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AUTHOR: Diana Harris

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Joan Hanor
THESIS COMMITTEE CHAIR

[Signature]

DATE 7/17/09

Jacqueline Thoonsand
THESIS COMMITTEE MEMBER

[Signature]

DATE 7/17/09
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Meeting the Needs of Students with Varied Learning Styles
Through Project-based Learning

by

Diana Harris

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Thesis Abstract

This study sets out to explore how project-based learning contributes to meeting the needs of students with varied learning styles. Research for this study consisted of two parts, a teacher survey, gauging familiarity and practice in project-based learning, and lessons created comparing two teaching methods, PBL and direct instruction.

This study cited the work of Howard Gardner and the eight intelligence types identified in his Theory of Multiple Intelligences. This work examined the outcome of assessments of students' understanding of curriculum, using the project-based learning method of instruction, in relation to direct instruction.

Project-based learning includes six necessary elements with a required use of technology for investigation and learning. Pivotal to the success of project-based learning is the creation of problems that students can identify with to reinforce existing knowledge. The research referred to in this study supports the claim that students who learn using project-based techniques process knowledge in a deeper and more mindful manner, and develop a greater ability to apply their knowledge to authentic experiences.

This study also shows evidence of project-based learning supporting students considered "at risk" or those with learning disabilities. Primary results of the success of this method of instruction amongst these groups come from the de-emphasis of standard methods of intelligence assessments.

Key Words: Multiple Intelligences, Project-based learning, students at risk
CHAPTER ONE

INTRODUCTION

To give due recognition to the active and constructive role of the learner, a different mode of interaction is required – one in which the expert and the learner see themselves as fellow members of a learning community in which knowledge is constructed collaboratively.

Gordon Wells and Gen Ling Chan-Wells

Overview

A skilled educator is constantly searching for effective methods to teach his or her students. Teachers looking to understand their students ask themselves questions such as: What makes most sense to them? What are their strengths? What are their weaknesses? What questions do they ask the most (Tobias, 1994)? In addition, knowing how to learn and having the ability to explore the ways to learn, has a direct effect on one’s sense of well-being (O’Toole, 2008). O’Toole’s study (as cited in Claxton, 1999; 2004) states “the learning to learn concept has moved beyond teaching intellectual skills and has embraced a host of emotional, social, and cognitive aspects that are needed for lifelong learners, such as perseverance, curiosity, self-knowledge and collaboration.” This study sets out to explore how project-based learning contributes to meeting the needs of students with varied learning styles.

This research consisted of two parts. First, a survey was distributed to 31 K-8 teachers, with the intention of gauging the familiarity and understanding of project-based learning amongst the average classroom teacher in a K-8 school. Second, a
study compared the results of four 6th grade social studies lessons. Two lessons were completed using the project-based learning teaching method, and two lessons were taught using the traditional teaching practice of direct instruction. This analysis sets out to investigate whether project-based learning shows greater academic understanding and information retention of concepts learned.

A Problem in Classrooms Today

Each child in today’s classrooms “perceives the world differently from the way we do. Each child is a unique individual with his or her own natural strengths and preferences. These individual gifts or bents are called learning styles” (Tobias, 1994, p.4). Although we recognize that each child is unique, it is difficult to work with varied learning styles when teachers rely on traditional methods, such as direct instruction, as the sole method of teaching. Using project-based learning to support individual learning styles is not a magic formula to solve all of the problems in today’s classrooms. However, it is a valuable framework that can enable teachers to focus on the individual strengths of their students and help the student build confidence in learning, so they can become successful, lifelong learners (Tobias, 1996).

Purpose of the Study

There are several theories of personality types that can be found to categorize individual styles. Howard Gardner’s Theory of Multiple Intelligences is one theory that claims “a pluralistic view of mind, recognizing many different and discrete facets of cognition, acknowledging that people have different cognitive strengths and
contrasting cognitive styles” (Gardner, 1993, p.6). Gardner defines intelligence as “the ability to solve problems, or to fashion products, that are valued in one or more cultural or community settings” (1993, p.7). Gardner has developed his theory, describing eight intelligence types and two profiles, which each individual possesses to varying degrees. His theory states that these intelligence types do not work independently, but collaboratively, to create each individual’s learning style (Gardner & Moran, 2006). This study investigated how project-based learning affected student’s understanding of concepts, incorporating aspects of varied learning styles within the project-based learning lesson. Project-based learning incorporates real-life scenarios in a collaborative learning environment. By constructing solid problem-based learning scenarios, this method of instruction can validate and support all of the intelligence types as described in Gardner’s Theory of Multiple Intelligences. In their research, Chen and McGrath have found that “at-risk students became active learners willing to engage in cognitively challenging tasks when presented with a PBL opportunity” (p.54). They also state that “PBL offers positive effects in cognitive, metacognitive, affective, and social domains” (p.54). Students who learn using project-based techniques, process knowledge in a deeper and more mindful manner. They move from simple knowledge delivery to complex knowledge transforming (Chen & McGrath, 2004). Project-based learning offers many educational opportunities for students such as:

- Multiple solution approaches with multifaceted products
- A social experience using small group work
Effective communication and teamwork skills

Activities that can be solved at different levels of sophistication

Activities that promote problem posing as well as problem solving, due to questions evoked throughout the process

(English, Fox, Watters, 2005, p. 156)

By using project-based learning in the curriculum, teachers are providing rich learning experiences that help their students develop the necessary “abilities to function effectively in a world that is demanding more flexible, creative, and future-oriented thinkers and problem-solvers” (English, Fox, & Watters, 2005, p.156).

Project-based learning goes beyond hands-on learning by including six necessary elements:

1. **A driving question** – Also known as “A big question,” which guides the project by creating a curiosity and need to know, and keeps the students working toward their goal.

2. **Student construction of an artifact or consequential task** – By students constructing something that can be seen by everyone, their thinking and what they understand is made visible. This enables the teacher and classmates to discuss and provide feedback, which enables the student to fix or readjust any misconceptions or gaps in their thinking.

3. **Student collaborative research over an extended period of time** – Students contribute various skills and talents that help each other learn. This
encourages a sense of responsibility, promotes teamwork, improves the quality of the projects, and provides support to students.

4. Community of inquiry – Students working collaboratively to pursue questions of interest such as interviewing experts, searching the Internet and library, collecting data, and making observations.

5. Presentation to an audience – The experience of a real audience has an enormous impact on student work. The idea of presenting their work to people besides their teacher causes them to work harder and produce higher quality work. In addition, the concept of having to answer questions about their work helps motivate them to fully understand their project. Students make a greater effort to perfect their final product.

6. Use of technology tools for cognition and communication – Students learn how to use real-life, authentic tools to design, plan, research, and manage their product

(McGrath, 2005).

Project-Based Learning and the 21st Century Student

When discussing the aspects of project-based learning, it is essential to include the importance of implementing technology. According to a 2003 report by the North Central Regional Educational Laboratory (NCREL), there are four important sets of skills that are essential for today’s students:

1. Digital-age literacy (science, economic, technological, visual, information, and multicultural/global literacies)
2. Effective communication (collaboration, interpersonal skills, personal and civic responsibility, interactive communication)

3. Inventive thinking (dealing with complexity, flexibility, self-direction, curiosity, creativity, higher-order thinking)

4. High productivity (planning, prioritizing, managing for results, use of authentic tools, production of high-quality products)

(McGrath, 2005)

When using technology in the classroom, students are more likely to build on their technical skills and experiences when their existing knowledge is made to be a key component in the learning process. In this regard, it is essential to link technology focused knowledge to the student’s needs and interests, rather than teaching technological skills in isolation from curricular or instructional objectives (ChanLin, 2008).

Summary

This study examines how project-based learning contributes to meeting the needs of students with varied learning styles, as identified in Gardner’s eight intelligence types. In addition, an evaluative survey was conducted to show a sample of the familiarity of PBL amongst a population of K-8 instructors. Studies show that students who are involved in their learning, or learn by doing, have a superior long-term recall in comparison to information learned through direct instruction and memorization, since they learned the information in greater depth (Piece & Jones, 2000). Project-based learning creates learning opportunities for students to
individualize their own instruction as they follow leads that sometimes direct them to new and exciting areas and to further explore concepts within their personal interests (Sterling, 2007). One of the greatest results from project-based learning is the production of new knowledge derived from the students’ own investigations and exploration. In addition, teachers also experience the benefits from the teacher-learner interaction and come to appreciate the students’ learning and construction process (ChanLin, 2008).
Definition of Terms

*Project-based learning.* Students, work collaboratively, research realistic problems, conduct hands-on activities to learn more, incorporate new information on the topic, and make informed recommendations for solving the problem, or answering the question, based on their findings.

*Direct instruction.* An instructional method that is focused on systematic curriculum design and skillful implementation of a prescribed behavioral script.

*Intelligence.* The ability to solve problems, or to fashion products, that are valued in one or more cultural or community settings.

*At-risk students.* Students who have not met grade level standards and need remedial instruction or interventions.

*Classroom Management.* A teacher’s strategies and techniques for managing the behavior of students to ensure lessons run smoothly.

*Skilled Educator.* Teachers found to consistently increase student achievement and motivation regardless of student background or ability level.
CHAPTER TWO

REVIEW OF LITERATURE

*Education is a social process. Education is growth. Education is, not a preparation for life; education is life itself.*

*John Dewey*

**Introduction**

The goal for teachers, administrators, parents and students in school is academic success. Success can be measured by observing students actively engaged in the learning process, and understanding the concepts they are investigating. This objective can be achieved by incorporating project-based learning (PBL) into the curriculum. Project-based learning meets the needs encountered by varied learning styles as described by Howard Gardner’s Theory of Multiple Intelligences. The use of project-based learning in the curriculum encompasses every area of curriculum, and provides opportunities for every child to feel successful regardless of ability level. By using project-based learning, teachers, parents, students, principals, local businesses and the community can all take part in the schooling process and create a community of learners (Teele, 1995).

When asking how project-based learning contributes to meeting the needs of students with varied learning styles, it is important to look to research to explore the background of these topics. This chapter discusses literature concerning what project-based learning is and its origins, the history and definitions of the Theory of
Multiple Intelligences, traditional methodology in education, obstacles found in implementing PBL, and criticisms of the Theory of Multiple Intelligences.

*Origins of Project-based Learning*

The model of educating using scenarios of real life events, originated from educator John Dewey in the early 1900's. “Dewey addressed both content and context by envisioning a type of schooling where real-world activities form the setting for meaningful learning” (Hutchinson, 2002, p.3). He believed that teachers should teach by appealing to students’ natural instincts to investigate and create (Delisle, 1997). This concept was later refined during the mid 1960's by Howard Barron, considered by many educators as the “father of PBL in the United States” (Pierce & Jones, 2000, p.76). Barron, a physician and medical professor at McMaster University in Ontario, Canada, set out to develop methods to instruct physicians in training, moving beyond traditional case studies to develop a solid “clinical reasoning process.” Barron was also instrumental in helping PBL make the transition from its use in medical schools to the first high school in Alabama. He is a pioneer in the development of PBL, and because of his efforts, project-based learning is presently used in more than 60 medical schools worldwide, including schools of dentistry, pharmacy, optometry and nursing, as well as high schools, middle schools and elementary schools (Delisle, 1997).

*Definition and Philosophy of Project-based Learning*

Project-based learning, also referred to as problem-based learning, has been described in the following statement by Lambros (2002):
A method based on the principle of using problems as the starting point for the acquisition of new knowledge. Pivotal to its effectiveness is the use of problems that create learning through both new experience and the reinforcement of existing knowledge. Situations that are in the learner’s real world are presented as problems and stimulate the need to seek out new information and synthesize it in the context of the problem scenario. (pp.1-2)

It is important to remember when planning for a project-based lesson that each learner has their own unique frame of reference, whether based on age, location of residence, or socio-economic factors. These factors should be taken into account and used in the creation of the lesson. By respecting each student’s individual differences and allowing the learners to determine their own learning needs or issues, the student-centered element of PBL is created (Lambros, 2002).

The process of creating a project-based lesson can be summarized as follows:

1. The problem is encountered first in the learning sequence, before any preparation or study has occurred.
2. The problem situation is presented to the student in the same way it would be presented in reality.
3. The student works with the problem in a way that permits him to reason, apply knowledge, to be challenged and evaluated at an appropriate level of learning.
4. Needed areas of learning are identified in the process of work with the problem used as a guide for individualized study.
5. The skills and knowledge acquired by this study are applied back to the problem, to evaluate the effectiveness of learning and to reinforce learning.

6. The learning that has occurred in work with the problem and in individualized study is summarized and integrated into the student’s existing knowledge and skills. (Barrows & Tamblyn, 1980, pp.191-192)

*The PBL Continuum*

Since the conception of John Dewey’s theory to promote education through teamwork and problem solving, educators have worked to incorporate these ideas to varying degrees. Cognitively challenging project-based learning seeks to meet both criteria of increasing student involvement, persistence, and motivation while meeting the needs of using higher order thinking (Chen & McGrath, 2005). On one end of the continuum is high PBL in which, “students define and research their own problems, usually collaboratively with a teacher or other practicing professional” (Pierce & Jones, 2000, p. 78). The other end of the continuum describes the level of contextualization, meaning the degree to which the “students experience the context of learning in the real world” (Piece & Jones, 2000, p. 79). Using PBL, “the classroom is transformed into a different kind of setting, one that transports students to a new environment for learning” (Hutchinson, 2002, p.2). The levels in which highly contextualized PBL are used can be summarized in a quadrant, reflecting four types of learning approaches. Levels of PBL and contextualization used in activities
are defined in Table 1. Descriptions with examples of each level of PBL and contextualization are shown in Table 2.

Table 1. Types of Learning Approaches

<table>
<thead>
<tr>
<th>Quadrant A</th>
<th>Quadrant B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High PBL/High Contextualization</strong></td>
<td><strong>High PBL/Low Contextualization</strong></td>
</tr>
<tr>
<td>Activities and approaches represent rich implementation of problem-based learning and contextualized learning.</td>
<td>Activities that meet the requirements of problem-based learning, but have few elements of contextualization.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quadrant C</th>
<th>Quadrant D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low PBL/High Contextualization</strong></td>
<td><strong>Low PBL/Low Contextualization</strong></td>
</tr>
<tr>
<td>Activities that have few elements of problem-based learning but strong in contextualized learning.</td>
<td>Activities that have few elements of problem-based learning and contextualization.</td>
</tr>
</tbody>
</table>

(Adapted from Piece & Jones, 2000)

Table 2. Characteristics Activities and Learning Approaches

<table>
<thead>
<tr>
<th>Quadrant A: Hi-PBL/Hi-Contextualization</th>
<th>Quadrant B: Hi-PBL/Lo-Contextualization</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ Projects involve students, teachers, and practicing professionals or community members as co-investigators, co-developers, and co-learners.</td>
<td>♦ Projects involve the experience of authentic work conditions and use of tools, without the richness of the thinking process involved in Quadrant A.</td>
</tr>
<tr>
<td>♦ Focus is on questions or problems relating to real-world issues.</td>
<td>♦ Learning opportunities involve some degree of role playing, such as in cases or simulations, which are well-structured situations presented by an instructor either before or after the students have been supplied the essential information and artifacts.</td>
</tr>
<tr>
<td>♦ Students understand the context in which the problems or issues take place and have opportunities to find solutions based on their background knowledge and experiences.</td>
<td>♦ Students engage in a process drama method of instruction, in which the students complete a production of a play or other piece of literature. The focus is on understanding the subtext, setting, use of music, art, and any...</td>
</tr>
</tbody>
</table>
**Quadrant A: (cont.)**  
Hi-PBL/Hi-Contextualization  
- Manipulation of real data and research.  
- Opportunities are provided for students to explore authentic work conditions and tools, either actual or virtual site visits.  
- Assessments are ongoing and designed to be constructive throughout project as well as final presentation to parents, peers, and professionals.  
- Debriefing which involves the whole class understanding what was learned by the various groups or diverse individuals, including the research, technology, and collaborative learning amongst each other and with the professionals.

**Quadrant C:**  
Lo-PBL/Hi-Contextualization  
- Learning approaches that are highly contextualized, taking place in a workplace, community or family setting, but contain few elements of PBL.  
- Examples include field trips or shadowing an adult role model at work.  
- Learning the procedures of a professional, in isolation of the process of projects.  
- Use of activity simulation kits for conducting mini-investigations.

**Quadrant B: (cont.)**  
Hi-PBL/Lo-Contextualization  
- other sociocultural factors present. Teachers and students research key elements of the play.  
- Project-based learning, designed by teachers, incorporating information from multiple subjects, elements of technology, and contextual learning, but set to artificial problem-solving without taking advantage of the many opportunities students have to solve problems in real-world contexts.

**Quadrant D:**  
Lo-PBL/Lo Contextualization  
- Teacher-led, structured group discussions of real-world problems, provided by the textbook. Includes “hands-on” activities presented in textbooks, and on internet websites. These activities are taught as ends in themselves, rather than part of an effort to understand real world scenarios and/or recreate the role of the professional.  
- Thematic, teacher-led projects in which students do research on a general theme, engage in traditional research activities, and post their findings on the Web or make a class presentation.

(Adapted from Piece & Jones, 2000)

*History of Theory of Multiple Intelligences*

Shortly after the explosion of Darwin’s theory of evolution, the question of the development of intelligence was a leading topic in research. From the late 18th
century and into the mid 20th century, many of the most renowned and influential psychologists became interested in the nature of human intelligence (Gardner & Hatch, 1989). The theory of intelligence measurement had become a central idea in psychology and remained so until the late 1970's when a reawakening of an interest in aspects of intelligence emerged. This time the focus turned into information-processing aspects of intelligence and how this was related to psychological tests (Gardner, 1983).

In his research, which has combined the empirical findings of hundreds of studies from a variety of disciplines, Howard Gardner has constructed a theory which he terms "The Theory of Multiple Intelligences." The basis of this theory validates the unique personality traits of individuals, and provides the opportunity to recognize and develop various areas of learning styles that may otherwise be unrecognized in a traditional method of teaching. Gardner defines an intelligence as a "biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture" (Gardner & Moran, 2006). Gardner's theory, originally introduced in his book, Frames of Mind, published in 1983, has evolved to cite 8 possible intelligences, each oriented to a specific type of information: linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, naturalistic, interpersonal, and intrapersonal. Further modifications resulted in the addition of two intelligence profiles: searchlight and laserlike. Gardner believes that each intelligence is relatively independent, yet interacts with each other. This provides a better understanding of the variety and scope of human
cognition, as well as the "incongruities and imbalances of intelligent behavior, not only between individuals, but within individuals" (Gardner & Moran, 2006, p.228).

**Intelligence Types and Intelligence Profiles Defined**

**Linguistic.** The linguistic intelligence type is described as a "sensitivity to sounds, rhythms, and meanings of words; a sensitivity to the different functions of language" (Morgan, 1996, p.264). Linguistic students have highly developed auditory skills, enjoy reading, writing, word games, and have a good memory for names, dates and places. They have well developed vocabularies and use language fluently. They are often able to spell words easily and accurately using phonetics (Teele, 1995). A linguistic type of individual is adept at all components of language including phonology, syntax, semantics, and pragmatics. Individuals with linguistic strengths have an acute sensitivity to sounds of language, adept at manipulating the structure of language, have a deep appreciation for the meaning of words, and have the capacity to use language to achieve practical goals (Armstrong, 1993). The linguistic intelligence is most likely the most universal of the eight intelligences and in our culture ranks among the most highly regarded (Armstrong, 1993).

**Logical-mathematical.** The logical-mathematical intelligence type is described as having a "sensitivity to, and capacity to discern, logical or numerical patterns; and the ability to handle long chains of reasoning" (Morgan, 1996, p. 264). Logical-mathematical individuals enjoy exploring patterns and relationships and perform activities in a sequential order. They often like mathematics, enjoy problem solving and reason logically and clearly. In their problem solving strategies, they often
perform experiments to test concepts they do not fully understand (Teele, 1995). This is the second of two intelligences highly regarded in education in our culture (Armstrong, 1993).

*Spatial.* The spatial intelligence type is described as a person having the “capacities to perceive the visual-spatial world accurately and to perform transformations on one’s initial perceptions” (Morgan, 1996, p. 264). Spatial students think in images and pictures and enjoy art activities. They are proficient in tasks such as reading maps, charts, and diagrams, with the ability to visualize images when thinking about things. These types of individuals often need to see pictures of objects or information before being able to comprehend meanings (Teele, 1995).

*Musical.* The musical intelligence type is described as the “ability to produce and appreciate rhythm, pitch, and timbre; the appreciation of the forms of musical expressiveness” (Morgan, 1996, p. 264). Individuals with a musical strength prefer working and studying while listening to music and often sing to themselves. Students who are musically inclined can be aided in learning processes by clapping their hands, snapping their fingers, chanting words, or moving rhythmically in relation to information being taught (Teele, 1995). Through this process, students are better able to retain and apply knowledge, and it has been shown to be beneficial to all students, particularly musically inclined individuals (Armstrong, 1993).

*Bodily-kinesthetic.* The bodily-kinesthetic intelligence type is described as “the ability to control one’s body movements with expertise and to handle objects skillfully” (Armstrong, 1993, p. 78). Bodily-kinesthetic individuals process
knowledge best through their bodily sensations and movements and use their bodies
in skilled ways. Students with this type of intelligence strength tend to act things out,
and function best in classrooms that provide physical activities and hands-on learning
experiences (Teele, 1995). Physical skills involved in the bodily-kinesthetic area
include competence in strength, endurance, flexibility, balance, dexterity,
expressiveness, coordination, and reflexes (Armstrong, 1993).

*Intrapersonal.* The intrapersonal intelligence type is described as the “access
to one’s own feelings and the ability to discriminate among them and draw upon them
to guide behavior; the knowledge of one’s own strengths, weaknesses, desires, and
intelligences” (Morgan, 1996, p. 264). Intrapersonal individuals prefer their own
inner world. They enjoy being alone and have a deep sense of self confidence. These
individuals are self-motivated and prefer working independently. Other qualities
include being autonomous and strong-willed, often with firm opinions (Teele, 1995).

*Interpersonal.* The interpersonal intelligence type is described as an individual
possessing the ability to make fine distinctions in the intentions, motivations, moods,
feelings, and thoughts of other people” (Armstrong, 1993, p. 110). Interpersonal
people enjoy being social, having many friends, and participating in many activities.
They learn best in cooperative and collaborative environments (Teele, 1995).

*Naturalist.* The most recently defined intelligence, not of the original seven, is
the naturalist intelligence. The naturalist intelligence “processes information related
to distinguishing among natural and manmade objects...” (Gardner & Moran, 2006,
p. 229). Individuals with a naturalist intelligence type enjoy being outside and notice
patterns and rhythms in nature. They have a strong sense what is fair and think through the impact of one’s actions in relation to others (Learning Styles Activity).

**Searchlight and Laserlike Profiles**

Searchlight and laserlike are intelligence profiles which “describe the strength of intelligences relative to each other” (Gardner & Moran, 2006, p. 228). Searchlight profiles involve an ability to quickly shift among intelligences that are of comparable strength. Laserlike profiles demonstrate the dominance of one or two intelligences used in great depth that overshadow the other intelligences (Gardner & Moran, 2006).

**Traditional Methodology in Education**

The traditional methodology of education and assessment has long been an area of speculation for its effectiveness. In almost any elementary or middle school what an observer is likely to see, is the scenario in which the students are exiting the classrooms with an abundant amount of energy, as the teachers are left fatigued from a full day of direct instruction and classroom management. With many traditional teaching styles, the teacher is doing a disproportionate amount of the work, in relation to the students who are often passive, waiting for direction, or an opportunity for permission to respond (Lambros, 2002). The primary approach to instruction in most schools is driven by textbooks and other prepared instructional materials. These materials lead students through a set of skills that focus on memorization of factual information, paper and pencil tests, with the expectation that the teacher is the provider of that information (Pierce and Jones, 2000). Alfred Whitehead, English mathematician and philosopher, “used the term ‘inert learning’ to describe a situation
in which students memorize definitions of concepts without having the opportunity to apply those concepts in real world settings” (Hutchinson, 2002, p. 3). Critics of the current educational system claim that schools generally focus on only two cognitive aspects, linguistic and logical-mathematical, which often alienate students who excel in other areas. Most definitions of intelligence focus on the capacities that are important for success in school, and those strengths that are easily measurable by standardized testing methods. Currently, academic success is recognized as the ability to answer items on tests of intelligence. Tasks featured in I.Q. tests are remote from every day life and are often unrelated to each other. Intelligence tests reveal little about a person’s potential for future growth (Gardner, 1983). In contrast, the use of problem-based learning, with an emphasis on incorporating the intelligence types as described in Gardner’s theory, will lead to an intelligence-fair and individual-focused method of instruction. This will “require an interdisciplinary perspective, cultural sensitivity, and an interactionist-dynamic” approach to education (Gardner & Moran, 2006).

Benefits of Multiple Intelligences for Exceptional Students

It is estimated that many students are placed unnecessarily in remedial instruction programs or classrooms for students with learning disabilities (LD), only because school administrators have not been able to identify and make use of those students’ talents that do not follow the traditional models of intelligence. This is due to the overemphasis of assessment by means of standardized exams such as the Stanford-Binet I.Q. test. The current manner of instruction for those students who do
have a learning disability remains oriented toward finding and curing deficits, rather than reinforcing talents and strengths. To date, this process has been unsuccessful. In examining students with learning disabilities, researchers have used a variety of tests to analyze six types of motivational and cognitive predictor variables: productiveness for academic tasks, creative potential, interests, disruptive behavior, self-concept, and attribution for academic success or failure. The results showed that students with high/ability learning disabilities performed higher than other groups at tasks which involved problem solving and abstract thinking. They had also been observed to be creative, motivated, and productive in completing tasks in which they found challenging and of their own interests (Hearne & Stone, 1995).

Interestingly, most of the information which is written regarding talents and strengths of students with learning disabilities is found in journals for the study of gifted children. Critics of the belief that students with learning disabilities could be considered gifted in some areas, reflects the traditional ideology measures of intelligence (Hearne & Stone, 1995). In a survey sent to 444 directors of gifted and talented programs throughout Texas, comments were returned stating, “LD children cannot be in a gifted program and students with high aptitude are not LD” (Hearne & Stone, 1995, p. 440). These misconceptions are due in large part to a lack of knowledge and direct experience in working with those students labeled as having learning disabilities. It is a common belief of special educators that many students labeled as having learning disabilities are of average or above average intelligence, and that there are large discrepancies between their school achievement and their
intelligence. There has been additional research recently, in the field of learning
disabilities, focusing on creativity and nontraditional strengths and talents, which had
previously been undervalued by schools (Hearne & Stone, 1995).

The Theory of Multiple Intelligences, as a method of instruction, is also
important for identifying talents in ethnically diverse, low income students, and those
students identified as “at-risk.” Gardner’s theory respects diversity and strives to
educate students, respecting and incorporating their cultural practices. Because of
this, children from ethnically and socially diverse populations are offered greater
opportunities based on their unique intelligences. Currently segregated populations
of schools are dictated specific curricula. Groupings for this instruction exist
primarily as functions of time, economics, and students’ ability in traditional
intelligence measurements (i.e. verbal and mathematical), rather than strengths,
talents, or interests (Hearne & Stone, 1995; Plucker, Callahan, & Tomchin, 1996).

Criticisms of the Theory of Multiple Intelligences

However positive the theory of multiple intelligences may be, and its potential
benefits in education, it is not without criticism. Critics state that Gardner’s theory is
not one in which he has introduced distinct units of cognition, but rather his theory is
a restructuring of what has previously been referred to as “cognitive style” (Morgan,
1996). This theory states that human development follows a biological course which
is systematic and dependent upon earlier stages; influenced more by internal structure
than environmental experiences. This viewpoint is not unique, but what are original
are Gardner’s efforts in implementing this theory to reform traditional and often discriminatory methods of teaching and opinions of learning.

Lynn Waterhouse, a child behavior researcher at the College of New Jersey, feels that Gardner’s theory lacks empirical evidence, and claims that “there are no publications from cognitive psychologists, cognitive neuroscientists, or evolutionary psychologists to suggest that they have conducted research directed at defining or validating Gardner’s intelligences” (Waterhouse, 2006, p. 210). Waterhouse defends research findings that support the theory of a unitary general intelligence known as the “g” theory. This theory states that general intelligence is reflective of overall brain efficiency with an interconnection to working memory, and can be measured by IQ tests. Gardner refutes these claims, stating that he has based his theory “entirely from empirical findings,” and feels that Waterhouse misrepresents science by viewing research as only possible through experiments in a laboratory. Gardner believes that “science progresses not only through experimentation but also by synthesizing the experimental, observational, and theoretical work of others to build a foundation for future research” (Gardner & Moran, 2006, p. 229).

Contrary to the assessment methods commonly used in today’s classrooms, Gardner’s Theory of Multiple Intelligences does not easily conform to paper and pencil assessments. “Rather, it is repeatedly assessed and reformulated as new empirical findings from a variety of disciplines are analyzed and integrated” (Gardner and Moran, 2006, p. 230). A theory, such as that of multiple intelligences develops,
through the continuing accumulation of evidence which constantly tests its plausibility, relevance and usefulness (Gardner & Moran, 2006).

**Obstacles of Project-Based Learning**

The induction of project-based learning as an instructional method does not come without its share of obstacles. First, teachers are concerned with the need to guarantee that required content from state standards are covered in the curriculum. Because project-based learning is student-centered and there is often no one correct answer, one solution may be to structure the first half of the semester in a traditional method of instruction and let the students create curricula, that meets the criteria of a class created rubric, for the second half of the semester (Pierce & Jones, 2000). In addition, a well planned project-based lesson includes key terms for all students to understand, and uses these key terms within the scenario of the lesson.

Another concern regarding the use of PBL may be the time and commitment needed for planning and performing the lesson. Effective project-based learning does take effort and a dedication to the philosophy from the faculty. This is a collaborative effort, not only from the students performing the lessons, but the teachers who plan the lessons. It is important that like-minded instructors band together, so they do not feel as if their efforts are not appreciated by administration that may put a greater emphasis on traditional teaching methods (Pierce & Jones, 2000).

Finally, there may be resistance from both faculty and students to a change in the curriculum. Administration, teachers, and students may need time to adjust to the
change in thinking, as well as time to develop PBL experiences (Pierce & Jones, 2000).

Summary

By incorporating project-based learning into the curriculum, teachers are validating the varied learning styles of each student in their classroom. Well planned project-based learning lessons, meet the needs of every student, and allow them to feel successful in school. Project-based learning creates a community of learners allowing each student to perform to their best ability and areas of strength. This method of collaborative learning, allows students to learn though exploration and from each other, rather than relying on the teacher to provide all of the information. Within the core of project-based learning is the assurance that lessons will fulfill the varied learning styles of students, as defined in Gardner’s Theory of Multiple Intelligences.
CHAPTER THREE

METHODOLOGY

The aim of education should be to teach us rather how to think, than what to
think--rather to improve our minds, so as to enable us to think for ourselves,
than to load the memory with thoughts of other men.

Bill Beattie

Overview

The purpose of this mixed-methods research study was to answer several
questions regarding the familiarity and use of project-based learning strategies in the
classroom. This study set out to determine how effective project-based learning is at
meeting the needs of students with varied learning styles, while implementing the
theory of multiple intelligences. Two determining factors in the implementation of
any teaching method is motivation by teachers and students, and academic success.
To analyze and measure these two factors, it was necessary to conduct a survey of the
teachers at the target school, as well as score the students participating in this study
on a rubric scale and written assessment, measuring their success with the projects
given and understanding of the curriculum material. The survey, provided to 31
teachers at the school, focused on their familiarity and attitude toward project-based
learning. Questions on this survey were designed to evaluate the familiarity and use
of project-based learning teaching methods and varied learning styles of the K-8
teachers at the test school. In addition, to accurately assess the success of PBL as a
teaching strategy, it was necessary to collect data and perform evaluative research,
published in the 2008/2009 school year, the population of the school totals 595, including a 6th grade class size of 67 students. The demographics of the school population consist of approximately 65% Caucasian, 25% Latino, 3% Asian, 2% African-American, with the remaining identified as Filipino, and Native American/Alaskan. In addition, 20% of the students are considered socio-economically disadvantaged, 12% English Language learners, and 7% students with disabilities. The average class size for the 6th grade is 31 students. All teachers at the school are fully credentialed.

Procedure – Teacher Survey

For the qualitative research portion of this study, the first step was to analyze the responses to the surveys provided by the teachers (see Appendix B). The purpose of the survey was to assess the teacher’s familiarity with and use of project-based learning as a teaching method, and strategies of differentiated instruction based on students’ varied learning styles.

Procedure – PBL Lesson and Direct Instruction

During the 2008-2009 school year, the school studied serviced 67 sixth grade students. These students were divided into 2 groups, taught by the same teacher. For the purpose of this research, the two groups are referred to as Group A and Group B. Because the researcher was not currently teaching in a classroom during the time this study was conducted, all of the lessons cited in this research were implemented by the regular classroom teacher.
This study consisted of creating two Webquests, relating to two units from the regular classroom social studies text. The purpose of creating the Webquests was to provide an opportunity for the students to participate in a project-based learning lesson that had a structure that could be followed by the classroom teacher, while still allowing the students to research the intended material independently. A Webquest, as defined by Bernie Dodge, is “an inquiry-oriented activity in which some or all of the information that students interact with comes from resources on the Internet (http://webquest.org/index.php). The building blocks of a Webquest are: Introduction, Task, Process, Resources, Evaluation, and Conclusion. In addition, by following the classroom curriculum, this allowed for comparisons of the students’ understanding of the material, studied by both groups taught using PBL and direct instruction. Both groups studied the units at the same time, over a comparable period of time. To ensure equity within the groups and the study, this procedure was repeated by the opposing groups using a different unit of study.

Procedure of Lessons

To begin, the Ancient Americas unit was taught to both groups. Group A completed the lesson using the project-based learning method of instruction via the Webquest, and Group B was taught using the direct instruction method. Appendix C outlines the procedures followed for this lesson. The length of these lessons spanned approximately three weeks including assessments.

At the conclusion of the lesson unit, assessments provided within the curriculum were completed by both groups. In addition, a rubric was completed for
Group A, the PBL group, grading the students on various aspects of their presentations and final projects created.

To maintain equity amongst the students, and reduce the possibility of skewed data resulting from differing academic ability, an additional Webquest on Ancient Greece was created by the researcher for Group B (see Appendix D). For this unit, Group B completed the unit using the problem-based learning method of instruction, while Group A was taught by direct instruction. Procedures, facilitation, and assessments were duplicated for this unit. Data from the assessment results are described in the Findings section, Chapter 4.

Analysis of Data

Post-tests following both problem-based learning projects and direct instruction lessons were graded and compared. Criteria for comprehension included the curriculum based assessment provided with the Discovering Our Past: Ancient Civilizations classroom curriculum.

Summary

The purpose of this mixed-methods study was to gather data using surveys and lessons taught, as to the familiarity with and effectiveness of using project-based learning as a means of instruction to best meet the needs of students with varied learning styles. The study, performed at one K-8 school in a rural area in San Diego County, consisted of a teacher survey, and four lessons taught using both a project-based learning method of instruction as well as direct instruction. The two units were taught to the 6th grade classes, which were identified as Group A and Group B. To
assess the students’ understanding of the material presented and investigated, curriculum assessments were administered to both groups after each group was taught in the respective manner of instruction.
CHAPTER FOUR

RESULTS

The whole art of teaching is only the art of awakening the natural curiosity of young minds for the purpose of satisfying it afterwards.

Anatole France

Teacher Survey Results

The survey, sent out to 31 K-8 teachers at target school, consisted of seven questions relating to teaching experience, familiarity with project-based learning, and the accommodations of varied learning styles of students. Nine participants returned the surveys, ranging in teaching experience from 4 to over 40 years. Of the 9 participants, 4 teachers responded with an accurate understanding of project-based learning. Three of the four teachers with correct responses have been credentialed for 7 years or less. Of the remaining 5 respondents, all teachers have been credentialed 8 years or more. All teachers responded that direct instruction does not meet the needs of all students. Responses supporting the use of varied teaching methods ranged from stating that the teachers “were not allowed to vary the instruction to a great extent,” to others that discussed implementing interactive learning environments, such as digital devices. All teachers stated that they currently adapt the curriculum or teaching method to accommodate students with varied learning styles. Methods cited in response to this question ranged from grouping students, using multimedia within projects, and pacing of instruction.
Ancient Americas Lesson

The first lesson in this study related to the Ancient Americas. Two 6th grade
groups participated in these lessons, described as Group A and Group B. For this
lesson, Group A completed a Webquest created by the researcher
(http://sites.google.com/site/ancientamericanswebquest/Home), based on information
from Chapter 6 - Ancient Americas, in the Social Studies text, Discovering our Past:
Ancient Civilizations. Group B was taught the same information directly from the
text and supporting curricular materials by direct instruction. Direct instruction for
these lessons consisted of paired and guided reading, lecture and oral review after
reading, scaffolding with worksheets and individual practice work. The lessons for
both groups lasted approximately 12 days. Both groups were tested for
comprehension of the material using the curriculum assessment. In addition to this,
the Webquest group was assessed using a rubric based on the role the student played
according to the presentation of their project, and the quality of the project completed.

Test results for Group A (Webquest) and Group B (Direct Instruction) are
presented in Table 3.

Ancient Greece Lesson

To ensure equity amongst the two groups and minimize inconsistency in the
data results, the procedure was repeated using both methods of instruction, completed
by the opposing groups. For the Ancient Greece unit, Group B was instructed using a
Webquest created by the researcher (http://sites.google.com/site/greekcivilization),
and Group A was taught by direct instruction. The methods of assessment were also
duplicated, using the curriculum test for both groups and additional rubrics for the Webquest group.

Curriculum test results for Group B (Webquest) and Group A (Direct Instruction) are presented in Table 4.

Table 3. Group A and Group B Curriculum Test Results for Ancient Americas Lesson

<table>
<thead>
<tr>
<th>Method of Instruction</th>
<th>Group A: Webquest</th>
<th>Group B: Direct Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>90</td>
<td>92</td>
</tr>
<tr>
<td>Quartile 1</td>
<td>83</td>
<td>81</td>
</tr>
<tr>
<td>Minimum Grade</td>
<td>68</td>
<td>64</td>
</tr>
<tr>
<td>Maximum Grade</td>
<td>97</td>
<td>100</td>
</tr>
<tr>
<td>Quartile 3</td>
<td>92</td>
<td>92</td>
</tr>
</tbody>
</table>

Table 4. Group A and Group B Curriculum Test Results for Ancient Greece Lesson

<table>
<thead>
<tr>
<th>Method of Instruction</th>
<th>Group B: Webquest</th>
<th>Group A: Direct Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>92</td>
<td>92</td>
</tr>
<tr>
<td>Quartile 1</td>
<td>86</td>
<td>82</td>
</tr>
<tr>
<td>Minimum Grade</td>
<td>70</td>
<td>62</td>
</tr>
<tr>
<td>Maximum Grade</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Quartile 3</td>
<td>94</td>
<td>97</td>
</tr>
</tbody>
</table>

The box and whiskers diagram shown in Figure 1 displays the results for both groups and all units as follows.
In analyzing this diagram, the smaller the box and the closer to the top end of the vertical line (whisker), the better the test results for the overall class. A large box equates to a larger range of scores. Half of the class scores fit in the box. The top of the whisker represents the top quartile of the results, and the bottom whisker represents the bottom quartile of results. The star represents the median.

In comparing the results from both groups and all lessons, the test results are all within 4 percentage points of each other, with the exception of an 8% differential of the minimum scores for the Ancient Greece lesson.

Although the test results for both groups in all lessons were consistent with each other, the authentic assessment of role play and project completion could only be
done for the Webquest lessons. Rubrics for the Webquests were completed by
students to practice self and peer critique. Each student was also assessed by the
teacher using the same rubric assessment. Any discrepancy between student and
teacher scoring was discussed.

Overall Curriculum Test Results

Overall test results show a slightly higher curriculum test average for the
direct instruction lessons in relation to the Webquest lessons. Overall average test
results are shown in Table 5.

Table 5. Overall Test Results for the Ancient Americas and Greece Lessons

<table>
<thead>
<tr>
<th></th>
<th>Ancient Americas</th>
<th>Ancient Greece</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>86.2 (Grp. A – WQ)</td>
<td>88.2 (Grp. B – WQ)</td>
</tr>
<tr>
<td>Overall</td>
<td>84.2 (Group A)</td>
<td>88.6 (Grp. A – DI)</td>
</tr>
</tbody>
</table>

Rubric Assessment Results

In addition to the curriculum assessments, the Webquest groups were
evaluated on presentation and project content using rubrics. All rubrics used were
scored on a scale of 1, being the lowest, to 4, being the highest. Complete rubrics for
all roles for both lessons can be found in Ancient America Webquest (Appendix C)
and Ancient Greece Webquest (Appendix D). Assessment results for the Ancient
Americas Webquest are presented in Table 6. Assessment results for the Ancient
Greece Webquest are presented in Table 7.
Table 6. Ancient Americas Webquest Rubric Assessment Results

<table>
<thead>
<tr>
<th>Category</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparedness</td>
<td>55%</td>
<td>41%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Speaks Clearly</td>
<td>78%</td>
<td>22%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Stays on Topic</td>
<td>89%</td>
<td>11%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Oral Presentation Content</td>
<td>88%</td>
<td>8%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Posture and Eye Contact (Oral Presentation)</td>
<td>7%</td>
<td>78%</td>
<td>15%</td>
<td>0%</td>
</tr>
<tr>
<td>Comprehension of Material</td>
<td>87.5%</td>
<td>12.5%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Quality of Project</td>
<td>72%</td>
<td>27%</td>
<td>1%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 7. Ancient Greece Webquest Rubric Assessment Results

<table>
<thead>
<tr>
<th>Category</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philosopher – Oral Presentation</td>
<td>65%</td>
<td>10%</td>
<td>15%</td>
<td>10%</td>
</tr>
<tr>
<td>Philosopher – Project</td>
<td>30%</td>
<td>30%</td>
<td>25%</td>
<td>15%</td>
</tr>
<tr>
<td>Scientist/Mathematician – Oral Presentation</td>
<td>40%</td>
<td>30%</td>
<td>30%</td>
<td>0%</td>
</tr>
<tr>
<td>Scientist/Mathematician – Project</td>
<td>20%</td>
<td>30%</td>
<td>35%</td>
<td>15%</td>
</tr>
<tr>
<td>Historian – Oral Presentation</td>
<td>30%</td>
<td>52.5%</td>
<td>10%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Historian – Project</td>
<td>32.5%</td>
<td>45%</td>
<td>20%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Theater Producer – Oral Presentation</td>
<td>33%</td>
<td>63%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Theater Producer – Project</td>
<td>67%</td>
<td>33%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Architect – Oral Presentation</td>
<td>25%</td>
<td>40%</td>
<td>25%</td>
<td>10%</td>
</tr>
<tr>
<td>Architect – Project</td>
<td>35%</td>
<td>40%</td>
<td>25%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Summary of Learning Styles Met Through Project-Based Learning Webquests

With proper planning and execution, project-based learning lessons can improve student knowledge by enhancing individual learning styles. In this study,
Webquests were used for student investigation and learning. These Webquests were designed to support the eight learning styles, as described by Howard Gardner, in his Theory of Multiple Intelligences. Project-based learning lessons can be designed to support student’s strengths by working according to their dominant learning style or to help them improve in areas they may find as greater challenges.

The following activities created in the Webquests supported the seven original learning styles identified:

Ancient Americas Lesson

Linguistic: Oral presentation

Logical-Mathematical: Spreadsheet (Berengia Land Bridge)

Spatial: Map representation

Musical: Choice in method of oral presentation

Bodily-Kinesthetic: Role play

Intrapersonal: Reflection on how these civilizations affect society today and how their contributions impact our lives.

Interpersonal: Group collaboration

Ancient Greece Lesson

Linguistic: Oral presentation

Logical-Mathematical: Model creation

Spatial: Model creation

Map representation

Musical: Choice in method of oral presentation
Bodily-Kinesthetic: Role play

Intrapersonal: Reflection on how these civilizations affect society today and how their contributions impact our lives.

Interpersonal: Group collaboration

In addition to meeting individual learning styles, these lessons met curriculum standards in writing and reading requirements, and included practice and proficiency of technology skills.

Summary

There were minimal differences in the curriculum based test scores for Groups A and B in all lessons taught by Webquest and direct instruction. Overall, percentages for Group A were approximately 2.6% higher than Group B, when factoring in both the Webquest and direct instruction lessons. Differences in scores between the Webquest lesson and direct instruction lesson ranged from .7% for Group B to 2.4% for Group A. Overall, test results for both groups, in all lessons, showed a similar level of understanding of the material presented and investigated. Again, the primary difference in the evaluative results were due to the additional measures of authentic assessment based on role play/oral presentation and project completion by the Webquest groups. These additional areas of assessment supported students varied learning styles by evaluating them on presentation, project quality, as well as content comprehension and retention.
CHAPTER FIVE

DISCUSSION

Education is for improving the lives of others and for leaving your community
and world better than you found it.

Marian Wright Edelman

Overview

Although the curriculum test results show slightly higher scores for direct
instruction, this method of teaching does not account for the varied learning styles
each student possesses and works best at. In addition to curriculum chapter tests, the
Webquest project-based learning groups were able to have authentic assessments
completed on their understanding of the subject matter, using a rubric to evaluate
project completion and oral presentation on the subject matter. In addition, each
learning style was addressed in the roles students participated in through the
Webquest lessons. The project-based learning method of instruction can be meant to
follow the student’s natural strength, or help them to improve in areas that may be a
greater challenge for them.

Teacher Instruction and Support

The data I gathered through the teacher surveys revealed gaps in
understanding of what project-based learning is and how this method of instruction
can be used in the classroom. This result is especially evident by teachers who have
had their credential for over 7 years. Implementation of inservices and/or extended
learning courses should be conducted to support teachers’ awareness and be trained as
to how technology and student driven learning can be put into practice to enhance the curriculum, rather than viewed as a deviation from the curriculum.

Limitations of the Study

The limitations in this study should be viewed in two parts. First, regarding the survey provided to the teachers, it is possible that the number of teachers involved and responded in this study was not a large enough sample to make the study represent the overall population of teachers. The results of this survey can only represent the population of teachers with similar backgrounds, and experiences. Also, it is possible that teachers who did not respond to the survey may have an understanding of project-based learning and may use variances of this teaching style in their classroom. Reasons for the low response rate may have included confusion with the survey questions, unsure of how to answer the questions, or simply did not have the time or interest in participating.

With regard to the classroom instruction methods chosen, limitations that could have affected the outcome of data may have been that the study was conducted at only one school, between two groups of 6th grade students. In addition, the true essence of project-based learning may not have been met, as the circumstances of the researcher not implementing the lessons, called for a more structured method of PBL lesson than that defined in this study. Furthermore, the familiarity with PBL and teaching style of the classroom teacher may be different than that of the creator and researcher of this study. Finally, this may have been the first experience the students
had completing a Webquest, and their level of experience with this type of instruction may have affected this component of the study.

**Implications for Future Study**

The findings from the study imply that much change is needed in education in the form of shifting the teaching philosophy from a teacher-centered provider of information to a student-centered guide to information. Specifically, improved professional development in the areas of implementing technology into the curriculum and varied teaching strategies will positively impact student learning in the classroom, allowing students to utilize their interests in technology and personal learning styles in their understanding of classroom curriculum. Further research should be conducted on the impact of learning styles in the classroom and how various teaching methods affect students’ preferences in learning. With our rapidly changing society, technological devices should be considered aids in instruction for students. This change requires teachers to be aware of these instruments and have the willingness and ability to implement them as teaching tools.

**Summary**

The focus of this study was to examine the impact and effectiveness of project-based learning in comparison to direct instruction for student understanding of curricular material. This study was completed in two parts, consisting of a teacher survey and lessons created and taught using both project-based learning and direct instruction methods of teaching. Results of this study showed that although test results for both methods of instruction were consistent, additional areas of
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Appendix A

Letter to Participants
Dear Classroom Teacher,

**Invitation to Participate and Purpose of Research**

Diana Harris, researcher and graduate student at California State University, San Marcos is conducting a study, comparing the learning outcomes of students using two teaching methods, direct instruction and project-based learning. You are invited to participate in this study because you are a K-8 teacher at San Pasqual Union School. The objective for this portion of the study is to gather information from teachers regarding familiarity and implementation of varied teaching methods.

**Procedures/Activities**

You will be asked to complete a voluntary, anonymous seven question survey. The researcher will provide you with a pre-addressed envelope in which to return the survey, at no cost to you, via US postal mail.

**Risks and Inconveniences/Benefits**

There are minimal risks attached to this survey. Your survey responses will be kept confidential; available only to the researcher for analysis purposes. If the length of the survey or the time it takes to complete is inconvenient for you, you may terminate your survey participation at any time without any consequence.

Although there is no direct benefit to you for participating in this study, I feel your participation will likely benefit the teaching community in the near future.

**Safeguards, Confidentiality, and Voluntary Participation**

Surveys will be locked in a safe place. Only the researcher will have access to the information you give. The surveys will be shredded five years after commencing of the project.

Survey responses will not be linked to your name or address. You should know that the Cal State San Marcos Institutional Review Board (IRB) may inspect study records as part of its auditing program, but these reviews only focus on the researcher and the study, not on your responses or involvement. The IRB is a committee that review research studies to make sure that they are safe and that the rights of the participants are protected.

You do not have to participate in this study if you do not want to. If you agree to be in this study, but later change your mind, you may drop out. There are no penalties or consequences of any kind if you decide you do not want to participate.
Questions

If you have any questions about this study, I would be happy to answer them via email or phone. My email address is theharrisfamily6@cox.net and my telephone number is (760) 802-3738. If you have any questions about your rights as a research participant, you may contact our Institutional Review Board at (760) 750-4029.

Thank you for your time,
Diana Harris
Appendix B

Survey for K-8 Teachers

San Pasqual Union School
Survey for K-8 Teachers
San Pasqual Union School

1. How long have you been a credentialed teacher?

2. What grades have you previously taught and are currently teaching?

3. Are you familiar with project-based learning? If yes, what is your understanding of PBL?

4. Do you currently adapt your curriculum or teaching method to accommodate students with varied learning styles? If yes, how so?

5. Do you have a method which you use to formally assess and tabulate the predominant learning style(s) of your students? If yes, what is it?

6. Do you feel direct instruction and other traditional teaching methods meet the needs of all students? Why or why not?

7. Please list up to 3 challenges you have faced in trying to meet the learning needs of your students.

Please remember to return survey in the enclosed envelope via US mail to Diana Harris. Thank you!
Appendix C

Ancient Americas Webquest
Welcome to the Ancient Americans Webquest in which we will learn about the Olmec, Mayan, and Moche civilizations. Here we will focus on how the place we live in affects how we live.

**Introduction**

**Big Question:** In this Webquest we will focus on how physical geography plays a role in how civilizations develop and decline. The first people in the Americas arrived thousands of years ago. Farming led to the growth of civilizations in what is now Mexico, Central America, and Peru. Now let's enter the world of the ancient Americas and explore the causes for the rise and decline of these great civilizations. Now it is your turn to take on the role of Museum Curator, Cartographer, or Historian in this Webquest, to research and answer questions as to the rise and fall of these great ancient civilizations.

**Task**

Congratulations!

You have been selected to take part in the research of an ancient American civilization. Now it is your turn to take on the role of Museum Curator, Cartographer, or Historian, investigating one of three ancient civilizations, the Olmec, Mayan, or Moche. In this Webquest you will research various websites and answer questions as to the rise and fall of these great ancient civilizations. Your final project will display what you have uncovered.

Job duties and roles in this research are:

**Museum Curator** - Tells the life of the people through their interpretation of their art and statues. Presentation can be done by collage through poster representation, or Powerpoint presentation of ancient relics. All forms of presentation must be accompanied with a written description of the significance of the item.

**Cartographer** - Tells the life of the people, the significance of their geographic region, and its effect on their survival through the creation of a map. The map must contain information as to the present day names for the ancient civilizations. Maps must be accompanied with a written description of the significance of the area to their rise and fall as a civilization and how geography can effect the inhabitants.

**Historian** - Tells the life of the people through various factors of everyday life. Historians will focus on elements such as:
- Time period of civilization
- Impact of farming, trading etc.
- Daily life, social roles
- Religion
- Writing system
Process

Step 1:

Students will divide into three groups: The Olmec, The Maya, and the Moche.

As a group, you will decide who will take on the roles of Curator(s), Cartographer(s), and Historian(s).

Step 2:

Working with you partner(s), investigate the questions guiding your research for your job duty.

Step 3:

Keep a journal of your findings so that you can compare your notes with your partners and to provide the necessary information for your final project.

Step 4:

With your partner(s), create the final project task for your job description. Use your journal notes to gather and include any information supporting your findings.

Step 5:

Present your findings to the class using the materials created from the final project.

Step 6:

Using the data from the attachment below, create an Excel spreadsheet and line graph displaying the changes in land mass and sea level of the Beringia Land Bridge.

For your research, explore the following sites:

Olmec    Maya    Moche
Resources
Each civilization has their own area for research information.

Olmec:
Elements to include in your project and presentations include:
How did the Olmec people get their food and goods? Farming? Hunting-gathering?
Was impact did trading have on their survival?
Were there any crops or natural elements that impacted their survival (i.e. corn, obsidian etc)
What factors made the civilization strong?
What factors weakened their civilization and led to their collapse?
What was their location and where would that be based on our present day maps?
What years did the civilization exist? How long?
Did they war with other people?
Did they have a written language?
Did they practice a religion?
What was significant about Teotihuacan?
What does the term Mesoamerica mean?
Describe the significance of the Beringia Land Bridge. Which land masses were joined? How did the people travel it? What happened to the land bridge?
To find the answers to the questions predetermined websites were provided.

Maya:
Elements to include in your project and presentations include:
How did the Mayan people get their food and goods? Farming? Hunting-gathering?
Was impact did trading have on their survival?
Were there any crops or natural elements that impacted their survival (i.e. corn, obsidian etc)
What factors made the civilization strong?
What factors weakened their civilization and led to their collapse?
What was their location and where would that be based on our present day maps?
What years did the civilization exist? How long?
Did they war with other people?
Did they have a written language?
Did they practice a religion?
What was the significance of astronomy (stars) to this civilization?
Did they practice human sacrifice? Why?
Why was their calendar system important?
What are sinkholes? How did it help them?
Who was Jasaw Chan K'awiil I?
Why was their location in Peten important?
What does the term Mesoamerica mean?
Describe the significance of the Beringia Land Bridge. Which land masses were joined? How did the people travel it? What happened to the land bridge?
To find the answers to the questions, predetermined websites were provided.

Moche:
Elements to include in your project and presentations include:
How did the Moche people get their food and goods? Farming? Hunting-gathering?
Was impact did trading have on their survival?
Were there any crops or natural elements that impacted their survival (i.e. corn, obsidian etc)
What factors made the civilization strong?
What factors weakened their civilization and led to their collapse?
What was their location and where would that be based on our present day maps?
What years did the civilization exist? How long?
Did they war with other people?
Did they have a written language?
Did they practice a religion?
What does the term Mesoamerica mean?
Describe the significance of the Beringia Land Bridge. Which land masses were joined? How did the people travel it? What happened to the land bridge?
To find the answers to the questions predetermined websites were provided.

**Evaluation**
The following rubrics were provided to evaluate each student's participation according to the role completed and overall participation.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
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</thead>
<tbody>
<tr>
<td>Title</td>
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</tr>
<tr>
<td>Title tells the purpose/content of the map, is clearly distinguishable as the title (e.g. larger letters, underlined, etc), and is printed at the top of the map.</td>
<td></td>
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</tr>
<tr>
<td>Title tells the purpose/content of the map and is printed at the top of the map.</td>
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</tr>
<tr>
<td>Title tells the purpose/content of the map, but is not located at the top of the map.</td>
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</tr>
<tr>
<td>Purpose/content of the map is not clear from the title.</td>
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<tr>
<td>Spelling/Capitalization</td>
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<tr>
<td>95-100% of words on the map are spelled and capitalized correctly.</td>
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<tr>
<td>94-85% of the words on the map are spelled and capitalized correctly.</td>
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<tr>
<td>84-75% of the words on the map are spelled and capitalized correctly.</td>
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<tr>
<td>Less than 75% of the words on the map are spelled and capitalized correctly.</td>
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<tr>
<td>Labels - Accuracy</td>
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<tr>
<td>At least 90% of the items are labeled and located correctly.</td>
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<tr>
<td>80-89% of the items are labeled and located correctly.</td>
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<tr>
<td>79-70% of the items are labeled and located correctly.</td>
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</tr>
<tr>
<td>Less than 70% of the items are labeled and located correctly.</td>
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<td></td>
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</tr>
<tr>
<td>Labels &amp; Features - Neatness</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90-100% of the labels/features can be read easily.</td>
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<td></td>
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</tr>
<tr>
<td>89-80% of the labels/features can be read easily.</td>
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</tr>
<tr>
<td>79-70% of the labels/features can be read easily.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 70% of the labels/features can be read easily.</td>
<td></td>
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</tbody>
</table>
### Project-Based Learning and Multiple Intelligences

#### Historian Rubric – Making a Poster

<table>
<thead>
<tr>
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<th>4</th>
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<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Required Elements</strong></td>
<td>The poster includes all required elements as well as additional information.</td>
<td>All required elements are included on the poster.</td>
<td>All but 1 of the required elements are included on the poster.</td>
<td>Several required elements were missing.</td>
</tr>
<tr>
<td><strong>Graphics - Relevance</strong></td>
<td>All graphics are related to the topic and make it easier to understand. All borrowed graphics have a source citation.</td>
<td>All graphics are related to the topic and most make it easier to understand. All borrowed graphics have a source citation.</td>
<td>All graphics relate to the topic. Most borrowed graphics have a source citation.</td>
<td>Graphics do not relate to the topic OR several borrowed graphics do not have a source citation.</td>
</tr>
<tr>
<td><strong>Knowledge Gained</strong></td>
<td>Student can accurately answer all questions related to facts in the poster and processes used to create the poster.</td>
<td>Student can accurately answer most questions related to facts in the poster and processes used to create the poster.</td>
<td>Student can accurately answer about 75% of questions related to facts in the poster and processes used to create the poster.</td>
<td>Student appears to have insufficient knowledge about the facts or processes used in the poster.</td>
</tr>
<tr>
<td><strong>Attractiveness</strong></td>
<td>The poster is exceptionally attractive in terms of design, layout, and neatness.</td>
<td>The poster is attractive in terms of design, layout and neatness.</td>
<td>The poster is acceptably attractive though it may be a bit messy.</td>
<td>The poster is distractingly messy or very poorly designed. It is not attractive.</td>
</tr>
</tbody>
</table>

#### Museum Curator Rubric – Making a Collage

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attention to Theme</strong></td>
<td>The student gives a reasonable explanation of how every item in the collage is related to the assigned theme. For most items, the relationship is clear without explanation.</td>
<td>The student gives a reasonable explanation of how most items in the collage are related to the assigned theme. For many of the items, the relationship is clear.</td>
<td>The student gives a fairly reasonable explanation of how most items in the collage are related to the assigned theme.</td>
<td>The student's explanations are weak and illustrate difficulty understanding how to relate items to the assigned theme.</td>
</tr>
<tr>
<td><strong>Number of Items</strong></td>
<td>The collage includes 15 + different items.</td>
<td>The collage includes 10-14 different items.</td>
<td>The collage includes 9 different items.</td>
<td>The collage contains less than 9 different items.</td>
</tr>
<tr>
<td><strong>Creativity</strong></td>
<td>Several of the graphics or objects used in the collage reflect an exceptional degree of student creativity in their display.</td>
<td>One or two of the graphics or objects used in the collage reflect student creativity in their creation and/or display.</td>
<td>One or two graphics or objects were made or customized by the student, but the ideas were typical rather than creative</td>
<td>The student did not make or customize any of the items on the collage.</td>
</tr>
<tr>
<td><strong>Titles and Text</strong></td>
<td>Titles and text were written clearly and were easy to read from a distance. Text varied in color, size and/or style.</td>
<td>Titles and text were written clearly and were easy to read close-up. Text varied in color, size and/or style.</td>
<td>Titles and text were written clearly and were easy to read close-up. There was little variation in the appearance of text.</td>
<td>Titles and/or text are hard to read, even when the reader is close.</td>
</tr>
</tbody>
</table>
### Presenter/Participant Rubric – Oral Presentation Rubric

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparedness</td>
<td>Student does not seem at all prepared to present.</td>
<td>The student is somewhat prepared, but it is clear that rehearsal was lacking.</td>
<td>Student seems pretty prepared but might have needed a couple more rehearsals.</td>
<td>Student is completely prepared and has obviously rehearsed.</td>
</tr>
<tr>
<td>Speaks Clearly</td>
<td>Often mumbles or can not be understood OR mispronounces more than one word.</td>
<td>Speaks clearly and distinctly most (94-85%) of the time. Mispronounces no more than one word.</td>
<td>Speaks clearly and distinctly all (100-95%) the time, but mispronounces one word.</td>
<td>Speaks clearly and distinctly all (100-95%) the time, and mispronounces no words.</td>
</tr>
<tr>
<td>Stays on Topic</td>
<td>It was hard to tell what the topic was.</td>
<td>Stays on topic some (89-75%) of the time.</td>
<td>Stays on topic most (99-90%) of the time.</td>
<td>Stays on topic all (100%) of the time.</td>
</tr>
<tr>
<td>Content</td>
<td>Does not seem to understand the topic very well.</td>
<td>Shows a good understanding of parts of the topic.</td>
<td>Shows a good understanding of the topic.</td>
<td>Shows a full understanding of the topic.</td>
</tr>
<tr>
<td>Posture and Eye Contact</td>
<td>Slouches and/or does not look at people during the presentation.</td>
<td>Sometimes stands up straight and establishes eye contact.</td>
<td>Stands up straight and establishes eye contact with everyone in the room during the presentation.</td>
<td>Stands up straight, looks relaxed and confident. Establishes eye contact with everyone in the room during the presentation.</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Student is unable to accurately answer questions posed by classmates about the topic.</td>
<td>Student is able to accurately answer a few questions posed by classmates about the topic.</td>
<td>Student is able to accurately answer most questions posed by classmates about the topic.</td>
<td>Student is able to accurately answer almost all questions posed by classmates about the topic.</td>
</tr>
<tr>
<td>Listens to Other Presentations</td>
<td>Sometimes does not appear to be listening and has distracting noises or movements.</td>
<td>Sometimes does not appear to be listening but is not distracting.</td>
<td>Listens intently but has one distracting noise or movement.</td>
<td>Listens intently. Does not make distracting noises or movements.</td>
</tr>
</tbody>
</table>

### Conclusion

Congratulations! You have successfully completed your assignment researching the rise and fall of the civilizations of the Ancient Americas.

California state standards supporting this lesson Webquest were included.
Appendix D

Ancient Greece Webquest
Ancient Greece Webquest

Home
Welcome to the Ancient Greek Webquest in which we will learn about the influence of Greek civilization.
Here we will focus on how this civilization has influenced and affects how we live today.

Introduction
Big Question: In this Webquest we will focus on how cultures of the past influence present-day cultures. There is much to learn from the culture of Ancient Greece, including the contributions from Greek historians, scientists, mathematicians, leaders, and the influences from poems and stories still popular today.
Now let’s enter the world of Ancient Greece and explore how this great civilization has influence what we learn today.
It is your turn to take on the role of Theater Producer, Architect, Scientist & Mathematician, Philosopher, or Historian in this Webquest, to research and answer questions as to what made the civilization of Ancient Greece great and powerful.

Task
Congratulations!
You have been selected to take part in the research of an ancient Greek civilization. Now it is your turn to take on the role of Theater Producer, Architect, Scientist/Mathematician, Philosopher, or Historian.
In this Webquest you will research various websites and answer questions as to what made the ancient Greek civilization, influential then and into the present. Your final project will display what you have uncovered.

Job duties and roles in this research are:
Theater Producer - Tells the life of the people through the arts. This job focuses on Greek poetry, fables, literature, comedy, dramas, and mythology. Presentation can be done by collage through poster representation, or Powerpoint presentation. All forms of presentation must be accompanied with a written description of the significance of the item.

Architect - Greek art and architecture expressed Greek ideas of beauty and harmony. This job focuses on describing Greek style in its buildings and sculptures. For this job students are to create a model of The Parthenon with a written description of the significance of greek sculpture.

Scientist/Mathematician - Tells the life of significant Mathematicians and Scientists from ancient Greece. Students are to research and role play their individual, describing important contributions that were made. Students will create a written account of their individual in addition to their role play.
**Philosopher** - Tells the life of significant Philosophers from ancient Greece. Students are to research and role play their individual, describing important contributions that were made. Students will create a written account of their individual in addition to their role play.

**Historian** - Tells the life of famous Greek historians and the leaders of the Greek civilization. Will account the changes Greece encountered through history, the life of Alexander the Great and the influence of leadership he had. This task includes role play and creating a map and timeline of his conquests in battle.

**Process**

Step 1:

Students will divide into five groups: Theater Producer, Architect, Scientist/Mathematicians, Philosophers, and Historians.

In groups, you will decide who will take on individual tasks and roles.

Step 2:

Working with you partner(s), investigate the questions guiding your research for your job.

Step 3:

Keep a journal of your findings so that you can compare your notes with your partners and to provide the necessary information for you final project.

Step 4:

With your partner(s), create the final project task for your job description. Use your journal notes to gather and include any information supporting your findings.

Step 5:

Present your findings to the class using the materials created from the final project.

For your research, explore the following sites:

Theater Producer  Architect  Scientist/Mathematician  Philosopher  Historian
Resources

Theater Producer - Tells the life of the people through the arts. This job focuses on Greek poetry, fables, literature, comedy, dramas, and mythology. Presentation can be done by collage through poster representation, or Powerpoint presentation. All forms of presentation must be accompanied with a written description of the significance of the item.

Elements to include in your project and presentations include:
1. What are myths? What purpose did they serve?
2. What role did gods and goddesses play in the lives of the Greeks?
3. Who were the 12 most important gods and goddesses, where did they live?
4. What is an oracle and which was the most famous?
5. What were epics? Who wrote the first two great epics? Describe what the Iliad and the Odyssey were about, and what they meant to the Greeks.
6. Who was Aesop?
7. What is a fable?
8. What is drama? Describe the two types of Greek dramas, a tragedy and a comedy and what made this type of performance unique.
10. Describe the works of Aristophanes.
To find the answers to the questions, predetermined websites were provided.

Architect - Greek art and architecture expressed Greek ideas of beauty and harmony. This job focuses on describing Greek style in its buildings and sculptures. For this job students are to create a model of The Parthenon with a written description of the significance of Greek sculpture.

Elements to include in your project and presentations include:
1. What is the best known example of Greek architecture? Describe what is inside and the purpose of the structure?
2. Describe the styles and construction of Greek columns.
3. Describe the significance of the use of marble.
4. What was the prevalent form when creating Greek sculptures?
To find the answers to the questions, predetermined websites were provided.

Scientist/Mathematician - Tells the life of significant Mathematicians and Scientists from ancient Greece. Students are to research and role play their individual, describing important contributions that were made. Students will create a written account of their individual in addition to their role play.

Elements to include in your project and presentations include:
1. What is astronomy?
2. Who was Aristarchus? What was his contribution and beliefs?
3. Who was Eratosthenes? What was his contribution and beliefs?
4. Who was Archimedes? What was his contribution and beliefs?
5. Who was Euclid? What was his contribution and beliefs?
6. Who was Hipparchus? What was his contribution and beliefs?
7. Who was Hippocrates? What was his contribution and beliefs?
8. Who was Hypatia? What was her contribution and beliefs?
9. Who was Pythagoras? What was his contribution and beliefs?

To find the answers to the questions, predetermined websites were provided.

**Philosopher** - Tells the life of significant Philosophers from ancient Greece. Students are to research and role play their individual, describing important contributions that were made. Students will create a written account of their individual in addition to their role play.

Elements to include in your project and presentations include:
1. What does the word philosophy mean?
2. Who were the Sophists?
3. Who was Plato? What did he teach? What were his accomplishments?
4. Who was Aristotle? What did he teach? What were his accomplishments?
5. Who was Socrates? What did he teach? What were his accomplishments?

**During the Hellenistic Era:**
6. Who was Epicurus? What did he teach? What were his accomplishments?
7. Who was Zeno? What did he teach? What were his accomplishments?

To find the answers to the questions, predetermined websites were provided.

**Historian** - Tells the life of famous Greek historians and the leaders of the Greek civilization. Will account the changes Greece encountered through history. Students will create a written account of information presented. This task includes one role play, of Alexander the Great, and the influence of leadership he had. This role is to include creating a map and timeline of his conquests in battle.

Elements to include in your project and presentations include:

**Classic Greek Period**
1. Who was Herodotus? What did he teach? What were his accomplishments?
2. Who was Thucydides? What were his accomplishments?
3. Where is Macedonia? Describe their people and culture. Include the rule of Philip II in 359 BC and accomplishments.
4. Who was Alexander the Great? Describe his life, leadership, and conquests. Why was he viewed as both a villain and a hero? What influence did Homer's *Iliad* have on Alexander?

**Hellenistic Era**
5. What was the Hellenistic Era? What made this period special?
6. What happened to Alexander's empire after he died?
7. Describe the factors causing the fall of Greece to Rome.
To find the answers to the questions, predetermined websites were provided.

**Evaluation**

The following rubrics were provided to evaluate each student's participation according to the role completed and overall participation.

### Theater Producer Rubric – Making a Poster

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4</th>
<th>3</th>
<th>2</th>
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</thead>
<tbody>
<tr>
<td>Graphics - Originality</td>
<td>Several of the graphics used on the poster reflect a exceptional degree of student creativity in their creation and/or display.</td>
<td>One or two of the graphics used on the poster reflect student creativity in their creation and/or display.</td>
<td>The graphics are made by the student, but are based on the designs or ideas of others.</td>
<td>No graphics made by the student are included.</td>
</tr>
<tr>
<td>Graphics - Relevance</td>
<td>All graphics are related to the topic and make it easier to understand. All borrowed graphics have a source citation.</td>
<td>All graphics are related to the topic and make it easier to understand. All borrowed graphics have a source citation.</td>
<td>All graphics relate to the topic. Most borrowed graphics have a source citation.</td>
<td>Graphics do not relate to the topic OR several borrowed graphics do not have a source citation.</td>
</tr>
<tr>
<td>Labels</td>
<td>All items of importance on the poster are clearly labeled with labels that can be read from at least 3 ft. away.</td>
<td>Almost all items of importance on the poster are clearly labeled with labels that can be read from at least 3 ft. away.</td>
<td>Several items of importance on the poster are clearly labeled with labels that can be read from at least 3 ft.</td>
<td>Labels are too small to view OR no important items were labeled.</td>
</tr>
<tr>
<td>Attractiveness</td>
<td>The poster is exceptionally attractive in terms of design, layout, and neatness.</td>
<td>The poster is attractively in terms of design, layout and neatness.</td>
<td>The poster is acceptably attractive though it may be a bit messy.</td>
<td>The poster is distractingly messy or very poorly designed. It is not attractive.</td>
</tr>
</tbody>
</table>

### Theater Producer/Historian – Oral Presentation Rubric

<table>
<thead>
<tr>
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<th>3</th>
<th>2</th>
<th>1</th>
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</thead>
<tbody>
<tr>
<td>Enthusiasm</td>
<td>Facial expressions and body language generate a strong interest and enthusiasm about the topic in others.</td>
<td>Facial expressions and body language sometimes generate a strong interest and enthusiasm about the topic in others.</td>
<td>Facial expressions and body language are used to try to generate enthusiasm, but seem somewhat faked.</td>
<td>Very little use of facial expressions or body language. Did not generate much interest in topic being presented.</td>
</tr>
<tr>
<td>Preparedness</td>
<td>Student is completely prepared and has obviously rehearsed.</td>
<td>Student seems pretty prepared but might have needed a couple more rehearsals.</td>
<td>The student is somewhat prepared, but it is clear that rehearsal was lacking.</td>
<td>Student does not seem at all prepared to present.</td>
</tr>
<tr>
<td>Stays on Topic</td>
<td>Stays on topic all (100%) of the time.</td>
<td>Stays on topic most (99-90%) of the time.</td>
<td>Stays on topic some (89%-75%) of the time.</td>
<td>It was hard to tell what the topic was.</td>
</tr>
<tr>
<td>Content</td>
<td>Shows a full understanding of the topic.</td>
<td>Shows a good understanding of the topic.</td>
<td>Shows a good understanding of parts of the topic.</td>
<td>Does not seem to understand the topic very well.</td>
</tr>
</tbody>
</table>
### Architect Rubric – Building a Structure

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Construction - Care Taken</td>
<td>Great care taken in construction process so that the structure is neat, attractive and follows plans accurately.</td>
<td>Construction was careful and accurate for the most part, but 1-2 details could have been refined for a more attractive product.</td>
<td>Construction accurately followed the plans, but 3-4 details could have been refined for a more attractive product.</td>
<td>Construction appears careless or haphazard. Many details need refinement for a strong or attractive product.</td>
</tr>
<tr>
<td>Construction - Materials</td>
<td>Appropriate materials were selected and creatively modified in ways that made them even better.</td>
<td>Appropriate materials were selected and there was an attempt at creative modification to make them even better.</td>
<td>Appropriate materials were selected.</td>
<td>Inappropriate materials were selected and contributed to a product that performed poorly.</td>
</tr>
<tr>
<td>Content</td>
<td>Model is extremely detailed, including columns, center rooms, and inner statues.</td>
<td>Model shows a high level of detail, including columns and inner statues.</td>
<td>Model shows some level of detail on columns or statues.</td>
<td>Model does not include center rooms or statues.</td>
</tr>
<tr>
<td>Plan</td>
<td>Plan is neat with clear measurements and labeling for all components.</td>
<td>Plan is neat with clear measurements and labeling for most components.</td>
<td>Plan provides clear measurements and labeling for most components.</td>
<td>Plan does not show measurements clearly or is otherwise inadequately labeled.</td>
</tr>
</tbody>
</table>

### Architect/Scientist & Mathematician/Philosopher/Historian Rubric Research Report

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of Information</td>
<td>Information clearly relates to the main topic. It includes several supporting details and/or examples.</td>
<td>Information clearly relates to the main topic. It provides 1-2 supporting details and/or examples.</td>
<td>Information clearly relates to the main topic. No details and/or examples are given.</td>
<td>Information has little or nothing to do with the main topic.</td>
</tr>
<tr>
<td>Organization</td>
<td>Information is very organized with well-constructed paragraphs and subheadings.</td>
<td>Information is organized with well-constructed paragraphs.</td>
<td>Information is organized, but paragraphs are not well-constructed.</td>
<td>The information appears to be disorganized.</td>
</tr>
<tr>
<td>Mechanics</td>
<td>No grammatical, spelling or punctuation errors.</td>
<td>1-3 grammatical, spelling or punctuation errors.</td>
<td>4-5 grammatical spelling, or punctuation errors.</td>
<td>6 or more grammatical, spelling, or punctuation errors.</td>
</tr>
<tr>
<td>Sources</td>
<td>All sources (information and graphics) are accurately documented in the desired format.</td>
<td>All sources (information and graphics) are accurately documented, but a few are not in the desired format.</td>
<td>All sources (information and graphics) are accurately documented, but many are not in the desired format.</td>
<td>Some sources are not accurately documented.</td>
</tr>
</tbody>
</table>
### Project-Based Learning and Multiple Intelligences

#### Scientist & Mathematician/Philosopher/Historian Rubric Role Historical Play

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historical Accuracy</td>
<td>All historical information appeared to be accurate and in chronological order.</td>
<td>Almost all historical information appeared to be accurate and in chronological order.</td>
<td>Most of the historical information was accurate and in chronological order.</td>
<td>Very little of the historical information was accurate and/or in chronological order.</td>
</tr>
<tr>
<td>Role</td>
<td>Point-of-view, arguments, and solutions proposed were consistently in character.</td>
<td>Point-of-view, arguments, and solutions proposed were often in character.</td>
<td>Point-of-view, arguments, and solutions proposed were sometimes in character.</td>
<td>Point-of-view, arguments, and solutions proposed were rarely in character.</td>
</tr>
<tr>
<td>Required Elements</td>
<td>Student included more information than was required.</td>
<td>Student included all information that was required.</td>
<td>Student included most information that was required.</td>
<td>Student included less information than was required.</td>
</tr>
<tr>
<td>Props/Costume</td>
<td>Student uses several props (could include costume) that accurately fit the period, show considerable work/creativity and make the presentation better.</td>
<td>Student uses 1-2 props that accurately fit the period, and make the presentation better.</td>
<td>Student uses 1-2 props which make the presentation better.</td>
<td>The student uses no props OR the props chosen detract from the presentation</td>
</tr>
</tbody>
</table>

**Conclusion**

Congratulations! You have successfully completed your assignment researching how the civilization of ancient Greece influences our lives today.

California state standards supporting this lesson Webquest were included.