediate environment. As psychology moved into the laboratories, research was conducted on the connection between environmental conditions, referred to as stimuli, and the response of the organism. Ivan Pavlov was one of the early researchers in this field of connectionism. Pavlov's work revolved around a study of how dogs acquired and lost the salivation reflex. From this research, the protocol for classical conditioning was developed (Pavlov, 1060): a previously neutral stimulus applied multiple times over a period of time followed by a reinforcing stimulus could produce a specific response. After the response had been conditioned, the organism would then produce the response any time the stimulus was applied with or without the reinforcing stimulus. Pavlov's research further demonstrated that the conditioning could be lost if the reinforcing stimulus was not provided with the previously neutral stimulus over multiple times (Pavlov, 1960).

While Pavlov developed the idea of classical conditioning, E. L. Thorndike (1942) was working to develop a similar theory, the stimulus-response (S-R) theory

of learning. In his work with animals, Thorndike observed that learning was a process of association. Responses were directly connected to stimulus and environment. He concluded that learning was the process of rewarding correct responses and punishing incorrect responses. Over a period of time, responses would be associated with rewards or punishments which in turn spurred the developed of a pattern of appropriate and inappropriate responses. (Thorndike, 1942). Thorndike adapted this idea for educational purposes showing that individuals could learn specific and appropriate behaviors.

Although the works of Pavlov and Thorndike have the theoretical framework of behavioral psychology, it is John B. Watson (1930) who is credited as the founder of behaviorism. He based his research on the work of Pavlov (p. 29) and came to believe that it is the examination of behavior that leads to the understanding of individuals and "that introspection can at best yield only a very meager and incomplete kind of psychology" (p. 39). He further suggests that even with such limitations, much could be learned through observation of the animals. Watson took this a step further and adapted it to human behavior. He argued for the objective study of humans through the observation of behavior. Watson's belief in psychology as a behavioral science would not be lost on his successors.

Following the early work of Pavlov, Thorndike, and Watson came B.F. Skinner. Skinner, as an idealist in behavioral psychology, argued for the removal of concepts such as meaning, spontaneity, and conscience. Skinner, furthermore, contended that self-determination was an illusion, and that individuals are passive products of external influences (Alonzo, LaCagnina, & Olsen, 1977; Swaim, 1972).

Therefore, the only attribute of the individual that was important was their physical behavior.

Physical behavior, Skinner argued, was the result of external stimulus from the individual's immediate environment (Rogers, 1983; Skinner, 1953), and was the basis of his theory for the betterment of society. Skinner claimed that each individual controls and is controlled. He suggested that society use his theory for the betterment of humankind by creating controlled conditions that produce desired behaviors (Bordin, 1981; Skinner, 1953). He maintained that control must be administered in a specific manner; that is, external stimulus must be given in the form of positive reinforcement so that the individual is not only performing in a desired way, but also conforming to what the society has deemed appropriate (Skinner, 1948). By teaching all members of a society the exact same things a happy, productive, and well-behaved society would result.

Skinner believed that teachers have the potential to redesign and better society (Swaim, 1972). He argued that the social ills of American society could not be remedied without a well structured and consistent view of learning, one based on the behaviorist perspective. The following section provides an overview of what behaviorists expect from an educational environment, followed by an examination of how behaviorism has influenced education.

*Implications for Education*

Behaviorism promotes learning as an association between stimuli and response, with the learning environment organized in a manner to ensure that specific behaviors occur (Svinicki, 1999). Such a view of learning includes the

implementation of controls to modify behavior in socially acceptable manners (Elias & Merriam, 1995; Milhollan & Forisha, 1972). The educational environment must be designed so that constant and immediate feedback is given for the desired behavior. Furthermore, the desired behavior must be clearly defined, and, if necessary, have sequential steps specified (Swaim, 1972). Finally, behaviorists focus on each individual to ensure that the desired behavior is produced, allowing each student to work toward producing the next desired behavior at her own rate (Swaim, 1972). Supporters of the behaviorist approach to education claim that the organization of material into sequential steps combined with constant and immediate feedback allows the school to provide the child a large number of desired responses (Milhollan & Forisha, 1972).

Because the goal of the behaviorist learning environment is to bring about change in student behavior, teachers must act as a controller who manipulates students toward the production of the desired behaviors. The teacher manipulates external stimuli and provides appropriate consequences to produce these responses (Swaim, 1972).

In order for the teacher to be successful in bringing about specific behavior change, they must have a clear understanding of what behavior is desired. Stienberg (1980) argues that "if we cannot specify what we would take to be appropriate evidence, then how can we justify the claim to be teaching them anything" (p. 86)? The creation of behavioral objectives helps the teacher to develop criteria for appropriate evidence. It is argued that by creating behavioral objectives, the teacher is able to specify exactly what students need to be able to do, then create a learning

environment that promotes students attaining the behavior (Steinberg, 1980). Furthermore, it is suggested that the specification of such objectives helps both the learner and instructor to have a clear understanding of what qualifies as success (Svinicki, 1999).

Not only do behavioral objectives allow the teacher and the students to know exactly what success is, they may also be used to hold teachers and students accountable for what they do in the classroom (Steinberg, 1980). Some would suggest that "a student has learned something if there is a change in behavior and if his or her response occurs again under similar circumstances" (Elias & Merriam, 1995, p. 88).

Behaviorists argue that no matter what the teacher has done in the classroom, understanding what the students have gained from that process can only be understood through the demonstration of behavioral objectives (Steinberg, 1980). Humanists on the other hand believe that the behavior is only a partial demonstration of the learning and that the remaining understanding lies within the consciousness of the individual. Their foundational perspectives and educational implications are explored in the following section.

## *Humanism*

### *Foundational Perspectives*

Like behaviorism, humanism has been espoused as the accurate structure of human nature for centuries. It can be found in the thoughts of Plato, as well as the Renaissance philosophers Leibnitz, Kant, and Herbart. In humanistic psychology an

individual is viewed as a subject in the midst of living, reacting, and changing through a reflection on self and the environment. Thus, humanism promotes the belief that behavior is the external expressions of internal complexities which cannot be known by observation alone (Alonzo, LaCagnina, & Olsen, 1977; Bugental, 1967; Combs, Popham, and Hosford, 1977).

Humanistic principals promote the significance of the individual and individual's needs. This is shared through a lens that suggests that the individual is competent to construct important choices within the limitations handed down by genetics, individual history, and the environment (Maslow, 1959). Humanists would argue that, although focused on the individual, humanism has as its overall goal a focus on society. Lamont (1997) and Swaim (1972) suggest that it is an internal awareness of self that will help individuals to create the perfect society, and that individuals can find the best in themselves by working toward the good of all.

Many clinical psychologists have agreed with the humanistic philosophy. Abraham Maslow and Carl Rogers have been at the forefront humanistic psychology. They, unlike the behavioral psychologists, studied human subjects only. They were concerned with the internal thoughts of their subjects and worked to understand individuals' perceptions of their feelings, needs, expectations, and ambitions (Alonzo, LaCagnina, & Olsen, 1977).

Maslow (1961) stated "that no theory of psychology will ever be complete that does not centrally incorporate the concept that man has his future within him, dynamically active at this present moment" (p. 59). These thoughts were the result of Maslow's (1959) work with exceptional people who he had determined to be self

actualized: an individual who has resolved the conflict between "that which he is and that which he yearns to be" (p. 130). Self actualized individuals who have met each of these criteria fail to be preoccupied by aspiration, uneasiness, or other issues that cause an individual to loose their sense of mental balance. It is these understandings which lead Maslow to believe the focus of learning should be self-actualization (Alonzo, LaCagnina, & Olsen, 1977). Through self actualization, he believed, that individuals could begin to have power over their personal responsibility. This power would help to develop a set of values by which to live. Better societies would then result from a combined set of personal values created by self actualized individuals (Nemiroff, 1992).

Rogers shared a similar theory. In his work as a clinical psychologist he came to understand that individuals often found disequilibrium between their present self and their idyllic self. Rogers theorized that this dissatisfaction with self could cause one of two issues. It could stimulate the individual to work toward the ideal self, or it could stymie the individual causing further dissatisfaction (Alonzo, LaCagnina, & Olsen, 1977; Rogers, 1967). From these experiences, Rogers began to form his theory of learning. He argued that learners who feel free to define and work toward their own goals will find more value in that which they are learning, work harder to learn it, and retain the information for longer periods of time (Nemiroff, 1992; Rogers & Freiberg, 1994). Although Rogers focus was on adults, he maintained that even as infants, individuals possess the ability to build concepts about the self, the environment, and the self in the environment. Because of this ability, Rogers firmly

believed that the individual also had the internal ability to direct their own development (Rogers, 1951).

Although contemporary educators look to Maslow and Rogers for appropriate humanist practice in the learning environment, humanists have been practicing their philosophy in the field of education for centuries. The next section describes how it has been integrated in education in the past, and how it is to be used in the present and future.

*Implications for Education*

Educators who fall within the humanist realm, such as Comenius, Rousseau, and Pestalozzi, promoted the humanistic ideals through their visions of education. In 1657 Comenius promoted "a system of education that would enhance social, emotional, spiritual, and intellectual development" (Elias & Merriam, 1995, p. 112). A hundred years later Rousseau published *Emile* (1911) and shared that teaching is an act of working with and guiding a student to self-sufficiency through a child-centered curriculum that focused on individual needs and interests. Building on Rousseau's philosophy, Pestalozzi "called for the natural, balanced, and harmonious development of all capacities of the child and spoke of the need for balanced growth of head, heart, and hand" (Schubert, 1986, p. 66).

In the three hundred fifty years since Comenius promoted the humanistic view of education, humanists have continued to focus on education as a way to develop the entire individual while upholding the interests of humanity (Elias & Merriam, 1995). They often find themselves at odds with the mainstream educational system declaring that it has two main pitfalls. First, the educational system assumes that all students

are alike and categorizes them into classes based on age. Second, educational experiences are planned and designed by teacher with a focus on disciplines while individual student needs are overlooked (Swaim, 1972). Humanistic education, on the other hand, would promote individualistic and student run curriculum.

Rogers and Maslow have argued that the goal of the educational system must be individualistic with learners working toward understanding themselves and developing their full potential as a member of society (Milhollan & Forisha, 1972; Nemiroff, 1992). A key ingredient to understanding the self is learning how to learn. Once the individual understands their own learning technique, they will be able to adapt to the change that is inevitable within society. Rogers (1994) notes that curriculum must be seen as a process for developing the individual rather than a preparation to meet externally defined goals.

In order to create a learning environment that nurtures the individual, the humanistic classroom must be student-centered. Teaching is no longer a direct act. The learner works with a facilitator. The facilitator must build up a connectedness with the learner promoting free flowing communication and acceptance between the two. The job of the facilitator is to draw out from the learner issues that are relevant to her and help the learner to internalize and find meaning in that which she is learning (Elias & Merriam, 1995; Milhollan & Forisha, 1972; Nemiroff, 1992; Rogers, 1994). The goal is to help learners define methods for finding answers that are personally meaningful (Swaim, 1972). Furthermore, humanists maintain that growth and maturity do not develop in isolation and that individual growth is

dependent upon a social environment that promotes cooperative and supportive activities (Elias & Merriam, 1995).

Rogers states that humanist education promotes "significant learning." He states "by significant learning I mean learning which is more than an accumulation of facts. It is learning which makes a difference-in the individual's behavior, in the course of action he chooses in the future, in his attitudes and his personality" (Rogers, 1961, p. 280). The focus of humanist education requires a unique view of accountability. Rogers advocated for education to focus on the process of learning rather than the diffusion of knowledge (Nemiroff, 1992). This idea is reflected in the humanist call to make evaluation, like the process of learning, student-centered. Learners are not to be focused on the end result, but rather on the continual personal and interpersonal evaluation of the process. Thus, reflective activities become a key element in the learning and evaluation process. Furthermore, humanistic education suggests that evaluation is necessary for all members of the environment, facilitator and students alike (Nemiroff, 1992).

### *Conclusion*

An individual's knowledge of human nature underpins their understanding of the purpose, technique, and evaluation of the learning process. The preceding sections have discussed the differences between the behaviorist and humanist views of education. Although it is unlikely that these two philosophical positions will ever come to an agreement on the purpose of education, teachers will perhaps have to deal with both perspectives. The following section of the literature review explores the philosophical, methodological, and theoretical foundations of the four components of

the TILE program, middle school philosophy, technology integration, student achievement, and NASA Explorer Schools, and how they align with one of these two perspectives.

## Middle Schools

### *Historical Perspectives*

Although the middle school movement seemed to explode onto the scene in the late twentieth century, it is a movement that began much earlier, when researchers were in the beginning stages of understanding human development. Among these early pioneers in human development was G. Stanley Hall. Hall's work in 1904 on the development of adolescents inspired educators to take a serious look at the deficiencies in meeting the needs of adolescents in either the elementary school or high school environments. His research suggested a child-centered learning environment that actively engaged the students in the learning process (Wiles & Bondi, 1993). This started the movement, and the junior high school, as it came to be known, was created.

By the 1940s, middle level education had not only become an entity of its own, but had become a focus of serious research and scrutiny. In 1947, Gruhn and Douglass published their vision of what middle level education should aspire to be. Among these ideals were: integration of learning among disciplines, discovery and exploratory learning, guidance programs, and socialization experiences. Decades later their framework would spur the middle school movement.

By 1963, middle level education had reached a crossroad in separating itself from the junior high school forcing William Alexander, "the father of modern day middle schools," to call for the movement from junior high schools to middle schools to begin (Powell & Van Zandt Allen, 2001). This immediately inspired harsh debate between those who favored middle schools and those who favored junior high schools. Members of the middle school movement claimed research into early adolescent development proved that physical, cognitive, and social changes of adolescents were greater than at any other point in the lifespan (Clark & Clark, 1993). Promoters maintained that the needs created by these changes in early adolescents were not and could not be met by elementary or secondary education (Wiles & Bondi, 1993, Anfara, 2003). They termed meeting the physical, cognitive, and social needs of adolescents as "developmental responsiveness." It was argued that, the middle school, unlike the junior high school which preceded it, encouraged academic success through a flexible and individualized curriculum that focused on the utilization of knowledge (Wiles & Bondi, 1993) and that such a curriculum promoted developmental responsiveness.

Advocating the idea of developmental responsiveness proved to be successful for the middle school movement. In the 1970s and 1980s junior high schools gave way to middle schools. The early 1990s continued to be successful for middle schools with junior high schools continuing their trend toward becoming middle schools and promoting an interdisciplinary curriculum, the close working of teachers in the core subjects areas (math , language arts, social studies, and science), as a way to better meet the needs of adolescents. The promotion of the interdisciplinary

curriculum was hailed by many as the pinnacle of middle school success, but was still below the idealized integrated curriculum which combined all subjects into a nonlinear program based on negotiation of learning between teacher and student (Powell & Van Zandt Allen, 2001). In the next section, the ideology promoted by the middle school movement will be defined and discussed.

### *Characteristics of a Successful Middle School*

The success of the middle school movement was not only the result of educators pushing for reform, but was also buoyed by the support of nationwide organizations and endowed foundations. These organizations and foundations helped to bring the middle school ideology to the forefront by creating and widely distributing middle school manifestos. The two most referenced of these documents are, *This We Believe* (National Middle School Association, 1982; revised 1995; 2003), and *Turning Point: Preparing Americas Youth for the 21st Century* (Jackson & Davis, 1989; revised 2000). Each defines what it is that a middle school does to empower adolescents. Their recommendations are noted below.

First, it is argued that middle schools must develop curriculum that challenges students to meet standards while participating in integrative and exploratory activities. Such activities must be experienced via multiple learning and instructional methods that simultaneously meet the needs of diverse groups and develop life long learners (Jackson & Davis, 2000; National Middle School Association, 2003). It is claimed that such instruction will engage the students by encompassing student ideas and questions into the curriculum, allowing the students to be part of the problem solving process, encouraging collaborative and cooperative learning environments,

and promoting democratic values that demonstrate the worth of all individuals. Furthermore, adolescents must be encouraged to explore areas of innate interest outside the academic core. This may include music, arts, sports, career building and others (National Middle School Association, 1996).

Second, middle schools should organize themselves in a manner promoting positive and supportive relationships that encourage intellectual as well as social development (Jackson & Davis, 2000; National Middle School Association, 2003). Such an organization is often accomplished through the development of interdisciplinary teams of two to five teachers who teach the core academic program to an academically heterogeneous group of students. Interdisciplinary teams also provide the teachers with greater opportunities to meet student needs through collaborative planning periods. Such time promotes integration and discussions of individual student needs (Powell & Van Zandt Allen, 2001; National Middle School Association, 1996).

Third, middle schools must be designed to advance student safety, health, and wellbeing (Jackson & Davis, 2000; National Middle School Association, 2003). This is often accomplished through the creation of advisory programs that aim to connect adolescents with one adult. This adult mentors the adolescents on social concerns and might include working with students on individual, peer, and family issues, as well as career planning and health maintenance. It is suggested that such programs promote positive self concepts and, on the larger scale, positive school environments (Powell & Van Zandt Allen, 2001; National Middle School Association, 1996).

Finally, middle schools must be staffed with educators who are experts in the field of adolescent education. These teachers and administrators must then have the power to decide on the appropriate activities for their students and learning environments (Jackson & Davis, 2000; Oakes, Hunter Quartz, Gong, Guiton, &Lipton, 1993; Powell & Van Zandt Allen, 2001).

Those in favor of middle schools have spent a great deal of time and effort into making sure that middle schools have a place in the American educational system. The research below addresses each of the characteristics of a middle school and describes how middle schools have fared since their inception.

### *Research on Middle School Characteristics*

Middle school research has often been conducted for the purpose of promoting a quality middle school philosophy and methodology. Much of the research conducted in the 1980s supported the goals of middle level education, but has since failed to be a sustaining factor as it was often conducted by middle level supporters who presented it in a partisan way (Mac Iver & Epstein, 1993). Beyond this, critiques have argued that support for middle schools is often based on rhetoric and not research. This has allowed the middle school movement to be weakened by opposing arguments (Mergendoller, 1993).

Quality research, however, is available on the progress of the middle school movement. It notes that by the mid 1990s middle schools far outnumbered junior high schools in the United States. The research further indicates that although schools have changed in name, they have failed to embrace the ideology of a fully integrated learning environment (Anfara, 2003; Powell & Van Zandt Allen, 2001,

Clark & Clark, 1993). Gorwood (1994) believes that among the greatest flaws within the middle school environment is the disagreement between theory and practice. Practitioners often go about their work without regard to the theory and student achievement suffers. In the cases of schools that have changed name, and/or have few structural changes, it has been found that student achievement is lessened (Davis 2001).

Not all middle schools have failed to make the complete change from junior high school to middle school. The research on schools that have fully embraced the middle school ideology have shown an increase in overall achievement and students' personal development (George & Shewey, 1994) and have, furthermore, shown progress in achievement in individual subjects (Vars, 1996).

The research on homogeneous grouping by academic ability in core teams states that it often promotes more learning by the students, especially in math courses. On the other hand, such grouping also promotes a decreased motivation and opportunity to learn for those in lower ability groups (Mac Iver & Epstein, 1993). If the individuals' psychosocial growth is disregarded, this research supports homogeneous grouping of students by ability level. On the other hand, it also supports the middle school philosophy of heterogeneous grouping in order to support psychologically healthy, motivated learners.

Finally, quality advisory programs have proven to be successful. Principals have reported decreased expected dropout rates (Mac Iver & Epstein, 1993). This is a clear indication that properly run middle schools may accomplish the goal of producing well balanced adolescents.

The data on middle school classroom practices across the board states that middle schools have failed to provide students with the opportunity to be academically challenged or to develop higher order thinking skills. Mac Iver & Epstein (1993) suggest that most middle school students are likely to encounter classrooms where teacher directed, drill and kill practices are the norm. Although fewer in number, in middle schools that promote "active, interactive, and discovery instructional approaches, students have higher achievement and less fear of asking questions in class" (p. 526).

One of the issues that has surfaced with regard to middle level research is the issue of discontinuity among middle school programs. Because many middle schools have failed to implement the entirety of the middle school ideology, researchers have encountered difficulty reproducing data (Oakes, et al., 1993). What is clear is that middle schools that have implemented the philosophy completely have produced more encouraging results than those that have not (Mac Iver & Epstein, 1993). Thus, if the middle school movement is to continue with its original charge of producing academically and socially well rounded students, middle schools must begin to adopt the entirety of the philosophy.

In addition to the middle school philosophy that TILE claims to be maintaining, it also claims to be supporting learning with technology. The history, philosophy, and research of learning with technology is the focus of the next section of this literature review.

## Learning with Technology

### *Historical Perspectives*

Technology is an integral part in the human cultural experience. From the first cave painting to the current hypermedia explosion, humans have utilized technology to reflect on share their understanding of their environment. The modern age of technology in education started after the turn of the twentieth century. Electricity had been harnessed and with it a plethora of new inventions followed. Two of the first inventions were a tool to capture moving pictures and a tool to display the captured moving pictures. These two items were created in Thomas Edison's laboratories, and he soon envisioned the ways that they would change the world. In 1913 Edison stated, "Books will soon be obsolete in schools. Scholars will soon be instructed through the eye. It is possible to touch every branch of human knowledge with the motion picture" (Cuban, 1986, p.11). This vision did not come true, but technology has made other changes in the way that education is conducted.

In the 1950s and 1960s education was introduced to yet another tool that would "revolutionize teaching and learning:" the programmed learning machines. These machines followed the basic rules of behaviorist theory in that learners were expected to change their behavior by being rewarded for positive behavior in trial and error activities (Semple, 2000). Learning machines served a purpose, but failed, as well, to change the overall way in which education was conducted.

When computer technology became available for use in classrooms, they were often used for individualized tutorials or "drill and kill" practice. These, much like the programmed learning machines, were utilized to ensure that students learned

specific skills and/or concepts. At the same time many in the field of education were taking notice of the cognitive view of learning. This view of learning emphasized the processing of information rather than the storage of information. This led the way to what was known as "Intelligent Tutoring Systems." The systems began by identifying the learner's initial cognitive level. It then lead the learner through the appropriate predefined information to help her/him move to the next level (Dalgarno, 2001). Soon, computers would become part of the curriculum. In the 70s and 80s, standards were created for using technology in education. These skill based standards focused on the students' ability to use the computer (Barron, Kemker, Harmes, & Kalaydjian, 2003).

Technology in education has continued to evolve and the continuum of how technology is utilized in the classroom has grown to include microcomputers and the networks that connect them. They have become places, albeit virtual, where students can communicate and share insights with others (Hung, 2001). By the time the No Child Left Behind Act of 2001 had been signed, the standards for utilizing technology in the classroom had begun to reflect the change in technology. Standards were no longer skills based, but had evolved to the use of technology as a means to demonstrate learning. Computer technology is now expected to be used for researching, analyzing, and communicating with others (Barron, et al., 2003). The National Educational Technology Standards for Students (NETS) and the theories that support them will be addressed in the following section. These will help to define the optimum strategies and methodologies behind students' use of technology in today's learning environment.

## *Standards and Theory*

There are a number of tightly held beliefs about learning with and through technology. In the above section, the concept of educational technology standards for students was introduced. Those standards will be discussed here. The theory of constructivism and its relationship to technology for learning will be presented.

### *Technology Standards*

The International Society for Technology in Education (ISTE, 2004) has developed a set of standards to guide the use of technology in public school classrooms and define proficiencies for graduating students. The broad categories of these standards are as follows:

- Basic operations and concepts
- Social, ethical, and human issues
- Technology productivity tools
- Technology communications tools
- Technology research tools
- Technology problem-solving and decision-making tools

Only two of these categories deal directly with the technology itself: Basic operations and concepts and social, ethical, and human issues. The other four standards promote technology as a pathway to understanding. They encourage creativity, collaboration, and non-linear thinking, all integral parts of the constructivist framework for learning with technology.

As the computers and networks have evolved it has become increasingly clear that the application of technology in the learning environment must change as well.

Papert (1980) began to question the classroom application of the computer. He argued that previously computer-based learning activities controlled the students learning, but that future learning activity must be controlled by the student. David Thornburg (1999) concurred and shared that what is important is not to think of technologies as tools to supplement what we have always done, but as tools to allow us to do things that we have never done.

*Constructivism*

Constructivism, which finds its roots in the humanist philosophy, is of particularly importance in the realm of educational technology. Constructivists argue, as Papert did, that learning is not linear, nor is it something that can be forced upon you; therefore, educators must reevaluate instructional methods to meet this new understanding. Constructivists also supports collaborative learning environment, believing that such environment, real or virtual, bring about new ways of conceiving concepts that might not be visualized by individuals alone (Abrami, 2001).

Constructivism supports the integration of technology in learning environments. Abrami (2001) agrees that technology meets the needs of the constructivist view by first allowing the learner to have greater interaction with the material, and then by promoting previously unavailable communications with peers and experts at distant sites. Educational technologists continue this argument by sharing that new technologies, such as hypermedia and virtual worlds, further open up access to non-linear, student-centered, collaborative environments (Semple, 2000). Activities such as computer simulations and microworlds also fit cleanly into this concept by giving learners the opportunity to explore and manipulate data with

immediate feedback. Papert (1980) argues that learners may make incorrect decisions in the process of working in these environments, but that, unlike the errors in earlier behaviorist technologies, the errors here are integral to the learning process and help the learner to redefine what they must do to be successful.

With this said, it is important to understand that these new uses of technologies are not a cure-all for what ails education. They are one of the many supplements to learning that provide a new generation of students with powerful learning opportunities (Farwick Owens, Hester, & Teale, 2002). As Semple (2000) further points out, the path described by Papert and Thornburg may prove difficult for educators to follow for, as most humans do, educators let their past experiences rule what is done and how it is done. This is well reflected in the research on learning with technology discussed below.

### *Research on Theories for Learning with Technology*

Papert (1980 and Thornburg, (1999) have set some lofty goals for the integration of technology into education. They maintain that the path to achievement for students lies in the reform of education. This may be a "hard sell" considering the poor track record of technology in education. Some have argued that technology in learning continually appears as if it will make an impact, but fails to do so (Baker, & O'Neil Jr., 2003). Part of the reason for the failure of technology may have been due to the technology gap that had plagued schools for the latter half of the twentieth century. Current research reports that there is a great deal of evidence to support that the technology gap between the wealthy and the poor appears to be closing in terms of access to technology (Baker, & O'Neil Jr., 2003).

There is conflicting support for continually push of integrating technology into learning environments. It is claimed that much of the support has arisen out of non-significant gains in student achievement (Page, 2002). Furthermore, some contend, that any such gains cannot be directly attributed to the technology as technology is integrated into the learning environment. In such a situation it becomes impossible to make an exact determination of whether technology was the cause of change, or if change was due to one of the other components; such as a change in instructional design (Abrami, 2001; Lim, 2002; Page, 2002).

In recent years, there has been a great push to place hardware in classrooms throughout the United States (U.S. Department of Education, Office of Educational Research and Improvement, 2001). Unfortunately, this has not been combined with appropriations for teachers to be trained in the use of the technology. As a result much of the technology sits collecting dust or is utilized for word processing or for games during "free time." Part of the reason for this may be that this technology was mandated and not requested by educators. (Baker, & O'Neil Jr., 2003).

This situation had some researchers expressing the need for educators to be trained in the use and integration of technology (Barnet, 2003). It is critical that teachers be schooled in the appropriate application of technology in the classroom if students are to benefit. Research has defined the following obstacles faced by educators as they move to integrate technology into the learning environment: 1) teachers are resistant to using equipment and ideas for which they have little experience, 2) teachers do not understand how certain technologies can benefit them and their students, 3) students envision the use of technology differently than the

teachers do, and 4) teachers are looking at the technologies as tools to replace old ones, not as tools that have not been available previously (Prain & Hand, 2003) It is argued that as teachers begin to understand that their responsibilities have changed from giver of information to supporter of learning. This constructivist approach promotes the computer or other technology as one tool of many that helps students to realize, assess, and marvel at their worlds (Goddard, 2002). The literature has offered that children are less afraid of technology and learn it much more rapidly than many adults. This may be the result of the technology having been available since the child's birth, whereas it was introduced to the adult during her/his adulthood. Because of this, educators must not only learn from other adults about the integration of technology, they must open their eyes to what their students have to share (Misangyi Watts, 2003).

Research on the integration of technology into the learning environment has been shown to have some positive affects. A number of studies have found that when computers are used as tutors, the students have higher gains than average on standardized tests, and those students had better grades as they progressed through their years of education (Abrami, 2001; Barnett, 2003; Page, 2002). To add to this, Page (2002) has shared that some studies showed an increase in self esteem among students involved in computer aided instruction and, furthermore, that the proper integration of technology in the classroom led to a student-centered environment that allowed for more interaction with and among students. Barnett (2003) points out that given the opportunity to use computers as tools for learning and not tutorials, the benefits to students seemed to surpass those gained by the use of the computer as a

tutor alone. Students began to use higher order thinking skills (above their grade level) and they began to take control of their own learning, staying on task, and collaborating more often. Students think differently about learning and education when they use technology. They begin to see that school is not only about mastering the subject at hand, but that the subject at hand has implications outside of the classroom (Farwick Owens, Hester, & Teale, 2002).

What we have learned from the research is that when technology is simply inserted into educational settings without making changes to the way that education is conducted, no positive changes should be expected. For technology to enhance the learning process, the design of learning activities must change to meet the current understandings of the way people learn. Learners become motivated and excited about the process of learning with computers, not when the technology is taught, but when the technology is fully integrated into well planned units of instruction (Farwick Owens, Hester, & Teale, 2002; Mellon, 1999; Misangyi Watts, 2003). As the learners are actively involved with the technology the focus moves from the technology to the ideas being studied. This brought some researchers to suggest that instruction should promote learning that is both individual and collaborative, self regulated, active, thoughtful, and efficient (Abrami, 2001; Goddard, 2002).

Abrami (2001) shares that, "while there is good evidence that some computer-based instruction can promote learning, effects established to date are limited in scope and duration; there is clearly the need for additional research as usage grows and applications evolve" (p. 115). Finally, it is important to note that while the jury is still out on whether or not good technology integration and the constructivist

approach promote student achievement; the jury is in on what poor technology integration does to student achievement: it leads to frustration and abandonment.

The role that technology and the middle school curriculum play in student achievement is of utmost importance in the TILE program and to stakeholders outside of the program. With the release of "A Nation at Risk" in 1983 the United States began its most recent journey into looking at the educational goals of American students from a national perspective (National Commission on Excellence in Education). This, combined with recent legislation, has led to many states enacting high-stakes tests to measure student achievement and promote accountability. It is to the test that this review of literature now turns.

## Student Achievement

### *Historical Perspectives*

In Europe in 1444 the first known example of student/teacher evaluation was recorded. This evaluation was a contract between a teacher and township and shared that the teacher would be paid based on student achievement. Student achievement was measured through oral examination (Scriven, Stake, & Eisner, 2000). Throughout the following five hundred years evaluations continued. Many of these looked not at students, but at how educators and schools performed their duties. By the 1930s this changed. The tide shifted and assessment tools were used to determine student achievement, to give grades, to track students, and to diagnose learning problems.

At the beginning of the 1940s Ralph Tyler was thrust to the forefront of the assessment scene with the publication of *Adventures in American education, Vol. III: Appraising and recording student progress* (Smith, Tyler, and the Evaluation Staff, 1942). This volume evaluated student attainment of goals in the Eight Year Study and is considered the birth of behavioral objectives. Within ten years Tyler had formalized his principles and by the 1970s behavioral objectives were seen as a cornerstone in assessment and instruction (Pinar, Reynolds, Slattery, & Taubman, 2000). Tyler's contributions to education went far beyond the creation of behavioral objectives. In 1963 he joined the U. S. Commissioner of Education to develop the National Assessment of Educational Progress (NAEP) project.

The NAEP, created at the request of John F. Kennedy to assess the achievements of students in the United States as a whole, was a response to the launching of the Soviet satellite Sputnik. The idea that the Russians had outpaced American schools infuriated politicians who demanded to know where our schools had gone wrong.

One of the initial goals of NAEP was to assess students across the United States. The data gathered from the assessments would then be released to the states so that they could develop curriculum to meet deficiencies. Labeling states as deficient created a backlash which resulted in the revision of the NAEP to reflect the nation as a whole. The findings of this test had no great effects until the release of A Nation at Risk (National Commission on Excellence in Education, 1983). In this pivotal report it was stated that:

> If an unfriendly power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war. As it stands, we have allowed this to happen to ourselves. We have even squandered the gains in achievement made in the wake of the Sputnik challenge. Moreover, we have dismantled essential support systems which helped make those gains possible. We have, in effect, been committing an act of unthinking, unilateral educational disarmament. (p.5)

Recommendations were then laid out by the commission:

- Strengthen requirements for graduation in basics: English, mathematics, science, social studies, and computer science
- Produce robust and measurable standards of academic performance must be developed by secondary and post secondary schools
- Require more time on learning activities
- Provide relevant professional development to the teaching profession

With this, the United States began the mission to improve achievement among K-12 students in the United States (Ravitch & Vinovskis, 1995).

Ten years after the release of A Nation at Risk, it appeared as if the changes suggested by National Commission on Excellence in Education had failed to be accomplished. To combat this problem, in 1994 the Clinton administration began to push its national reform agenda; the Educate America Act (Goals 2000) and the Improving America's Schools Act. These Acts, and the No Child Left Behind Act that would follow, gave monies to states with the expectation that each of them would

1) develop state standards to improve student achievement and 2) create assessment tools to measure this achievement (Danitz, 2000). The state of Arizona quickly began to create state standards and develop the Arizona's Instrument to Measure Standards (AIMS).

By the spring of 1999 the Arizona state standards were in place and students had taken their first AIMS test. Bowman (2000) reported the student performances on the test were "dismal" (p. 13). The unacceptably low scores (only 12 % of sophomores passed the math section of the test) on the tests caused the state board of education to move back certain graduation requirements to the 2004 school year. By 2004 passing rates had risen to nearly 40%. This passing rate left many in the field of education wondering what they could do to better student performance (Kossan & Gonig, 2004).

The fact that the last four presidential administrations have drummed up bipartisan support and have passed educational legislation requiring learning standards and the testing of these standards makes it evident that not only is there political support for such mandates, but that there is societal support for these mandates as well. The next section discusses the research on standards and the tests that measure them.

### *Research on Student Achievement, Standards, High-Stakes Testing, and Classroom Practice*

In the preface to *Raising Standards or Raising Barriers?* Orfield and Kornhaber (2001) share that a major misunderstanding of using high-stakes testing to measure the achievement of educational standards is that student scores on such tests

are not correlated to actual academic achievement. They also argue that such tests do little to improve classroom practice. Based on these arguments the research shared below describes what is known about actual academic achievement and changes to classroom practice.

In the spring of 2002 a report was released that discussed the data on the eighteen states that were then requiring that students pass a state exam for high-school graduation. In this report, Amrein and Berliner (2002, 2003) let it be known that the students' scores on these tests rarely coincided with their scores on other standardized tests. This, they argued, demonstrated that the high-stakes tests were not a valid indicator of the authentic learning desired by the American public. Amrein and Berliner are supported in their data by Neill and Gayler (2001) who found similar data and noted that their evidence also pointed out that students in states without high-stakes testing reported higher gains.

The results of the Amrein and Berliner research have been argued vigorously in the research community. Others (Braun, 2004; Carnoy & Loeb, 2002; Raymond & Hanushek, 2003) either analyzed or reanalyzed the same data as used by Amrein and Berliner and share that students did seem to perform better on other standardized tests, but that in at least one case (Carnoy & Loeb, 2002) there was no significant change in other educational outcomes. Somewhere in the middle of this argument comes the report by Manhattan Institute for Policy Research (2003) which says that high stake testing can be used to generalize student achievement, but that it should not be used for much more.

The data on student achievement is at best inconclusive at this time. What then is known about the classroom practices of educators?

We often hear of teachers "teaching to the test." Many argue that such practices are not harmful to students; others argue that they are. Kober (2002) claims that teaching to the test is not inherently bad, but that certain extreme practices are, such practices like teaching the test questions themselves is inappropriate. In fact research has shared that between 11 and 35 percent of teachers in studies have gone as far as teaching specific items on tests. On the other hand, Kober also suggests that the standards and high-stakes tests can positively affect classroom teaching. If teachers work to cover general and specific knowledge required by the standards, using methods that require both lower and higher order thinking skills, then the data retrieved from the tests can help them to realign their instruction to meet the students' and the state standard's needs. Below are two examples of specific instances in which high-stakes testing impacted teachers' practice.

Stecher and Barron (2001) set out to examine how classrooms changed when teachers were rewarded based on their students' abilities to pass high-stakes tests. In their research they found that the teachers reacted to the high-stakes test by changing their classroom behaviors/activities to meet the targets of the test. Teachers in these studies worked to develop lessons that would deliver ideas specific to the tests. They further found that such changes met the immediate tests needs, but not necessarily the intended long term goals set by the state.

Vogler's (2002) study investigated the way in which teachers' practice changed with the implementation of a high-stakes test in the state of Massachusetts.

In this study he found that teacher practice did change. A 54 question self report survey indicated that there had been a "noticeable increase in the use of open response questions, creative/critical thinking questions, problem solving activities, use of rubrics or scoring guides, writing assignments, and inquiry/investigation" (p. 39). He suggests that this is not all due to the teachers, but the design of the test itself. He argues that since the test (unlike previous versions) required higher order thinking, classroom practice had to follow suit. Such data gives a positive outlook to teaching to the test.

The research on the effect of high-stakes testing on student achievement and teacher practice is as of yet inconclusive, and as Amrein and Berliner (2002) report in their much debated study, "high-stakes testing policies are not now and may never be policies that will accomplish what they intend." If this is the case, one might ask why, then, is there so much support behind the high-stakes tests? It can be argued that the support comes from a desire by society to improve education and thereby improve children's future. These are virtuous goals, but whether or not the current trend in high-stakes testing leads to the accomplishment of them remains to be seen.

Although some departments of the federal government have mandated large scale standards and testing to improve student achievement, others have been going about it through the creation of relationships with individual schools. This document turns next to NASA's Explorer Schools program to see what this program is and how it attempts to shape learners of the future.

## NASA Explorer Schools

### *History and Philosophy of the NASA Explorer Schools Program*

The NASA Explorer Schools program (NES) is new to the field of education. During the fall of 2002 and the spring of 2003 schools (with grades 4 through 9 in them) from "diverse communities across the country" (¶ 2) submitted applications to become the first fifty schools to be accepted into the program (NASA Explorer Schools, 2004). As schools were accepted into the program a three year partnership was developed. The partnerships gave each of the schools access to new teaching resources, technology tools, content experts, and resources. The goals of NES are:

- Increase student interest and participation in science, mathematics, and technology;
- Increase student knowledge about careers in science, mathematics, and technology;
- Increase student ability to apply science, mathematics, and technology concepts;
- Increase the active participation and professional growth of educators in science, mathematics, and technology;
- Increase family involvement in student learning; and
- Increase the academic assistance for technology use by educators in schools with high populations of underserved students. (NASA Explorer Schools, 2004)

To ensure that these new schools understood the objectives of NES the teachers and administrators were required to attend a one week professional development workshop during the summer of 2003. At this workshop the participants were immersed into activities that helped them to learn educational methods and develop an action plan for their school. The teachers became more knowledgeable about hands/minds on activities, using technology for learning, collaborative activities for learning, and problem-based learning. They were able to explore NASA's educational materials and learn more about real world applications of math, science, and technology. Teams, consisting of administrators and teachers from a specific site, were created. These teams took their new knowledge and created an action plan to meet local needs in science, mathematics, or technology education.

### *Research on the NASA Explorer Schools Program*

Due to the newness of NES and the fact that it is only two years into its first three year program, there is very little research on what the program has accomplished. The one study that was found looked to determine whether or not involvement in the program had led to early achievement of the program's objectives. In the area of changing instructional practice the study looked to determine whether or not the teachers at the schools were implementing a constructivist approach. It found that although the teachers had not been completely turned into constructivists, they tended to report a constructivist philosophy of teaching, use of technology in line with the constructivist ideals, and engagement in constructivist teaching strategies. It also reported that the teachers tended to have a positive attitude about technology and above average technical skills. Although the study does show a change in approach to

teaching and attitudes about technology it does not discuss the subject of the students meeting the objective of the program (Hernandez, McGee, Kirby, Reese, & Martin, 2004).

The data shared on each of the four components of TILE, middle schools, learning with technology, student achievement, and the NASA Explorer Schools, develops a background on 1) how the component came to be, 2) what educational philosophies the stakeholders behind the component promote, and 3) what research has determined about these philosophies. In the following section the literature will be discussed that describes how each of the items works together in the TILE program.

## Intersections Among Components

Each of the components promotes its own philosophical position. When put into action in the classroom they can often be found working to support one another or in opposition to one another. The following section addresses research describing two or more of the components working within a single environment.

### *Middle Schools and Technology*

Although there is a great deal of research on the integration of technology into learning environments, the role that technology plays specifically in the middle school classroom has yet to become the focus of in-depth research. Despite this lack of focused research, the National Middle School Association (2001) has released a research summary that describes, according to them, how technology can best impact

middle level learning. They share that for technology to be successfully integrated into the middle level curriculum it must:

- Move beyond rote learning and challenge students to hone their higher order thinking skills,
- Be exploratory, allowing students to participate in what have come to be known as hands-on/minds-on activities, and
- Lend itself to a variety of teaching and learning approaches.

In order for these goals to be verified, more studies focused specifically on technology integration in the middle school must be conducted.

### *Middle Schools and Student Achievement*

According to the Arizona Education Association (2003), the AIMS test currently uses technical analysis to assure that the questions are aligned to standards and according to the Arizona Department of Education (2004) website, all school districts have aligned the curriculum to meet these standards. This infers that the method of teaching is independent of success on the AIMS or any other high-stakes exam. But what has been found points to the contrary. Much of the recent research that has evaluated the progress of middle school education has been based on standardized tests and high-stakes tests (Anfara, 2003; Powell & Van Zandt Allen, 2001). The data from these tests have shared that middle school students have yet to demonstrate mastery of standards and have provoked some schools to abandon the middle school ideology completely and move back toward a junior high school structure where the focus is on content and not the individual. Two major cities, Philadelphia and Cincinnati, have begun this process (Anfara, 2003). Despite the

evidence that has projected this outlook, George (2002) shares that "a close look reveals the act [the No Child Left Behind Act] can provide support for many practices that are the hallmark of middle level education" (p. 5). These include promoting achievement among all students and requiring highly qualified teachers for each classroom.

### *Technology and Student Achievement*

It has been suggested that the integration of technology into the classroom is at this point "being discounted in schools since these approaches to learning [process learning] may not link directly or immediately to rising test scores" (Keller & Bichelmeyer, 2004). The argument put forth here by Keller and Bichelmeyer is that because technology promotes higher order thinking, it fails to prepare students for the rote information that is tested on many standardized tests. Swain and Pearson (2003) agree that the integration of technology promotes student achievement if achievement is looked at as higher order thinking skills. Abrami (2001) questions the assumptions of these studies by sharing "there is much promise but less substance, especially long-term evidence, regarding the effective use of technology for learning" (p. 114).

While Abrami (2001) questions the long term effectiveness of technology used for higher order thinking he shares that the use of technology for drill and practice benefits students on standardized achievement tests. Others have found that even the traditional use of the technology for drill and practice can fail to enhance student scores if teachers are not trained to use the technology in this manner (Waxman & Huang, 1995). Furthermore, the same study found that a lack of training even has the potential to bring scores down. Research on the role of technology in

student achievement must be further developed before a clear understanding can be achieved.

The research on the intersections of the components of the TILE program has yet to fully explain the positive or negative impact created by integrating multiple philosophical principles in a single learning environment. The research does make it clear that within each of these learning environments the focus is on creating successful learners. The final section of this literature review will continue to focus on the development of successful learners, but through the lens of thinking and classroom questioning. The section will address the effects of questioning in the classroom, the common uses of questions in the classroom, and how classroom questioning affects the ranges of thinking.

## Levels of Thinking in the Classroom

One aspect of describing how teaching and learning occur in a classroom, is defining the "levels" of thinking in conversations among students and teachers. Studies have accomplished this by examining levels of thinking in classroom questioning based on Blooms Taxonomy. Bloom's Taxonomy was a hierarchy developed in 1956 by Bloom, Engelhart, Furst, Hill, & Krathwohl to understand and promote levels of thinking. The following section will begin with a description of that tool, followed by an overview of research conducted on the taxonomy. The last section will describe, through the lens of questions and based on Bloom's Taxonomy, what research has determined about levels of thinking in educational environments.

*Bloom's Taxonomy*

The development of Bloom's Taxonomy began in 1948. It was originally designed to assess "objectives pertaining to the recall or recognition of knowledge and the development of intellectual skills and abilities" (Bloom, 1994, p. 2). It was to be used as a framework for examinations at colleges and universities throughout the United States, but has come to be used as a general framework at all levels of education throughout many areas of the world. They began the process of developing the taxonomy by collecting large numbers of educational objectives. The objectives from the cognitive domain were divided into groups from the simplest to the most complex behavior. These groups became the six major classes of the taxonomy: knowledge, comprehension, application, analysis, synthesis, and evaluation and were split into two groups, lower thought processes and higher thought processes (See Table 2.1). In years following comprehension was split into translation and interpretation. It is the argument of Bloom, et al. (1956) that behaviors from one class can be combined to produce more complex behaviors. Because of this, they believe that the classes are in a hierarchical order with the lowest being knowledge and the highest being evaluation.

Table 2.1.

*The Seven Thought Processes of Bloom's Taxonomy*

| | |
|---|---|
| | Memory : |
| Lower Thought Process | Translation: |
| | Interpretation: |

| | |
|---|---|
| Higher Thought Process | Application: |
| | Analysis: |
| | Synthesis: |
| | Evaluation: |

Note. From Assessing instructional climate: The class activities questionnaire by Steele, J. M., 1982. Adapted with permission.

The taxonomy was based, not on theory, but on the results of sorted educational objectives (Bloom, et al., 1956). Since its release many researchers have set out to determine whether or not a hierarchy actually exists within the taxonomy. The seminal study of Bloom's Taxonomy was undertaken by Kropp, Stoker, and Bashaw (1966). In this report they detailed how the taxonomy was studied through two unique investigations. The investigators developed a set of four tests with questions in increasingly difficult order. They theorized that fewer and fewer questions would be answered correctly as students moved through the hierarchy. They were correct, but threw out the result based on a previous study (Guttman, 1953) which stated that difficulty and complexity are separate. The second investigation required Kropp, Stoker, and Bashaw to examine the complexity of questions with the same content. This investigation produced mixed results, with one of the four tests aligning to the taxonomy and the other three having one or two items out of order.

Other researchers used the data of Kropp, Stoker, and Bashaw to further define the legitimacy of the hierarchical structure. Smith (1968), Hill and MacGaw

(1981), and Hill (1984) through a number of different tests found that in general, Bloom's Taxonomy is hierarchical. Others produced mixed results. O'Hara, Snowman, and Miller (1978) showed that the hierarchy was complete with the exception of evaluation following comprehension, but later (Miller, Snowman, & O'hara, 1979) examined a subset of the data to find inconclusive results. Finally, Others (Madaus, Woods, and Nuttall, 1973) shared that there seems to be a hierarchy, but that it appears to be Y-shaped with knowledge and comprehension on the bottom, one branch for analysis, and one branch for application and synthesis.

The data points out that there is still a great deal to be learned regarding Bloom's Taxonomy. It neither confirms nor denies that there is a hierarchical structure. Seddon (1978) points out that "no one has been able to demonstrate that these properties do not exist. Conversely, no one has been able to demonstrate that they do" (p. 321). Despite the lack of firm data, educators and researchers continue to use Bloom's Taxonomy to define educational objectives and to understand levels of thinking in the classroom. The next section develops the idea of questioning in the classroom and how questioning can be used to understand levels of thinking.

### *Questioning*

Questioning is of great importance within the learning environment. Studies have shown that teacher questions consume between one-tenth and one-sixth of classroom contact time (Dunkin & Biddle, 1974). Furthermore, research indicates that the frequency of questioning can range between three and four hundred questions on a typical day (Levin & Long, 1981). There is evidence to support the extensive use of questioning in the classroom. Studies conducted by Eddinger (1985), Frase

(1967), and Gall et al. (1978) demonstrated that students who were questioned either during or after a textbook reading or lecture tended to have better performances on achievement tests than those who were not questioned at all. Furthermore, one study suggests that increasing the number of questions asked is of even greater benefit to the learner (Rosenshine, 1986).

Questions that teachers and students pose in the classroom fall on a continuum and are assessed through classification systems (i.e. Bloom's Taxonomy). Although each uses unique language, they all address thinking as a range from factual knowledge to evaluative knowledge. Thinking based around factual knowledge is considered "lower cognitive;" thinking based around evaluative knowledge is considered "higher cognitive" (Mills, Rice, Berliner, & Rosseau, 1980). Studies conducted by Gall (1984) and Wilen (1986) state that up to sixty percent of classroom questions focus on lower cognitive abilities. Gall (1970, 1984) further indicates that the remaining forty percent of questions are split evenly between those that require students to think (higher cognitive) and those that are procedural (i.e. questions on how to complete an activity). The high rate of lower cognitive questioning suggests a correlation between lower cognitive questions and student achievement based on standardized tests. Gall (1984) points out that the continual use of questions requiring one correct answer prepares students for standardized tests requiring one correct answer. The next section discusses what the research says about the use of higher level questioning to promote student achievement.

The research presented thus far suggests that questioning promotes student achievement and that most questions asked in the classroom are at the lower cognitive

level. Further research has been conducted to examine the role of higher cognitive level questioning on student achievement. A review of studies correlating student achievement to cognitive levels of questions by Rosenshine (1971) and Dunkin and Biddle (1974) produced no clear connection. This has been further supported by Winne (1979) and Samson, Strykowski, Weinstein, & Wahlberg (1987). Redfield & Rousseau (1981), on the other hand, found a moderate connection. This moderate connection has been supported through studies by Dillon (1982) and Mills, Rice, Berliner, & Rosseau (1980). Both studies reported a fifty percent correlation between the cognitive level of teacher question and student answers. One study (Foster, 1981) found a positive correlation between the cognitive level of teacher questions and student answers. Overall, the research on higher cognitive level questioning and student achievement is inconclusive.

The research above noted that lower cognitive questions are most often presented in learning environments. Wilen (1986) and Goodlad (1983) suggest this may be due to an underlying belief that education is aimed at diffusing knowledge to others and that questioning at lower cognitive levels meets this need. Furthermore, the research proposes that the implementation of higher level questioning is not clearly promoting student success. Mills et al. (1980) suggests that the results of the studies may be due to the learners not having the appropriate tools to answer higher cognitive level questions. Researchers promote training students with the appropriate tools. Others have added that teacher-centered classrooms where teacher's question up to ninety-six percent of the time remove the opportunity for students to practice

higher level cognitive answering or questioning (Gall, 1970; Graesser & Person, 1995).

Although the research has yet to declare the hierarchical structure of Bloom's Taxonomy valid, it has been used by educators for nearly fifty years as a way to define levels of thinking within the classroom. Furthermore, Bloom's Taxonomy and other systems for measuring levels of thinking in the classroom (i.e. the Guilford Structure of Intellect Model, 1967) have allowed researchers to examine classrooms and describe what levels of thought are generally targeted. This research has pinpointed specific levels of thought that are in need of more attention within the classroom.

## Summary

This chapter has explored the philosophical underpinnings of behaviorism and humanism as they relate to education. This was followed by a study of the four educational components that make up the TILE program; middle schools, learning with technology, student achievement, and the NASA Explorer Schools. Next was a discussion of the intersection of one or more of these components. Lastly, research on Bloom's Taxonomy and classroom questioning was explored. Throughout the review of literature and discovery process, key issues were brought foreword and explained. This process has brought to light the antecedents upon which the program is founded. In the following chapter this research and analysis process will be illustrated.

# CHAPTER III:

# METHODOLOGY

## Introduction

The purpose of this chapter is to define the purpose of this study, the questions to be answered, and the methods for finding those answers. The first goal of this chapter, then, is to describe the purpose of this study and the questions to be answered. The second goal is to define the methodology used in the study. The third goal is to explain the research design that was utilized within the methodology. The research design is broken down into multiple sections. It begins with a section on data collection: who, when, where, and how data were gathered. This will be followed by a section on data analysis, including methods used for interpretation of the data, the steps taken to validate the data, how the data can be used by others, and researcher biases.

## Purpose of the Study

The TILE program was designed with the belief that middle school philosophy, technology integration, standardized test preparation, and the NASA Explorer Schools principles could all work seamlessly together. The publication of higher scores on national standardized tests (Kincaid, 2004a, 2005) helped to produce an image of a program that is successful. Although increasing student achievement on standardized tests was one goal of TILE, there were other goals that had yet to be studied.

The purpose of this research was to describe teaching and learning in the TILE program. The literature on research of innovative programs in education suggests that more qualitative studies should be conducted in order to better understand what is happening within the particular learning environments. O'Connell Rust and Freidus (2001) share that to truly understand innovative programs, it is imperative to not only ask what is happening, but to observe the happenings. Investigators of innovation must elicit meaning and explanation from the participants and use these understandings to begin to stitch together a broad picture (Popkewitz, Tabachnick, & Wehlage, 1982, p. 21).

## Restatement of the Research Questions

The purpose of this study was to describe teaching and learning in the TILE program. The three primary questions that were used in this research are:

1. How are teaching and learning experiences planned, implemented, and assessed?
    a. Who is involved in the planning of learning objectives, methods, and assessments?
    b. How is learning assessed in the program?
    c. What are the roles of teachers and students in the TILE community? What do they look like?
2. How is the TILE environment affecting levels of thinking? (Relevant to Bloom's Taxonomy)
    a. What assignments are students expected to complete? What must they do to be successful on the assignments?

b. What are the roles of teachers and students in discussions? What types of questions are asked?

3. How is technology used in the teaching and learning process?
    a. What technologies are available in the learning environment?
    b. How is technology utilized for teaching and learning by the teachers?
    c. How is technology utilized for teaching and learning by the students?

## Case Study

The case study methodology fit the needs of the this inquiry, which was to describe teaching and learning in the TILE program. Stake (1995) states that the "first obligation" (p.4) in case study research is to fully develop and understand the case at hand. Case studies are chosen because the research requires the "close examination of people, topics, issues, or programs" (Hays, 2004, p. 218). Each of the preceding items would constitute a case or what is termed a "bounded system." Bounded system is the term used to define the focal point of the study (Stake, 1995). The bounded unit for this study was teaching and learning in a middle school program founded on multiple theoretical constructs.

Yin (2003) argues that the system can be studied with one of three types of case studies, depending on the purpose: exploratory case studies, explanatory case studies, and descriptive case studies. Exploratory case studies are often used to define the framework of a future study. "In this type of case study, fieldwork and data collection are undertaken prior to the final definition of study questions and hypotheses" (Yin, 2003, p. 6). Explanatory case studies, on the other hand, seek to define how and or why an experience took place. Their purpose is to suggest "clues to

possible cause-and-effect relationships" (Yin, 2003, p. 7). Because these studies sometimes suggest causality, they risk the chance of being challenged on the basis that one case does not make for a true experiment. Finally, the descriptive case study is used to develop a document that fully illuminates the intricacies of an experience (Stake, 1995). These are often used to present answers to a series of questions based on theoretical constructs (Yin, 2003).

The descriptive case study was chosen for this study for two main reasons. First, one of the goals of all case study research is to develop an understanding of the bounded system. The main purpose of this research was to develop an understanding of teaching and learning in the TILE program. Second, descriptive case studies answer questions based on theory. The descriptions of teaching and leaning developed throughout the research process will help to define the theoretical constructs under which the classrooms of the TILE program operate.

The results of the study may be used by the teachers in the TILE program to gain a better sense of what their program looks like from an outsiders point of view. They may then use this insight to adjust teaching to meet their needs. The administrator in the building where the TILE program was based may use the results to share with the community or the school board as an example of the programs available at the school. Other teachers and administrators may use the results to better understand what is happening in teaching and learning and adjust their practices as needed.

## Research Design

Yin (2003) points out that case study inquiry is only successful when built on the collection and analysis of data from multiple sources. Furthermore, he maintains that "case studies may be based on any mix of quantitative and qualitative evidence" (p. 15). The triangulation of all data, both qualitative and quantitative, should lead to an credible understanding of the case. What follows is the design of this study including the sources of data, the methods to be used in obtaining the data, how the data will be analyzed, and how the data will expose a credible representation of the TILE program.

### *Data Collection*

In December of 2005 the prospectus for this research was passed by the dissertation committee. The researcher immediately submitted documents to the Northern Arizona University Institutional Review Board (IRB). By January 10, 2006 the IRB had approved the research and the documents that would be used in it. Part of the requirements of the IRB were to receive informed consent from the teachers and the parents, and assent from the students. Parental informed consent documents were mailed to the homes of the students with self addressed, stamped, envelopes on January 10, 2006. On January 11, 2006 the researcher visited the two history classes and received consent from teachers, the student teacher, and assent from 56 of the 57 students. Within the next few weeks parental consent was received from 37 parents. A second round of parental consent forms with self addressed, stamped, envelopes was sent out on February 1, 2006. No more forms were returned.

*Population and Sample*

In its first year, the TILE program consisted of two seventh grade teachers and fifty five students. In the two years up to the time of the research, the TILE program had grown to 12 teachers and three hundred thirty students. Six of the teachers worked with one hundred sixty-five of the students at the seventh grade level; the other six teachers work with the remaining students at the eighth grade level. Each grade level had three academic teams. Each team consisted of two teachers and approximately fifty five students. The two teachers on each team taught the school's four core academic disciplines: English, mathematics, social studies (geography or American history), and general science.

Data was collected from one of the seventh grade teams. The population of the study was 57 seventh grade students from the team, two teachers and one student teacher. The teachers are both Caucasian males and the student teacher a Caucasian female. The students are both male and female, of African American, Native American, Hispanic, and Caucasian descent, and have multiple levels of academic ability.

Limiting the collection of data to one team in the TILE program helped to make the amount of data collected more manageable. Yin (2003) points out that an investigator who attempts to cover everything will soon find that they are trying to accomplish the impossible. The two teachers on the seventh grade team offered their classrooms as the sample. Furthermore, all members of the team were observed in the classroom, only ten of the students, the two teachers, and the student teacher were asked for interviews. Although each of the teachers was interviewed multiple times,

only ten students were selected to be interviewed once. The students were chosen during the observation process based on their abilities to share multiple perspectives on the TILE program.

The data was collected through participant observations, focused interviews, the Class Activities Questionnaire (Steele, 1982), and documentation. The data that resulted from the methods was both qualitative and quantitative requiring analysis that was both qualitative and quantitative. Table 3.1 may be used as a reference for a holistic picture of how data was collected, and analyzed in this study. Each of the sub-questions from the study are located in the left-hand column of the table. In line with each sub-question are the source for the data, the method for data collection, and the method of analysis.

Table 3.1.

*Research Design Plan*

| Questions | Source(s) | Method(s) | Analysis |
|---|---|---|---|
| Who is involved in the planning of learning objectives, methods, and assessments? | Teachers<br>Students | Observation<br>Interviews<br>Documents (i.e. lesson plans) | Content analysis |
| How is learning assessed in the program? | Teachers<br>Students | Observation<br>Interviews<br>Assessment Documents (i.e. lesson plans) | Content analysis |
| What are the roles of teachers and students within the TILE community? What do they look like? | Teachers<br>Students | Observation<br>Interviews<br>The Class Activities Questionnaire | Content analysis,<br>Means and Standard Deviations<br>Consistency and Direction |

| | | | |
|---|---|---|---|
| What assignments are students expected to complete? What must they do to be successful on the assignments? | Teachers<br>Students | Observation<br>Interviews<br>The Class Activities Questionnaire | Content analysis, Consistency and Direction |
| What are the roles of teachers and students in discussions? What types of questions are asked? | Teachers<br>Students | Observation<br>Interviews<br>The Class Activities Questionnaire | Content analysis, Means and Standard Deviations, Consistency and Direction |
| What technologies are available within the learning environment? | Teachers<br>Students<br>Learning Environment | Observation<br>Interviews<br>Audit of Technologies | Content analysis |
| How is technology utilized for teaching and learning by the teachers? | Teachers on the team<br>Students | Observation<br>Interviews | Content analysis |
| How is technology utilized for teaching and learning by the students? | Teachers on the team<br>Students | Observation<br>Interviews | Content analysis |

*Data Collection*

*Participant observations.*

LeCompte and Schensul (1999a) define participant observation as "a process of learning through exposure to or involvement in the day-to-day or routine activities of participants in the research setting" (p. 91). They go on to suggest that it is an essential aspect of research in the field. They point out that it allows the researcher to have an understanding of how things are organized, prioritized, what the rules of etiquette are, and how individuals relate to one another. Hays (2004) concurs with this, pointing out that observation is an important aspect of case study research,

especially in school environments where interaction could not be otherwise understood.

The literature states that although integral to the interpretivist case study, observation is of little benefit unless conducted in a well planned and sometimes scripted approach (LeCompte and Schensul, 1999a). Hays (2004) points out that observation data may be collected in both formal and informal manners. Formal matters "usually require tallies of different types of observed behavior" (p. 230). She goes on to explain that the tallies may then be used as quantitative data. Informal observations, on the other hand, allow the researcher to openly observe the environment, recording all of the intricacies within it.

All questions in this study were addressed through a combination of formal and informal observations (See Table 3.1). It is the researcher's belief that this approach helped to more fully develop the description of the environment than either would have done on their own. LeCompte and Schensul (1999a) support this assumption by suggesting that used in combination with informal observations, formal "observational activities orient the researcher to the field and enable them to begin to sort out major social and cultural dimensions in the field setting" (p. 97).

This study involved a formal protocol in which the researcher observed and recorded class activities for five minutes, three times for each class period observed (55 in total). The observations were made at the middle, beginning, and end of the class periods. During each of the five minute periods the researcher recorded the classroom interactions with an audio recorder while at the same time transcribing the interactions on the observation protocol (Appendix D). The protocol was used to

indicate teacher talk, student talk, teacher behavior, student behavior, and technologies in use. The teacher talk/student talk protocol was adapted from the revised verbal interaction category system – science (Hunter, 1974). The teacher behavior/student behavior protocol was adapted from the multidimensional analysis of classroom interaction (MACI) (Honigman, 1974).

During the 33 remaining minutes of the class, the researcher took field notes describing activities and conversations, and the classroom environment itself. The notes continued to document the behaviors by teachers and students within the environments, and detailed conversations in the environment. The following section details the days on which this data were collected using these protocol.

On January 18, 2006 the researcher went to the one of the classrooms in the TILE program. The classes that were observed during that day were the math and history classes taught by Mr. Lincoln. The researcher was back in the same classes the following day. The following week, from January 24, 2006 to January 26, 2006, the researcher observed the science and English classes taught by Mr. Kelvin. The English class was run by the student teacher Ms. Roberts. Two weeks later, the researcher was back in Mr. Lincoln's classes for three days, February 14, 2006 through February 16, 2006. Finally, one week later the researcher was back in Mr. Kelvin's classes for three days of observation, February 21, 2006 through February 23, 2006.

*Focused interviews.*

Stake (1995) proposes that "qualitative researchers take pride in discovering and portraying the multiple views of the case (p. 64). Although observations allow

for the collection of rich qualitative data as well as quantitative data, they only permit the researcher's interpretation of the environment. Stake further suggests that the "the interview is the main road to multiple realities" (p. 64). Biklen (1992) suggests that using the participant's own words can help the researcher to develop an insight of others understandings of the environment that might include feelings, insights, experiences, judgments, thoughts, and intentions.

It is not only important to discover the participant' views, but to discover the views that pertain to this study. One way of assuring the acquisition of suitable data is by conducting the interview in a conversational manner with an open-ended nature, following a protocol based on research questions (Yin, 2003). LeCompte and Schensul (1999a) further point out that "interviews follow the format of the formative theoretical framework and explore the main domains in the study, initial hypotheses, and contextual factors related to the study" (p. 123). It is important that the researcher elicit facts, opinions, and insights about specific occurrences. This must be done remembering that "when the interviewer controls the content too rigidly, when the subject cannot tell his or her story personally in his or her own words, the interview falls out of qualitative range" (Biklen, 1992, p. 97). Hence, finding a balance between data gathering and storytelling in the interview process is of utmost importance. LeCompte and Schensul (1999a) point out that a good interviewer must:

- Keep in mind how the topic relates to and illuminates the larger question asked in the study
- Determine whether the person being interviewed is staying on topic, and if not, how to reintroduce the topic

- Understand what logical connections the interviewee is making in the discussion when those connections are likely to be quite different from those of the interviewer
- Probe for meaning of terms
- Recognize when the interviewee's ideas are clearly expressed, and when they need to be elaborated to make sure that they can be understood by everyone who reads the notes or transcripts. (p. 122)

In order to have a full understanding of the TILE program, the researcher conducted focused interviews with both teachers and students, abiding by the above suggestions (See Appendix B). These interviews addressed all research questions (See Table 3.1).

Lapan (2004) states that "testing the instruments in the field is essential to their readiness for use" (p. 241). He further explains that such activities allow the beginning researcher the opportunity to practice conducting interviews. To ensure that the interview protocols were ready for use, they were first pilot tested and then field tested. On February 24, 2006 I conducted the first pilot test with a colleague who was intimate with the program. This colleague gave me some feedback on clarifying questions and suggested that I add one question to the protocol. On February 27, 2006 I worked with a second colleague to pilot test the questions. Having been a middle school teacher herself, she gave me advice on making the student interview more language appropriate. On March 6, 2006 I conducted the final pilot with an experienced interviewer. He gave me further detail on language clarification. On April 4, 2006, after the third revision of the protocol, I met with a teacher from another team in the program. She and I went through the entire protocol

after which we talked about language and confusion with the questions. Her input assured me of the protocol readiness. On April 6, 2006 I field tested the student protocol. The student and I went through the same process and his feedback made it clear that the protocol was ready. Once the pilot testing and field testing were completed the protocols were ready to be used for interviews of teachers and students from the targeted TILE team.

Based on the suggestion of my committee members I also interviewed each of the teachers one time during the week of observations in their classes. These interviews asked the teachers about specifics they were doing in their classes at the time, while the culminating interviews focused on the program as a whole.

The researcher conducted one interview each with a total of ten students. The students were chosen during the observation process based on their abilities to share multiple perspectives on the TILE program. The students are both male and female, of African American, Native American, Hispanic, and Caucasian descent, and have multiple levels of academic ability. The interviews took place during the final two weeks of April, 2006 and the first week of May, 2006. They were conducted either at lunch time or during the student's study hall. Each lasted between 18 and 25 minutes in a private conference room. The final teacher interviews were conducted during the first week of May. The interviews occurred at the end of the school day, and lasted approximately 40 minutes. Each was conducted in a private conference room. Since the interviews required the students and teachers to take time away from other activities, each were compensated for their time. The students were each given a ten dollar gift certificate to a local department store, and the teachers received a

thirty dollar gift certificate to a local restaurant. The compensation was provided after all the interviews had been conducted.

*The Class Activities Questionnaire.*

Yin (2003) and Bernard (1995) suggest that combining data collection methods from two apparently disparate fields can work to the advantage of the researcher. Furthermore, Bernard states that qualitative data combined with a good questionnaire "is hard to beat when it comes to improving the description of complex human behavior patterns and unraveling important questions about how variables interact to produce those patterns" (p. 288). Fraser (1998) points out that gathering data through validated, appropriate questionnaires can provide robust data and insight regarding teacher and student perceptions of classroom settings.

The Class Activities Questionnaire (CAQ) (Steele, 1982) was developed to supply an appraisal of classroom climate, both cognitive and affective. It was used in this study to address the questions related to levels of thinking and roles of teachers and students in the classrooms (See Table 3.1). The cognitive domain of the questionnaire is based on Bloom's Taxonomy (Bloom, et al., 1956), measuring cognition as lower thought processes and higher thought process. The affective domains assessed are classroom focus and classroom climate. The classroom focus domain describes teacher and student roles in a class based on behavior; the classroom climate domain addresses teacher and student roles based on communication in the classroom (Nielsen & Kirk, 1974).

The CAQ was administered to the students and teachers between the two set of observations on February 7, 2006. This questionnaire was completed during the

students' history classes. The researcher was on campus to oversee and collect the questionnaires. Only those students who agreed to participate, and who received parental permission, were given the questionnaire (See Appendices A and E). The questionnaire was administered to 37 of the 57 students.

*Documentation.*

The use of documentation is vital to case studies and should be used to support and/or enhance data from other sources (Yin, 2003). In this case it was used to understand how assessment was created and used in the TILE program (See Table 3.1). Furthermore, the information suggested by documents collected in the field should not be used as indication of definite finding, but rather as a source of support or the need for further research and understanding. Hatch (2002) asserts that documents "are objects that participants use in everyday activity of the context under examination" (p. 117). He adds that they can be "powerful indicators of the value systems operating within institutions (p. 117). For these reasons, LeCompte and Schensul (1999a) argue that documentation may be necessary to develop a complete understanding of the physical and social environment under study.

Stake (1995) states that just as with the gathering of observational or interview data, the collection of documents must be based on the organization of the study. While much of what happens within the TILE program can be accessed through the use of observations, interviews, and the Classroom Activities Questionnaire, understanding how learning is assessed may need further research. To accomplish this, the researcher requested from teachers and students copies of the tools used to assess learning in the classroom, and copies of the teachers' lesson plans for the days

that the researcher was present in their classrooms. These resources supported the observations as well as interviews regarding how assessment was conducted and added to the understanding of the role of teachers and students in the program.

## *Data Analysis*

Stake (1997) suggests that "the concern with qualitative case studies is that they are too subjective. Too much rides on the researcher's impressions" (p. 402). This concern is validated if those who apply the case study methodology fail to ensure a quality approach to the research and analysis processes. When studying the data of case study research, it is imperative that procedures be followed to construct a product of such quality that even the most experienced researcher has difficulty discovering fault with the findings. The section that follows outlines the data analysis measures used in developing the credible and functional findings for this research.

### *Methods for Qualitative Data*

#### *Content analysis.*

Much of the data that was collected during this research was in the form of narrative text. This text was analyzed for its content in order to explain and describe the teaching and learning environment in the TILE program. According to Bernard (1995) "content analysis is a catch-all term covering a variety of techniques for making inference from 'texts'" (p. 339). Overall, the point of content analysis is to take text data that has been gathered and reduce it into a series of variables, or patterns that may be examined (Bernard, 1995; Hatch, 2002; LeCompte and Schensul, 1999b).

The process of content analysis begins with coding. Lofland and Lofland (1995) assert that the researcher must continually ask questions about the data being collected:

- Of what topic, unit, or aspect is this an instance?
- What questions about a topic does this item of data suggest?
- What do I see going on here? What are people doing? What is happening? What kind of events are at issue here? (p. 186)

Through the questioning of data in this manner the researcher will begin to develop basic codes, or understandings of intricacies of the environment. Once these initial codes amass, they will be reexamined. This examination assesses the available codes and begins to combine, or eliminate codes that do not fit the overall scheme into focused codes (Lofland & Lofland, 1995).

Miles and Huberman (1994) define the next step in the analysis process as memoing. The focused codes are reflected on by the researcher via a memo. A memo may be any length and reflects the researcher's thoughts on a particular construct or set of constructs. This memo is then coded and stored, separate from the primary data. These memos can be reused by the researcher at a later date to understand their thinking at the time, to support future constructs, or not at all.

The processes of coding and memoing are continual throughout the data collection and data analysis processes. They define what the key components of the case are, and the researcher's growing understanding of the case over time. Although understanding the case over time is important, understanding the case from a global perspective is equally important. In order to bring all of the

information to the table at once, the researcher engages in diagramming. Diagramming exists in a number of forms. Regardless of the form used, the researcher has the data laid out before them and physically moves it around, removes data, adds notes, and organizes it into a "succinct visual display" (Lofland & Lofland, 1995). This display is the final preparation and organization before writing the report. The final report is a work in progress needing to be checked by participant and fellow researchers.

The narrative data that was collected was transcribed by the researcher and imported into the N6 program. The narrative data included transcriptions of all interviews and field notes, questions from the Classroom Activities Questionnaire (CAQ) as well as the researchers' journal. Using the N6 program, the researcher coded the documents based on their connections to the research questions. The coded data was then sorted through multiple times as the researcher developed the findings presented in chapter four. The findings were then used to develop credible answer to the research questions and explanations on the inclusion of the four core components of the program. Hays (2004) states that the researcher must be aware of the research questions at all times during the desegregation of data. This will do two things: ensure that the data will answer the questions, and keep the researcher from being sidetracked by other "interesting and exciting data" (p. 232).

*Methods for Quantitative Data*

The CAQ was developed by Steele in 1969 to measure the cognitive and affective climates within classrooms (Steele, 1982). It is an opinionnaire that is completed by both the teachers and students to invoke individual views of the

learning environment. The questions are aligned with lower and higher thought processes (based on Bloom's taxonomy of the cognitive domain), classroom focus (teacher and student roles), and classroom climate (teacher and student involvement). The following describes how each of these categories along with the tabulations gained during observations were analyzed through standard descriptive statistics.

*Scoring of the CAQ*

The CAQ came with predetermined scoring methods that had been validated by it creator and others (Steele, 1982). The researcher in this study followed these previously designed methods. Within the cognitive domains, the researcher tested for consistency and direction of response as well as the mean and standard deviation of the responses. Consistency was determined through the use of paired questions. Answers on two questions representing the same level of thinking were compared for all students. If fifty percent or more of the answer either generally agreed or disagreed, then consistency had been established. Direction was determined by examining the consistent scores for neutrality, agreement, or in disagreement with the statements. This was assessed by finding the average of the mean values for the two questions. Together these defined for the researcher what the intended focus of teaching was in the classroom and what the actual learning was in the classroom, as defined by Bloom's taxonomy. The results of the mean values were compared between instructor and students to identify possible disconnects between teacher intent student perceptions of actual occurrences. Within the affective domain, the data was analyzed for its mean and standard deviation based on one question and using the author's scores to determine neutrality, agreement or disagreement.

The CAQ is a questionnaire that has been assessed for content validity, construct validity, and reliability. Steele (1982) explains that the content validity was determined through a number of field testing and research based applications of the questionnaire. He explains that at least two-thirds of a pool of thirty teachers, fourteen administrators, six college instructors, and six college professors agreed on the classification levels of CAQ items. Steele (1982) and Wahlstrom (1971) have shown through factor analysis and cross-validation of factorial validity that the construct of the CAQ is valid. The reliability of CAQ has been surmised through data collected from 2071 individuals. The results showed that all but the paired questions for memory showed high consistency. Steele (1982) notes that "a revision of this item has resulted in increased consistency of responses" (p. 19).

*Tabulations.*

A portion of the observational data was collected in the form of tabulations. Tabulations for this study are data collected showing how much or how often teacher and student talk and behavior occur. Within each of these categories were subcategories defining the type of behavior or talk. The information gained from these tabulations was analyzed based on total time, total number of behaviors or talk and percentages of behavior or talk to help define the roles of teachers and students during interactions. Most important for this study was developing an understanding of the general patterns of teacher and student behavior and talk. Each of the categories within teacher and student behavior and teacher and student talk were analyzed for their proportion of occurrence for all classroom participants, and their proportion of occurrence for students and teachers separately.

*Validity*

Validity is vital to all types of research. "*Validity* refers to the accuracy and trustworthiness of instruments, data, and findings in research. Nothing in research is more important than validity" (Bernard, 1995, p. 38). Often research bases validity on the standards of internal and external validity, precision, and reliability. Denzin and Lincoln (2005) argue that the standards by which validity are determined are different depending on the paradigm under which the research is being performed. In the interpretivist paradigm Denzin and Lincoln suggest criteria called trustworthiness. The trustworthiness criteria are parallel to those of rigor, but seen through a different light. Trustworthiness is broken down into credibility, dependability, confirmability, and transferability. The following is a description of each of these and how they were addressed throughout the research process.

*Credibility.*

Credibility is achieved by assessing the researcher's interpretation of the data (Charmaz, 2005). In this study credibility was assessed through methodological triangulation. Methodological triangulation was accomplished through the use of multiple methods for the collection of data (See Table 3.1). This research involved the collection of data through observations, interviews, questionnaires, and documentation. Member checking requires the researcher to involve participants in the analysis and reporting process. The researcher asked one teacher and two students to read through findings. The researcher selected students based on their ability to provide constructive feedback (as determined in observations and interviews). In this process the participants were encouraged to give feedback,

including their interpretations. This data could not be used by the researcher because no feedback was received.

*Dependability and confirmability.*

Dependability refers to consistency within the processes of gathering, analyzing, and interpreting data and confirmability refers to the development of logical understandings of the data that can be corroborated by other researches (Denzin, 1994). Dependability was first achieved through the pilot and field testing of data collection instruments. This process helped to ensure that the data received was consistent with the questions asked. Both dependability and confirmability can be tested through investigator triangulation. Investigator triangulation requires the researcher to share observation with other researchers. Their reactions to the observations are used to further develop consistency. The outside researcher may support the researcher's observations or they may refute them. This conversation between the researchers is used to develop supportable interpretations of the data collected. An external reviewer examined all of the documents collected and wrote a report of her conclusions for this study (Appendix H). These conclusions were used to support the researcher's conclusions in chapter five. Furthermore, the researcher maintained an audit trail that involved "the use of written field notes, memos, a field diary, process and personal notes, and a reflexive journal" Denzin (1994, p. 513). This dissertation journal has been kept throughout the process and used in the revisions of chapter three. The journal helped the researcher to keep track of the multiple ways in which the data was sorted and contributed to the development of findings in chapter four.

*Transferability or naturalistic generalization.*

Lincoln and Guba (1985) point out that it is “not the naturalist's task to provide an index of transferability; it is his or her responsibility to provide the database that makes transferability judgments possible on the part of potential appliers” (p. 316). Stake (1995) agrees, suggesting that generalization is not the purpose of the case study at all. He prefers the term “particularization.” He favors this term because the purpose of the case study is not to compare multiple cases, but to become intimately aware of the inner workings of a particular case. He suggests that “there is an emphasis on uniqueness, and that implies knowledge of others that the case is different from, but the first emphasis is on understanding the case itself” (p. 8). In addition, Stake (2005) proposes that if any generalization is appropriate for qualitative research it is “naturalistic generalization.” Such generalizations are formed by the readers as the case is unveiled for them. Hence, the purpose of this research is not to define findings that may be transferable to other middle school environments, but rather to deeply describe a unique teaching and learning environment. In this case the readers may be the teachers working to better understand the environment in which they teach. They may use this information to modify the environment. The school administrator may be a reader trying to understand the appropriateness of the program within the overall scheme of the school.

*Bias.*

Interpretivist research requires the researcher to act as the researcher, and part of the research. It is the argument of Creswell (1994) that "data are mediated through

this human instrument, rather than through inventories, questionnaires, or machines" (p. 145). Wolcott (1995) makes it clear that this is a great advantage for the researcher, but cautions that it also brings with it issues of bias. Lincoln and Guba (1985) suggest that because the researcher is intimately involved in the research, they must continually focus on the neutrality of the data. They point out that hidden biases by the researcher may affect how the data is interpreted. Furthermore, once the bias is known, it may be accounted for in the interpretations.

In this study, the researcher came to the study with a number of biases. First, the researcher was involved in procuring the initial funds that helped to start the program. This involvement indicates a desire by the researcher to see the program be successful on all fronts. Second, the researcher has been in and out of the classrooms a number of times and speaks with the teachers on a monthly basis. The researcher has observed teacher and student activities within the classroom. From the preliminary observations the researcher has come to believe that the TILE program promotes more of a behaviorist approach to learning than a humanist approach to learning. Thirdly, as a teacher, the researcher espouses to operate from the humanist paradigm. This may cause the researcher to be overly cognizant or unaware of behaviorist activities. Finally, the researcher's background in educational technology has revolved around technologies used as a constructivist tool. It is the researcher's opinion that the primary function of technology in the classroom is for the development and sharing of understandings with a community of learners. For this reason, the researcher may be overly apt to notice, or ignore non-constructivist uses of technology in the TILE program.

To help ensure the researcher stayed cognizant of his biases, they were first listed here, and then again addressed in a bracketing interview. The bracketing interview took place in the office of a tenure faculty member who is an expert in case studies. This interview helped to bring forth my personal views of teaching and learning, my feelings about educational change and those resistant to it, and a detailed account of my connection to the school and the program. This document was consulted many times throughout the writing of the findings and conclusions. I used it as a reminder of my biases and to examine the data for themes contrary to my own view as well as in alignment with my own views.

Some of the tools described above for ensuring trustworthiness can also help to ensure the knowledge and avoidance of bias in the research and interpretation process. The use of an audit trail, where the researcher details all of the data collection and interpretation processes, can be beneficial in the uncovering of researcher bias. This audit and researcher interpretation of data were shared with an outside researcher. This promotes the development of interpretations that are not tainted by researcher biases.

## Summary

This chapter has provided an over view of the purpose of the study as well as the questions of the study. A rationale for approaching this research as a descriptive case study was given. The research design was then laid out, including the methods for data collection, the methods for data analysis, issues with validity, and a research timeline.

The researcher through the first three chapters, has aimed to develop the research to be conducted on the TILE program. Chapter I was an overview of the project. Chapter II was a review of the literature relating to the multiple philosophies and components acting in the TILE program. And, Chapter III concluded the prospectus by addressing the research design to be used in the study. The final two chapters of this dissertation will examine the data to determine findings and conclusions about the research. Chapter four contains detailed descriptions of the TILE program through the data collected. Chapter five examines the data and develops possible conclusions that may be drawn from it.

# CHAPTER IV

# FINDINGS

## Introduction

The methods of data collection used in a descriptive case study can yield an enormous amount of information. The data comes from interviews with key informants, observations of activities, questionnaires, and artifacts produced by the informants. This data was studied and analyzed repeatedly in order to develop themes that begin to answer the research question(s). Data collection and analysis resulted in vivid understandings of the research environment. The purpose of this chapter is to share the data and understandings with the reader.

This case study was designed to describe teaching and learning in the Technology Integrated Learning Environment (TILE) during the spring semester of 2006. In the subsequent pages the reader will be reintroduced to the research questions as well as the data collection techniques and sources for answering the questions. The sections that follow immerse the reader in the data in order to fully grok (Heinlein, 1987) each of the research questions. Before each of these, though, the researcher describes understandings that he discovered about himself in the research process.

## Findings Concerning the Researcher

During the course of this research, data concerning the TILE program was not the only data uncovered. The development of the dissertation and the experiences from the data collection and analysis processes have caused the researcher to come to

new understandings about the field of education and the labels used to define it for this study. The following addresses these findings.

During the development of the proposal and prospectus for this dissertation, the researcher stressed that the TILE program was a dichotomous learning environment consisting of behaviorist traits and humanist traits. He maintained that behaviorism is the philosophical belief that humans are reactive organism controlled by their surrounding environment and that in the field of education this plays out as teacher directed curriculum that focuses on students demonstrating specific behaviors in the form of correct responses to stimuli given. Furthermore, he insists that humanism is the philosophical belief that behavior is merely the observable manifestation and product of personal internal reflection. In the field of education this philosophy puts the student at the center of the learning experience by suggesting that the individual's personal, conscious experiences are the crux of knowledge.

At that time, the researcher was limited by his own understandings of the field of education. As he prepared for the research he overlooked the fact that educational beliefs and practices may lie on a continuum including, but not limited to, the beliefs described to be associated with humanism and behaviorism in this study. As a result the study was developed around beliefs that were too rigid and narrow. As the analysis of the data commenced it became apparent to the researcher that neither of the terms could be used to clearly define teaching or learning in the TILE environment. By trying to place each of the four components (middle school philosophy, high-stakes testing, technology integration, and the NASA Explorer Schools) in one of the two categories, the components themselves were reduced to

these terms. Each of the components brings to education an entire structure of their own that span a continuum of educational beliefs. Fortunately this was discovered by the researcher in the development of this chapter.

The researcher leaves this study with a new understanding that there is no black and white or no wrong and right in the classroom. There is simply an intersection of beliefs and attitudes that demonstrate what is valued in that particular environment. The realization of this did not come too late and is reflected in this chapter which gives a detailed description of what these attitudes and beliefs are, this time, without the limitations of these two labels.

## Restatement of the Research Questions

The purpose of this research is to describe the roles, behaviors, and activities of students and teachers in a learning environment designed to meet the needs of stakeholders with varied and possibly conflicting philosophies of education. The following questions bounded and guided my research on this environment.

1. How are teaching and learning experiences planned, implemented, and assessed?
    a. Who is involved in the planning of learning objectives, methods, and assessments?
    b. How is learning assessed in the program?
    c. What are the roles of teachers and students within the TILE community? What do they look like?
2. How is the TILE environment affecting levels of thinking? (Relevant to Bloom's Taxonomy)

a. What assignments are students expected to complete? What must they do to be successful on the assignments?
b. What are the roles of teachers and students in discussions? What types of questions are asked?

3. How is technology used in the teaching and learning process?
    a. What technologies are available within the learning environment?
    b. How is technology utilized for teaching and learning by the teachers?
    c. How is technology utilized for teaching and learning by the students?

## Data Collection and Sources

Interpretivist research, like all types of research, requires the researcher to determine the best possible sources and methods for gathering data. The validity of the data collected from these sources is always in question. In order to promote validity in data collection, Denzin and Lincoln (2005) suggest that researchers ensure credibility. Two ways that credibility in interpretivist research is advanced are through methodological and source triangulations; that is, multiple methods and sources for gathering the data.

Methodological and source triangulations are achieved in this study through the following:

- Both students and teachers participated in interviews
- Both students and teachers participated in the Classroom Activities Questionnaire (CAQ) (Steele, 1982)
- Researcher observations contain descriptive data developed through both qualitative and quantitative methods

- Teacher created documents describing classroom activities were collected

The result of collecting data through various methods and from various sources is a case study that shares sufficient evidence to answer the research questions and displays alternative perceptions of the same phenomena ultimately helping the researcher and the reader become intimately aware of the inner workings of a particular case (Stake, 1995). In the following sections, the inner workings of this case, based on the research questions and the data, are described here.

The population of the study was 57 seventh grade students in the TILE program at Sentinel Middle School, two teachers and one student teacher. Although each of the teachers was interviewed multiple times, only ten students were selected to be interviewed once. The students were chosen during the observation process based on their abilities to share multiple perspectives on the TILE program. The students are both male and female, of African American, Native American, Hispanic, and Caucasian descent, and have multiple levels of academic ability. The students who will be giving their understandings of the TILE program are Aaron, Alisa, Belinda, Bethany, Frida, Heather, Kevin, Laurie, Michael, and Turner. The teachers are Mr. Kelvin, who teaches English and Science, Mr. Lincoln, who teaches geography and math, and Ms. Roberts, a student teacher in English.

## Planning, Implementation, and Assessment

In this first section of the findings, the goal is to create a description of how teaching and learning experiences were planned, implemented, and assessed in the TILE program. The description is the result of exploring three questions. First, who was involved in the planning of learning objectives, methods for meeting those

objectives, and assessing whether or not the objectives were met? Second, how was learning assessed in the program? And finally, what were the roles of teachers and students in the TILE community?

### *Who is Involved in the Planning?*

This particular section calls into question student and teacher involvement in three distinct areas of curricular development, learning objectives, methods of teaching and learning, and assessment. These three categories will be presented individually to create a complete account of who was involved in the development of teaching and learning experiences in the TILE program. The data comes from the following five sources: student and teacher interviews, researcher observations, classroom documents, and the CAQ.

#### *Learning Objectives*

On the whiteboards in the back of each of the classrooms in the TILE program are listed the weekly learning objectives. The objectives are located in a grid with five columns and two to four rows. The columns represent the days of the week and the rows represent the classes held in that room. Teachers and students can at any time look at the whiteboard in the back of the room to see what objectives they should be addressing. Understanding where those learning objectives came from is not as easy as looking to the back whiteboard. For this the students and teachers had to be questioned and lesson plans had to be reviewed. These sources revealed that there are three distinct entities that control planning of learning objectives for the TILE program: Teacher role, student role, and outside influences.

When asked about the planning of learning in the TILE classrooms, one theme that emerged was that of students playing a role in the process. When interviewed, one of the teachers was asked who was involved in the planning of the day's activities.

Mr. Kelvin: Me, not so much, the kids more than anything.

Supporting this idea that the students have a say in the direction of their classes, Mr. Lincoln, in his final interview with me stated that students play a role as well.

Mr. Lincoln: We also allow the students to make decisions at times, you know to where they begin to take more responsibility for some of their learning, more than maybe some other classes would.

The teachers were not the only ones to suggest that students played a role. Two students shared their take on the students' role in planning for the classes.

Belinda: Mr. Lincoln decides most of the time and Mr. Kelvin decides most of the time, but then he'll, both of them will let us put our opinion of what we want to do. Sometimes they'll let us put our opinion in.

Frida: The teachers, and every now and then, Mr. Lincoln and Mr. Kelvin give us a little free time to figure out what we want to do, kinda like a miniature study hall.

These were not the only students to share their opinions on planning what would be learned in the classroom. In an open ended question on the CAQ, when asked if they (the students) could change three things about this class, what would they be? Two responses were:

Freedom of speech, more say of what's going on.
Choosing projects to study.

This suggests that the students are not all in agreement on the role they play in planning their own learning objectives.

When asked who was involved in the planning of the day's activities, other students shared that it was the role of the teacher to plan learning objectives.

Alisa: Mr. Kelvin, Mr. Lincoln, and Ms. Roberts (Mr. Kelvin's student teacher)
Aaron: Mr. Lincoln and Mr. Kelvin, they each have their own different plans. Sometimes they'll work together, like we just finished building bottle rockets and launching them and that was, like, a both class assignment. Like, you'll get to Mr. Lincoln's and work on the rocket, you'll go to Mr. Kelvin's room and draw the scale model for the rocket, something, like, work on that.
Bethany: Usually the teacher, which would be either Mr. Lincoln or Mr. Kelvin. But if they're on the same subject, like the rockets, they'll decide it among themselves and tell the class.

When asked who planned for the day's activities, at times, the teachers agreed with the students.

Mr. Lincoln: These, I'm basically doing on my own. Mr. Kelvin is doing his own projects right now but we are going to be getting back on a common math project here before long so basically me.
Mr. Kelvin: Ms. Roberts and I work together.

The final entity that is suggested to play a role in the planning of learning objectives in the TILE classrooms is the administration beyond the program and school. Both students and teachers mentioned this in their interviews.

Michael: I think it's a pretty much the teachers have a pre-planned schedule or the whole TUSD has a year curriculum that they plan on having the teachers teach throughout the year.
Ms. Roberts: Yeah, I mean I'm realizing that maybe we should study for the AIMS (Arizona's Instrument to Measure Standards) a little bit, like, some of the chapters they just don't get it, I mean it's understandable we don't teach it to them and their just using that reference and the reference makes sense in that application, and so in that sense the purpose of it is probably good for me because now I'm realizing maybe I should incorporate mini lessons of grammar and, you know, items the kids don't wanna learn but they probably should for the test.
Mr. Lincoln: In math, the math activities are geared in part to making sure that they do understand the basics; standards.

Further evidence of the role that state and local authorities play can be found in the teacher's lesson plans (Appendix E). Each of these plans place meeting state

standards near the beginning. One of the plans addresses "Weekly testing based on AIMS type questions."

Knowing where the learning objectives derive from is only one part of the classroom planning picture. Developing ways in which to address learning objectives is equally important. Here these "ways" are referred to as methods of teaching and learning. Who is involved in the creation of these is the subject of the next section.

*Methods*

The methods used to develop teaching and learning experiences in the classroom is of equal importance to the learning objectives, which are the focus of the activities. To further explicate who was involved in the creation of classroom activities in the TILE program, more data from both student and teacher interviews, as well as lesson plans, was revealed. As was found in the section on learning objectives, the control of classroom methodology breaks into three groups, students having input, teachers having control, and administrative expectations.

One of the quotes by Mr. Kelvin, used above, described how students were involved in deciding what would be done in the classroom. In this interview he went on to describe the role of his students as developers of methods for imparting the content.

> I've planned the skeletal framework of it and given them the guide and the procedure, not so much the procedure, but the guide and the requirements, and the rest is up to them.

In his final interview with me Mr. Kelvin reiterated this sentiment stating, "They tend to come in wanting to be directed in the learning, they want the learning parameters,

and they want to be, they like to be involved in making decisions." One of the students shared this sentiment as well, in her interview.

Laurie: Usually our teachers, but if we think of some really good idea, then they'll look into trying to incorporate in a daily routine.

Although many of the students did not directly address who planned the teaching and learning methods, they did broach the subject when asked about how they find out what they need to do in class. The following quotations describe this.

Michael: They would write it up on the board and they'd just kind of hand it out to us and do like a practice before they give us the homework. They go over what this whole things about, and how you do it.

Laurie: Basically, you have to do whatever the sheet or one of the teachers tells you to do. I mean, it's not really that hard.

In describing whether or not the program was what he expected, Aaron alluded to the idea that the teachers were in control of methodology.

> I expected more various activities, more hands-on stuff. Then I found out that they only do that every so, once in a while. I thought it was going to be, like, every week, you're doing something hands on, like creating something, cause I really like building things and stuff like that, yeah.

The teachers addressed the idea of methodology when asked about future activities in their classrooms.

Mr. Kelvin: So on Friday they're gonna have, after the activity they're gonna have something written up that'll answer my questions of relating this data to the importance of, that's what I'm doing is comparing results so that they understand the importance of looking at this data and looking at other data and they start to see these trends…
So, I'm anxious to see how, the final test comes about. You know, after I try to highlight it for em tomorrow and the next couple of days of teaching and their taking notes.

Mr. Lincoln: In math, we will be finishing up our work on, on, geometry as we get, they'll began to get ready to build some maps for me, I'm sorry nets for me and, they'll create these and then they'll give them to each other and ask them to analyze them and then they'll create some things that other people will work with…

> Tomorrow when I do a review we're gonna, we're gonna put this up there and say who can tell me this. And it won't be the same student, I'll just say, to try to pull them in, to spiral that way.

In talking about the general description of activities in his classroom, Mr. Lincoln described what he wants to do with his students.

> I want the kids to see how you can learn from a variety of sources and when I build all the different PowerPoint Presentations, and do different things like the Jeopardy and all, that you can review and do these things in a different format, you don't have to do the same way, I want to see the group work, where I just throw a puzzle at em, and say you've got the tools, do it now.

The teachers' lesson plans clearly describe the activities that will happen in classrooms over particular time periods. The procedure sections of the plans are shared here.

Science Lesson Plan:

1. Put on gloves. Collect a surface water sample.
2. Stand with your back to the sun so that the transparency tube is shaded.
3. Pour sample water slowly in the tube using the cup. Look straight down into the tube with your eye close to the tube opening. Stop adding water when you cannot see the pattern at the bottom of the tube.
4. Rotate the tube slowly as you look to make sure you cannot see any of the pattern.
5. Record the depth of water in your tube on your *Hydrology Investigation Data Sheet* to the nearest cm.
6. Pour the water from the tube back into the sample bucket or mix up the remaining sample.
7. Repeat the measurement two more times with different observers using the same sample water.

Basic Math 7 and 8 Lesson Plan:

1. Teacher will have the students work on warm-up problems that reflect the standard test material to be mastered by April. These problems will be discussed and corrected in class using students as instructors. The problems will also be worked on by small groups of students.
2. The class will then correct the daily homework spending whatever time is needed to correct any misunderstandings of material that was missed by the class.
3. Teacher will introduce new material through a variety of means: discrepant examples, real-life illustrations, mystery strategy, and other hook methods.
4. Teacher will model the new procedure being considered.

5. Teacher will have the class work on similar problems in individual and small group settings.
6. Teacher will assign homework or have the S work on class projects. On Friday's, the T will have the S take exams, quizzes, and standardized test practice.

Appendix E has more examples from the lesson plans.

Finally, Mr. Lincoln explains how methodologies for classroom activities can come from outside the classroom.

> And the thing that's killing us right now is we are so tied to standardized testing and so many standards and all that we are always looking at, not what is the best teaching method for children, but how do we absolutely ensure that we reach the holy grail of standardized test results because whether we like it or not, that is the standard by which we are judged, not what is best or most effective, but what are they gonna look at.

Thus far in developing an understanding of who is involved in the planning of the TILE program, data on learning objectives and methods has been given. The third part of planning in the TILE program is assessment. The following section addresses who is involved in the planning and development of assessments.

*Assessment*

Unlike the two previous categories, this category was broken down into two themes. At no point in the interviews, observations, lesson plans or CAQ, was it suggested that students were involved in the planning of assessment. The two themes that did arise were teachers as planners and administrative entities as planners. The following will address the data on both of these.

The student data below are the result of two questions from the student interview. These questions were: What do you need to do to get an "A" on an assignment? and How do you know if you have been successful in doing assignments

in your classes? When asked how she knows if she has been successful on an assignment Alisa commented, "My grade." I probed further asking if there were any other ways that she would know and she stated, "They tell you." This and the following data describe how the students look at assessment as something external, with which they were not involved.

Kevin: I think that you would have to accomplish all the goals that were set on the sheet or what the teacher said and you would have to turn it in by the due date.
Heath: They have this, grade system. It's on his computer, and he, like, he like, puts it up on the board and we look at our grades and see what they are. And see what we need or not need.
Frida: Cause every now and then I get em done and I turn them in and, I get a good grade on them, yeah.
Turner: Well, most of the time, she hands out, or they hand out rubrics all the teachers. Our main assignments, you know, where, like, they tell you how much you have to do to get an A, what you have to do to get a B, and so on.
Bethany: Mr. Kelvin will show us grade checks and if we're missing something he will tell us to write it in our journal so that we can work on it later and turn it in to him.

When I asked the teachers how they would know if the students were successful in their future classes, they described the ways that they would assess the students.

Mr. Kelvin: Well, I won't know until I have given them the test really. I'll know if it's successful if the kids are engaged.
Mr. Lincoln: How they do on the test itself, how well I see work coming together in the organization, which is more subjective, but I just have to look and say at this time, if xyz has this much of the project done and somebody else has more or less you know, we may need to look at some things…
So I use the body language, the homework, the spiraling, I just use a lot of things to see, did I seem to get that across, and what do we need to do differently if I did it.

Finally, I observed the teachers in their classrooms as they discussed with the students how they would be assessed.

Observation: He tells the students that he has a rubric to assess those who will be "teaching" over the next few days. He projects the rubric on the board. There

> are five categories and four levels. Mr. Kelvin explains how he will grade based each category and each level within that…
> He sits at the front of the room and explains how the students were graded on their "fish stories." He tells them that he was looking for a holistic view of the life cycle of fish. He tells them that they can modify what they have done. He suggests that they use notes they have taken in the past and then tells them if they want to change their grade it is up to them.

The teachers pointed out that they did not always feel that student assessment was in their control. At one point in his class Mr. Lincoln states that one student feels that not all of the questions were represented by the pre-test, activities, and study guide. He tells the students that he did not create the test, so this could be true. Even beyond the grading of classroom tests is the standardized test which all students in Arizona must pass. In each of the lesson plans created for the math courses, Mr. Lincoln addresses this. Under lessons to be taught is "Weekly testing based on AIMS type Questions." Furthermore all lesson plans address the state standards up front (see Appendix E). Finally, in an interview with the student teacher, Ms. Roberts, she described the pressure she felt to meet AIMS requirements.

> Yeah, I mean I'm realizing that maybe we should study for the AIMS a little bit, like, some of the chapters they just don't get and it, I mean it's understandable we don't teach it to them and their just using that reference and the reference makes sense in that application, and so in that sense the purpose of it is probably good for me because now I'm realizing maybe I should incorporate mini lessons of grammar and, you know.

In this first section of the findings the data on three areas of who is involved with curricular development have been made clear. Revealing who controlled learning objectives, teaching and learning methods, and classroom assessment is only a small part of describing what teaching and learning look like in the TILE program. This exploration will continue in the next section as the focus shifts from who to how. This section will clarify how learning in the program was assessed.

*Assessing Learning*

The previous section addressed student, teacher, and external involvement in the planning and development of curricular activities. Here, the reader will explore the meaning of assessment in the TILE program. Along a similar track as that described earlier, assessment of learning was approached as a personal issue, as a teacher based issue, and external issue. The final component of this discussion was looking at classroom focus data gathered using the Classroom Activities Questionnaire (CAQ) (Steele, 1982).

As the data on how learning was assessed in the tile program was analyzed, one of the three themes to emerge was that of personal assessment. Although this was not a widely spoken about form of assessment, two students and one of the teachers addressed it in their interviews. When the students were asked how they know that they have been successful, they answered in terms of looking inward.

Belinda: We find out we have a good grade, or when I just feel good that, when I feel that I did really good on that assignment, and just my personal view of it.

Michael: I don't know, it's kinda, for me it's just kind subconscious, you learn it, and then you forget it, and then when you need it again then you just remember it. But, that's just me.

They were not alone in their beliefs that one aspect of assessment in the program revolves around the self. Mr. Lincoln also talked of self assessment, suggesting that "kids know when they have really accomplished and when they haven't, and when they get that taste of success, that breeds success."

More common among all the data was the idea that the teachers assessed learning in the program. Two examples of this can be found in the evaluation sections of the teacher's lesson plans.

Basic Math 7 and 8 Lesson Plan:

Evaluation:
Student competency is determined by the following methods:
Classroom observations
Exams and quizzes

Science Lesson Plan:

ANALYZE IT
Using the globe website the student plots the transparency tube measurements and precipitation data for the Bob Nelson Pond

The ways in which the teachers assessed learning is divided into two groups. The first group consists of the teachers assessing students on their daily activities. The students point out that for one class the homework is just practice.

Belinda: It's nice how Mr. Lincoln doesn't take the homework, math homework grade as a grade, grade. We just do it for extra practice.

I too observed this each day in Mr. Lincoln's class. He walked around to check if all students had their homework. They graded the homework as a class, but it was never collected for a grade. Michael pointed out that it's hard to know if you have been successful on the homework. About success he stated, "I guess you really don't cause you're just kind of checking it." Turner pointed out that in Mr. Kelvin's class homework is much more important.

> You have to work pretty hard and you have to do a lot of homework to get A's. I'd say especially in Mr. Kelvin's class. It's mostly all homework except the daily science and languages. It's all homework besides that.

Generally when the students were asked what they had to do to be successful on assignments, they shared what Frida shared, "Work really hard and turn it in on time." The teachers on the other hand had a different take on the role of daily activities in assessment. Each of them pointed out that although the students are in the class they are conducting some sort of assessment.

Mr. Lincoln: First of all, I'll look at the quality of the work product that they do. I will wander around and look over their shoulders and see if it looks like, they are on, they are on guidelines, they are on schedule to accomplish this, because they have a schedule to meet…
The body language, hopefully, during it. Are the kids involved? Are they engaged? Do they seem to enjoy what they're doing, as much as they can?

Ms. Roberts: And so then, while I'm reading they're gonna be focused on that. At one point they're gonna be predicting, they're gonna be captive, they're gonna get little check mark points for em.

Mr. Kelvin: The fish story is the culminating activity for our water-chemistry unit, so they could show me, by use of, literary devices all their language arts skills we have been using this year, what they knew about the four components of water chemistry we have talked about oxygen, pH, temperature, turbidity, and four components, I already talked about temperature…
I know it's, I know its being accomplished two-fold, because I've seen with their outlines that they understand the tasks we're doing, the safety issues involved, the data, the procedure of doing those tasks, the importance of them, they have all taken the data they have and compared results.

Although the observation of daily activities plays a role in the teachers' assessment of the students, so does giving the students "tests" on that information.

The students point out that testing plays a role in their success.

Bethany: Mr. Lincoln doesn't count, like, homework and stuff. He says our grades just depend on what we score on our tests.

Belinda: The homework we get is like a study guide for our test.

Michael: For a test you can usually tell by if you did a good job by like, well if you know the stuff, obviously.

In the teacher interviews and classrooms observations the following data was brought to light.

Mr. Kelvin: Yeah well that's a good question, but, in one instance, and they all fit in, as far as like the culminating, kinda the summative assessment of this Olympics story was achieved by them taking this test after they'd listen to it and taken notes for two and a half days.

Observer: As the students clear their desks Mr. Lincoln states that they are great students and that the test is a challenge and that they should be very successful. "Make this fun." The test begins and continues for the remainder of the class.

During my first day of observations, Mr. Lincoln tells the class that they will have a quiz tomorrow and a test on Friday. He mentions that this is all in preparation for the AIMS test coming up. This was my first documentation of the role that government testing plays in the program. When I asked Mr. Lincoln about the creation of the program, one reason he explained for the conception of the program was "to try to make it better for students, to try to meet the needs of quote, the new academic assessments of the state and the government." The following are further examples of how the TILE classrooms are working towards this goal.

Ms. Roberts: AIMS Olympics is to, it's only teaching to the test we're doing besides tutoring after school, if parents complain about their kids not doing enough before AIMS, we can say we've done the AIMS Olympics.

Observer: Mr. Lincoln mentions that this is all in preparation for the AIMS test coming up.

Basic Math 7 and 8 Lesson Plan:

Standardized Test Practice Included (Content Embedded):
The students are provided with daily life applications which introduce and allow the students to work through procedures which are included in the AIMS Evaluation.
Students will take AIMS style practice at the completion of the unit.

On a day that I was scheduled to observe the classrooms, the teachers and students were notified that the day would be devoted to benchmark testing.

Observer: Mr. Kelvin moves to the front of the room and speaks to the students about the modified schedule for the day. He tells them how the day will be organized. The students will be taking "Benchmark tests from 9:27 to 11:14 and from 12:47 to 2:22. At 9:27am testing begins. The students will be taking the "4Sight Arizona Benchmark" tests in reading and mathematics. The answers are multiple choice.

In his final statement to me about the program, Mr. Lincoln shared that he had concerns with the focus on this type of assessment.

Mr. Lincoln: They made laws, laws that were intended for meeting the needs of one type of student and end up being counter productive to other needs that other students have.

Not long after observations commenced, the students and the teachers answered a questionnaire on classroom activities (CAQ). One of the factors assessed by this questionnaire is that of classroom focus on testing and grades. This idea has been the subject of both the teacher role in assessment and the government role in assessment. This factor was represented by questions that asked the students and teachers about emphasis on grades and distinct correct answers. For the factor, mean responses were determined on a four point scale with 1 representing strongly agree and 4 representing strongly disagree. According to the author of the CAQ (Steele, 1982), mean responses to the factor between 2.25 and 2.75 are neutral, and mean responses to the factor between 1 and 2.24 show an emphasis on the factor. Furthermore, this emphasis has strength, with 2.00 to 2.24 showing some emphasis and 1.00 to 2.00 showing strong emphasis. When the students were questioned about what actually occurs in the TILE classrooms, they had a mean response of 2.04, showing some emphasis on testing and grading. When the teachers were questioned on their intended focus on the factor, they had a mean response to the factor of 2.33 showing no emphasis on testing and grading (Table 4.1). This suggests that the students believe there is a focus, but this focus is unintended according to the teachers.

The factor means were based on two questions. When students were asked if the student's job was to know the one best answer to each problem, 20 of the 36 or 56.6% of the respondents either agreed or strongly agreed that it was, creating a mean of 2.39 with a standard deviation of .838. The mean and variation of student responses shown by the standard deviation indicates that there was no clear emphasis

or de-emphasis by students on this idea. When the teachers were asked the same question, 1 of 3 (33.3%) stated they agreed that was the actual intention, creating a mean of 2.39 with a standard deviation of 1.00. Among the teachers, the mean and standard deviation indicate that there was no clear emphasis or de-emphasis on this idea. In the comparative statement students were asked if there was a great concern for grades in the classes. 34 of 36 or (94.4%) either agreed or strongly agreed that there was intention. When looked at on the 4 point scale, a mean of 1.69 and a standard deviation .749 are determined. The mean indicates that grades are emphasized in the classes, and the standard deviation indicates that the students varied on the level of agreement. When asked the same question, 2 of 3 teachers (66.6%) stated that they strongly agreed that was the actual intention. The mean of 1.67 suggests that this was the general emphasis, but the standard deviation of 1.155 suggests a wide range of intentions (Table 4.1).

Table 4.1

Comparison of Actual and Intended Focus on Testing and Grade Stress

| Question | Actual Mean(SD) | Intended Mean (SD) |
|---|---|---|
| The student's job is to know the one best answer to each problem. | 2.39 (.838) | 3.00 (1.00) |
| There is a great concern for grades in the class. | 1.69(.749) | 1.67(1.155) |
| Mean Response to Factor | 2.04 | 2.33 |
| Finding | Some emphasis perceived | Neutral – Neither strong emphasis or de-emphasis intended |

Through the use of multiple sources and multiple methods of data collection this section has described how learning is assessed in the TILE program. Analysis of the data brought out three themes, self assessment of learning, teacher assessment of

learning, and assessment of learning by governmental agencies. Thus far we have looked at the data describing who is involved in program planning and how learning is assessed. For further development of what teaching and learning look like in the TILE program data on the roles of teachers and students in the community will be presented.

### *Roles of Students and Teachers*

Describing the roles of the students and teachers will help to further develop an understanding of what teaching and learning look like in the TILE program. When asked about the initial goals of the program, Mr. Lincoln described the type of students that would emerge.

> Yeah, the goals are that they become critical thinkers, that they learn how to use technology, that they master the core subject areas. So we want the kids to become more than mediocre, we wanna develop good self discipline, good study skills, good interpersonal skills, we want them to develop high self esteem, and to me, any self esteem comes through genuine accomplishment, genuine accomplishment.

Understanding how the program helps students to develop each of the items Mr. Lincoln mentioned is the focus of the following sections. The three sections are broken out into students, teachers, and observation data. Although the roles in the classroom cannot be completely separated from one another, some data pointed more towards one participant than another, giving the student and teacher categories. The final section on observation data presents the observers views of classroom activities describing both student and teacher roles.

*Students*

In this section, the roles of students will be explored. The focus will be on how students find out what they need to do, what they do. Data will be derived from student interviews, teacher interviews.

When students were asked how they find out what they need to do in the classroom, the following responses were received:

Belinda: They post it on the back, on the whiteboard, in the back, they put the homework and everything down and Mr. Kelvin, he'll put it in two places in the room, so none of us can say hey I never got that and oh, that's just not right and stuff like that. And so he posts it up in two places and Mr. Lincoln makes sure that we look back and they both have us copy it down in our agendas so that we have it on our own.

Heath: Well, they give us like, they give us a problem, we have to find it out, he, like, goes around asking you questions, like, alright, what's the answer you got? Then he'll show us, like, when we have the real answer, he'll, like, show us the strategy to get it and stuff like that.

Alisa: You have to listen to what he is saying so you know how to do it... They both have boards that say homework, but Mr. Kelvin and Ms. Roberts have what they're doing for that day, what we're learning about.

Michael: They teach it using a lot of examples and they don't mind going back and helping you out if you're stuck. And they, like I said, they put it into stories and examples that make lot a lot easier to understand.

Aaron: Mr. Lincoln will explain something if you don't get it, Mr. Kelvin will, he'll go through stuff. They both each take the time to explain things. Get lectured for a little while on what to do and sometimes they'll give you time in class to do work and things. Things like that.

Turner: Mr. Kelvin is usually telling us what we need to get done, to get all of our work done, and Mr. Lincoln, you know, if you don't get your work done by the day it's due then he has you go to, either has you stay in at lunch detention or go to his room straight after school, if you don't have what you need that day.

Kevin: They pretty much give us the assignments, then tell us how to do the equations or formulas, and they'll help you out if you have any questions.

Frida: I look through my agenda.

Heather: They write it down on the board or they tell us.

Bethany: Mr. Kelvin will show us grade checks and if we're missing something he will tell us to write it in our journal so that we can work on it later and turn it I to him.

In order to find out what the students do in the classroom, Mr. Kelvin was asked what a typical day in the classroom was like:

> It's a typical day because we start out by kids reflecting on something individually and then as a group and doing that a number of times during the class, and then breaking off into the activity, and, moving through class with kids independently learning I guess, by kids constructing their learning… So I think from the beginning they're given an important role in decision making and I think it empowers them to believe that they will be given a major part of making team decisions. Which is important to me too because the kids can help be responsible for their own learning and it makes it that much easier for the teacher.

When the students were asked what they do in the classroom, they stated:

Laurie: Usually we do a lot of things, like, we have to interact with what he's saying, and try to argue two points of views, whether it's what we follow or what we don't believe in, and we have to take a lot of notes.

Aaron: Mr. Lincoln, he's a big guy on taking notes. I get the notes down… A lot of the kids, I mean when we're on something big, everybody is focusing and not as many people are talking. When it's something real big, say like a big project or assignment; a lot of kids are focusing.

Heath: When the teacher's asking a question, then I'll answer it."

Belinda: Most of them are paying attention and then he makes it so that we'll follow the attention, follow along and we'll read along and we won't mess around while he's talking.

The previous describes the students' role in the TILE program through students' own words and those of the teachers. Hearing how the students find out what they need to do and observing what they actually do in class, gave a view of the students' roles. Data from the students' roles in the TILE program also gives the reader an idea of the roles of the teachers in the program. This glimpse will be expanded in the following section on teacher roles.

*Teachers*

Because the roles of the teachers and the students are so intertwined, the following will focus on the roles of teachers in the TILE classrooms, and continue to

describe the development of the roles of students begun previously. These views of the teachers' role are again taken from interviews with both students and teachers.

When the students described what the teachers do in the classroom in the classroom, they shared the following:

Bethany: They are teaching or asking someone questions about what their choices are…
They'll be teaching about their subject or explaining questions that we have.
Heather: Well, they give us like, they give us a problem, we have to find it out, he goes around asking you questions, like, alright, what's the answer you got? Then he'll show us. When we have the real answer, he'll show us the strategy to get it.
Kevin: Well, they pretty much give us the assignments, and then tell us how to do the equations or formulas, and they'll help you out if you have any questions.
Frida: They try to push you to turn stuff in, or do something that they want you to do for class.
Aaron: Straight down you get ready no matter what, especially Mr. Kelvin, he is pushing you.

The following quotes, all from the teachers, describe what they believe their role in the classroom is.

Mr. Lincoln: At times I do play the more traditional role of saying you need to know this formula and here's how it works. But then, as we will do in the Algebra, to give them projects that they sit down and have to talk to each other and get limited assistance from me…
I'm trying to get them to think from both sides. A wise person learns to not just argue their own particular position, but they learn to look at it from the other side, they learn how to think, learn how to apply.
Mr. Kelvin: For most of it I saw myself as facilitating discussion, conversation, and then when we broke of into groups, I saw myself as actively engaging the students in really teaching themselves how to look and read textbooks and how to comprehend text.
Ms. Roberts: A lot of looking over shoulders, a lot of take out your rubric, this is what we're supposed to be doing, or take your writing log, you already did a rough draft for this, thank goodness.

The classroom observations produced a number of conversation excerpts that describe teachers and student in the midst of their activities. These are examples of student and teacher interactions during classroom activities. The interactions help to further describe the roles of students and teachers in the program.

As he finishes with the two problems dealing with the circle, he tells the students to stand up. He calls on a student on the far end of the back row. He asks what is the equation for finding the area of this shape (he points to a rhombus projected on the board
As she describes the assignments, the students sit at their desks and look at the front board…
When he has finished sharing the excerpt, he tells the students that they have two minutes to write their answers…
Mr. Lincoln immediately calls a group of students to the front of the room. He tells them that while in the front of the room, they are to describe the characters that they will play at the living history museum…
He tells them that he does not want to be punitive, but that he is at his end. Mr. Lincoln tells the students of a plan to require both lunch and after school detention for those students who fail to complete their homework. He asks the students if they understand the new system…
Mr. Lincoln references to the back board where he has written a number of the students' names. He tells them that the students whose names are on the board will have to show up after school today (Tuesday) and possibly Thursday to continue work on their character and/or items that they will show at the museum.
Mr. Kelvin moves on to the next question. He asks the students for answers to the questions, waits for their answers, then (without an explanation of right or wrong) he shares his own understanding of the question…
Mr. Kelvin asks the students to discuss among the groups how water may be conserved at a home, business, or school. As the students discuss in their groups, Mr. Kelvin asks questions out loud…
Ms. Roberts holds up a copy of Fahrenheit 451 and asks if the students read from the book the preceding night. One student asks, "What really happened?" The teacher has the students raise their hands if they know exactly what happened in the reading. Ms. Roberts calls on one student and the student tells what she thinks happened. Without comment, Ms. Roberts moves on to another student and asks the same question. After the student's response, Ms. Roberts talks about the general ideas of what has happened.

The preceding sections described, from student, teacher, and observer data, the roles of students and teachers in the TILE classrooms. Although this section gave glimpses of the classroom activities as seen through the eyes of individuals in the environment, the next sections describe what teachers intended and what the students see as actually happening in the classrooms.

*Classroom Climate*

When the students and the teachers participated in the CAQ, they answered questions about instructional climate. Thus far, classroom foci and specifically, the testing and grading factor, were explicated in the assessment of learning section. In this section three factors from the classroom climate dimension are reported: enthusiasm, independence, and divergence.

The factor of enthusiasm aims to develop an understanding of student excitement and involvement in class activities. This factor was represented by a question that asked the students and teachers about student excitement and involvement in classroom activities. For the factor, mean responses were determined on a four point scale with 1 representing strongly agree and 4 representing strongly disagree. According to the author of the CAQ (Steele, 1982), mean responses to the factor between 2.25 and 2.75 are neutral and mean responses to the factor between 1 and 2.24 show an emphasis on the factor. Furthermore, this emphasis has strength, with 2.00 to 2.24 showing some emphasis and 1.00 to 2.00 showing strong emphasis. When students were questioned on the actual focus on enthusiasm, 27 of the 37 or 73% of the respondents either agreed or strongly agreed that it was a focus of the classroom, creating a mean of 2.05 with a standard deviation of .848. The mean and variation of student responses shown by the standard deviation indicates that although there was some emphasis by students on this idea, not all students felt it as strongly as others. When the teachers were asked about the intended focus on enthusiasm, 3 of 3 (100%) stated they agreed that was the actual intention, creating a mean of 2.00 with a standard deviation of 0.00 (Table 4.2). Among the teachers, the mean and standard

deviation indicate that the teachers were unified in their intent to create some emphasis on student enthusiasm in the classroom. This data suggests that the students believe there is some focus on this factor and that the teachers intended it to be that way.

Table 4.2

Comparison of Actual and Intended Focus on Enthusiasm

| Question | Actual Mean(SD) | Intended Mean (SD) |
|---|---|---|
| Students are excited and involved with class activities. | 2.05 (.848) | 2.00 (0.00) |
| Finding | Some emphasis perceived | Strong emphasis perceived |

The factor of independence checks tolerance for and encouragement of student initiative. This factor was represented by a question that asked the students and teachers if students were encouraged to independently explore and begin new activities. For the factor, mean responses were determined on a four point scale with 1 representing strongly agree and 4 representing strongly disagree. According to the author of the CAQ (Steele, 1982), mean responses to the factor between 2.25 and 2.75 are neutral and mean responses to the factor between 1 and 2.24 show an emphasis on the factor. Furthermore, this emphasis has strength, with 2.00 to 2.24 showing some emphasis and 1.00 to 2.00 showing strong emphasis. When asked about the actual focus on independence in the TILE classrooms, 30 of the 37 or 81.1% of the students either agreed or strongly agreed that it was a focus of the classroom, creating a mean of 1.97 with a standard deviation of .726. The mean and variation of student responses shown by the standard deviation indicates that students strongly recognized

this as a classroom focus and that most student responses were within one category of this mean. When the teachers were asked about the intended focus on independence, 3 of 3 (100%) stated they either agreed or strongly agreed that was the actual intention, creating a mean of 1.33 with a standard deviation of .577 (Table 4.3). The mean and standard deviation indicate that the teachers were unified in their intent to create strong emphasis on student independence in the classroom. This data suggests that the students believe there is a strong focus on this factor and that the teachers intended it to be that way.

Table 4.3

Comparison of Actual and Intended Focus on Independence

| Question | Actual Mean(SD) | Intended Mean (SD) |
|---|---|---|
| Students are encouraged to independently explore and begin new activities. | 1.97 (.726) | 1.33 (.577) |
| Finding | Strong emphasis perceived | Strong emphasis perceived |

Finally, the factor of divergence assesses encouragement for seeking many solutions to problems. This factor was represented by a statement that assessed whether or not students were encouraged to discover as many solutions to problems as possible. For the factor, mean responses were determined on a four point scale with 1 representing strongly agree and 4 representing strongly disagree. According to the author of the CAQ (Steele, 1982), mean responses to the factor between 2.25 and 2.75 are neutral and mean responses to the factor between 1 and 2.24 show an emphasis on the factor. Furthermore, this emphasis has strength, with 2.00 to 2.24

showing some emphasis and 1.00 to 2.00 showing strong emphasis. To the question on the actual focus on independence in the TILE classrooms, 34 of the 37 or 91.9% of the students either agreed or strongly agreed that discovering as any solutions for a problem as possible was a focus of the classroom, creating a mean of 1.78 with a standard deviation of .672. The mean and variation of student responses shown by the standard deviation indicates that students strongly recognized this as a classroom focus and that most student responses were within one category of this mean. When the teachers were asked about intended focus on independence, 3 of 3 (100%) stated they either agreed or strongly agreed that was the actual intention, creating a mean of 1.33 with a standard deviation of .577 (Table 4.3). The mean and standard deviation indicate that the teachers were unified in their intent to create strong emphasis on divergence in the classroom. This data suggests that the students believe there is a strong focus on this factor and that the teachers intended it to be that way.

Table 4.4

Comparison of Actual and Intended Focus on Divergence

| Question | Actual Mean(SD) | Intended Mean (SD) |
|---|---|---|
| Students are encouraged to discover as many solutions to problems as possible | 1.78 (.672) | 1.33 (.577) |
| Finding | Strong emphasis perceived | Strong emphasis perceived |

The three factors described above, along with the interview and observation data before them, help to develop a complete description of the roles of students and teachers in the TILE program. These descriptions of roles, along with an understanding of how learning is assessed and who is involved with the planning of

curricular activates in the environment  begin to build  an overall report of what teaching and learning look like in the TILE program.  To further develop this picture, another overarching aspect of the environment will be explored, classroom interactions and activities.

## Classroom Activities and Interactions

This section will give data that helps to define the types of activities that the teachers and students do in the classrooms of the TILE program.  The first part will describe the types of assignments that the students do in the classes, and what they must do to be successful on them.  The second part moves into the area of classroom interaction.  In this section data describe the roles that students and teachers play in classroom discussions, as well as the types of questions that are asked in these discussions.  The final part of this section will extend this description by sharing student and teacher views of the levels of thinking, based on Bloom's taxonomy, that occur in the program.  The goal of this section is to further develop the picture of teaching and learning in the TILE program through an understanding of the assignments, the classroom conversations, and student and teacher assessed levels of thinking in both of these.

### *Student Assignments*

*What are they?*

Mr. Lincoln: Daily activities, again mastery, we do traditional type mastery learning, where we do modeling and put things on the board, what a noun, a verb, an adjective, you know whatever we go through the nuts and the bolts and then we teach how to invert and do all the mathematical steps and how it all works. But then we try as often as possible to plan projects to where we can integrate

between the various curriculum areas and show how these things are not isolated areas of interest, but that they actually work together.

In our final interview I asked Mr. Lincoln to share with me one or two assignments his students do to meet the goals of the program. The above quotation was his answer. As the data on classroom assignments was reflected, this quotation summed up what is expected from the students. The interviews with both the teachers and the students developed similar themes, sharing that assignments revolved around four main categories: daily beginning of class activities, worksheets and teacher developed questions, projects, and presentations. Data about each of these is below.

*Daily or beginning of class activities.*

Both the English course and the science course began each class period with some sort of daily activity that the students would begin to do as the walked into the class. When I asked Frida about typical assignments in her classroom, she stated, "Daily science, daily language." When other students were asked about typical assignments in their classes, they too gave explanations of these daily activities.

Belinda: It's, Mr. Kelvin he puts up on the SmartBoard, from the projector, he puts up a question and information above it and a fact about NASA or anything really, a fact about anything, and then we have to take that information and answer the question using our brains at our tables together, the table we're sitting at, we can help everyone out.

Turner: We usually start off in Mr. Kelvin's classes with a daily, a daily language or a daily science. It's where we take six minutes and we write about one specific subject. Sometimes it can be longer. On some day, special occasions it might take the whole class period to take up. When we're writing about, maybe a field trip thing, and it's just basically what's going on at that time. He usually uses, has us use newspapers and then it's mostly with rocks, it's mostly rock cycle work that we do in his classes.

For the teachers this was a vital part of the daily curriculum. Both Mr. Kelvin and Ms. Roberts shared that these are part of the normal routine.

Mr. Kelvin: One thing I like to do during warm-ups in both science and language arts classes, is have kids put heads together and cooperatively work on something, send a representative up to the whiteboard, and write their collective, answer to whatever the problem is.

Ms. Roberts: A normal day would go: daily language, I guess when we're reading aloud it would go, summary, read aloud, daily language, book I'm reading, and then whatever we're supposed to be doing.

*Worksheets and teacher developed questions.*

Also, part of the normal routine was answering questions on printed worksheets, or teacher developed questions. Mr. Lincoln states, "if you're gonna show something and show that it's worth knowing, they should practice with it so that when they get to the situations that are needful of that they can apply it." The students appeared to recognize a pattern of practice in their course work. Michael addressed this in his discussion of typical assignments, "In terms of typical everyday assignments we do, we usually just do, like, worksheets based on what we were learning that day in class or reviewing what we learned a previous week or month or something." Other students offered similar accounts.

Turner: We've got a math book that we use all, well we just started using it recently but we're going to use it through the end of the year. It's mostly just assignments he's put up on the board, packets and other stuff he's typed up.

Bethany: And then for Mr. Kelvin, which is science, its just science, he'll give us something out of the text book or he'll, we'll be learning about a new subject almost everyday, but now we've been learning about rocks, so he's giving us, like, work out of the textbook that I have to take home everyday.

While I watched the daily activities I, too, observed this happening. Below are excerpts from my field notes addressing these types of assignments.

Observer: Mr. Lincoln projects a new image on the front board. This time the image is of numbers within square root symbols. He tells the students that they have one minute to answer the ten problems…
He (Mr. Kelvin) tells the students to get out homework from over the weekend. He begins to walk around the class and talk to each student about whether or not they have completed the work. After he has checked each student he moves back to the front of the room and reads through a list of multiple choice answers…
Ms. Roberts reads the statements and questions projected on the SmartBoard. When she is done reading, she tells the students that they have five minutes to answer the questions. The students work at their seats with their teams.

Although the above two types of assignments were part of the general daily routine, two other types of assignments appeared to play an important role as well.

*Projects.*

Projects in the TILE program, require students to develop artifacts to share their understanding of a particular subject. These often come after the general activities described above. Below are a number of descriptions of the types of projects.

Heath: Well, right now we're, like, building a rocket, getting ready to launch it.
Michael: Well right now, we're just kinda working on bottle rockets to help us learn about trigonometry. Like, we're supposed to measure how high it goes using trigonometry.
Bethany: I think that the most difficult assignment I've ever had in my classes would be the rocket because you would have to design the rocket to make it go high enough, have the parachute deploy, and have your egg not cracked.
Ms. Roberts: They have an assignment that they're starting tomorrow that's really the final thing for Fahrenheit 451. They have to remove something from the world and make a brochure about how it would make the world a better place. Trying to like start a new society like that and it's gonna kinda segway, we have different writing things going on in literature now so its gonna segway into the persuasive essay, to have this propaganda filled brochure about how country music should be banned or whatever so, that's what one of the kids was saying, I though it was funny. It'll make the world a better place. So yeah that's all kind of the end of a unit fusing into a new unit and lots of things going on.
Mr. Lincoln: And, with this we're taking it from the beginning where we start talking about the different components that make a polygon and many different

geometric shapes and what I was trying to do this morning, a little bit more of a Constructivist approach to where the kids, instead of me just saying cube, kind of lecturing to them. The bodily kinesthetic, the cutting, they're having to work with them on hands so that they get an idea of what they're all about.

Observer: He tells the students that this class will be split up into teams (based on tables and sitting arrangements). The teams will act as business consultants. Their goal will be to define what cell phone plans can best benefit individual users. Student teams will develop a proposal to sell a product to an individual with specific needs (See, "Got a Plan" in documents). The students are given thirty minutes to work with their groups to develop the plans.
They must:
* Graph various plans
* Use x-y tables with coordinates
* Find a constant "k" for each plan
* Develop an equation that can be used to understand each plan (Based on Slope Intercept)

*Presentations.*

Presentations are similar to projects in that they are not necessarily part of the daily routine for all students. In some cases these are used as ways to allow students to share what they are doing outside of the class. The Book I'm Reading (BIR) is an example of this.

Alisa: Book I'm reading. Somebody stands up in front of the class and they tell, like, people about the book and, like, what it's called and the author then they have to write it down.

Laurie: In English, we usually have someone present what book they're reading to the class, so other people if they might be interested in reading that would know about it.

Turner: Ms. Roberts is the same way, in language she has a daily language most of the time, and she has a thing called B.I.R., book I'm reading, and she has one kid go up to the class and explain the book, and then she reads this story from one of her books everyday and then we usually go down to the lab and we work, we do a lot of typing in Ms. R's class, That seems like a very important thing to her.

Other presentations are the result of project type work. Throughout the interviews, the students referenced one such presentation many times, The Living History Museum.

Heath: We had to have 150 facts, no 200 facts. Two hundred and we all have to remember, like, memorize them, then we'd have to do a speech in front of the class, which was really hard, and then later on we'd have to, like, have a museum to show our parents what we've been doing.

Frida: Well we had this living history museum and I just couldn't do it, I don't like history. I must be doing well in it, but I just don't like it.

Aaron: Well, we did this Living History thing with Mr. Lincoln and you dressed up as one of the Civil War characters, someone who played a big role back in the 1850s, somewhere around that time period, and we had to literally become that person and know everything about them and we had everyone come to our living history night. Everyone came there and we had people come by and we pulled people over to our booths and we had to tell them the story of our life.

Turner: Probably, history, it was called the living history museum. It took a lot of preparing and it was when we had to pick one of the characters from Civil War times, and we had to dress up like them and know everything about them. And then we'd present, we'd have millions of, not millions, but hundreds people come to the school, I don't know, I'd say 300 people were there, walking around, we were out in the commons that Thursday night at 6 o'clock. They would come by and ask you about what you did and you would have to tell them the whole story about your character and you would have to have a poster board set up and stuff. It was very difficult because you need some hard work. I put a lot of work into it.

Finally, although the Living History Museum was the most talked about presentation, other types of classroom based presentations played a role in the program as well. Both teachers and one student mentioned these in their interviews.

Laurie: In history, a lot of the time, we have to teach something to the class, in groups.

Mr. Lincoln: In the testing project the kids have now, they have to become the specialist in one area, come up with a lesson over a two day period, provide materials that will make it meaningful to others, they basically have to take kids who don't know a lot and come up with something that will share knowledge to where they, so its getting them an experience where they integrate, not only research, but the computer technology, stand in the shoes of a teacher for a while, which might make them a little more appreciative of what happens in the classroom.

Mr. Kelvin: And then we moved into the last day of planning for our teaching about a certain part of water chemistry, whether its properties of water, water in the environment, water, in the ocean, freshwater ponds, so there's a number of topics there.

As important as the assignments themselves is what the students must do to be successful on these assignments. The following section describes this subject.

*What must be done for success?*

Two main themes describe what must be done for students to be successful on assignments. The first is that the students must turn the assignment in. In all but two of the student interviews the commented that this was the main goal for being successful on assignments.

Belinda: Basically, just turn them in. And if they're not right, then redo them.
Heath: Turn everything in and make sure, like, there's no errors or anything.
Frida: An A? Work really hard and turn it in on time, and then, yeah.
Michael: I guess you need to just, pretty much, turn it in on time.
Aaron: Everything is turned in 100% on time.
Turner: You have to have all of your work turned in on time, you have to have everything right to get an A, it's really hard to keep an A in our classes I'd say. You have to have all of your stuff turned in on time, you have to put all your effort into it. It's really hard, I'd say.
Bethany: They turn in their homework everyday when it's due, they'll usually do their homework, like, maybe earlier than the due date.
Kevin: I know that I've been successful if I turn it in on time and the teachers turn it back to me with a good grade on it.

At the start of many of the classes, the teachers visited each student's desk to determine whether or not they had successfully completed their homework. Although it was not required that it be physically turned in, it was required that it be completed. Below is one description of how the teachers handled such situations.

Observer: He (Mr. Lincoln) talks to a number of the students about not having the equations included on their homework. He has each of these students put their names on the back whiteboard and tells them to return at lunch to complete their homework.

The second theme to surface was that students had to be on task and listen to directions. Both students and teachers suggested that this was an important aspect in student success.

Heath: Being quiet and on task.
Alisa: Well, you have to listen to what he is saying so you know how to do it.
Laurie: They do the assignment like they're supposed to and they don't just stop listening at some point during class, if they're talking to their friends.
Aaron: If they're successful, they're always 100% focused in. They're doing everything they're supposed to do.
Kevin: I think what makes them successful is coming to school everyday, and always getting their work done, and paying attention when the teachers are talking.
Ms. Roberts: If at least half of the class raises their hands when I ask for a summary of what we read about or is willing to share whatever they learned or summarize it again, that would be a successful read aloud for both days.

As an observer, I witnessed both Mr. Kelvin enforce task importance.

> He (Mr. Kelvin) tells them that those who are off the mark will have to return after school to make up the areas where they didn't do well.

Although these two themes did appear most frequently, other themes were found as well. When asked what a student must do on an assignment to be successful, two students replied as follows:

Alisa: Study.
Michael: Make it legible, and try your hardest, and maybe do a little bit of studying.

Finally, one student suggested one other way to be successful.

Frida: Work really hard. And get help when you need it.

Knowing what assignments are required in the program, and how students can be successful on them, describes much of the philosophical underpinnings of the program. Equally important in understanding these philosophical issues is the type of conversations held in the classrooms. In the following section the focus will be on the data defining roles of teachers and students in classroom conversations.

## *Classroom Interaction*

When students were asked to list the three best things about the class from their point of view and the three things they would change if they could, two points of view concerning student and teacher classroom interaction were revealed. In answer to the first question, one student stated that "The teachers are great and ready to listen to your ideas." In response to the second question, a student responded "Less teacher talking." When students and teachers were asked to assess how much time the teachers spent talking, the median response from the 37 out of 57 students who responded was that the teachers talked 75% of the time. The mean response for the students was 74.85% and the range of responses was between 25% and 90%. The median response from the 3 teachers was that they talked 60% of the time. The mean response for the teachers was 53.33% and the range of responses was between 25% and 75%. This difference in responses begs the question, what is the role of student and teacher in classroom interaction in the TILE program.

In this section both teacher talk and student talk will be explored so they may be more clearly defined. It will further demonstrate the type of talk and behavior the students and teachers have during classroom interactions. One important aspect of classroom interaction is questioning. The type of questioning that occurs in the classrooms will be explored as well.

### *Roles of Teachers and Students in Discussions*

Students and teachers in the TILE program are involved in a variety of activities. Each of these activities may have the student and the teachers interacting in unique ways. At certain points in the class, the teachers were in the front of the

room giving information and directions and at other times asking questions. At other points in the class students were responding to the teachers by giving information without being prompted. And finally, at other points the students were working among themselves. The purpose of the following section is to describe these interactions to further develop a description of teaching and learning in this environment.

One way to understand the overall roles of teachers and students in a classroom is to determine how much and often students and teachers speak. In order to do this, the researcher observed interaction for three 5 minute periods during the beginning, middle, and end of each 48 minute class. This was 31.25% of the total time of each class observed. All together a total of 55 classes and 165 five minute samples were gathered. The observations were conducted for eleven days over a one month period at the beginning of the second semester of the school year. The data from these observations was noted in a spreadsheet. In this spreadsheet, the time for which an individual spoke, the content of the conversation, and the manner in which speaking happened were all recorded. The data were collected based on these descriptors using the Revised Verbal Interaction Category System (VICS) (Hunter, 1974) and the Multidimensional Analysis of Classroom Interaction (MACI) (Honigman, 1974). These organization systems for categorizing classroom interaction and behavior are based on the work of N. A. Flanders (1970).

The Flanders' model splits classroom interaction into three main categories: Teacher Talk, Student Talk, and All Talk/No Talk. These criteria are broken down into categories, which may consist of further descriptors.

- Teacher Talk and Behavior
  - Indirect
    - Accepting Feelings
    - Praising and Encouraging
    - Accepting and Using Ideas
    - Asking Questions
  - Direct
    - Explaining or Informing
    - Giving Directions or Commands
    - Reprimanding
- Student Talk and Behavior
  - Expected or Predictable Response
  - Initiated Response
- All Talk/No Talk

The data described below will give an overview of the conversations and behaviors among teachers and students in the TILE program based on this model. The criteria, Teacher Talk, Student Talk, and All Talk/No Talk are the focus. The two tools used to gather this data have slightly different foci. The VICS gathers data describing when and how language is used in discussions and the MACI gathers information describing both language and behavior. For example, when students talk, the VICS is concerned with who is talking, to whom they are talking, and what they are saying. On the other hand, the MACI is concerned with who is talking and how the information is being conveyed, is the student expressing emotion, are they digressing, is the teacher criticizing or praising. Furthermore, the MACI has fewer explicit categories and, as a result, some student data (i.e., talking among pupils) had to go in the all talk/no talk section. These differences in design result in slightly different numbers in the two overall categories, student talk and all talk/no talk.

The observations of all the classes produced 3082 separate instances of conversation and classroom activity. On both the VICS and the MACI, the teachers were responsible for 1734 or 56.26% of these occurrence. In the area of student talk,

using the VICS, which focuses solely on student conversation, the researcher found the students to be responsible for 1265 or 41.04% of the occurrences. All talk/no talk resulted in the remaining 83 or 2.69% of the classroom talk or activities; this data was unable to be clearly defined. Due to the differences in structure, the use of the MACI suggested 1119 or 36.31% of classroom talk or behavior was the result of the students and 229 or 7.43% was silence or miscellaneous; this data was also unable to be clearly defined. In each model the teacher had more instances of conversation than did the students. Furthermore, all talk/no talk occurred less frequently than both teacher and student talk.

Table 4.5

Instances and Percentages of Classroom Talk and Behavior

| | Teacher | Student | All Talk/No Talk |
|---|---|---|---|
| VICS (Raw (%)) | 1734 (56.26) | 1265 (41.04) | 83 (2.69) |
| MACI (Raw (%)) | 1734 (56.26) | 1119 (36.31) | 229 (7.43) |

Although the raw numbers and percentages show one aspect of roles of students and teachers in the classroom, the time spent in those categories shows another. The VICS and the MACI may have shown differences in the amount and percentages in the talk and behavior categories for student and all talk/no talk, there is no difference in the area of time. Though this may seem inconsistent with the data noted previously, the reason for this may have been the lack of categories in the MACI. Although there was no category for student to student conversation, in the area of time the students were still credited. In total there were 35700 seconds of classroom talk and behavior observed. The collection of data was broken down into

three five minute intervals at the beginning, middle, and end of each class period. The findings indicated that teacher talk was responsible for 19693 seconds or 55.16% of the total time. Student talk accounted for 12989 seconds or 36.38% of the classroom talk and behavior observed. 3018 seconds or 8.45% in all talk/no talk activities. It is important to note that the data shared above are overall and that each class deviated from this somewhat. Appendix F includes tables broken down by subject.

Table 4.6

Seconds and Percentages of Time in Classroom Talk and Behavior

| | Teacher | Student | All Talk/No Talk |
|---|---|---|---|
| Time in Seconds (%) | 19693 (55.16) | 12989 (36.38) | 3018 (8.45) |

The preceding data gives an overview of the amount and time of classroom talk and behaviors in the TILE classrooms; however, there is no detail as to what the talk and behaviors are. The following details each of these criteria to describe the type of talk and behavior occurring among teachers and students in the program.

Understanding how teachers and students interact is broken down into examples of what the interactions are. At certain points, interaction was focused on an individual teacher; at other times both students and teachers were involved in the interactions.

The following describes these interactions when there was communication from both the students and the teachers.

Belinda: Then we do daily science which is a normal thing. We'll go over it and he'll let everyone explain their ideas and what they thought it was going to be like.

Mr. Kelvin: And I'll ask leading questions that would kind of highlight what I want them to be looking for.

Mr. Lincoln: What do you see here? Say square, what is square? Triangle, what is triangle? Now, tell me how a triangle could be different since it has three sides, two sides could be the same. I want them to come up with this…

Observations: As he answers the questions, he encourages the students to ask questions or voice concerns about the data being shown…

She asks the students if they have predictions about what might happen in the future of the book. Instead of describing what they think will happen in the future, some of the students ask questions. What was on Montague's hands? Why didn't the woman want to leave? The whole book is confusing…

A student states that the role of the jury is to listen to what is shared and decide who has given a better argument. Mr. Kelvin asks how many decided the case with their own beliefs. Most of the students in the class raise their hands…

After the students have seen all of the answers, a student raises his hand and asks Mr. Lincoln how to figure out polynomials…

One of the students point out that an interesting part of the assignment is that one mistake in the math can result in other mistakes throughout the problem.

These excerpts incorporate both teacher talk and student talk. The teachers and the students appear to be giving and taking from one another. In the Flanders' model and the subsequent interaction analysis models based on it, this type of interaction falls under the heading, indirect in teacher talk and behavior and incorporates all of the student talk and behavior. The following examines the recorded interactions from the point of view of indirect teacher talk and behavior, and student talk.

Indirect teacher talk and behavior can be generalized as the teacher eliciting responses from students. This is generally done by accepting student participation in activity through questioning, praising, and accepting and using student ideas. When the data is examined in the VICS, indirect teacher talk results in more than half of the instances of teacher talk, occurring 915 out of 1734 times or 52.77% of the time (Table 4.7). When the data is explored through the lens of the MACI, similar results are found, where 899 out of 1734 (51.85%) of the teachers behaviors fall within the

indirect category (Table 4.8). This suggests that in interactions in the TILE classrooms, at least half of the teachers' communication is to draw information from the students.

Table 4.7

Instances and Percentages of Teacher Talk using the VICS

| | Indirect | | | Direct | | |
|---|---|---|---|---|---|---|
| Raw (%) | 915 (52.77) | | | 819 (47.23) | | |
| Sub Category | Questioning | Praising | Student Ideas | Information | Directions | Dis-approval |
| Raw (%) | 769 (44.35) | 42 (2.42) | 104 (6.00) | 524 (30.22) | 231 (13.32) | 64 (3.69) |

The data in the indirect realm can be broken down further to define what indirect teacher talk and behaviors are happening most often. In teacher talk, the first category is questioning; this is any time the instructor elicits a response from the students, regardless of whether or not one is given. Using the category breakdown of the VICS, questioning occurs most often with 769 occasions, 44.35% of the total teacher talk. The second category is defined as the use of student responses to elaborate or question further. This happened 104 times or 6.00% of the total teachers talk. The final category in indirect teacher talk is the praising of students; giving them accolades regardless of the manner in which it is done. Praising students occurred 42 times, 2.42% of the total teacher talk.

Table 4.8

Instances and Percentages of Teacher Behavior using the MACI

| | Indirect | Direct |
|---|---|---|
| Raw (%) | 899 (51.85) | 835 (48.15) |

| Sub Category | Soliciting Responses | Supportive Behavior | Student Ideas | Information Giving | Critical Behavior |
|---|---|---|---|---|---|
| Raw (%) | 774(42.91) | 77 (4.44) | 78 (4.50) | 764 (44.06) | 71 (4.09) |

As described previously, the VICS and the MACI have different foci. The VICS focuses on teacher and student classroom talk, the MACI focuses on teacher and student behavior. Before moving into the breakdown of the MACI, further information is needed. Indirect behavior on the MACI is also broken into sub categories. Although these subcategories are similar in their titles, the data within them varies from that of the VICS. This is due to the behavior component. One example of this lies in what the MACI refers to as performs emotionally supportive behavior. In this area the teacher is involved in boosting student morale; it may be through giving the students information, praising them, or simply accepting their feelings. In the VICS these are split up into specific categories, some direct and some indirect. For this reason the data from the VICS and MACI are different.

The data on indirect teacher behavior falls along the same lines as the teacher talk. The main indirect behavior was the solicitation of responses from the students. 774 of the total 1734 (42.91%) of the teacher behaviors observed in the class were teachers asking students for information. 78 times (4.50%) the teachers used the ideas that students gave in the conversation or activity being conducted at the time. 77 times (4.44%) they performed a supportive behavior. This data, along with the teacher talk data, point to a focus on drawing students into the classroom activities.

If a partial focus of classroom activities is to draw students in, then the question is; how are they being drawn in? The data on overall interactions in the TILE classrooms showed that students were responsible for 41.04% of the instances

of classroom talk and 36.31% of classroom behaviors. The following examines how the students talk and behave during these interactions.

It was reported earlier that 44.35% of the total teacher talk was asking questions. In the TILE classrooms, it was typical for student talk to be responses to questions or comments to others. Of the 1265 instances of student talk that were observed, 910 of them, 71.94%, were responses to others. Although a majority of student talk was the result of responding to others, some of it was to initiate conversation. 201 instances of student initiated talk were observed, 15.89% of all student talk. Students also were witness talking solely among themselves; this was seen154 times, 12.17% of the instances (Table 4.9).

Table 4.9

Instances and Percentages of Student Talk using the VICS

| | Respond to Others | Initiate Talk | Talk Among Students |
|---|---|---|---|
| Raw (%) | 910 (71.94) | 201 (15.89) | 154 (12.17) |

Equally as important to the type of talk the students conducted in the classroom are the behaviors students demonstrated within those conversations. The above broke down the type of talk that students used in conversations in the TILE program. The following section addresses the behaviors behind that talk. Student behavior in classroom conversations fits into five categories: original contributions, pre-structured contributions, digressions, emotions, and hostility.

The first category, original contributions, is characterized by the students sharing information that generally goes beyond the topic of conversation. This type

of behavior is distinguished from others through the student giving perceptions, asking questions, or making inferences. In the course of observations in the TILE program, this behavior was observed 143 times out of 1119. Of the total behaviors detected, 12.78% were original contributions (Table 4.10).

Pre-structured contributions are those contributions that follow along with the generalized line of classroom thought. These are often seen as rote behaviors where the student give the answer for which the teacher is asking. In pre-structured contributions there is only one correct answer. Of all the student behaviors observed 941 (84.09%) were in this category.

When a student performs in a manner that takes the activity or conversation away from the intended path, the student has digressed. The result is a move away from intended content, but not a move away from regular classroom activities. During the observation periods, digressions were noticed 30 times (2.68%).

The last two categories were observed rarely. The expression of emotions, showing joy, fear, or anxiety about other people was observed 3 times (.27%) during observations Hostility was observed 2 (.18%). Hostility is exemplified by act of restlessness and may progress into violent behavior.

Table 4.10

Instances and Percentages of Student Behaviors using the MACI

| | Original | Pre-Structured | Digressions | Emotions | Hostility |
|---|---|---|---|---|---|
| Raw (%) | 143 (12.78) | 941 (84.09) | 30 (2.68) | 3 (.27) | 2 (.18) |

The previous section addressed interaction between both the teachers and the students. This section begins by looking at the teacher focused interaction. When students were asked about a typical day in their class, one responded:

Belinda: We start out with science and in science. We do daily science which is a normal thing. Mr. Kelvin, he goes over it and he explains it like really, really well so that we understand it.

When asked about what her teachers do in class during Frida's interview, the following interchange occurred:

> Interviewer: Describe what you mean by being yelled at for me.
> Frida: Nobody was trying to push you to turn stuff in and do something that they want you to do for class. Basically the teacher teaches and yells at us if we're not on task. It's really just the basics.
> Interviewer: When you say that the teacher teaches, what do you mean by that?
> Frida: Teaches us lessons, helps us if we need it, you know, what a teacher should do.

When asked how he finds out what he needs to do in class, Aaron stated:

> Mr. Kelvin is pretty up forward about it. He's jumping on your back and pushing you to do it.

In observations and teacher interviews teacher focused interaction was observed as well.

Mr. Lincoln: At times I do play the more traditional role of saying you need to know this formula and here's how it works.
Observer: He next projects a new image on the board in the front of the room. This time it is a picture of a right triangle. He tells the class that the length of any side may be calculated by knowing the length of the other two sides and the Pythagorean Theorem. He then writes formula on the board a2+b2=c2. He then gives two of the sides projected on the board lengths. He then shows the students each of the steps necessary to find the length of the third side (in this case the hypotenuse).

Teacher focused interaction can also be thought of as direct teacher talk. This talk and behavior can be generalized as the giving of information; lecturing, giving

directions, or reprimanding. Direct teacher talk was observed in 819 out 1734 times or 47.23% of the time (Table 4.8). Direct teacher behavior was witnessed 835 out of 1734, 48.15% of all teacher behaviors (Table 4.9). Of the observed interactions in the TILE program nearly half of them fell into the categories of direct teacher talk and behavior.

When the teachers give the students information without expectation of return talk, the following was discovered. The focus is on direct teacher talk. Of the 819 times that the teachers used direct talk, 524 times or 30.22% of total teacher talk was to give information to the students without expectation of a response. The teachers also told the students how to do something by giving directions 231 times, 13.32% of all teacher talk. In the course of observations the teachers stated disapproval of student behavior 64 times or 3.69%.

The category of direct teacher behavior focuses on the behaviors the teachers demonstrated during the interaction. This has been split into two categories. The first is information giver and the second critical behavior. The type of information is not separated into smaller categories, just that there is an act of information dispersal. In the TILE program, the teachers were observed performing this behavior 764 times out of 1734 behaviors observed, 44.06% of all behaviors observed. Direct behaviors also include those behaviors that are critical of students ranging from an explanation of an incorrect answer to punitive behavior. This type of behavior occurred 71 times (4.09%).

In this section it was stated that 84.09% of student behaviors were observed to be pre-structured. Furthermore, 71.94% of student classroom talk was in response to

others. 42.91% of the teachers' behaviors were soliciting responses from the students. This data suggests that questions are asked often in the TILE program. The following section explores the types of questions asked.

*Types of Questions Asked*

During observations on January 18th, 2006, Mr. Lincoln was observed having the following discussion with his students.

> Mr. Lincoln: What is the name of a 2d object that makes the shape of a 3d object?
> Student: I know, Net.
> Mr. Lincoln: Can someone tell me one thing about this object?
> Student: It has a square in the middle.
> Mr. Lincoln: What is the general name of an object with four sides?
> Student: quadrilateral
> Mr. Lincoln: Quad? What does quad mean?
> Mr. Lincoln: What else has quad in it?
> Student: quadriceps.
> Mr. Lincoln: How about quadruped? What does that mean? Quad means four.

One week later, Mr. Kelvin was observed having the following conversation with his students who were about to present something to their classmates.

> What questions will you ask your classmates?
> What do you think their response will be?
> He tells them that they need to think about this so that they have the right questions for the presentation.

Each of the above demonstrates how questioning and answering is conducted in the TILE classrooms. Throughout the observation period many conversations between teachers and students were observed. The conversations at times were teachers asking and students answering questions. Knowing the types of questions asked can further help define teaching and learning through an understanding of what

it is the teachers want the students to get from the questioning. The following section explores types of questions, describes what they are and then addresses the frequency with which the type questions are used in the TILE classrooms.

The first type of question addressed is that which is based on cognitive memory. Questions in this realm aim for answers that can be answered based on rote memory. The answers are generally narrow in scope and have one correct answer. In the observation above, Mr. Lincoln asks the students "What does quad mean?" This is an example of a cognitive memory question. Of the 769 questions that were observed being asked of the students in the four classes, 698 fell into this category, 90.77% of all question that were observed being asked were based on cognitive memory (Table 4.11).

The second most often type of question asked was the convergent question. Convergent questions also require the use of information that has been memorized but requires more. This type of question requires that the memorized information not be the answer, but be the catalyst for finding an answer. The respondent analyzes the memorized information or integrates it into a new situation. In the observation above, Mr. Kelvin asks the students, "What questions will you ask your classmates?, What do you think their response will be?" This is an example of a convergent question, one that requires the students to use what they know in a new situation. 52 questions fell into this category. That is 6.76% of all question that were observed being asked were convergent

Whereas convergent questions ask the respondent to begin to analyze or integrate memorized content, divergent questions ask respondents to project or

predict different outcomes based on their understandings of the information given. An example of divergent questioning could have come from examining geometric shapes. Mr. Lincoln could have asked his students to consider how time would have affected Egyptian pyramids had they been made into other three dimensional shapes. Throughout all of the question and answer periods, 18 or 2.3% of the question fell into the divergent category.

The last type of question that was watched for was an evaluative question. Evaluative questions call for the respondent to offer suggestions of judgment, value, or choice. An example of this type of question is using the idea of drought. Mr. Kelvin could have asked his students to compare and contrast drought conditions in desert locales with those in mountain locales. 1 of the 769 questions that were observed fell into this category. This means that it was .13% of all questions asked.

Table 4.11

Types of Questions Asked in the TILE Program

| | Cognitive Memory | Convergent | Divergent | Evaluative |
|---|---|---|---|---|
| Raw (%) | 698 (90.77) | 52 (6.76) | 18 (2.34) | 1 (.13) |

Thus far in this section data has been shared that describes the roles of teachers and learners in classroom conversations. Furthermore, the types of questions that are asked in those conversations have been explored. The next segment addresses the idea of levels of thinking in the TILE program. Where the previous section explored the types of questions that are asked in the program, the next section addresses how teachers and students view theses interactions and assignments in terms of levels of thinking in the Technology Integrated Learning Environment.

*Levels of Thinking in the Classroom*

In 1956, Bloom, et al. published the book *Taxonomy of educational objectives*. The focus of this book was the standardization of the language describing teachers' expectations for their students. Furthermore, it is suggested that the use of the taxonomy may "also help one gain a perspective on the emphasis given to certain behaviors by a particular set of educational plans" (p. 2). The purpose of this section is to develop an understanding of the levels of thinking emphasized in the TILE program. Therefore, this section will describe student and teacher beliefs about the levels of thinking that occur within the assignments and the classroom conversations. The data described here will be based on Bloom's taxonomy of the cognitive domain (Bloom's taxonomy). A brief clarification of Bloom's taxonomy precedes the discussion.

The development of Bloom's taxonomy is the result of university researchers trying to develop a uniform framework so that they had a common language when discussing ideas about testing. In doing so the committee created taxonomy of seven unique categories on which to base educational objectives. The taxonomy has been split into two dimensions; lower level thought process and higher level thought process. The lower level thought processes are memory, translation, and interpretation. The higher thought processes are application, analysis, synthesis and evaluation. Each of these processes will be further defined as its incorporation in the TILE program is described below.

*Knowledge*

Knowledge in terms of Bloom's taxonomy is defined as experiences or activities that focus on remembering. Remembering is the "recognition or recall of ideas, materials or phenomenon" (Bloom, 1956, p. 62). One factor in the CAQ represented by statements that probed students and teachers about emphasis on remembering or memorizing was created for assessing focus on knowledge in the classrooms. For the factor, mean responses were determined on a four point scale with 1 representing strongly agree and 4 representing strongly disagree. According to the author of the CAQ (Steele, 1982), mean responses to the factor between 2.25 and 2.75 are neutral and mean responses to the factor between 1 and 2.24 show an emphasis on the factor. Furthermore, this emphasis has strength, with 2.00 to 2.24 showing some emphasis and 1.00 to 2.00 showing strong emphasis. When the students were questioned about what actually occurs in the classrooms, they had a mean response of 2.16, showing some emphasis on knowledge. When the teachers were questioned on their intended focus on the factor, they had a mean response to the factor of 2.50, showing no emphasis on knowledge (Table 4.12). This suggests that the students believe there is a focus, but this focus is unintended according to the teachers.

The factor means were based on two questions. When students were asked if the student's job was remembering or recognizing information, 28 of the 37 or 75.7% of the respondents either agreed or strongly agreed that it was, creating a mean of 2.22 with a standard deviation of .672. The mean and variation of student responses shown by the standard deviation indicate that there was some emphasis by students

on this idea. When the teachers were asked the same question, 2 of 3 (66.6%) stated they agreed that was the actual intention, creating a mean of 2.33 with a standard deviation of .577. Among the teachers, the mean and standard deviation indicate that there was no clear emphasis or de-emphasis on this idea. In the comparative statement students were asked if there was a great emphasis placed on memorizing. 27 of 37 or (73%) either agreed or strongly agreed that there was intention. This data produced a mean of 2.11 and a standard deviation .809. The mean indicates that there is some emphasis on knowledge in the classes, and the standard deviation indicates that the students varied on the level of agreement. When asked the same question, 1 of 3 teachers (33.3%) stated that they strongly agreed that was the actual intention, generating a mean of 2.67 and a standard deviation of .577. The mean and standard deviation indicate that there was no clear emphasis or de-emphasis on this idea (Table 4.12).

Table 4.12

Comparison of Actual and Intended Focus on Knowledge

| Question | Actual Mean(SD) | Intended Mean (SD) |
|---|---|---|
| Remembering or recognizing information is the student's main job. | 2.22 (.672) | 2.33 (.577) |
| Great emphasis is placed on memorizing | 2.11(.809) | 2.67(.577) |
| Mean Response to Factor | 2.16 | 2.50 |
| Finding | Some emphasis perceived | Neutral – Neither strong emphasis or de-emphasis intended |

*Translation*

The translation level of thinking has students moving beyond remembering. In translation, the students begin to take information and put it to use in manners other than how it was original presented or attained (Steele, 1982). For example, students may be able to create a 3 dimensional geometric form after hearing the term used for it. In order to assess the focus on translation in the TILE program, students and teachers were asked to respond to two statements concerning the summarization and restatement of ideas. The mean responses were determined on a four point scale with 1 representing strongly agree and 4 representing strongly disagree. According to the author of the CAQ (Steele, 1982), mean responses to the factor between 2.25 and 2.75 are neutral and mean responses to the factor between 1 and 2.24 show an emphasis on the factor. Furthermore, this emphasis has strength, with 2.00 to 2.24 showing some emphasis and 1.00 to 2.00 showing strong emphasis. When the students were questioned about what actually occurs in the classrooms, they had a mean response of 2.14, showing some emphasis on translation. When the teachers were questioned about their intended emphasis on the factor, they had a mean response to the factor of 1.67, showing strong emphasis on translation (Table 4.13). This suggests that the students believe there is a focus, but this focus is not as great as the teachers had intended.

The factor means were based on two questions. When students were asked if the restating ideas in their own words was a central concern, 25 of the 37 or 67.6% of the respondents either agreed or strongly agreed that it was, creating a mean of 2.30 with a standard deviation of .777. The mean and variation of student responses

shown by the standard deviation indicates that there was no clear emphasis by students on this idea. When the teachers were asked the same question, 3 of 3 (100%) stated they agreed that this was the actual intention, creating a mean of 1.67 with a standard deviation of .577. Among the teachers, the mean and standard deviation indicate that there was a strong emphasis on this idea. In the comparative statement students were asked if great importance was placed on explaining and summarizing presented material. 32 of 37 or 86.5% either agreed or strongly agreed that this was important. This data produced a mean of 1.97 and a standard deviation of .645. The mean and standard deviation indicate that students are in agreement that there is strong emphasis on translation in the classes. When asked the same question, 3 of 3 teachers (100%) stated that they agreed or strongly agreed that was the actual intention. This indicated a mean of 1.67 with a standard deviation of .577. The mean and standard deviation indicate that there was strong emphasis on this idea (Table 4.13).

Table 4.13

Comparison of Actual and Intended Focus on Translation

| Question | Actual Mean(SD) | Intended Mean (SD) |
|---|---|---|
| Restating ideas in your own terms is a central concern | 2.3 (.777) | 1.67 (.577) |
| Great importance is placed on explaining and summarizing presented material | 1.97 (.645) | 1.67(.577) |
| Mean Response to Factor | 2.14 | 1.67 |
| Finding | Some emphasis perceived | Strong emphasis intended |

*Interpretation*

The last of the lower thought processes is interpretation. Interpretation is concerned with a student's ability to go beyond reiteration and begin to develop a more generalized view of the data while at the same time recognizing the limits of this generalization (Steele, 1982). An example of this would be a student being able to recognize reasonable and unreasonable activities by characters within a story. Interpretation was assessed through student and teacher responses to two statements concerning implied content and trends and consequences of material. The mean responses were determined on a four point scale with 1 representing strongly agree and 4 representing strongly disagree. According to the author of the CAQ (Steele, 1982), mean responses to the factor between 2.25 and 2.75 are neutral and mean responses to the factor between 1 and 2.24 show an emphasis on the factor. Furthermore, this emphasis has strength, with 2.00 to 2.24 showing some emphasis and 1.00 to 2.00 showing strong emphasis. To the questions on the actual focus on interpretation in the TILE classrooms, the students had a mean response of 1.82 showing strong emphasis. To the questions on the intended focus on interpretation, teachers had a mean response to the factor of 1.50 also showing strong emphasis on interpretation (Table 4.14). This suggests that the students believe there is a focus on interpretation and that that focus was intended by the teachers.

The factor means were based on two questions. When students were asked if they are expected to go beyond the information given to what is implied, 32 of the 37 or 86.5% of the respondents either agreed or strongly agreed that they were, producing a mean of 1.73 with a standard deviation of .693. The mean and variation

of student responses shown by the standard deviation indicates that there was strong emphasis by students on this idea. When the teachers were asked the same question, 3 of 3 (100%) stated they agreed that this was the actual intention, creating a mean of 1.67 with a standard deviation of .577. Among the teachers, the mean and standard deviation indicate that there was a strong emphasis on this idea. In the comparative assessment students were asked if students are expected to read between the lines to find trends and consequences in what is presented. 34 of 37 or 91.9% either agreed or strongly agreed that this was important. This data produced a mean of 1.92 and a standard deviation of .892. The mean points to a strong emphasis on interpretation in the classes and standard deviation indicate that students varied on their agreement with this. When asked the same question, 3 of 3 teachers (100%) stated that they agreed or strongly agreed that was the actual intention. This indicated a mean of 1.33 with a standard deviation of .577. The mean and standard deviation indicate that there was strong emphasis on this idea (Table 4.14).

Table 4.14

Comparison of Actual and Intended Focus on Interpretation

| Question | Actual Mean(SD) | Intended Mean (SD) |
|---|---|---|
| Students are expected to go beyond the information given to see what is implied | 1.73 (.693) | 1.67 (.577) |
| Students are expected to read between the lines to finds trends and consequences in what is presented. | 1.92 (.829) | 1.33(.577) |
| Mean Response to Factor | 1.82 | 1.50 |
| Finding | Strong emphasis perceived | Strong emphasis intended |

*Application*

Application, the first of the higher thought process, moves the students into a new complexity of thinking. In application, the students are no longer prompted with a procedure to use, instead, they begin to apply appropriate procedures in new situations without prompting (Steele, 1982). One example of this is students taking their understandings of human inequalities throughout history and developing a plan to create equality for the currently disenfranchised members of society. In order to understand the role of application in the TILE program, students and teachers were asked to consider whether or not using their understandings in new or life-like situations was central to the program. The mean responses were determined on a four point scale with 1 representing strongly agree and 4 representing strongly disagree. According to the author of the CAQ (Steele, 1982), responses to the factor between 2.25 and 2.75 are neutral and mean responses to the factor between 1 and 2.24 show an emphasis on the factor. Furthermore, this emphasis has strength, with 2.00 to 2.24 showing some emphasis and 1.00 to 2.00 showing strong emphasis. When asked about the actual focus on application, the students had a mean response of 2.00, showing some emphasis. When the teachers were asked about their intended focus on the factor, they had a mean response to the factor of 1.17, showing a strong intended emphasis on application (Table 4.15). This suggests that the students believe there is some focus on application, but not to the extent that the teachers had intended.

The factor means were based on two questions. When students were asked if they actively put methods and ideas to use in new situations, 32 of the 37 or 86.5% of the respondents either agreed or strongly agreed that they did, producing a mean of

1.95 with a standard deviation of .664. The mean and variation of student responses shown by the standard deviation indicates that there was strong emphasis by students on this idea. When the teachers were asked the same question, 3 of 3 (100%) stated they agreed or strongly agreed that this was the actual intention, creating a mean of 1.33 with a standard deviation of .577. Among the teachers, the mean and standard deviation indicate that there was a strong emphasis on this idea. In the comparative statement students were asked if a central concern is practicing methods in life-like situations to develop skills in solving problems. 31 of 37 or 83.8% either agreed or strongly agreed that this was important. This data produced a mean of 2.05 and a standard deviation of .705. The mean and standard deviation point to some emphasis on application in the TILE classes. When asked the same question, 3 of 3 teachers (100%) stated that they strongly agreed that was the actual intention. This indicated a mean of 1.00 with a standard deviation of .000. The mean and standard deviation indicate that there was strong emphasis on this idea (Table 4.15).

Table 4.15

Comparison of Actual and Intended Focus on Application

| Question | Actual Mean(SD) | Intended Mean (SD) |
|---|---|---|
| Students actively put methods and ideas to use in new situations | 1.95 (.664) | 1.33 (.577) |
| A central concern is practicing methods in life-like situations to develop skills in solving problems | 2.05 (.705) | 1.00(.000) |
| Mean Response to Factor | 2.00 | 1.17 |
| Finding | Some emphasis perceived | Strong emphasis intended |

*Analysis*

Analysis begins where interpretation leaves off. Whereas interpretation looks for generalizations and limits of generalizations of content, in analysis the generalizations are broken down so that "a methodological inquiry into the structure of material and the nature of its interrelationships" (Steele, 1982, notes on Taxonomy of Intellectual Ability) may be differentiate. Continuing with the example started in interpretation, in analysis, students would not only be able to recognize reasonable and unreasonable activities by characters within a story, but they would be able to break these reasonable and unreasonable activities down into parts in order to understand what makes them reasonable or unreasonable. Analysis in the TILE program was assessed by asking students and teachers if great importance was placed on logic, reasoning, and analysis. The mean responses were determined on a four point scale with 1 representing strongly agree and 4 representing strongly disagree. According to the author of the CAQ (Steele, 1982), mean responses to the factor between 2.25 and 2.75 are neutral and mean responses to the factor between 1 and 2.24 show an emphasis on the factor. Furthermore, this emphasis has strength, with 2.00 to 2.24 showing some emphasis and 1.00 to 2.00 showing strong emphasis. To the questions concerning the actual focus on analysis, the students had a mean response of 2.07, showing some emphasis. In response to questions about the actual emphasis on analysis, the teachers had a mean response to the factor of 1.33, showing strong emphasis on the intention of analysis (Table 4.16). This suggests that the students believe there is some focus on analysis, but not to the extent that the teachers had intended.

The factor means were based on two questions. When students were asked if great importance was placed on logical reasoning and analysis, 32 of the 37 or 86.5% of the respondents either agreed or strongly agreed that they did, producing a mean of 2.14 with a standard deviation of .673. The mean and variation of student responses shown by the standard deviation indicates that there was some emphasis recognized by students on this idea. When the teachers were asked the same question, 3 of 3 (100%) stated they agreed or strongly agreed that this was the actual intention, creating a mean of 1.67 with a standard deviation of .577. Among the teachers, the mean and standard deviation indicate that there was a strong emphasis on this idea. In the comparative assessment students were asked if using logical and reasoning processes to think through complicated problems was a major activity. 32 of 37 or 86.5% either agreed or strongly agreed that this was important. This data produced a mean of 2.00 and a standard deviation of .707. The mean and standard deviation point to some emphasis on analysis in the TILE classes. When asked the same question, 3 of 3 teachers (100%) stated that they strongly agreed that was the actual intention. This indicated a mean of 1.00 with a standard deviation of .000. The mean and standard deviation indicate that there was strong emphasis on this idea (Table 4.16).

Table 4.16

Comparison of Actual and Intended Focus on Analysis

| Question | Actual Mean(SD) | Intended Mean (SD) |
|---|---|---|
| Great importance is placed on logical reasoning and analysis | 2.14 (.673) | 1.67 (.577) |
| Using logic and reasoning processes to think through | 2.00 (.707) | 1.00(.000) |

| | | |
|---|---|---|
| complicated problems (and prove the answer) is a major activity | | |
| Mean Response to Factor | 2.07 | 1.33 |
| Finding | Some emphasis perceived | Strong emphasis intended |

*Synthesis*

Synthesis is the level of thinking that provides for creative behavior. In synthesis, "the students must draw upon elements from many sources and put these together into a structure or pattern not clearly there before" (Bloom, 1956, p. 162). This may be seen through an example of a student developing and testing a hypothesis, only to find out that the hypothesis is flawed. The new data is taken into account and the hypothesis is modified accordingly. Ideas about inventing, designing, and creating something new were the focus of the questions for the teachers and the students in order to understand the role of synthesis in the TILE program. The mean responses were determined on a four point scale with 1 representing strongly agree and 4 representing strongly disagree. According to the author of the CAQ (Steele, 1982), responses to the factor between 2.25 and 2.75 are neutral and mean responses to the factor between 1 and 2.24 show an emphasis on the factor. Furthermore, this emphasis has strength, with 2.00 to 2.24 showing some emphasis and 1.00 to 2.00 showing strong emphasis. When students were questioned about the actual occurrences in the TILE classrooms, the students had a mean response of 2.08 to the questions addressing synthesis. This response showed some emphasis on the factor. When the teachers were questioned on their intended focus on synthesis, they had a mean response to the factor of 1.33, showing strong intended

emphasis (Table 4.17). This suggests that the students believe there is some focus on synthesis, but not to the extent that the teachers had intended.

The factor means were based on two questions. When students were asked if they are urged to build onto what they have learned to produce something new, 31 of the 37 or 83.8% of the respondents either agreed or strongly agreed that they were, producing a mean of 1.92 with a standard deviation of .722. The mean indicates that there was strong emphasis recognized by students on this idea but that the students varied somewhat in their responses. When the teachers were asked the same question, 3 of 3 (100%) stated they agreed or strongly agreed that this was the actual intention, creating a mean of 1.33 with a standard deviation of .577. Among the teachers, the mean and standard deviation indicate that there was a strong emphasis on this idea. In the comparative statement students were asked if inventing, designing, composing, and creating were major activities. 25 of 37 or 67.6% either agreed or strongly agreed that this was important. This data produced a mean of 2.24 and a standard deviation of .760. The mean points to some emphasis on synthesis but with varied student responses. When asked the same question, 3 of 3 teachers (100%) stated that they either agreed or strongly agreed that was the actual intention. This indicated a mean of 1.33 with a standard deviation of .577. The mean and standard deviation indicate that there was strong emphasis on this idea (Table 4.17).

Table 4.17

Comparison of Actual and Intended Focus on Synthesis

| Question | Actual Mean(SD) | Intended Mean (SD) |
|---|---|---|
| Students are urged to build onto what they have learned, to produce something brand | 1.92 (.722) | 1.33 (.577) |

| | | |
|---|---|---|
| new | | |
| Inventing, designing, composing, and creating are major activities | 2.24 (.760) | 1.33(.577) |
| Mean Response to Factor | 2.08 | 1.33 |
| Finding | Some emphasis perceived | Strong emphasis intended |

*Evaluation*

"Evaluation is defined as the making of judgments about the value, for some purpose, of ideas, works, solutions, methods, materials, etc" (Bloom, 1956, p. 162). Continuing with the example started in interpretation and analysis, evaluation might take place after the student has begun to understand what makes the character's action reasonable or unreasonable. Evaluation would be the act of judging whether or not the character's actions were justified regardless of their reasonability. Students and teachers were asked to give their input on the role of judgments in the TILE program as a way to assess evaluation. The mean responses were determined on a four point scale with 1 representing strongly agree and 4 representing strongly disagree. According to the author of the CAQ (Steele, 1982), responses to the factor between 2.25 and 2.75 are neutral and mean responses to the factor between 1 and 2.24 show an emphasis on the factor. Furthermore, this emphasis has strength, with 2.00 to 2.24 showing some emphasis and 1.00 to 2.00 showing strong emphasis. When asked about the actual focus on making judgments in the classrooms, the students had a mean response of 2.26, showing no actual emphasis on evaluation. When asked about the intended focus on making judgments, the teachers had a mean response to the factor of 2.00 showing some emphasis on the intention toward evaluation in the

TILE classrooms (Table 4.18). This suggests that although the teachers intended some level of evaluation, the students were not aware of it.

The factor means were based on two questions. When students were asked if a central activity is to make judgments of good/bad, right/wrong, and explain why, 26 of the 37 or 70.3% of the respondents either agreed or strongly agreed that it was, producing a mean of 2.30 with a standard deviation of .740. The mean indicates that there was no emphasis recognized by students on this idea and that the students varied somewhat in their responses. When the teachers were asked the same question, 2 of 3 (66.6%) stated they agreed or strongly agreed that this was the actual intention, creating a mean of 2.33 with a standard deviation of 1.528. Among the teachers, the mean and large variation among responses demonstrated no emphasis on this idea. In the comparative assessment students were asked if the students' major job was to make judgments about the value of issues and 25 of 37 or 67.6% either agreed or strongly agreed that this was important. This data produced a mean of 2.22 and a standard deviation of .712. The mean points to some emphasis on synthesis but with varied student responses. When asked the same question, 2 of 3 teachers (66.6%) stated that they strongly agreed that was the actual intention. This indicated a mean of 1.67 with a standard deviation of 1.155. The mean indicates that there was strong emphasis on this idea while the standard deviation indicates that the responses varied widely (Table 4.18).

Table 4.18

Comparison of Actual and Intended Focus on Evaluation

| Question | Actual Mean(SD) | Intended Mean (SD) |
|---|---|---|
| A central activity is to make | 2.3 (.740) | 2.33 (1.528) |

| | | |
|---|---|---|
| judgments of good/bad, right/wrong, and explain why | | |
| The students major job is to make judgments about the value of issues and ideas | 2.22 (.712) | 1.67(1.155) |
| Mean Response to Factor | 2.26 | 2.00 |
| Finding | Neutral – Neither strong emphasis or de-emphasis intended | Some emphasis intended |

In this section, the levels of thinking in the TILE program, based on Bloom's taxonomy, have been explored. This, in combination with the preceding sections on classroom assignments, and classroom interactions, gives an overall view of expectations for learning and thinking by students and teachers in the TILE classrooms.

## Use of Technology

When Mr. Lincoln was asked about the name of the Technology Integrated Learning Environment (TILE), he shared,

> When I first came here we had 30 computers and over 700 students and it was almost impossible to get in and use them more than maybe once or twice during the whole academic year. Kids learn better with tech, cause they're kids, technology is a part of them at this time, it's just second nature and its part of their lives. We use these tools to enhance their learning. It's in some ways almost an abbreviated mission statement. These are the things that really are the pillars of what we do. We learn, we implement technology, we develop and keep a community going, and we try to enhance what is already here.

The name of the program, along with the statements by Mr. Lincoln, implies a technology component to the TILE program. This component is the focus of the following section of data. In this section data will be studied to identify how technology is used in the teaching and learning processes. Three specific items will

be addressed, what technologies are available, how technology is utilized by the teachers, and how technology is utilized by the students.

*What technologies are available in the learning environment?*

Having a clear understanding of the technologies available to the students and teachers required that the students and teachers be asked about what was available and that the learning environment be surveyed for available technologies. The following demonstrates the technologies that the students and teachers recalled as being available as well as a listing of all of the technologies found in the two classrooms and the team's computer lab.

When the students were asked what technologies were available, they declared the following:

Heath: Computers is one.
Alisa: Computers.
Michael: I guess it's computers.
Bethany: Computers, that's all I can think of.
Kevin: We use computer labs, SmartBoards, laptops, and just things like that.
Laurie: We have the SmartBoards and we go to the computer lab a lot.
Turner: Technologies, we use computers, mostly all computers. I really like the SmartBoards, how they're linked up to computers.
Frida: Computers and that's just about it. There's a SmartBoard, there's a projector, there's like an overhead kinda thing, and then there's this camera like thing, where the thing is like bendable like a flexi kinda lamp thing but you actually get to see what, what the lamp is over.
Aaron: Computers, SmartBoards, overheads, pretty basic teaching things. We have our own thumb drives and that's helped out a ton this year. Each student has their own thumbdrive to keep all their materials on from each computer and stuff, that's helped out a lot.

The teachers then added to the list of what the students said were available.

Mr. Kelvin: Right, pencil and paper for one thing. Get out your pencil, get out your paper. If you don't have a pencil and paper, then how are you gonna bring a computer to school? Computers in the classrooms, SmartBoard, and projector, that's all part of that…
Palm Pilots.

Mr. Lincoln: We have, of course, the very nice bank of 90 Microsoft platform computers, accompanying printers, the teachers have SmartBoards, we have AVerVision, projectors, we have, oh my goodness, we have the video conferencing, robotics, we have so many wonderful tools…
We have some PDAs, as well as a camera.

An audit of the technologies available produced the following list. In the list are the technologies, quantity available, and their locations.

Table 4.18

Audit of Technologies available for the TILE program (Some are shared by multiple classroom)

| Technology | Quantity | Location |
|---|---|---|
| Projector | 2 | Closet in the Computer Lab |
| Palm 505 Handheld | 15 | Closet in the Computer Lab |
| Assorted Palm Probes | 1 | Closet in the Computer Lab |
| ClearOne Video Conferencing System | 1 | Closet in the Computer Lab |
| TI 73 Calculator | 30 | Closet in the Computer Lab |
| Lego MindStorms (Robotics) | 2 | Closet in the Computer Lab |
| Computer (with Internet Capabilities and Office Suite) | 90 | Computer Lab |
| Color Printer | 1 | Computer Lab |
| SmartBoard | 1 | Mr. Kelvin's Room |
| AVerVision | 1 | Mr. Kelvin's Room |
| Projector | 1 | Mr. Kelvin's Room |
| Laptop (with Internet Capabilities and Office Suite) | 1 | Mr. Kelvin's Room |
| Computer (with Internet Capabilities) | 2 | Mr. Kelvin's Room |
| TV | 1 | Mr. Kelvin's Room |
| SmartBoard | 1 | Mr. Lincoln's Room |
| AVerVision | 1 | Mr. Lincoln's Room |
| Projector | 1 | Mr. Lincoln's Room |
| Laptop (with Internet Capabilities and Office Suite) | 1 | Mr. Lincoln's Room |
| HearIt (Voice Projector) | 1 | Mr. Lincoln's Room |
| TV | 1 | Mr. Lincoln's Room |
| Microwave | 1 | Mr. Lincoln's Room |
| Black and White Printer | 1 | Teacher's Pod |

| | | |
|---|---|---|
| 128Mb Thumb Drives | 60 | Teacher's Pod (When not in use in the lab) |

The student and teacher comments, along with technology audit give an overview of what technologies are available, but they do not describe how it is used in the teaching and learning process. The next two sections will delve into this, addressing first how they are used by teachers, and second how they are used by the students, with the understanding that sometimes the uses may not be separated.

*How is technology utilized for teaching and learning by the teachers?*

When the teachers and the students were probed on the use of technology in the classroom, a number of the students and one of the teachers addressed how often it is used. It is important to note that in the following the use of technology by the teachers may involve the students, making it student used technology as well.

Aaron: In class the teachers are always at the computers…Mr. Lincoln won't teach on anything but the SmartBoard.

Turner: They use the SmartBoard all the time, SmartBoards are used a lot. Everyday we use them for the whole class period…
Mr. Lincoln uses the SmartBoard all the time to explain problems that students may have missed on the homework. Mr. Kelvin always shows the daily science up on the board so he doesn't have to hand out packets and go through that all the time.

Kevin: The SmartBoard and laptop are usually used every period.

Mr. Lincoln: The SmartBoard is probably one of my big things. I use it all the time. Of course the laptop I use all the time because that's what makes my SmartBoard available.

The observations agree with this. Of the 11 days observed, notes the teacher uses laptops, projectors, and/or the SmartBoards were present everyday. They used it often, and one of the ways that they used it was to present information to students. Kevin shared that one of the technologies that is used most of the time is "used for

listing and showing the class, important information." Other students, the teachers, and observation notes concurred with this.

Belinda: He uses it for math and history; he makes slide shows for us and, to where we can understand things.

Frida: They type stuff up and then they have it on the screen of the computer and then the projector projects it onto the SmartBoard for the students to see.

Aaron: Mr. Kelvin, he'll get a newspaper and toss it under there. We have to read off of it.

Mr. Lincoln: I use the SmartBoard a lot because it's very interactive, it gives me some flexibility that the traditional whiteboard or chalkboard don't, in terms of even going in the morning and putting up a bank of problems and being able to hit one button and going quickly to the next where you have that, you're not rewriting and kids waiting, you know cause kids need to be kept (snaps his fingers) active to keep their focus…

It gives more variety, a wider variety of experiences. It allows me to illustrate and demonstrate points much more effectively. I believe kids' attention span is that of the 30 second sound bite. They're used to media. That's what they're used to looking at. And so it allows me to plug into some tendencies, to some, leanings that they already have…

The Hear-It system is for the projection of my voice. Not, that you're usually unable to hear it, but the clarity with which some kids are able to hear tends to bring their attention better.

Observer: Mr. Lincoln moves to the laptop and opens a PowerPoint presentation. The presentation is projected on the SmartBoard in the front of the room…

Mr. Kelvin projects weather information from a website onto the SmartBoard. He describes how the information on the page was gathered through a weather station that sits on top of the school building. He describes for the students each weather reading presented on the page…

Ms. Roberts moves to the laptop, opens the DVD player and puts in a DVD. Fahrenheit 451 appears on the SmartBoard.

Sometimes the technologies are used for giving students problems to work through.

Belinda: They put the work on them and problems for us to do. They'll put work up there before hand and they can save it on there to where we can get to it later on.

Heath: On the boards, they write problems for us to do.

Aaron: He'll show assignments that we have to do under the overhead, just so everyone can see it.

Observer: He moves to the laptop and opens a PowerPoint presentation. The presentation is projected on the SmartBoard in the front of the room. The first slide that is projected shows a cylinder and an equation and it plays a tune (The James Bond Theme) in the background. Mr. Lincoln tells the students that they have till the end of the song to find an answer to the equation…

> Mr. Lincoln then projects a new set of problems on the board. The problems projected on the board are square root problems. He tells the students that they have 30 seconds to answer all of the problems…
> Ms. Roberts uses the AVerVision to project three passages up on the board. The students are told to work as groups to answer all of the questions that deal with the passages projected on the front board…
> Mr. Kelvin uses the AVerVision to project an article on the SmartBoard. He then tells the students to write down the question, "Will this work?" He then begins reading excerpts from the article. The students are then directed to answer the question in their journal.

Other times the teachers use the technologies available in the TILE classrooms to have the students demonstrate understandings. Mr. Kelvin pointed out:

> Students write on the SmartBoard. Students are expected to put their heads together and discuss and then come up to the SmartBoard. And my tactic there is to find representative sample of the kids in the group and have them share their thoughts.

Mr. Lincoln shared how he uses the tools with his students:

> I'm able to use, by being able to take the SmartBoard and manipulate things, I can show principles, auditorily, visually, and kinesthetically. All the goodies, send kids up there to work with it, have the kids develop things.

The students also recognized this use of the technologies.

Belinda: If there is like a math problem on there, where we're all trying to figure it out together, he'll let us go up there and try different, ways of figuring it out.
Heath: Sometimes we do problems on the SmartBoard.
Laurie: Sometimes they'll have us go up and write something on the board.
Aaron: Mr. Lincoln uses his SmartBoard, we do all our math problems up there. Students can come up and show the class what they did.

This role could be found in observation notes as well.

> He moves to the computer and projects a new plane onto the board. On the plane is a filled in red square and a dotted line red square of equal size. He asks a student to walk him through the process of moving from the solid square to the dotted square…
> Mr. Lincoln tells the student that they will play his version of Hollywood squares. He turns on the projector and a PowerPoint presentation that resembles the TV show Hollywood squares appears. He tells the students that they will be chosen to pick a square and answer the question associated with it.
> Mr. Lincoln projects definitions on the board with the AVerVision and then selects a student to read the first definition…

Mr. Kelvin asks a student to read the "summary" on the Smart Board. The student reads the summary. Mr. Kelvin highlights two words on the board. He asks the student for definitions of the words.

The above explored how the teachers in the TILE program utilize technology for the teaching and learning process. In each of the above, the student played a role in how the technology was used, although the direct focus was not necessarily on the students use. The following section delves into the student specific use of technology.

*How is technology utilized for teaching and learning by the students?*

As the students were in some way involved in each of the teachers' uses of technology, so are the teachers involved in the students' use of technology. In the following the student use of technology will be discussed.

Outside of the previous description of how the students use technology, almost all descriptions revolved around student use of the computers in the computer lab. Before discussing how the computers are used in the computer lab is addressed, the issue of how often the computers are used will be addressed. When asked how often they use technology in the TILE program, the students responded as follows:

Belinda: Last week in English we used them everyday, but not often. We go whenever it can be fit into our schedule.
Laurie: We use the lab usually a little more than once a week.
Aaron: Once every 2, once every week or so. It depends on if we're doing something like a big project or just going in there for a day. Some days we'll go in there 3 days in a row. A lot of times we'll go there for like a day or 2.
Turner: Computers, only for 4th period. Every other week we usually go to the computer lab. For the first half of the year we didn't go at all, but then we started going every other week.
Bethany: Maybe once a week, once or twice a week.
Kevin: The computer lab is used I'd say on an average of 4 times every two weeks.

The observation data pointed out that the students visited the computer lab 2 out of 6 observed days in English, 1 out of 6 observed days in science (part of the class), 1 out of 5 days in history and 0 out of 5 days in math. That is 10 periods out of 55 observed.

When the students visited the computer lab, the students were writing papers, researching, or developing presentations. Generally the students were doing one or more of these at a time. These findings are based on the following data, derived from student and teacher interviews and observations. When the students were asked how they use technology, they responded:

Kevin: We use the computer labs for typing papers and researching, and making slide shows.
Bethany: Usually research, typing papers, and that's all I can think of.
Turner: Computers are only used for typing pretty much. We type a lot of the time. I guess sometimes we go up onto the Internet to find pictures to post on, but it's usually only typing.
Aaron: We use the computers for, mainly for English class, for typing when you're writing stories, History to tie down all your facts, type down stories. We just did this group thing where we broke into groups of 4 in history class and we had to teach the kids about different subjects. We had to type up our pre-test, post-test on that. We had to type a study guide up on that. We had to make games on that to put in the study guide. It was a lot of work. PowerPoint presentations, we've made quite a few of those this year. Personally if I had to pick anything I enjoy, I enjoy creating PowerPoint's.
Laurie: When we go to the computer lab, we usually make PowerPoint presentations or we type up some things that we've written in our writing logs.
Michael: I guess mostly just research and doing slideshows and quick, fast assignments.
Alisa: Typing and looking up stuff on the Internet.
Frida: We type up, in English now we're doing this 6 page thing and we're just typing it up.
Belinda: We write reports on em. Right now we're working on this assignment that is due next Monday. We are working on 6 pages of writing which are due.

When the teachers were asked how they use technology with the students, they shared the following:

Ms. Roberts: I like a lot of typing things, which is, doesn't really seem very high tech to me, but in middle school I guess, typing something is a big deal… We're gonna go straight to the computers. On the computers they're gonna start writing their brochures.

Mr. Lincoln: They are used for research primarily, they try WebQuests, they're develop PowerPoint presentations, some Excel presentations, these are usually group work, to where different people are given assignments on a program to where they are working at the same time on different components and merge them or bring them together.

The previous section described the role that technology plays in the TILE program. In the section, the technologies available and the teacher and student uses of those technologies were discussed.

## Conclusion

In this chapter the reader was taken through the data for three primary questions asked in order to meet the overall goal of this study which is to describe teaching and learning within the TILE program. The researcher began by lookin back at how the study was approached and described the limitations and revelations exposed in the research process.

The first question that was examined was how are teaching and learning experiences planned, implemented and assessed? To allow the reader to assess this question, data was given first describing who was involved in the planning of learning objectives, teaching and learning methods, and assessments. This was followed with an exploration of how learning is assessed in the program. Finally, data was displayed that demonstrated the roles that teachers and students play in the TILE program.

The next question for which data was reported was how was the TILE environment affecting levels of thinking? Readers were given data that described the

assignments that students were expected to complete as well as information relating what they must do to be successful on the assignments. Further information for this question was derived by examining the roles of teachers and students and the questions asked in classroom discussions. Lastly, through the lens of Bloom's taxonomy, statistics of student and teacher views of the levels of thinking in assignments and discussions in the TILE program was presented.

The final question investigated to develop a description of teaching and learning in the TILE program was how was technology used in the teaching and learning processes? The reader was first given an overview of the technologies available for teaching and learning activities. Next, teacher use of technology was relayed. And the last topic to be dealt with was the use of technology by students.

In the final section, the researcher looked back at how the study was approached and described the limitations and revelations exposed in the research process.

Chapter five is the conclusion of this study. In the chapter, a summary of the purpose of the study will be presented. A summary of the research design used in the study will be presented. Next, an interpretation for the study from the researcher's perspective as a stakeholder will be presented. This will be followed by a description of the limitations of the study, recommendations for further research, and finally, an overall conclusion.

# CHAPTER V

# SUMMARY AND CONCLUSIONS

As a primer to chapter five it is imperative that the researcher explain the difference between the general applications of findings in case study research and the application of case study research findings for a dissertation. Generally, no recommendations are made based on the findings of the researcher. The findings are left for interpretation and application by the participants and other stakeholders of the study (Stake, 1995). In the dissertation process the researcher must also consider the committee members as an audience. For this audience, the researcher must proceed to a level of interpretation that meets academic standards. As a result, this chapter will include a section on researcher as stakeholder. This section will include a comparison of the findings with the literature review, as well as guidelines that the researcher would follow if he were to make changes in the case. These conclusions are in no way intended as recommendations for students or teachers in the TILE program.

## Introduction

This study of the Technology Integrated Learning Environment (TILE) reveals data collected during the spring semester of 2006 that creates a description of teaching and learning in the program. In this chapter the study and its purpose are summarized. This is followed by a synopsis of the research design which includes a section on how conclusions are drawn in such an investigation. The researcher then plays the role of a stakeholder and examines the data as it relates to the literature in

chapter two. The subsequent segment addresses the limitations of this inquiry. The final section gives an overall conclusion to the study.

## Summary of the Study and its Purpose

The release of the report, A Nation at Risk (National Commission on Excellence in Education, 1983), began a movement in United States education that has since developed into federal law. The No Child Left Behind Act (2001) has moved most states to develop high stakes tests to determine eligibility for graduation. Arizona's Instrument to Measure Standards (AIMS) is one example. The TILE program was developed with the concern for success on AIMS as one of its core values. Three other components comprise the remaining foci: the middle school philosophy, technology integration, and the NASA Explorer Schools (NES) program.

The literature on the philosophical foundations that make up the four components of the TILE program indicate a split in the way the stakeholders for the components approach teaching and learning. Focus on high stakes testing and the use of technology as intelligent tutoring systems demonstrate a behaviorist approach to teaching and learning. On the other hand, the middle school philosophy, the NES programs, and technology used as a tool for researching, analyzing, and communicating with others reveal a humanist approach to education.

Although the research developed an indication of a split in philosophical underpinnings, it was unclear how teaching and learning would be conducted in an environment that holds value for both behaviorist and humanist philosophies. As a result, the purpose of this research was to describe the roles, behaviors, and activities

of students and teachers in a learning environment designed to meet the needs of stakeholders with varied and possibly conflicting philosophies of education.

## Summary of Research Design

Beginning to develop a description of the roles, behaviors, and activities of the students and teachers in the TILE program required an approach to research that viewed the environment through multiple lenses. This in return required that multiple methods of data collection be utilized. O'Connell Rust and Freidus (2001) share that to truly understand unique learning environments, it is imperative to not only ask what is happening, but to observe the happenings. Furthermore, it is suggested that investigators must elicit meaning and explanation from the participants and use these understandings to begin to stitch together a broad picture (Popkewitz, Tabachnick, & Wehlage, 1982). Yin (2003) indicates that studies of this nature may use a mixture of quantitative and qualitative evidence. The following sections describe why and how this study has been designed with these criteria in mind.

### *Interpretivist Research*

This research began with the belief that the researcher's interpretation of roles, behaviors, and activities was one of many. Others in the environment, students and teachers, had unique interpretations of these as well. Because of the multiple points of view, it was essential that this research was approached from a paradigm that values the interpretation of the environment from multiple sources. Interpretivist research is dependent upon the multiple perspectives of any given environment. It aims to determine understanding of the world by defining particular constructs which

are shared by both the subject(s) and researcher. In this study that was achieved through strategies that promoted observations, interactions, and communications with and among both the researched and the researcher.

### *The Case Study*

Although there are a number of interpretivist methodologies that could have been utilized to answer questions about the TILE program, the case study methodology surfaced as the best fit for the current inquiry. In describing what is special about a case study Stake (1997) states, "it's special because it's about one thing: one person, one classroom, one curriculum, one case. You learn the intricate complexity of one case" (p. 401). Case studies, furthermore, are conducted on what is termed a bounded system. A bounded system is the focal point of the investigation; in this case it is teaching and learning in a middle school program founded on multiple theoretical constructs.

Yin (2003) contends that there are multiple types of case studies. The current case study is what Yin terms descriptive. The descriptive case study is used to develop a document that fully illuminates the intricacies of an experience (Stenhouse, 1988). These are often used to present answers to a series of questions based on theoretical constructs (Yin, 2003). The descriptive case study has been chosen for this study to develop an understanding of teaching and learning in the TILE program and use this understanding to define the theoretical constructs under which the classrooms of the TILE program operate.

Finally, Yin (2003) points out that any case study inquiry is only successful when built on the collection and analysis of data from multiple sources. The

triangulation of all data, both qualitative and quantitative, should lead to a credible understanding of the case. This study has resulted in findings that stem from students, teachers, researcher, and classroom documentation. The data was gathered through classroom observations, face-to-face interviews, and a questionnaire.

### *Naturalistic Generalization*

The data gathered and presented in this descriptive case study may be used in a number of ways. First, the teachers in the TILE program may use it to gain a better sense of the multiple lenses of student, teacher, and researcher. They may then use these insights to adjust teaching to meet their needs. The TILE administrator may use the results to share with the community or the school board an example of the programs available at the school. Finally, other teachers and administrators may use the results to better understand what is happening in their own environments and adjust their practices as needed. All of these may be considered naturalistic generalizations.

Naturalistic generalizations are the culmination of successful interpretivist research. As Stake (1997) concludes his thoughts on what is so special about a case study he states that, "sometimes you find that what is true for one case is true about other cases too" (p. 401). Stake and Trumbull (1982) point out that the findings of a descriptive report can create "vicarious experiences" through which the reader may begin to develop connections with their own previous experiences. These connections are then used as a catalyst for change within their own environments.

The purpose of the current research is not evaluation. It is simply a description of the roles, behaviors, and activities of students and teachers in one

learning environment. This data is meant for the research participants, stakeholders, and others who may use the data to better understand their own environments. It was collected and analyzed for the sole purpose of naturalistic generalizations.

## Researcher as a Stakeholder

Although the data was collected and analyzed for the sole purpose of naturalistic generalizations, the researcher must go beyond this purpose to meet the requirements of a doctoral study. In this section I will take the role of a stakeholder of the program. As a stakeholder, my concern is what conclusions can be drawn from the data, how this data aligns with the literature concerning the four components, and what this might mean if the future of the program were under my control . The following section will then address the researcher as a stakeholder in the TILE program. First, the findings will be examined to determine conclusions about the three primary questions of this research. Next, the literature in chapter two will be reconsidered and examined for connections to the conclusions. Finally, the researcher will make recommendations that he would abide by if he were to make changes to the program.

### *Conclusions*

The primary goal of this section is to consider the findings and make logical assumptions based on them that give possible answers to each primary question: How are teaching and learning experiences planned, implemented, and assessed?, How is the TILE environment affecting levels of thinking?, and how is technology used in the teaching and learning environment? The findings from chapter four will be the

basis of all assumptions. The reader may, at times, be referred to tables from that chapter. Although the tables only give a snapshot of the findings, they serve as refreshers and references to the broad spectrum of data presented in chapter four.

Validity of the assumptions presented can be assessed through examination of the use of source triangulation, triangulations of data collection methods, and the external review. Source triangulations may be considered by scrutinizing the sources for the basis of the conclusions. The inclusion of multiple sources gives credibility to the findings. Multiple ways in which data was gathered show triangulation of the data collection methods. The inclusions of multiple methods also give credibility to the findings. Finally, an external reviewer examines the raw data and gives their interpretations. These interpretations are used to further confirm the conclusions suggested by the researcher. The incorporation of these in the data collection and analysis process provide credence to the overall validity of the conclusions. These outside researcher interpretations have been included in Appendix H. Next, the findings on the main research questions will be presented.

*How are teaching and learning experiences planned, implemented, and assessed?*

This section will explore three themes: who is involved in the planning of learning objectives, learning and teaching methods, and assessment; how learning is assessed in the program; and the overall roles that the teachers and students play. Each theme will be unpacked by examining the findings from chapter four and developing feasible meanings from the data.

*Who is involved in planning?*

When the findings of chapter four are referenced, they pinpoint three distinct groups who may be responsible for planning in the TILE classrooms; students, teachers, and administration from outside the school. When asked in interviews and questionnaires, both the teachers and students indicated that there are moments when the students had input into what would be taught in the classroom and how it would be taught. Other indications from interviews, questionnaires, and lesson plans point to the teachers as having control of designing learning objectives and the methods for presenting them. Although the students and teachers indicated that the teachers determined the objectives and methodologies, both groups, along with the lesson plans, also indicated that these were in line with district criteria or state standards. In the area of planning assessment in the TILE program, the students were never mentioned; students, teachers, and lesson plans all indicated that it was the teachers, or outside forces that were responsible for the planning of assessment.

The probable conclusion drawn from these findings is that teachers had control over the creation, implementation, and assessment of classroom activities. The data used to come to this conclusion was gathered from teachers, students, and documentation through interviews, observations, and the CAQ. The findings indicated that there was advanced development of lesson plans, methods, and assessment activities by the teachers. The complete descriptions of activities, goals, and assessments in the lesson plans demonstrate that the teachers are in control of what happens in their classrooms. It is also supported by the frequent admissions of both the teachers and the students that the teachers do the planning. Furthermore, even when students had the opportunity to make decisions, it was within the teachers'

control. One teacher pointed out "we also allow the students to make decisions at times." Finally, any district or state requirements were filtered into the classroom through the teachers when the teachers decided how they would design the classes to meet those requirements.

Another possible conclusion that may be made is that the learning objectives, methods, and assessments are controlled by outside forces. In classroom observations, lesson plans, and interviews with teachers and students, merit was given to the influence of district, state, and national policies. One student indicated that the teachers may have had to follow a preset curriculum, while the teachers connected what they taught to the state standards. As for methods of teaching, one of the teachers explained that he felt a lack of control because he had to teach a specific way in order to meet those standards. And finally in the area of assessment, the lesson plans mentioned preparation for Arizona's Instrument to Measure Standards (AIMS) and the teachers indicated that they created assignments in order to prepare for the test.

*How is learning assessed?*

The findings from chapter four indicated that learning is assessed in three ways; personally by the students, by the teachers, and by external sources. Although it was not often spoken about, both students and teachers did mention in interviews that students assess themselves by determining whether or not they have been successful in their classroom activities through self reflection. Students and teachers also indicated that the responsibility for determining student success lies with the teacher. In lesson plans, interviews, and observations, the teachers were identified as

controlling assessment. The findings indicated that the teachers assessed two different types of activities; those that were in progress, and those that had been completed. Those that were in progress were checked by teacher observation, completion of work, and student-teacher interaction. The assessment of items completed was done through traditional tests or quizzes. Finally, there were some signs that assessment was conducted as preparation for the AIMS. The teachers' lesson plans, teacher interviews, and classroom observations all included description of the importance of standardized tests.

The primary conclusion to be drawn is that the teachers are mainly responsible for assessment in the TILE program. Classroom observations, interviews with students and teachers, lesson plans, and the CAQ (Steele, 1982) all indicated an assessment system maintained by the teachers. In student interviews the students generally indicated that they learn whether or not they have been successful on an activity through teacher feedback. When the teachers described student success, they often indicated that it was based on their own observations or on their grading of assignments or tests. The lesson plans also pinpointed the teacher as in control of assessment through the descriptions of evaluation as teacher observations, exams and quizzes, and student responses. Observations of the classroom also supported teacher controlled assessment, noting that the teachers were giving tests and were often asking students to give them answers to their questions. Finally, one factor from the CAQ pointed to a focus on grades and testing.

Another implication that one might find is that assessment in the TILE classrooms is beyond the teachers' control; in the control of state or district through

sanctioned standardized tests. Support for this comes from teacher interviews, observations, and lesson plans. Throughout the teacher interviews the teachers referenced AIMS many times, discussing the importance of preparing the students to take it. Observations also included AIMS, with the researcher describing multiple occasions where the teachers explained the importance of AIMS to the students. The lesson plans also indicated the importance standardized testing through the listing of activities including practice tests.

*What are student and teacher roles?*

The findings detailed in chapter four on the roles of teachers and students in the TILE program can be broken down into two categories; intended and actual roles. Data for these findings were taken from the CAQ results, observations, and student and teacher interviews. Midway through the observation period, the students and teachers were asked to consider classroom climate by reflecting on the intended role of student enthusiasm, independence, and divergence. In each of these categories, the teachers indicated that they had intended to create an environment where the students were excited about the courses and took a student dependent path to understanding content. The actual happenings revealed by the students, indicated that this was a focus in the classes. Furthermore, when the teachers were asked in interviews what type of students they wanted to produce, they described students who approached learning independently. At the end of observation days, teachers were asked about their roles and indicated that they took a more traditional role giving students the information and instructions they needed to be successful during the day. In interviews at the end of the semester, the students also described their role as

following the teachers' instruction or guidance. Observations from the classes during the first half of the semester indicated that teachers often gave instructions or information as they worked with the students.

The principal conclusion to be drawn from these findings is that the TILE classrooms were unintended teacher-centered learning environments. Through responses in interviews and the CAQ, the teachers described their intent. Through student and teacher interviews and classroom observations, actual class happenings were distinguished. The overwhelming evidence from the interviews with both the students and the teachers, along with the observations indicate that most class time was spent in a traditional structure with the teacher as the distributor of knowledge and the student as the empty vessel. Often the teachers described intentions to develop activities where students played a major role in the action. When teachers talked about what they did in class, generally they described how they facilitated learning or got the students to think from multiple sides. The students on the other hand indicated that generally what they did in class was get information from the teachers and do the assignments they were given. The findings from the observer described situation after situation where students received information, but seldom reacted to it.

Another potential conclusion that may be made is that the students have a greater control over learning activities in the TILE program than they might in other programs. In the CAQ, both the teachers and the students indicated a clear view that the teachers had intended to create an environment that was both supportive and open to independent thought. In final interviews the teachers also indicated that they

thought that the students may have more options than they might in other programs. Two students also indicated that they felt that they had a say in how the classrooms operated.

*How is the TILE environment affecting levels of thinking?*

In order to develop possible understandings of how the TILE program is affecting levels of thinking, this section will be broken down differently from the preceding. This section will begin by presenting an overview of the findings based on the following themes; the types of assignments students were expected to complete and how they determined success on those assignments, what the roles of students and teachers were during classroom interactions the types of questions asked during those interactions, and what the intended and actual levels of thinking targeted in the TILE classrooms actually were. The summary of the findings will be followed by possible conclusions on the levels of thinking in the TILE environment that combine findings from all themes.

*Assignments.*

The findings from chapter four indicate that there were four distinct types of assignments and that students could be successful on them in two ways. The first types of activities were the daily or beginning of class activities. In interviews with both students and teachers they describe beginning classes with an activity that took a short time but got the students working from the time they walked into the classrooms. This was also observed in researcher notes that detailed these activities. These activities generally require that the students read and respond to something projected on the SmartBoard in the front of the room. These activities ranged from

students solving problems with the flow of water through the local streams, to the solving of math equations or the diagramming of sentences. The students were also expected to work through problems on worksheets or those that had been developed by the teachers. Student and teacher interviews and observations indicate students working on worksheets, out of books, and on problems presented on the classrooms' front boards. These types of assignments have the students working through multiple versions of the same types of problems, or answering questions that relate to a reading or lecture. Teacher lesson plans, classroom documents, student and teacher interviews, and observations describe the role of projects in the TILE classrooms. Projects can be defined as multiple day activities on which students worked alone or within groups to create artifacts. Projects observed ranged from the building of rockets to be used for understanding trigonometric concepts to the creation of brochures to demonstrate an understanding of propaganda. The students and teachers, in their interviews, and the notes from observations described activities where students presented information to fellow students, teachers, and sometimes parents. The presentations ranged from students giving 30-second overviews of books to the description of how they would portray Civil War era individuals.

The students described the typical assessment of their assignments and activities in the two following ways. First, they were successful if the assignment was completed and given to the teacher. Second, students felt they were successful if the were paying attention in class.

*Classroom interactions.*

The findings on classroom interactions revealed in chapter four were the result of analysis of audio-recorded classroom observations. The analysis indicated that in the TILE program, the teachers were responsible for talk or behaviors 55.16% of the time. The students on the other hand were responsible for 36.38% of the total talk or behaviors. See table 4.6 and the surrounding sections of chapter four for further detail. Of the teacher interactions, 43.54% were giving directions or instructions and 44.35% of the teacher interactions were spent asking students questions. Table 4.7 in chapter four gives the total breakdown of teacher interactions.

71.94% of the student interactions were responses to others. Of these responses, nearly 72 % are to the teachers. When the teachers asked students questions, 90.77% of them were cognitive memory level questions.

*Intended and actual levels of thinking.*

Students and teachers were also asked to consider the level of thinking in the classroom through the CAQ. The findings indicate that the teachers have no intended focus on knowledge level activities in the classroom and that students recognize some focus on this level of thought. In the area of evaluation, the students indicated that they did not recognize a focus on it in the classroom, while the teachers indicated that some focus was intended. In the area of interpretation, both teachers and students felt a strong emphasis, in the remaining four levels, translation, application, analysis, and synthesis, the student data concludes that there is some focus while the teachers intended a strong focus for each of them.

*Possible conclusions on how is the TILE environment affected levels of thinking.*

The central conclusion to be drawn by these findings is that, although the teachers intended a focus on higher level assignments and interactions, the contrary was projected. Through student and teacher interviews, classroom observations and teacher and student answers on the CAQ, the intended and actual occurrences in the classes were disclosed. In responses to interview questions, the teachers explained that they wanted the students to "become critical thinkers." Mr. Lincoln included this as one of the overall goals of the program. They also indicated on the CAQ that they had intended a focus on the higher levels of Bloom's Taxonomy; notably indicating an intended focus on evaluation and no focus on knowledge. On the other hand, observation data and admissions by both teachers and students indicated that student assignments often required the students to develop answers to problems within a few moments time and often with one possible answer. This is supported by observation data that pointed out 90.77% of the questions asked were at the cognitive memory level. Furthermore, the students indicated that they sensed no focus on evaluation, and some focus on the knowledge level of Bloom's Taxonomy throughout the program.

Another conclusion that might be considered is that the TILE program has developed a learning environment that promotes engagement at all levels of thinking, as defined by Bloom's taxonomy. Support for this may be found through observations and student answers on the CAQ. In the observations of some activities, the students were seen to be engaged in knowledge level activities where they gave

cognitive memory level answers. At the same time the students were involved in the development of projects that required them to apply it to alternative situations (i.e., "teaching" others about the information, and the development of arguments for removing "something" from society). The teachers also indicated that they had a strong intention for focus on higher levels of thinking and the students indicated for all but one, that some intention was perceived. Observations and interviews described situations when the learning environments had students participating in activities requiring more than rote recitation.

*How is technology used in the teaching and learning environment?*

The findings on the use of technology for teaching and learning can be broken down into three themes; technologies available, teacher uses and student uses. Like the previous section, this section will begin by presenting an overview of the findings based on the three themes. After the summary of these findings will be an examination of potential conclusions on how technology was utilized in the TILE program.

*Available technologies.*

When the teachers and the students were asked about the technologies available in the interviews, the students and the teachers indicated that they were clearly aware that many technologies were available to them. When the students were asked to list the technologies available, all indicated that there was a computer lab specifically for them and most indicated that the teachers had laptops, SmartBoards, and document readers in their classrooms. In their final interviews, the

teachers included each of the items listed by the students and went on to share that palm pilots, robotics, and video conferencing were also available. A survey of the learning environments produced a list of 14 unique types of technologies. These included those mentioned by the students and teachers as well as others like black and white and color printers, probe attachments for the handhelds (For science activities) and a classroom set of TI 73 calculators.

*Teacher uses of technology.*

The findings in chapter four indicated through observations and student and teacher interviews that specific technologies are used daily by the teachers in the TILE program. These technologies are the teachers' laptops, the projectors, the SmartBoards, and the document readers. First, and most often, the teachers use these technologies to present information to the classes. In interviews, the teachers and the students both described how the teachers used the tools to project information about which they would then talk. Observational data supported this, describing multiple instances of this type of use. Second, the technologies were used to give the students assignments. Student interviews and observations described the teachers projecting questions or problems on the SmartBoard and then asking the students work through it at their seats. The teachers also produced games in PowerPoint that would give questions for the students to solve and answer. Third, the technologies were used to involve students in problem solving in front of the class. Observations and interviews with both the students and teachers indicated that at times the students would move to the front of the room and solve problems or write ideas on the SmartBoard.

*Student uses of technology.*

The findings in teacher uses of technologies may also be used in part to indicate how the students use technologies in the TILE program. The students as a result of the teachers' daily use of technology also used technology everyday. Observations and interviews with both teachers and students indicated that the students viewed what the teachers presented, used the presentations as their source for assignments, and at times used it to present their understandings to the teacher and class. The students also had the opportunity to use the TILE program's computer lab. Observations indicated that the students visited the lab 10 periods out of the 55 that were observed. In interviews with students and teachers they described the use of the lab as being involved in research, writing papers, and developing presentations.

*Possible conclusions on how technology is used in the teaching and learning process.*

It can be concluded that although the students and the teachers have greater access to more diverse technologies, the use of technology by students and teachers in the TILE program is not out of the ordinary. Support for this comes from student and teacher interviews, observations, and a survey of the environment. The findings describe an environment where the technologies in use did not include the full array of technologies available. The findings did not indicate that the students knew that graphing calculators, robotics, or video conferencing equipment were available. The teachers, although recognizing availability, did not integrate such items into their lessons. Further support for this can be found in the way the technologies were used. The teachers were in control of the technology, primarily using it as a digital

chalkboard for the presentation of information or student work. When the students did have "hands-on" experiences with the technology it was for research, the production of papers and other word-processed documents, and presentations.

### *Connection to the Literature*

The purpose of this study is to develop a description of teaching and learning in an environment that brings together four unique views of successful approaches to teaching and learning. In chapter two each of these components, the middle school philosophy, learning with technology, high-stakes testing, and the NASA Explorer Schools program were surveyed. As the components were appraised, key aspects of each were given to the reader. This section juxtaposes those key aspects with the possible conclusions presented in the previous section in order to develop an understanding of the TILE program and how it might align to its initial mission of meeting the needs of all four components.

#### *Middle Schools*

One of the core tenets of the middle school is that it must develop curriculum that challenges students to meet standards while participating in integrative and exploratory activities. It is claimed that such instruction will engage the students by encompassing student ideas and questions into the curriculum, allowing the students to be part of the problem-solving process, encouraging collaborative and cooperative learning environments, and promoting democratic values that demonstrate the worth of all individuals (National Middle School Association, 1996).

Possible conclusions made about the TILE program imply that it is meeting some of these criteria while falling behind in others. The teachers' focus on standards in the TILE program is clear. The findings indicated that the teachers included references to standards in all lesson plans and wrote the standards that were being addressed on the whiteboards in the back of their rooms. Although the students are involved from time to time in activities that integrate the four core subjects, it is more the exception than the norm with teachers focusing mainly on individual subject content within the classes. In observation day interviews the teachers indicated that they often took sole responsibility for designing classroom activities. Integrating student ideas and questions into the curriculum was addressed in the TILE program, but took a back seat to the teacher-centered environment. Documentation from the lesson plans and data from the student and teacher interviews indicated that the teachers held the responsibility for the development of lessons, methods, and assessments. Finally, data from student and teacher interviews and observations indicate that when the teachers gave beginning of class assignments and project-based assignments, the students were encouraged to work as a team to solve problems.

A final analysis may point toward the TILE program having instances of meeting the middle school goal of student engagement, but that it is far from consistent in this purpose.

*Technology and Learning*

How learning with technology is approached lies on a continuum. On one end is programmed learning where students are drilled for memory of specific skills or concepts. On the other end is a constructivist use of technology where students use

the technology to interact with content and others for immediate feedback and further content manipulation. In the middle of this continuum the students would be using the technology to develop artifacts that demonstrate base-level understandings of content.

The findings reveal that the TILE program has a clear focus on using technology in the learning environment. The way in which technology is used in the program is neither programmed learning nor constructivist. Their use of technology lies somewhere in-between. Some of the findings exhibit a use of technology that focuses on the delivery of content by the teachers. Observations and interviews presented numerous examples of the teachers projecting definitions, examples, and assignments. Other findings presented examples of the students using the technologies to develop papers, brochures, and PowerPoint presentations.

One possible conclusion is to suggest that this is a typical way in which to use technology. The program is neither using technology for drill and practice, or using it to allow students more in-depth exploration of content. The program is simply using the technologies as ways for students and teachers to present content.

*High-Stake Testing*

In consideration of the role that high-stakes tests play in the classroom, the literature showed evidence against the practice claiming that it in no way measured standards (Amrein and Berliner, 2002, 2003) and in some cases altered the way in which teaching and learning were addressed in the classroom by focusing solely on the test. Others who favor the tests suggest that a focus on the standards and high-stakes tests can positively affect classroom teaching (Kober, 2002). These

individuals insist that if teachers work to cover general and specific knowledge required by the standards, using methods that require both lower and higher order thinking skills, then the data retrieved from the tests can help them to realign their instruction to meet the students' and the state standard's needs.

In the TILE program it appears that there is a focus on the test. The findings show evidence from observations and teacher lesson plans of the teachers assigning homework packets that were preparation for AIMS. An actual focus on testing and grades in the TILE classrooms was revealed by the student responses on the CAQ. It also appears that the levels of thinking within the program remain mostly within the lower levels. The findings shared that 90.77% of all questions asked were at the cognitive memory level. Finally, the majority of assignments and activities called for levels of though at the memory, translation, and interpretation.

A concluding examination of the role of high-stakes testing in the TILE program may suggest that the program has moved toward a focus on testing. At the same time, the teachers are intending to maintain a curriculum that covers both higher and lower levels of thinking.

*NASA Explorer Schools*

The TILE program had included a focus on the NASA Explorer Schools (NES) as part of its core. Part of the mission of the NES was to help teachers learn educational methods and develop an action plan for their school. The teachers were to become more knowledgeable about hands/minds on activities, using technology for learning, collaborative activities for learning, and problem-based learning. The NES

and the middle schools are similar in their goals if using technology for learning is pulled out.

As was stated in the section on middle schools, data from student and teacher interviews and observations indicate that when the teachers gave beginning-of-class assignments and project-based assignments, the students were encouraged to work as a team to solve problems. The findings point out that such activities were hands-on, collaborative, and problem-based. The findings also indicate that this type of activity was more an exception than a norm. Interviews with teachers and students and observations showed a daily use of technology for the presentation of content and a less often use for the development of student artifacts.

One may conclude that the TILE program is partially meeting the goal of hands/minds on activities through the use of collaborative projects. One may also conclude that the program was completely meeting the goal of technology in learning based on the NES program. Because the NES does not explain what is meant by using technology for learning, it is possible that all applications of technology in the TILE program fit this category. One final note on the NES and the TILE program is that any reference to the NES by teachers is missing from the data. A couple of students mentioned it as a reason for joining the program. Although it was not confirmed, it appears that this is no longer one of the core components of the program.

### *Recommendations*

As I begin this section let me again make it clear that these recommendations are in no way meant for implementation by the teachers or the students in the TILE

program. They are simply issues that I would address as a researcher based on the possible conclusions described in the previous two sections.

The possible conclusions and the connections to the literature have developed a picture of the intricacies of the TILE program. In this section consideration of the conclusions and their connections to the literature result in recommendations describing how one might proceed in making changes to the program to meet the requirements of the four core components.

1. The goals of the program should be reevaluated. The conclusions drawn in the previous two sections have indicated that some of the core components of the program were not well represented in classroom activities. The teachers and administrators in the program must come to a consensus as to the future direction of the program.
    a. It must be decided whether success high-stakes tests is the goal of the program, or one goal of the program. The curriculum and the "selling points" (i.e., technology integration, focus on the student, working with the NASA Explorer Schools) of the program must then be aligned with that goal.
    b. If the goals of the middle school are to be met, the program must begin to implement multiple learning and instructional methods that promote integrative and exploratory activities. The teachers must begin to work together to develop a curriculum that meets the standards while engaging students in cooperative activities that encourage learning beyond the classroom.

c. The program must consider whether or not the NASA explorer schools program remains in the core. It is imperative that future students in the program have a clear view of what type of activities they may be involved in the classes.

d. The program must make a decision on the role of technology in the program. It must then begin to either use or discard those technologies that are currently stored in closets in the labs. This again comes back to what the students believe about the program. The program must be upfront with prospective students about the technologies available and how they will be used.

2. The teachers must examine their classrooms to ensure that their espoused views of what is happening in the classroom is what is happening in the classroom. The findings indicated that in many aspects of the program, the teacher intentions and the actual happenings in the classroom were disconnected. The possible conclusions pointed out that the teachers' perceptions of student involvement in the development of classroom activities were greater than was the actual involvement. They also indicated a disconnect in intended versus actual levels of thinking. The teachers may benefit from the incorporation of action research into their teaching as a way of checking intended and actual occurrences.

3. If the original core components of the program remain, the way in which students are involved in the planning of classroom activities and involved in classroom discussion must be modified to meet the requirements of each of the components.

   a. The possible conclusions revealed that the roles that students and teachers play in the program are primarily traditional. Although this may work well

for aspects of the technology component and the high-stakes testing component it does not fully allow for the incorporation of the middle school philosophy. For adolescent students to fully understand democratic values and the worth of all individuals, two components of the middle school philosophy, they must be given opportunities to make decisions in the classroom. Although the teachers may have an overall intended outcome for the course, student input can be used in deciding the exact content to be addressed, the way in which content will be accessed by the students, and how their understandings will be assessed.

b. The possible conclusions exposed that in classroom interactions the students are mostly involved as inactive participants who have the opportunity to add knowledge level information from time to time. Again, if the students are to begin to understand democratic values and the worth of all individuals, the way in which classroom conversations are approached must be changed. The teachers must begin to ask questions that not only probe for knowledge, but allow the students to demonstrate their abilities to use, modify, and judge the content. Furthermore, the students must be given the role of questioner. The students must begin to not only answer questions, but probe one another and the teacher for their understandings of topics being covered.

## Limitations of the Study

There are a number of limitations to this study.

1. The greatest limitation is the design of the study itself. The bounded unit for this study was teaching and learning in the TILE program. The students, teachers, and

learning environment of one of the six teams that comprised the TILE program were used as the sample. The use of other teams may have produced different data. This was further bounded by the place and time in which the research took place. The team was in the second semester of two years together. Had the data been collected at another time or for a longer time within those two years, alternative findings may have been revealed.

2. The informants posed their own limitations to the study. The teachers and the students arrived at interviews with their own preconceived notions of what teaching and learning were in the program. Teachers were interviewed three times throughout the study period giving data from throughout the process while the student interviews were limited to one at the end of the semester.
3. The researcher was a limitation to the study. First of all the researcher approached the research with personal connections to the program, views of how the program should have operated, and partially formed views of how it was operating. Because the researcher conducted the observations, interviews, and the data analysis, it was necessary to examine the researcher's biases. These biases were addressed through a bracketing interview (Appendix G). This interview was used to define the researcher's positions on the key components of the research. Furthermore, researcher limitations could be found in the researcher's inexperience with observation techniques. In some of the observations, the researcher recorded opinions of what was happening instead of facts, limiting the total observation data that could be used.

4. Finally, researcher preparation and the data collection instruments posed a limitation to the study. The researcher had asked questions concerning classroom interactions, but only developed instruments for the collection of data concerning interaction between teachers and students. These instruments were not developed to collect data on student-to-student interactions. This limited the information on student interactions in the classroom.

## Need for Further Study

As the researcher went into this study, he approached it with the belief that what was important was understanding what teaching and learning looked like in the TILE program. This researcher focus blocked out a number of other possible research avenues.

1. The team selected was one of six teams in the TILE program. The examination of teaching and learning in this team revealed findings that indicated that there may not be a clear vision of what the program goals are. A systematic evaluation of the entire program may develop a clearer understanding of the program goals and their application across teams.
2. Student to student interaction within the program was completely missed. It may be possible that conversations between students have different levels of thought than those interactions between teachers and students. This could account for the differences in the students reported view and the findings from the interaction analysis. A more in-depth exploration of classroom interactions may reveal intricacies within student-student, teacher-teacher, and student-teacher interactions that could not be unpacked here.

3. Some of the data that this study has produced addresses multiple levels of control. Although school and district administrators were intentionally left out of this study, their understandings of teaching and learning in the classroom combined with that of the teachers and the students may begin to develop a complete picture of the control mechanisms placed on teachers and students within the classroom. Examining this data from a critical theoretical lens may begin to unravel the levels of control and move the students and teachers to regain control of the teaching and learning environment.
4. The TILE program is a school within a school. One concern about this program is that it gives part of the population of the school unlimited access to technology while the other part of the population wrestle for the opportunities to use limited resources of the general population. Two pieces of research may come out of this. First, an examination of what the creation of a digital divide within a building does to teacher and student morale and second, an examination of the activities and the levels of learning occurring in the two populations can be conducted.
5. The pressures placed on the teachers and students of the TILE program are not unique to them. The entire public school system throughout the nation is under the same strain. This study revealed that these pressures may be causing a movement away from some core values to manage this pressure. These findings may be the indication of a more systematic movement toward teaching for high-stakes testing. Large scale evaluations of classroom climate and levels of thinking in schools throughout the state or nation may shed further light on the high-stakes testing debate.

## Conclusion

This study has made an effort to fully describe teaching and learning in an environment controlled by multiple stakeholders of diverse philosophical backgrounds. In the course of doing this detailed data were examined and presented. The findings shed light on control in the classroom by pinpointing how teaching and learning experiences were planned, implemented, and assessed. The findings demonstrated levels of learning in the program by unpacking the types of assignments required and the interactions between students and teachers during classroom conversations. Finally, the use of technology was examined through its availability and student and teacher use.

The researcher took the role of stakeholder to draw possible conclusions about the data. In this section the researcher shared one or more conclusions that could be made, along with the data, sources, and methodologies supporting them. These findings were also connected with the four core components of the program to determine possible conclusions about the roles played by each. Recommendations for the program are then given based on these possible evaluations. Finally, the limitations and possible avenues for future research based on the findings were given.

Although the goal of this study is not to make evaluations of the program, this chapter has revealed that there are many possible conclusions that may be made about teaching and learning in the TILE program. This data, although unique to the TILE program, may be used by others to better understand their own teaching and learning environments. Although the purpose of the data presented here may not be for generalization, it has caused the researcher to reflect on the current state of education

in the United States. The following and final section goes beyond the data and into these reflections.

## Researcher Reflection and Speculation

As a researcher in the classrooms of the TILE program, I was privy to much more data than could be shared here. Although the study was bounded and the study protocol made clear, the data to be collected, other data were casually noted and have led the researcher to the views expressed in the following paragraphs. This is in no way an evaluation, but rather a contemplation of the educational system in the United States.

The data collected and the findings presented along with an intimate experience of the daily activities of the TILE classrooms have caused me to question the innovativeness of this program. While reading through the findings a colleague commented to me, "and this is an innovative program?" The concern for my colleague and myself is that this program had been recognized by the state as a school that demonstrated the best practices in education (Arizona Education Foundation, 2007). With 90.77% of the questions asked by the teachers in the program being based on cognitive memory, one has to ask if this is really innovative. And if this innovative, what's going on everywhere else?

What I saw in the classrooms was a strong focus on preparing students for the state mandated high-stakes test. I do not believe that this is the entire fault of the teachers in the TILE program. I believe that much of it stems from a systematic movement toward a focus on high-stakes testing. This has moved the importance of classroom activities from the student to the content. Nichols & Berliner (2007)

contend that “high-stakes testing so distorts and corrupts education that their continued use seriously endangers the educational profession and limits the learning outcomes of our youth” (p. 8).

The final thought is this: without more research on other classrooms from across the building, the district, the state and the country, it hard to say if this is really an innovative program or one that pushes the status quo. Either way, I am concerned for our children. Do we really want them to meet the standard, or do we want them to progress beyond it? The findings from this study make me question whether or not moving beyond the standard is at all possible under the current pressures placed on teachers and students in our classrooms. It is imperative that alternatives to high-stakes testing be explored. Only when this burden has been lifted from our students and their teachers will our educational system be able to encourage independent, original, and boundless thinking for our students.

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# APPENDICIES

## Appendix A

## Informed Consent and Assent

NORTHERN ARIZONA UNIVERSITY

**College of Education, Curriculum and Instruction Doctoral Program**

**INFORMED CONSENT DOCUMENT FOR TEACHERS**

**Project Title:** Teaching and Learning in an Innovative Middle School Program: A Descriptive Case Study

**Dear Teacher,**

You are being asked to participate in a project conducted through Northern Arizona University. The University requires that you give your signed agreement to participate in this project.

Below you will find information that details: (a) the purpose of the project, (b) the procedures or protocols to be used, (c) how your personal information will be kept confidential, and (d) the potential benefits and possible risks of participation.

Please read through each section. For further detail or explanation of the project, contact Shadow Armfield at 928-523-7651.

Then, if you decide to participate in the project, please sign on the last page of this form. You will receive a copy to keep.

**1. Project Purpose and Description:** This project has been designed to describe the day-to-day activities of teachers and students in a unique learning environment based on multiple educational philosophies. The purpose of this study is to develop an understanding of the following in this program: 1) the goals of learning, 2) the roles of teachers and students, and 3) the use of technology in the learning process. The results of this study may be used by the teachers and administration to assess the program and make changes or modifications if necessary. The results may also be used by the larger educational community to inform administrators and teachers of alternative ways to approach teaching and learning.

**2. Explanation of Procedures or Protocols:** Data collection will include classroom observations, interviews with teachers, and interviews with students. Classroom observations will occur throughout the months of January and February. The researcher will observe a total of twelve full school days, six days with each of the teachers and their students. Student and teacher interviews will be conducted throughout the months of February and March. Ten randomly selcted students, who have received parent permision, will be interviewed for approximately 45 minutes

during lunch or after school. Both teachers will be interviewed during the months of February and March for approximately an hour and a half after school. An audio recording of the interviews will be made to ensure that the teachers' and students' thoughts and ideas collected completely.

**3. Confidentiality:** Confidentiality will be guarded by the researcher in the following ways: 1) all interviews will be conducted in a private conference room to reduce the chance of being overheard. The researcher will be the only person who knows the identity of the teacher or student being interviewed. The researcher will protect the identity of the teacher in the classroom by presenting an aggregate view of teaching and learning environments and activities in the program. All data, when not being collected or analyzed, will be stored in a password protected folder on the researcher's home desktop computer and/or in a locked file cabinet at the researcher's home. All data will be destroyed or deleted at the end of the research project.

**4. Benefits:** Teachers who participate in this project will receive a final report of the data analysis. This report should be helpful in understanding exactly what teaching and learning look like in their classrooms. With this information they get the opportunity to appreciate how students and an outside observer see that same environment. This, in turn, allows for refinement of their philosophies as educators. Furthermore, each participant will receive a small token of thanks once the data collection has been completed.

**5. Risks:** Participants in this study will be reflecting on the teaching and learning activities that occur daily in their classrooms. These reflections may include descriptions of peers, and students. The following are risks that may be encountered through the sharing of these reflections: 1) knowledge of teacher's reflections may also result in damaged relations (i.e. mistrust by students, other faculty members or administrators). 2) Classroom observations may uncover incongruence with school or district policy. 3) The introduction of an outside observer into the classroom may cause students to behave in inappropriate manners resulting in management learning issues for the student and others. To reduce these risks, the researcher will make every effort possible to ensure the confidentiality of the individuals.

**6. Refusal/Withdrawal:**

(a) Refusal to participate in this study will have no effect on any present or future services or benefits that I may be entitled to from the University.

(b) Anyone who agrees to participate in this study is free to withdraw from the study at any time without penalty.

(c) I understand that it is not possible to identify all potential risks in an experimental procedure.

- _____ Date _____

**Signature of Participant**

- Printed Name _____

- _____ Date _____

**Signature of Research Representative**

- Printed Name _____

There is a dated approval stamp on this consent form (below). The stamp indicates that this project has been reviewed and approved by the Northern Arizona University Institutional Review Board (IRB) for the Protection of Human Subjects in Research. Contact the Human Research Protections Administrator at 928-523-4340 if you have any questions about: (1) the conduct of the project, or (2) your rights as a research participant, or (3) a research-related injury. Any other questions about the conduct of this research project should be directed to:

Shadow Armfield (Principal Investigator)
Northern Arizona University
PO Box 5774
Flagstaff, Arizona 86011
928-523-7651
Shadow.Armfield@NAU.edu

Dr. Becky Willis (Faculty Sponsor)
928-523-0354
Becky.Willis@NAU.edu
College of Education, Northern Arizona University

NORTHERN ARIZONA UNIVERSITY

**College of Education, Curriculum and Instruction Doctoral Program**

**PARENTAL INFORMED CONSENT DOCUMENT**

**Project Title** Teaching and Learning in an Innovative Middle School Program: A Descriptive Case Study

**Dear Parent/Guardians,**

Your child or minor is being asked to participate in a project conducted through Northern Arizona University. The University requires that you give your signed agreement for your child/minor to participate in this project.

As you are aware, your child is involved in a unique learning program at her/his middle school. This program has been designed around educational philosophies that have traditionally been separate. The bringing together of these distinct philosophies opens the door to new visions of education. As a result, the activities of the students and the teachers in this program may help to influence the way that teaching and learning are approached in future educational environments. With this in mind, this research will work to describe what teaching and learning look like in the program.

Below you will find information that details: (a) the purpose of the project, (b) the procedures or protocols to be used, (c) how your personal information will be kept confidential, and (d) the potential benefits and possible risks of participation.

Please read through each section. For further detail or explanation of the project, contact Shadow Armfield at 928-523-7651.

Then, if you decide to allow your child/minor to participate in the project, please sign on the last page of this form and return it to the researcher in the self addressed stamped envelope provided. A copy of this form will be sent to you for you to keep.

Your child/minor will also be asked to sign an Assent Form prior to participation in this research.

**1. Project Purpose and Description:** This project has been designed to describe the day-to-day activities of teachers and students in a unique learning environment based on multiple educational philosophies. The purpose of this study is to develop an understanding of the following in this program: 1) the goals of learning, 2) the roles of teachers and students, and 3) the use of technology in the learning process. The results of this study may be used by the teachers and administration to assess the

program and make changes or modifications if necessary. The results may also be used by the larger educational community to inform administrators and teachers of alternative ways to approach teaching and learning.

**2. Explanation of Procedures or Protocols:** Data collection will include classroom observations, interviews with teachers, and interviews with students. Classroom observations will occur throughout the months of January and February. The researcher will observe a total of twelve full school days, six days with each of the teachers and their students. Student and teacher interviews will be conducted throughout the months of February and March. Ten randomly selcted students, who have received parent permision and who have agreed to participate, will be interviewed for approximately 45 minutes during lunch or after school. An audio recording of the interviews will be made to ensure that the teachers' and students' thoughts and ideas collected completely.

**3. Confidentiality:** Confidentiality will be guarded by the researcher in the following ways: 1) all interviews with students will be conducted in a private conference room to reduce the chance of being overheard. The researcher will be the only person who knows the identity of the student being interviewed. Classroom observations will not contain the names of individual students. All data, when not being collected or analyzed, will be stored in a password protected folder on the researcher's home desktop computer and/or in a locked file cabinet at the researcher's home. All data will be destroyed or deleted at the end of the research project.

**4. Benefits:** Students who participate in the study will have the opportunity to have their voices heard in an anonymous way. Students have an opportunity to affect the education of future students. Such input may be empowering to some students. During the interviews, the students will be provided with a nutritional snack. After the data has been collected the students will be compensated ($5.00) for their time.

**5. Risks:** Participants in this study will be reflecting on the teaching and learning activities that occur daily in their classrooms. These reflections may include descriptions of peers, and teachers. The following are risks that may be encountered through the sharing of these reflections: 1) Students may place themselves at risk by sharing information that the researcher is legally bound to disclose (i.e. intent to commit harm to self or others, or drug use). The researcher will inform the participants of his legal obligation to reveal such information before interviews commence. If a student divulges information that the researcher must report, the interview will be stopped and a school counselor will be immediately contacted and made aware of the situation. 2) A student identity may be connected to reflections and damaged relations (i.e. treatment by peers or grade issues with teachers) may result. In order to avoid this, every effort will be made by this researcher to maintain confidentiality. Furthermore, a school counselor has agreed to arbitrate should such a situation arise. 3) The introduction of an outside observer into the classroom may cause students to behave in inappropriate manners resulting in the interferance for some students.

**6. Refusal/Withdrawal:**

(a) Refusal to participate in this study will have no effect on any present or future services or benefits that I may be entitled to from the University.

(b) Anyone who agrees to participate in this study is free to withdraw from the study at any time without penalty.

(c) I understand that it is not possible to identify all potential risks in an experimental procedure.

Name or study identification number of Child/Minor:

_____

- _____ Date _____

**Signature of Parent**

- Printed Name _____

- _____ Date _____

**Signature of Research Representative**

- Printed Name _____

There is a dated approval stamp on this consent form (below). The stamp indicates that this project has been reviewed and approved by the Northern Arizona University Institutional Review Board (IRB) for the Protection of Human Subjects in Research. Contact the Human Research Protections Administrator at 928-523-4340 if you have any questions about: (1) the conduct of the project, or (2) your rights as a research participant, or (3) a research-related injury. Any other questions about the conduct of this research project should be directed to:

Shadow Armfield (Principal Investigator)
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PO Box 5774
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Dr. Becky Willis (Faculty Sponsor)
928-523-0354
Becky.Willis@NAU.edu
College of Education, Northern Arizona University

NORTHERN ARIZONA UNIVERSITY

**College of Education, Curriculum and Instruction Doctoral Program**

**STUDENT ASSENT FORM**

I, _____understand that my parent or legal guardian has given permission (said it's okay) for me to take part in a project about being a member of this middle school program under the direction of Shadow Armfield.

I am taking part because I want to. I have been told that I can stop at any time I want to and nothing will happen to me if I want to stop.

- _____ Date _____

**Signature of Child**
Printed Name _____

- _____ Date _____

**Signature of Research Representative**
Printed Name _____

The dated approval stamp on this consent form indicates that this project has been reviewed and approved by the Northern Arizona University Institutional Review Board (IRB) for the Protection of Human Participants in research projects or research-related activities. Contact the Human Research Protections Administrator at 928-523-4340 if you have any questions about: (1) the conduct of the project, or (2) your rights as a research participant, or (3) a research-related injury.

Direct any other questions about the conduct of this research project to:

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928-523-0354
Becky.Willis@NAU.edu
College of Education, Northern Arizona University

# Appendix B

## Interview Protocol

First Day of Observation Interview

1. Tell me about the activities in your classroom today.
    a. What did you do?
    b. What did the students do?
    c. Who was involved in planning today's activities?
2. What was the purpose of these activities?
    a. Was the purpose accomplished?
    b. How do you know?
3. How do today's activities fit in the overall picture of learning in the TILE program?
    a. Why were these activities performed today? (as opposed to yesterday or sometime in the future)
4. What will happen tomorrow in your classroom?
    a. What will you do?
    b. What will the students do?
    c. Who is involved in the planning of tomorrow's activities?
    d. How will you know if the day is successful?
5. Would you describe today as a "typical" day in your classroom? Why?

Final Teacher Interview

Initial Information for the participants:

Thank you for your willingness to participate in this interview regarding the Technology Integrated Learning Environment. I am Shadow Armfield and this research is being conducted for my dissertation in Curriculum and Instruction at Northern Arizona University.

Your answers to these questions are very important to me and the study I am conducting. By understanding the program through multiple perspectives, I will be able to develop a full description of the activities, beliefs, and settings that define TILE. Your confidentiality is assured. Pseudonyms will be used so that participants cannot be identified by location, classroom, or individual statements. All data that I collect will be stored in a password protected folder on my home computer and/or in a locked file cabinet at my residence.

With your permission I would like to make an audio recording of this interview as well as take notes while you speak. This will help me to collect your thoughts and ideas more accurately.

(Check the recording device and begin interview)

I would like to ask you a few questions regarding your experiences as a teacher in the Technology Integrated Learning Environment. If, at any time you feel uncomfortable about a question, just let me know and we will move on to the next question. Remember that you may stop the interview at any time.

6. Describe your teaching experience(s) before TILE.

a. How did you use technology in these teaching experiences?

b. How did you assess your students?

7. Tell me about the TILE program.

    a. Why was it created?

    b. Where did the term Technology Integrated Learning Environment come from?

        i. What does it mean?

        ii. Is TILE a description of what students should expect from the program? If so, How?

    c. Do you think the TILE program is different from the rest of the school? If so, How?

    d. How is it the same as the rest of the school?

    e. Are there specific goals for the program? If so, what are they? Who was involved in creating these goals?

        i. Thus far, where is the program in achieving those goals?

        ii. Is the program doing what it was set out to do?

        iii. Give one or two examples of how the day-to-day activities in the program support the goals.

    (Prompts: You mentioned that it was created to (or that the goals are) _____, do I have that correct?, How does _____, support the goals of the program?)

8. How would you describe your students as compared to the rest of the school population?

a. Why do you think they chose to join the TILE program? What has lead you to this conclusion?

b. Why do you think other students did not choose TILE?

(Prompts: What type of student joins TILE?, Who is TILE designed for?)

9. Tell me about your expectations for your students. Describe what makes for a successful student in your class.

a. Describe what makes for an unsuccessful student in your class.

b. Describe what makes for an average student in your class.

(Prompts: You mentioned that _____, _____, and _____ lead to success (or average success), how are these demonstrations of success (or average success)?, What do you expect from the successful (or average success) student?)

10. What technologies are available for you and your students?

a. What technology is used most?

b. What technology do you use most? Why?

c. What technologies are available, but least used? Why?

(Prompts: You stated that _____ is used most often, could you describe how it is used.)

11. Describe a typical use of technology in the program.

a. Would you like to see technology used more or less often in the program?

b. How is the technology utilized by teachers and students?

c. What is your ideal vision of technologies use in your classroom?

(You stated that teachers (or students) use the technology to _____, why is it used for this?, You suggested that you wanted (more or less) use of technology, what prompted you to make this judgment?)

12. What effect has the technology had on the teaching and learning activities in your class, if any? Please describe the impact for me.

    (Prompts: Tell me a little more about how ____ has affected the activities in your class., how does _____ have a (positive, neutral, or negative) effect on your class?)

13. If there was one thing you could tell me about the program, what would it be? Why?

14. Is there anything else you wish to add that I did not ask you about?

Student Interview

Initial Information for the participants:

I am Shadow Armfield and I am doing this research to earn my doctorate in education. Thank you for taking the time to share your thoughts on TILE with me. Your answers to the questions that will be asked here are very important to me and the study I am conducting.

I am using your answers, the teachers' answers, and my own observations to develop a complete description of TILE. I want to assure you that no one, except for me, will have access to the information you share with me today. All data that I collect will be stored in a password protected folder on my home computer and/or in a locked file cabinet at my residence.

With your permission I would like to make an audio recording of this interview as well as take notes while you speak. This will help me to collect your thoughts and ideas completely.

(Check the recording device and begin interview)

I would like to ask you a few questions regarding your experiences as a student in TILE. If, at any time you feel uncomfortable about a question, just let me know and we will move on to the next question. Remember that you may stop the interview at any time.

15. Tell me about the TILE program.

    a. Are there any differences between this program and classes that you have had in the past?

16. Why did you choose to join the TILE program?

a. When you learned about TILE, what interested you most?

b. Is it meeting your expectations? How?

17. Describe a "typical" day in your TILE classes.

a. What do you do in the class?

b. What does the teacher do in the class?

c. What do other students do in the class?

18. Tell me about the activities (assignments) you are doing in your classes.

a. Tell me about a typical assignment you have had in your classes.

b. Tell me about the most difficult assignment you have had in your classes.

c. Tell me about the easiest assignment you have had in your classes.

d. What do you need to do to get an "A" on an assignment?

19. Who decides what will be done in the class on a day-to-day basis?

a. How do you find out what you need to be doing in your classes?

b. How do you know if you have been successful in doing activities or assignments in your classes?

20. Tell me about successful students in your classes.

a. What makes them successful?

b. What's the difference between a successful student and an unsuccessful student in your classes?

21. Describe a typical use of technology in the program.

a. What is the technology used for?

b. How is it used?

c. Who uses it?

d. How often is it used?

22. What technologies are available?

a. Who uses _____? (Insert the technologies listed, here)

b. What technologies are used most?

c. What technologies do you use most?

23. How did you use technology in your previous classes?

a. Describe any differences in the use of technology in TILE versus your previous classes?

24. Is there anything else you wish to add that I did not ask you about?

# Appendix C

## Class Activities Questionnaire

CLASS ACTIVITIES QUESTIONNAIRE

For each sentence below, circle the letters which show the extent to which you AGREE or DISAGREE.

Base your answer on how well each sentence describes what is stressed in your class - what your teacher has you do.

| | |
|---|---|
| Circle - SA | If you STRONGLY AGREE with the sentence |
| Circle – A | If you AGREE moderately with the sentence |
| Circle – D | If you DISAGREE moderately with the sentence |
| Circle – SD | If you STRONGLY DISAGREE with the sentence |

| | | | | | |
|---|---|---|---|---|---|
| 1. | Remembering or recognizing information is the student's main job. | SA | A | D | SD |
| 2. | A central activity is to make judgments of good/bad, right/wrong, and explain why. | SA | A | D | SD |
| 3. | Students actively put methods and ideas to use in new situations. | SA | A | D | SD |
| 4. | Most class time is spent doing other things than listening. | SA | A | D | SD |
| 5. | The class actively participates in discussions. | SA | A | D | SD |
| 6. | Students are expected to go beyond the information given to see what is implied. | SA | A | D | SD |
| 7. | Great importance is placed on logical reasoning and analysis. | SA | A | D | SD |
| 8. | The student’s job is to know the one best answer to each problem. | SA | A | D | SD |
| 9. | Restating ideas in your own terms is a central concern. | SA | A | D | SD |
| 10. | Great emphasis is placed on memorizing. | SA | A | D | SD |
| 11. | Students are urged to build onto what they have learned to produce something brand new. | SA | A | D | SD |
| 12. | Using logic and reasoning processes to think through complicated problems (and prove the answer) is a major activity. | SA | A | D | SD |

| | | | | |
|---|---|---|---|---|
| 13. A central concern is practicing methods in life-like situations to develop skills in solving problems. | SA | A | D | SD |
| 14. Students are encouraged to independently explore and begin new activities. | SA | A | D | SD |
| 15. There is little opportunity for student participation in discussions. | SA | A | D | SD |
| 16. Students are expected to read between the lines to find trends and consequences in what is presented. | SA | A | D | SD |
| 17. Students are encouraged to discover as many solutions to problems as possible. | SA | A | D | SD |
| 18. Detailed examination of ideas and conclusions is a major activity. | SA | A | D | SD |
| 19. Students are excited and involved with class activities. | SA | A | D | SD |
| 20. The student's major job is to make judgments about the value of issues and ideas. | SA | A | D | SD |
| 21. Great importance is placed on explaining and summarizing what is presented. | SA | A | D | SD |
| 22. There is a great concern for grades in the class. | SA | A | D | SD |
| 23. Inventing, designing, composing, and creating are major activities. | SA | A | D | SD |
| 24. Students mainly compare ideas to find likenesses and differences. | SA | A | D | SD |
| 25. There is very little joking or laughing in this class. | SA | A | D | SD |

Did you circle an answer for each question?

On average, the teacher talks how much of the time: 90% 75% 60% 40% 25% 10%

On average, how much time do you spend preparing for this class each week?

0 ½hr. 1hr. 1½hrs. 2hrs. 2½hrs. 3hrs. 3½hrs. 4hrs. 5hrs. more
List the three best things about this class, from your point of view:

1. _____

2. _____

3. _____

If you could change three things about the class, what would they be?

1. _____

2. _____

3. _____

COMMENTS: If you have any comments, please write them below.

# Appendix D

## Observation Protocol

Date:_____Location: _____ Event: _____

| Observation of Activities: | Researcher Comments: |
| --- | --- |
| Teacher Behaviors: | Teacher Behaviors: |
| Teacher Talk:<br>(Teacher talk and student talk deal with my fifth question<br>. | Teacher Talk: |
| Student Behaviors: | Student Behaviors: |
| Student Talk: | Student Talk: |
| Technology in use: _____ By whom: Teacher / Student<br>Description of technology use: | Technology: |

Date: _____ Location: _____ Event: _____

| Drawing of Learning Environment: | Description of Learning Environment: |
| --- | --- |

# Appendix E

## Example Lesson Plans

**Subject: American History**
**This Unit (1870 - 1900) will occur throughout the month of February**
**Date and duration of the lesson: February 1 through February 28**
**State Standards Presented:**

**Lessons to be Taught:**

- **Students will learn about the changes in Western America**
- **Students will learn about the rise of industry and unions**
- **Students will learn about Immigration and Growth in our cities**
- **Students will learn about Progressives and Reformers.**
-

| | | | |
|---|---|---|---|
| M 1 Number Sense/Operation | SS-E4 Tools ☐ | R1 Process ☐ | W1 Process x |
| **M 2 Data Analysis, Probability/Discrete** | SS-E5 Place/Regions ☐ | R2 Comprehend. Literary Text ☐ | W2 Components ☐ |
| M 3 Patterns & Algebraic, Functions XXX | SS-E6 Patterns ☐ | R3 Comprehend. Info Text x | W3 Application x |
| M 4 Geometry/Measurement XXX | SS-E7 Human/Environment Interaction ☐ | | |
| M 5 Structure/Logic ☐ | SS-E8 Interpretation ☐ | | |
| SC1 Inquiry ☐ | SC4 Life ☐ | | |
| SC2 History/Nature | SC5 Physical ☐ | | |
| SC3 Personal/Social | SC6 Earth/Space ☐ | | |

***STANDARD 1*: History**
Students analyze the human experience through time, recognize the relationships of events and people, and interpret significant patterns, themes, ideas, beliefs, and turning points in Arizona, American, and world history.
***STANDARD 2*: Civics/Government**
Students understand the ideals, rights, and responsibilities of citizenship, and the content, sources, and history of the founding documents of the United States, with particular emphasis on the Constitution and how the government functions at the local, state, national, and international levels.
***STANDARD 3*: Geography**
Students analyze locations, regions, and spatial connections, recognizing the natural and cultural processes that impact the way in which people and societies live and interact with each other and their environment.
***STANDARD 4*: Economics**
Students develop economic reasoning skills to apply basic economic concepts, assess problems, make choices, and evaluate the choices of others as consumers, workers, and citizens participating in local, national, and global economies.

**Objective(s) of Lesson:**

*Students will be able to demonstrate mastery of the material below by scoring at least 80% on exams and quizzes.*

- Students will be able to discuss and apply to current events the roll(s) of the Robber Barons
- Students will be able to discuss and apply to current events the challenges facing immigrants in the late 1800's.
- Students will be able to discuss the displacement of Native Americans and relate this to events in World History and Current Events
- Students will be able to discuss the American Labor Movement and relate it to current events.
- Students will be able to discuss the fight for Women's Rights and relate it to current events.

- Students will be able to discuss the role of agriculture in the late 1800's and relate it to current events.
- Students will be able to discuss the impact of the railroad on the growth of the United States and relate it to events today.
- Students will be able to discuss the impact of mining, logging and other industry on the environment and relate it to events today

**Objective(s) of Language:**

- Students will listen to the teachers instruction on the information found in the Lesson Objectives and apply it to its historical roots and to current events.
- Students will discuss and work together to develop a lesson as assigned to the group by the teacher. This work will include a pre and post test, study guide, Power Point and 2 days of instruction
- Students will read, assess and discuss in small groups problems presented by the teacher and will then participate in how they decided to solve the problem in a whole class discussion.
- Students will use their problem solving strategies to debate and arrive at solutions to presented problems..

**Objective(s) of Department/Strategy:**

Students will become critical thinkers and demonstrate the ability to use acquired skills in real life situations.

**Instructional Strategies/Procedures:**

The daily procedure will be as follows:
1) Teacher will have the students read books for 10 minutes per day that relate to the times covered by our study.
2) The class will then correct the daily homework spending whatever time is needed to correct any misunderstandings of material that was missed by the class.
3) Teacher will introduce new material through a variety of means: discrepant examples, real-life illustrations, mystery strategy, and other hook methods.
4) Teacher will model the new procedure being considered.
5) Teacher will have the class work on similar problems in individual and small group settings.

**Hook/Relevancy/Building Background:**

Teacher will use a mixture of discrepant observations, real life-examples, KWL discussions, mystery strategy and other methods to hook the classes attention on each day's class material.

**Technology Included:**

The students will use the computer lab to conduct research, create pre test, post tests, study guides and Power Points for their lessons for the class.

**Use of Instructional/Diagnostic Software:**

N/A

**Standardized Test Practice Included (Content Embedded):**

NA

**Student-to-Student Conversation:**

All instruction is based on problems where the students work in teams using prior knowledge and common sense to seek solutions to problems based on new material.
Students are not allowed to ask the teacher for help until they can demonstrate how their team has sought to solve the problem on their own.

**Student Activity/Engagement:**

Students actively seek to solve problems which deal with material that they are not familiar with.
Students will propose projects that they will create using a variety of geometric techniques.

**Student Activity Type:**

**Active Learningxx** ☐
**Student Conversationxx**
**Teacher Led Instructionxx** ☐
**Student seatwork with teacher engagedxx** ☐

**Reading, Writing or Vocabulary Strategies used:**

**Rote learning of terms**
**Analysis and synthesis of materials presented in daily life application lessons**
**Students debate possible solutions to problems.**

**Comprehensible input:**

**Bodily kinesthetic, verbal exchange, and visual presentations, technology applications and integration and student designed projects.**

**Evaluation:**

Student competency is determined by the following methods:
Classroom observations
Exams and quizzes
Students responses to classroom discussion

**Re-Teaching Strategy:**

Group work
After school tutoring
One-on-one assistance
Peer coaching

**Enrichment Plans:** Students are free to decide how to research and present their material.

Daily Work
February 6 -- Assignments are made to the students and teams are formed.
February 7 -- Students meet to decide how to create the project and begin conducting research
February 8 -- Students continue with their research in the computer lab
February 9-- GREAT PROGRAM
February 10 -- Students meet in the computer lab to work on their projects.

February 13 -- Students meet in the computer lab to work on their projects
February 14 -- Students listen to Mr. White give background information on American History from 1870 - 1900
February 15 -- AIMS Students work in computer lab on Project
February 16 -- GREAT Progroam
February 17 -- Major Exam

Vocabulary terms for History

| | | | | | | |
|---|---|---|---|---|---|---|
| Assimilation | Emigrant | Exodusters | Gilded Age | Graft | | Immigration |
| Industry | Imperialism | Industry | Jim Crow | Lynching | | Monopoly |
| nativism | political boss | Robber Barron | rural | urban | | spoils system |
| Strike | tariff | tenement | union | vaudeville | literacy test | dug out |

The students will share the load of teaching this section of our nation's history. The teacher will provide periodic instruction to provide an overall platform for the study. The students have been divided into teams of four to five members and assigned major subdivisions to teach to the class. They will provide a pretest, post test, study guide, and will teach the class using Power Point illustrations. Each phase will be graded and evaluated. The students also receive a weekly grade from the teacher on their performance for the week. Each team member will also grade fellow team members on the participation. Daily Journals are being kept by each team to record progress, memorialize assignments and assess their progress.

**Subject: Basic Math 7 and 8**
**This Unit (Geometry) will occur throughout the month of February**
**Date and duration of the lesson: February 1 through February 24**
**State Standards Presented:**

**Lessons to be Taught:**

We will examine the following topics:
The basic methods for working with factoring, polynomials, and quadratic trinomials
Life applications for the use of factoring, polynomials, and quadratic trinomials
Daily warm-up reviews to keep students fresh on previously studied materials.
Weekly testing based on AIMS type questions.

M1 Number Sense/Operation
**M2 Data Analysis, Probability/Discrete**
M3 Patterns & Algebraic, Functions ☐
M4 Geometry/Measurement XXX
M5 Structure/Logic ☐
SC1 Inquiry ☐
SC2 History/Nature
SC3 Personal/Social
SC4 Life ☐
SC5 Physical ☐
SC6 Earth/Space ☐
SS-E4 Tools ☐
SS-E5 Place/Regions ☐
SS-E6 Patterns ☐
SS-E7 Human/Environment Interaction ☐
SS-E8 Interpretation ☐
R1 Process ☐
R2 Comprehend. Literary Text ☐
R3 Comprehend. Info Text ☐
W1 Process ☐
W2 Components ☐
W3 Application ☐

## Strand 4: Geometry and Measurement

Every student should understand and use all concepts and skills from the previous grade levels. The standards are designed so that new learning builds on preceding skills and are needed to learn new skills. Communication, Problem-solving, Reasoning & Proof, Connections, and Representation are the process standards that are embedded throughout the teaching and learning of mathematical strands.

### Concept 1: Geometric Properties

Analyze the attributes and properties of 2- and 3- dimensional shapes and develop mathematical arguments about their relationships.

PO 1. Draw a geometric figure showing specified properties (e.g., Draw an obtuse triangle.).

PO 2. Classify 3-dimensional solids by their configuration and properties (e.g., parallelism, perpendicularity and congruency).

PO 3. Identify the net (2-dimensional representation) that corresponds to a rectangular prism, cone, or cylinder.

PO 4. Distinguish between length, area, and volume, using 2- and 3-dimensional geometric figures.

PO 5. Draw polygons with appropriate labels.

PO 6. Identify the angles created by two lines and a transversal.

PO 7. Recognize the relationship between central angles and intercepted arcs.

PO 8. Identify arcs and chords of a circle.

PO 9. Model the triangle inequality theorem using manipulatives.

PO 10. Identify corresponding parts of congruent polygons as congruent.

**Objective(s) of Lesson:**

*Students will be able to demonstrate mastery of the material below by scoring at least 80% on exams and quizzes.*

- Identify two and three-dimensional geometric shapes
- Identify the characteristics of polygons and circles
- Identify equations for perimeter, area, volume and circumference
- Apply the above equations in real-life situations
- Create and identify nets for three dimensional shapes and calculate surface area
- Identify and define geometric terminologies and symbols
- Characterize shapes based on congruency, similarity and symmetry
- Accurately determine translations, rotations and slides
- Apply principles of angles, parallelism and relationships of angles.

**Objective(s) of Language:**

- Students will listen to the teachers explanations of how to work with the itmes listed in the objectives and use this information in practice situations and in real life applications.
- Students will discuss and work together to find appropriate solutions for daily warm-up and Power Point life applications
- Students will read, assess and discuss in small groups problems presented by the teacher and will then participate in how they decided to solve the problem in a whole class discussion.
- Students will write their problem solving strategies out in each classroom situation.

**Objective(s) of Department/Strategy:**

Students will become critical thinkers and demonstrate the ability to use acquired skills in real life situations.

**Instructional Strategies/Procedures:**

The daily procedure will be as follows:
1) Teacher will have the students work on warm-up problems that reflect the standardized test material to be mastered by April. These problems will be discussed and corrected in class using students as instructors. The problems will also be worked on by small groups of students.
2) The class will then correct the daily homework spending whatever time is needed to correct any misunderstandings of material that was missed by the class.
3) Teacher will introduce new material through a variety of means: discrepant examples, real-life illustrations, mystery strategy, and other hook methods.
4) Teacher will model the new procedure being considered.
5) Teacher will have the class work on similar problems in individual and small group settings.
6) Teacher will assign homework or have the S work on class projects On Friday's, the T will have the S take exams, quizzes, and standardized test practice.

**Hook/Relevancy/Building Background:**

Teacher will use a mixture of discrepant observations, real life-examples, KWL discussions, mystery strategy and other methods to hook the classes attention on each day's class material.

**Technology Included:**

The students will use TI-73 Graphing calculators to demonstrate how these tools can be used for data analysis and representation

**Use of Instructional/Diagnostic Software:**

N/A

**Standardized Test Practice Included (Content Embedded):**

The students are provided with daily life applications which introduce and allow the student to work through procedures which are included in the AIMS evaluation
Students will take AIMS style practice at the completion of the unit

**Student-to-Student Conversation:**

All instruction is based on problems where the students work in teams using prior knowledge and common sense to seek solutions to problems based on new material.
Students are not allowed to ask the teacher for help until they can demonstrate how their team has sought to solve the problem on their own.

**Student Activity/Engagement:**

Students actively seek to solve problems which deal with material that they are not familiar with.
Students will propose projects that they will create using a variety of geometric techniques.

**Student Activity Type:**

**Active Learningxx☐**
**Student Conversationxx**
**Teacher Led Instructionxx☐**
**Student seatwork with teacher engagedxx☐**

**Reading, Writing or Vocabulary Strategies used:**

**Rote learning of terms**
**Analysis and synthesis of materials presented in daily life application lessons**
**Students debate possible solutions to problems.**

**Comprehensible input:**

**Bodily kinesthetic, verbal exchange, and visual presentations, technology applications and integration and student designed projects.**

**Evaluation:**

Student competency is determined by the following methods:
Classroom observations
Exams and quizzes
Students responses to classroom discussion

**Re-Teaching Strategy:**

Use of spiraling
After school tutoring
One-on-one assistance
Peer coaching

**Enrichment Plans:** Students who demonstrate mastery of the material will be allowed to begin work with our graphing calculators before formal instruction begins.

Homework:

February 6 -- Geometry Study Guide 7
February 7 -- Geometry Study Guide 8
February 8 -- Geometry Study Guide 9
February 9-- AIMS Review 1, !a, 1b
February 10 -- Master Exam Weekly Quiz 2

February 13 -- AIMS Review 2,2a,2b
February 14 -- AIMS Review 3, 3a, 3b
February 15 -- AIMS Review 4, 4a, 4b
February 16 -- AIMS Review 5, 5a, 5b
February 17 -- Exam

Vocabulary terms for Geometry:

Polygon Triangle Square Trapezoid Rectangle Parallelogram Circle
Circumference Area linear volume cubic line segment radius
Diameter chord tangent secant symmetry similar congruent parallel
perpendicular transverse rotation reflection slide cube pyramid prism
Pentagon hexagon heptagon octagon decagon ray point

Science lesson plans
Language Arts plans to include "How to be a Fish." Etc. writing lessons.

Jan.24-29. 2006

The Lesson to be taught: Water quality (there are five(5) components of the study and it may take us two weeks to properly train everyone)
NOTE: We are readying our Living History Museum this week and that may take some of our time.

# Water transparency

## STANDARDS

*Earth and Space Sciences*
Water is a solvent.
Earth materials are solid rocks, soils, water and the atmosphere.
*Physical Sciences*
Objects have observable properties.
*Life Science*
Organisms change the environment in which they live.
Humans can change natural environments.
All organisms must be able to obtain and use resources while living in a constantly changing environment.

## SWBAT:

Identify answerable questions.
Design and conduct scientific investigations.
Use appropriate mathematics to analyze data.
Develop descriptions and explanations using evidence.
Recognize and analyze alternative explanations.
Communicate procedures and explanations.

## ESSENTIAL QUESTIONS:

Does the transparency of the water change with other parameters, such as precipitation, water temperature, wind speed and direction, seasons, and land cover?
How would major changes in land cover around your Hydrology Site (e.g., forest fire or clear cutting) affect water transparency at your site?

# Water temperature

## *STANDARDS*

*Earth and Space Sciences*
Earth materials are solid rocks, soils, water and the atmosphere.

*Physical Sciences*
Objects have observable properties.

*Life Science*
Organisms can only survive in environments where their needs are met
Earth has many different environments that support different combinations of organisms.
Humans can change natural environments.
All organisms must be able to obtain and use resources while living in a constantly environment

## SWBAT:

Use a thermometer to measure water temperature.
Identify answerable questions.
Design and conduct scientific investigations.
Use appropriate mathematics to analyze data.
Develop descriptions and explanations using evidence.
Recognize and analyze alternative explanations.

# Appendix F

## VICS and MACI Data by Subject

English

Instances and Percentages of Classroom Talk and Behavior

| | Teacher | Student | All Talk/No Talk |
|---|---|---|---|
| VICS (Raw (%)) | 394 (53.46) | 313 (42.47) | 30 (4.07) |
| MACI (Raw (%)) | 394 (53.46) | 261 (35.41) | 82 (11.13) |

Seconds and Percentages of Time in Classroom Talk and Behavior

| | Teacher | Student | All Talk/No Talk |
|---|---|---|---|
| Time in Seconds (%) | 3854 (42.82) | 3893 (43.26) | 1253 (13.92) |

History

Instances and Percentages of Classroom Talk and Behavior

| | Teacher | Student | All Talk/No Talk |
|---|---|---|---|
| VICS (Raw (%)) | 276 (55.42) | 218 (43.78) | 4 (.8) |
| MACI (Raw (%)) | 276 (55.42) | 196 (39.36) | 26 (5.22) |

Seconds and Percentages of Time in Classroom Talk and Behavior

| | Teacher | Student | All Talk/No Talk |
|---|---|---|---|
| Time in Seconds (%) | 2698 (56.21) | 2075 (43.23) | 27 (.56) |

Math

Instances and Percentages of Classroom Talk and Behavior

| | Teacher | Student | All Talk/No Talk |
|---|---|---|---|
| VICS (Raw (%)) | 776 (56.73) | 559 (40.86) | 33 (2.41) |
| MACI (Raw (%)) | 776 (56.73) | 519 (37.94) | 73 (5.34) |

Seconds and Percentages of Time in Classroom Talk and Behavior

| | Teacher | Student | All Talk/No Talk |
|---|---|---|---|
| Time in Seconds (%) | 8364 (64.84) | 3225 (25.00) | 1311 (10.16) |

Science

Instances and Percentages of Classroom Talk and Behavior

| | Teacher | Student | All Talk/No Talk |
|---|---|---|---|
| VICS (Raw (%)) | 286 (59.71) | 177 (36.95) | 16 (3.34) |
| MACI (Raw (%)) | 286 (59.71) | 144 (30.06) | 49 (10.23) |

Seconds and Percentages of Time in Classroom Talk and Behavior

| | Teacher | Student | All Talk/No Talk |
|---|---|---|---|
| Time in Seconds (%) | 4777 (53.08) | 3796 (42.18) | 427 (4.74) |

# Appendix G

## Bracketing Interview

January 13, 2006

What are my Educational beliefs?

- Personal view of learning
- How should teaching be conducted?
- My connection with the constructivist/tionist theories

When I left high school many years ago, I left with the feeling that my education was not all that it could be. I remember thinking that I would go into the field of education for two reasons. The first reason had to do with those who I considered to be "bad" teachers. These were the teachers who could care lees about their students. The ones who stood in front of the class, gave the daily lecture of what ever topic, then went back to their desks while the students work on some artifact that would show that they had mastered whatever it was that the teacher thought they were teaching. The second reason I wanted to join the field was to continue the work of those who I thought were "good" teachers. These were the teachers who, although often stood in the front of the room, strived to ensure that the students were not only mastering the curriculum, but also finding it meaningful in their lives and even enjoying it from time to time. Little did I know at the time that somewhere down the road I would come to feel that both sets of teachers missed the mark. Some more than others.

As began my college career, I was sent straight back into a system much like the one I had left in high school. In my first few semesters I ran into a number of professors who stood in front of the class, lectured, maybe gave homework, and then tested us on what they had shared. I was always amazed that an average of 50% on tests throughout the course could somehow be manipulated to mean a B or C for the semester. At the beginning of my sophomore year I took my first class in education. From this class I remember only a couple of things vividly. The one that sticks out as most important in the current frame of reference is an argument/discussion that the professor and I had in front of the class. I remember arguing that the way that teachers have been teaching and they way that students have been learning was actually counter productive. The professor on the other hand insisted that the current paradigm that was playing out in the public schools had a great deal of historical president to support it. While I couldn't argue against that point of view (due to immaturity and lack of background in the field), I continued to assert that in my gut I knew what we were doing to our students was wrong. We ended the argument with an agreement to disagree. This argument taught me that the field of education is not always cut and dry. First, the professor argued that a traditional paradigm had hold of public education for many reasons, yet in allowing me and other students to suggest alternative points of view, he practiced a style of teaching that was not traditional at all. This began my journey of discovering alternative methods for teaching and learning in the classroom.

The remaining years of my undergraduate degree were spent in classes in a relatively traditional learning environment (English), and an environment that espoused a more progressive attitude towards learning (Education). I am not sure if it hit me while I was an undergrad, or after I was an undergrad, but it did hit me. My education in the college of education was extremely paradoxical. In general, the professors promoted a type of learning that was contrary to the type of learning that the general population participated in, but then conducted their own classes in a relatively traditional manner. When I left the university I thought I was ready to be a teacher that promoted student engagement by making the student and not the curriculum the foal point of the classroom. This isn't what happened. After receiving my teaching contract, I found myself giving students information in the exact same manner that it had been given to me; lecture and test. Why was I doing this? I loathed this style of teaching and often times the teacher for doing it. I knew that I was in charge of my own destiny and my own classroom, but it seemed hard to make that switch. What I came to understand is that I had not really experienced, from the student point of view, the type of learning environment described by my instructors. I was a little dismayed. Had I really just spent five and a half years learning to become what I had set out to change? It looked as if I had.

By the spring of my first year of teaching I had become frustrated with the contradiction I was living. At that point, I began the slow process of change in my classroom. This process began with me giving the students predefined activities in which they would actually work with materials to fined answers. All of their answers would of course be the same, because that's how the assignments were created. I was thinking that these were the hands-on/minds-on activities that I had heard so much about as an undergraduate. These activities had peaked my students' interests and seemed to make them active in the learning process. Still though, my students were bound by the predefined limits that I had set for them. That same semester while taking a graduate course at the local university I was introduced to the idea of Constructionism. This type of learning/teaching environment, I thought would take me to the place that I wanted to be as a teacher.

As part of the graduate class, I designed a short unit in which I would implement the Constructionist framework within my classes. I told my students to create something that has or causes movement, and that we would use these objects to understand motion. The students dove into the first part of the assignment. Most of them created cars. Much of this was due to my limits. I couldn't think of what else they could do and basically helped them to define a limited array of options. Once the cars were created, the students and I then tested them to see their speed, along with other aspects of motion. The students actually figured out the equation for speed by observing their cars moving. I thought that this was a great step in the right direction for my class, but then the school year came to an end. The following school year ran in much the same manor, starting off with the students as traditional students, and then ending with a Constructionist

activity. By the end of my second year of teaching, I had made some strides in changing how I was as a teacher, but was still subjecting my students to a traditional class for at least half of the year. By the end of my second year of teaching I was ready to move into a full time Constructionist environment. The hardest part for me was making that transition at the beginning of the school year.

While a teacher in the classroom I had also become a member of the school's technology committee and had people coming to me all times of the day with technology questions. As a result I thought that it was time to get another degree. I felt that a degree in educational technology would meet the needs of both my classroom needs and my technology needs. Little did I know that the degree would help me to become more of a constructionist and less of a technology expert in the school.

The program started in the summer of 1999, with a week at a campus in L.A. During this week a met with those who would be my classmates. My classmates consisted of classroom teachers, individuals who ran technology for their districts and church administrators. Each of them brought a unique perspective to the discussion of how to correctly integrate technology into learning environments. Many of the individuals in the program started with a very traditional view of education. One of the first texts that we read in the program, Constructionism in Practice, had already become a favorite of mine. I am not sure it had the impact on all of my classmates as it did me. Much of the book is descriptions of constructionist activities that faculty members from MIT had been using with students in public schools in and around the Boston area for many years. I began to use their ideas, and the ideas from other reading to inform how I could begin to change what I was doing in my classroom.

By the time I had finished the program, I had done my best to move my classroom from one of traditional teaching to one of constructionist facilitating. I felt like my students had a lot more control over what we did in the classroom. They pushed me to learn and think with them. They really began to judge their work more harshly than I could. I was not only proud of their abilities, but impressed with the ownership they took of the class.

What are my feelings about change in the classroom?

- What must teachers do to create learning environments consistent with my views?
- What are my thoughts about teachers who refuse to change, to move beyond a traditional approach to teaching and learning?

I have been known to complain about the preaching of ideas without change. I find it to be rather flawed to preach constructivism or even just to claim it as a "bylaw" of what you do in your classroom when there is nothing constructivist about the classroom. For me, I find issue with myself when I say one thing and do another. It mentally and physically affects me. For me to operate in that state of disconnect actually makes me a worse teacher of

either type. For that reason, I really feel like you must make a decision, at least for the activities you do if you cannot make the decision for the entire teaching experience.

I don't think most people can create learning environments that are consistent with my views. I think that they think that the pressures of outside forces dictate how classrooms must be run. I disagree, I believe that teaching our students to take control of the learning environment, and to begin to use information in a way that is meaningful to them actually promotes deeper and broader thinking than the outside forces expect. Taking ownership of ideas, allows our students to not only know the ideas, and possibly when they might be used, but to understand how these ideas are connected to what they do in life. I want to see an end to regurgitation and forgetting. I want to see our students, regardless of their perceived ages and abilities, take their knowledge and change the way that we approach the very essence of life. What matters is what they know they leave with, not what others think they leave with.

Creating a learning environment consistent with my views means throwing away the constraints of the system and our past. It means that the teachers approach learning, not through their needs, or the needs of their bosses, but through the needs of the students. A classroom is about the individuals within it. The focus should be on those individuals and their needs. Give them the opportunities to show you what they need to be successful and the evidence of their understandings will be far more impressive than any we could have designed for them.

I am not sure what I feel about those who refuse to change. On one hand I think to myself, that's ok. The world needs all sorts of thinkers. On the other hand, though, I think aren't they doing a disservice to their kids by limiting their potential. I want to give everyone the benefit of the doubt. I want to believe that all teachers feel as I do about our children; they are there for them, to meet their needs, to help them get what they need. At the same time I wonder how they can believe that a focus on the basic knowledge of today can meet the needs of students who live in the future. Although I want to be fair, I want to believe that we share the same desire to meet our students' needs, I can't help but to think that their focus is on yesterday. I'm not saying we don't need the information of yesterday, we do. What I am saying is that by stopping there, we don't promote thinking; we don't prepare our students for a world of changing understandings.

So how do I feel about them? I guess I sum it up this way, I feel that the message and the approach to given the message are fundamental wrong; wrong, for all the right reasons. These are people who love our students, generally, but fail to see that they have needs that have not yet been contemplated.

What is my history at the school where the research is being conducted?

- Action research on constructivism in the classroom
- Relationship with the founder of the program
- Connection to the teachers on the team

In my answer to an earlier question I shared that during my Master degree work, I worked to create a learning environment that was based on the constructionist framework. This was done during my third year of teaching, at the school, where the current research will be conducted. For a year, my classroom was unlike any other in the school. I did my best to develop a learning environment where we focused on their needs and fitting the ideas of science into those needs. This was my last year of teaching at the middle school level; although, at the time I didn't know it. In the school was a first year teacher. This teacher was in his third career and went into teaching because it was a calling. This man and I spent a great deal of time together that year. We would go out to a bar, have a few drinks and discuss what the public schools need to be better. At the end of the year, this man proposed that a team be created where the students remain with the same four teachers for the two years that they are in middle school. Due to a change in administration his request was denied. The following year he again taught in a traditional middle school team. Six weeks into that school year I left, but the two of us often got together to discuss our views on education. By the end of the year this man had convinced the new administration that he had an idea that could better teaching and learning at the middle school. The following year he began to loop as a math teacher with students. During this time, he began a Master degree in Educational Technology through the University at which I was working. His first class was from me and was based on the idea of Constructionism. Over the year he put together a plan to increase the looping population and develop a program where the students were working not only to learn knowledge, but to use it as well. Hat following year, that program turned into the program which is the focus of this current study.

In the process of getting the program off the ground, I worked with a colleague to procure funding for technology and training for the teachers in this program. While the technology was abundant, the training was not. Regardless the program grew from 2 teachers to 12 within 3 years.

While the teammate, of the original team, and I did not have a close relationship, we do have an interesting one. When I left the school, the new principal had this gentleman observe one of my classes. She was trying to convince him to teach at the school and take over my position. I believe that he did, and two years later teamed up with the designer of the program for the original team of 2.

While I am not sure if my input has affected the growth of this program in any way, it is important that I hash out my involvement for my own understanding of what I believe about the program and so that others know where it is that I am coming from.

# Appendix H

External Review

**External Review**
**For Shadow Armfield**
**C & I Doctoral Degree Candidate**
**College of Education**
**Northern Arizona University**

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**Provided by MaryLynn Quartaroli, Ed.D.**
**Lecturer-Northern Arizona University**

**Dissertation: A Descriptive Case Study of Teaching and Learning in an Innovative Middle School Program**

## Introduction

This report is a compilation of my analyses and assertions that arise from data supplied to me by Shadow Armfield for his case study of an innovative, technology-enhanced middle school program. My role as an external reviewer of this dissertation study will be to review the raw data and offer analyses, interpretations, and conclusions that Mr. Armfield will incorporate into the final data presentation to support or question his own analyses, interpretations, and conclusions. There has been no communication between this reviewer and Mr. Armfield relative to the content of his dissertation work since my agreement to perform this review and my receipt of raw data documents.

## Overview

Mr. Armfield's case study is the first formal examination of the Technology Integrated Learning Environment (TILE) middle school program located in an isolated urban community in the American Southwest. The purpose of the study is to describe how the TILE teaching/learning experiences are planned, implemented and assessed, how the TILE environment affects levels of thinking, and how technology is utilized in the teaching/learning process.

Raw data for this study include the insights, views, and opinions of the two program instructors, one student teacher, and ten selected students obtained through interviews, questionnaires completed by the three teachers and 37 students, plus two weeks of descriptive classroom observations and structured interaction analyses. Mr. Armfield taught at this school and was a colleague of the two primary teachers; he is also a co-principle investigator for the grant that provided funding for the technology used in these classrooms. The data were collected during the spring semester, 2006.

Both quantitative and qualitative measures have been employed to describe the TILE program, some aspects of the teaching/learning processes and environment, and perceptions of students and teachers in the program. The data offer an understanding of the context, the teaching/learning processes and expectations, experiences, and other issues relevant to the students and instructors as they took part

in the program during that specific period in time. It should be noted that the classroom observations have somewhat more limited influence on this review, as much of that data is more interpretive than descriptive.

## Guiding Questions and Assertions

Assertions that address the guiding research questions arise from all data sources. This reviewer has examined all sets of data and identified themes that emerged from these sources of information. These themes then provide the basis from which assertions are made to answer the overarching question of the study: What does teaching/learning look like in the TILE program?

**1. How are the teaching and learning experiences planned, implemented, and assessed?** *(Questionnaires, interviews, interaction analyses, observations)*

- **Teachers are overwhelmingly responsible for planning, implementing, and assessing the teaching and learning experiences**

Teachers generally plan alone, although some projects are developed by both teachers to be investigated concurrently in the different courses. Language and writing skills are emphasized across all disciplines (i.e, comparisons, synthesis of information into one or two sentences, written creative stories in science, vocabulary uses). The AIMS test and state standards are major considerations in planning, implementing, and assessing student learning (i.e., AIMS Olympics for writing skills, math concepts organized by specific individual topics or standards for AIMS test, rather than in a linear progression).

Teachers perceive that there is more student input and engagement in daily lesson planning and decision-making than do students or as revealed during observations. Students suggest that one way to improve the program is to include more student input into course design and assignments.

Assessment of the learning experiences generally utilizes traditional strategies; these include observation of student body language, traditional quizzes and tests, and assignments with accompanying detailed instructions and scoring rubrics. *Doing* the homework is strongly emphasized, with teachers checking that students did it, requiring students to complete this work at lunch or after school if it was not done at home, and spending class time to provide the 'right' answers, and to answer questions, although there were many times when students had no questions. The data set does not provide explicit information regarding grading practices; therefore it remains unclear how these types of assessments are weighted in assigning grades to students.

It should be noted that one teacher developed a student project that required them to plan and teach lessons to the class that include an activity or demonstration and use some of the available technology.

- **Teacher-centered classroom environment**

Although traditional lectures make up, on average, less than 50% of class time, presenting information, directions, and questioning with pre-structured answers predominate in the typical classroom environment, representing more than 80% of the observed interactions. Teacher talk time differs by subject area, with math being the most dominated by teacher talk, followed by history and science classes. Student and teacher talk time is approximately equal in the English classes observed.

- **Perceptions of TILE program goals and success vary among participants**

The teacher instrumental in the initial design of the program has clear goals in mind and a declining view of success of the program. He stated that TILE was created to build a positive community where students work with supportive teachers for two years to accomplish academic and technological goals and to develop interpersonal skills such as teamwork and intrapersonal values such as responsibility, determination, and high self esteem through genuine accomplishment. He described the success of the program as peaking during the previous year, with declining success subsequently; he stated, "Until last year, we were moving steadily toward achieving those goals, but as more people have become involved in the program, as district politics have come to play…it has become more and more difficult to keep the integrity of the program…"

The other teacher is less clear about the intent of the program; he describes the goals as assisting students in feeling successful in middle school and providing them with the tools and skills necessary to succeed in high school. Among his expectations were that students will become independent thinkers and independent learners, as well as emphasizing cooperation with others. With this focus, he describes the program as "in pretty good shape" but concedes that the TILE team should spend more time in defining goals and a "banner" mission statement.

Apparently uninformed regarding the specific goals of the program, students indicated that they expected more hands-on experiences and a stronger emphasis on science and math, particularly space science and rocketry, due to the information provided that the learning community was developed in collaboration with the National Aeronautics and Space Administration (NASA). The students also were aware that working well in groups was an important, and pleasurable, component of the TILE community.

- **Student/teacher relationships shape perspectives of program**

In general, participants reported an engaging climate that successfully creates a community focused on student success in learning. Students often used the word "fun" to describe the classes. Teachers can confidently leave the classroom when students are engaged in classroom activities; most often, there are no behavior problems as a result. However, at a specific classroom level, the quality of the student/teacher relationship was instrumental in shaping perceived value of the learning experiences and in creating positive conditions for learning. One of the teachers was evidently less patient, sarcastic, and often "yelled" at students, thus negatively influencing the classroom environment for all. Several students also mentioned that a key to being successful in the program is to avoid confrontations with the teachers; as one commented, "You have to be on the teacher's good side, that's the main thing."

- **Amount of preparation for class widely varies among participants**

Students reported that their own preparation time for success in the TILE classes varied from zero (1 student) to more than five hours (9 students) per week, with a median weekly preparation time of two hours. However, observations, interviews and open-ended questions on the questionnaire suggest that much more homework is assigned and students must complete it at school if not done at home. Perhaps students misinterpreted the question to discount preparation work done during school. Several also noted that students who were successful were those who

completed all homework and other assignments in a timely and thorough manner. Some went on to suggest that the teachers place an inordinate amount of pressure on students to complete assignments and make good grades on tests, creating a high level of stress.

Teachers' reported preparation time per week ranged from three to more than five hours. Caution is urged in interpreting this data. The questionnaire protocol asks how much time the respondent spends in preparing for the classes; it does NOT ask how much time teachers believe students should spend in preparing for the classes. Organization is also mentioned as an area for improvement, particularly in one teacher's classes. Having all materials at hand and ready in a timely manner was deemed important by students to be successful in the class.

**2. How is the TILE environment affecting levels of thinking?**
*(Interviews, questionnaires, interaction analyses, observations)*

- **Teacher-centered instruction promotes lower cognitive levels of thinking**

The students and teachers have different perceptions regarding levels of cognitive engagement. Teachers generally perceive classroom activities to be at higher cognitive levels than do students. The amount of time spent in teacher-centered instruction, particularly doing questioning with pre-structured answers, lends support to the student view. Although teachers indicate that it is important for students to construct their own meaning and become critical thinkers, most of the learning experiences are focused at the knowledge, comprehension, and application levels.

- **Teachers are aware of cognitive, affective, and psychomotor needs of middle school students**

Teachers try to "mix it up" in how information and activities are planned, to engage students in multiple ways during a single class period, in an attempt to meet diverse learning styles. Teachers generally believe that middle school students have very short attention spans and try to schedule changes in activities every 8 – 12 minutes in a 47-minute class period. Acknowledging the importance of social interactions for this age group, teachers structure some teamwork experiences into every class session, during which students work with others on projects, homework assignments, and discussions of issues, in addition to doing independent work. Both teachers and students noted that having the same teachers three times a day for two years promotes a feeling of caring and concern with student success, in essence a 'second' set of parents. Many class sessions also include having students moving to the computer lab or carrying out experimental procedures to allow students some reprieve from just passively sitting at tables.

- **Daily class sessions include multiple, often unrelated, concepts and activities**

The lessons as enacted in the classes often contain multiple and unrelated concepts and activities. For example, in a single math class, students are asked to examine the geometric relationships between 3-dimensional objects and 2-dimensional representations of these, followed by a group project to examine various cell phone plans utilizing x-y coordinate graphing and slope-intercept equations. As another example, in the science classroom, students review homework prior to doing a group vocabulary activity summarizing their assigned section of a newspaper

article, after which the teacher gives a brief lecture on laws and elections; this is followed by an experiment to determine the number of drops of water that can be placed on a penny, which is to be graphed and related to surface tension, magnetism, and capillary action. In an English class, the teacher reads aloud a section of the novel Fahrenheit 451; this is followed by a selected student describing the book that student is reading outside of class, which leads to students writing biographical poems in computer lab. The teachers believe that frequent changes keep students engaged in the learning; however, the instructors are not examining the effects of this type of lesson planning in developing student deep conceptual understanding and critical thinking skills.

- **Classroom arrangements impact student behaviors**

Overall, the students in the TILE program exhibit compliant behaviors. As the data were collected during the spring semester, it is apparent that the learning community has clearly established standard classroom procedures and behavioral expectations. These are articulated on the program application form and are reinforced in each class. Although both teachers are in rooms with tables and chairs, rather than desks, they choose to arrange these differently. The math/history teacher has students generally facing the front of the room, whereas the English/science teacher has students facing each other in groups across the tables. In observations and interviews, more behavioral problems had to be addressed by the English/science teacher, often using a raised voice. In some instances, the other teacher in the team will correct student behavior, usually excessive noise, in a class by speaking over the half-wall separating the two rooms.

**3. How is technology used in the teaching and learning process in TILE?** *(Interviews, questionnaires, observations)*

- **Technology implementation is primarily limited to typical uses**

Computer use is widespread throughout the TILE program. Both students and teachers use computers to present information, conduct searches on the internet for information, type up papers, and create brochures and PowerPoint presentations. Students save their work on individual thumb drives; they also post some to on-line portfolios using templates provided by the English teacher. SmartBoards are used in both classrooms to facilitate learning experiences, with daily use noted in one of the two classrooms; the teachers believe that this assists students in staying on task and minimizing transition time, as well as being more visually stimulating. Both teachers also use the AVerVision to facilitate activities and for students to present information to their peers. Grades are kept in electronic grade books and are shown to students regularly to allow them to check their progress.

One of the less traditional uses of technology in these middle school classrooms is using the computers and LCD projectors to produce Jeopardy, Hollywood Squares, and other ‘game’ formats as learning activities, primarily for review of previously learned materials. Students appear to enjoy this use of technology, becoming quite competitive in their team’s ability to get right answers and score points.

- **Students unaware of diverse potential and applications of technology**

In general, students explain the uses of technology along traditional lines as described above. In some instances, they describe the classroom environment and

technology uses in TILE as similar to those they experienced in previous years. More complex applications and technologies are not evident in these classrooms.

## Summary

Overall, the TILE program appears to create a technology-rich setting in which teaching and learning is enhanced. Students and teachers develop competence using a variety of computer-based technologies, transitions from one activity to another can be smoothly accomplished, and teacher and student organization of materials and assignments can be improved. Sharing the same students, teachers can more effectively plan and implement learning experiences that are coordinated and meaningful across disciplinary boundaries. With only two teachers, students have a clear understanding of the expectations for their performance, academically and behaviorally.

An important finding is that although teachers have access to many advanced technologies, instructional objectives and strategies tend to remain teacher-centered, with technology simply adding "bells and whistles" to traditional approaches. Therefore, the goal of developing students who are active learners, critical thinkers, and problem-solvers is not yet achieved.

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