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PROJECT-BASED LEARNING FOR INDEPENDENT STUDY STUDENTS
WITH TECHNOLOGY INTEGRATION

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Interdisciplinary Studies:
Integrative Studies

by
Laura Sturman

June 2002

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ABSTRACT

This project developed criteria for evaluating projects for independent study students through a review of the literature and a survey of teachers. The literature review examined topics relevant to project-based learning including constructivism, brain-based learning, experiential learning and technology integration. As a result of the literature review, preliminary criteria were developed and a sample project evaluated against those criteria was selected. Five teachers were asked to evaluate the sample project. Based on the responses, the original criteria were revised and additional sample projects were selected and added to the project.

The criteria included fourteen points. The main points were that the project: be largely student-directed and multi-disciplinary; engage higher level thinking skills; incorporate a variety of resources including technology.

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CHAPTER ONE

INTRODUCTION

Statement of the Problem

Independent study programs, run by school districts and county offices of education, often use a textbook-driven teaching strategy. Students read from state-adopted texts, answer questions, complete activities, or memorize facts and details designed by the textbook authors and prescribed by educators to meet grade-level standards. Although students submit hundreds of essays, worksheets and tests to meet academic and attendance requirements, evidence found in the literature reviewed for this project shows that a purely textbook-based approach is not the most effective way for students to learn.

The textbook itself is not the problem. A textbook can be a good resource for background, research and project ideas. But the textbook doesn't have to drive the curriculum. A textbook-based approach to independent study would require an eleventh grader to read a state-adopted American history book, answer the

comprehension questions and complete teacher-selected activities with little regard for the student s interests and abilities. This publisher-produced, lesson-by-lesson, chapter-by-chapter approach, often fails to motivate and excite students to learn.

An alternative to the textbook-delivery method for independent study students is a project-based approach. This approach could require the same eleventh grader to develop a research question or problem related to American History, research and investigate primary and secondary sources, interpret the collected data and present the information in a way that will inform and enlighten others. The textbook might serve as a springboard, source of information and/or guide, but it would not drive the curriculum. The learner s research question(s) would be the primary driving force of the curriculum.

Thousands of projects are available to teachers through publishers and online. Selecting quality projects and adapting those projects to fit the needs of the independent study student can be a daunting task. This project will develop criteria and a rubric

to evaluate existing projects or design new projects to meet the needs of individual students.

Addressing the Needs of the Independent Study Student

Independent study students, like classroom students, are diverse. In many cases, the caseload of an independent study teacher is far more varied than that of a classroom teacher. Often, an independent study teacher has multiple grades, skill levels and ages on his/her caseload. It is not unusual for a teacher's caseload of approximately 30 students to range from Kindergarten through grade twelve. Multiple subjects have to be taught at all levels with varying degrees of support from administration, parents, other teachers, counselors and other district school sites. Some students may be on IEPs (individualized education plans) for special learning difficulties. Some of these students may have withdrawn from special education services, and some still may be receiving services. Even though these students are not in the traditional classroom, they still must satisfy the same grade-level

standards and pass the same state-mandated tests as students in the traditional classroom. This is a challenging task, considering the wide age, ability, and learning-style differences with which an independent study teacher must contend.

A textbook-based teaching strategy is the easiest way to address the diverse students in independent study. Teachers use state-adopted, grade-level-appropriate texts and assign reading and the questions or problems that follow the reading. Although this is the easiest and most convenient strategy, is it what is best for students? With textbook-based learning students answer some critical thinking type questions and memorize facts and details. Students have no reason to learn the material other than for taking the test or filling in the worksheet. This is an externally imposed motivation in which students memorize unrelated facts, ideas and concepts to earn a grade, please an adult or move on to the next level. This external motivation may drive the student to learn the material initially, but, since no internal motivation or personal relevance is likely to be involved, as evidence in the literature

will demonstrate, the information usually is forgotten, and the student often becomes bored, frustrated and disillusioned with the learning process.

As my own experience and studies in the literature review will show, students come to independent study for a variety of reasons, including religious beliefs, demands of the performing arts, chronic illness and parent and/or student perception that schools are unsafe. One of the most frequent reasons students enter independent study is that they have been unsuccessful in the traditional classroom. Many of these students may be unable to control their behavior, fit in with peers, or pass their classes.

Independent study is a strategy that has a built-in flexibility and certain advantages for all of the above-mentioned students. Academic levels, activities and teaching/learning strategies can be individualized to meet student needs. A sixth-grader reading and writing at a second-grade level does not have to struggle to keep up with the class, but can focus on the skills and strategies she needs to learn to progress. Although California state law now demands

that she reach her state-mandated reading level to be promoted to seventh grade, she can accelerate or slow down as needed and devote more time on weak areas (e.g., decoding skills or writing a well-constructed paragraph).

Because learning activities can be tailored to meet student needs in independent study, there is no need to apply the same strategy (textbook-based learning) to all students just because it is convenient and easy. When students show no interest in learning material other than to pass the class, and when they are unable to apply what they have learned to new situations, a radically different strategy is called for.

An Alternative to the Textbook- Based Approach

This project will focus on a strategy designed to motivate students from within to learn material and apply it to real-world situations and problems—project-based learning (PBL). The project will also explore methods of incorporating technology into student projects. Much of the literature reviewed

supports students completing authentic tasks for learning to occur. Project-based learning with technology integration is one way to encourage independent study students to learn authentically by performing real-world tasks, such as building models or researching controversial issues. This project will examine the theoretical foundations of project-based learning, including experiential learning, constructivism and brain-based learning. Much of the published literature concerns project-based learning in the classroom; therefore, the project also will discuss the characteristics and needs of the independent study student and ways to modify project-based learning to fit the independent study learning strategy.

Developing Criteria for Evaluating Projects for Independent Study Students

Thousands of project ideas with varying degrees of quality have been published in books and on the Internet. Some of the projects I have found do not meet the needs of independent study students, are not truly constructivist or brain-based and do not address authentic tasks. The major purpose of this project is

to define what a quality project is for independent study students and to develop criteria for evaluating and/or developing such a quality project. For this project, a quality project needs to be consistent with the implications of brain-based learning, constructivism and experiential learning. Another focus of this project is to examine effective methods of integrating technology.

Chapter two will review literature regarding independent study and project-based learning. References that define independent study, describe the independent study student and present effective learning strategies for independent study students will be considered. The theoretical foundations of project-based learning will also be reviewed in the context of it being an effective learning strategy for independent study students.

Chapter three will describe the methodology. The chapter will also describe the instruments, subjects and procedures used to gather information to develop criteria for quality projects tailored for the independent study student.

Chapter four will present the results gathered from the instruments that are described in the methodology chapter. The surveyed subjects responses will be detailed. In addition the selected criteria will be presented along with a project that meets the criteria.

Chapter five will include the conclusion and recommendations. The criteria will again be presented with a justification based on the results. The recommendations will address the concerns and challenges of implementing project-based learning with independent study students.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The purpose of this project is to evaluate the effectiveness and feasibility of project-based learning for independent study students. Before considering this strategy, the needs of these students will be discussed. Literature that examines the reasons students enter independent study programs will help to clarify their needs.

The literature review also will compare textbook-based and project-based approaches as learning strategies for independent study students. The two approaches will be reviewed in terms of what is best for today's students. Since this project's focus is project-based learning, three theoretical foundations for this approach--experiential learning, constructivism and brain-based learning--also will be reviewed. An analysis of four studies concerning project-based learning will follow.

Since project-based learning is not an easy approach for teachers, issues of implementation will be discussed. Topics included in this section will be scaffolding, technology integration and social interaction.

Independent Study: Learners Characteristics

It is important to understand the needs of the independent study student before contemplating the most effective learning strategies. The California Department of Education Independent Study Operations Manual (1996) states that independent study is an instructional strategy to ensure that student s needs are met (p. 11-3). It is the ideal medium for stretching the skills of the elementary child, rekindling the curiosity of a bored teen, or helping the returning student develop real-life skills while earning credits toward a high school diploma (Independent Study Operations Manual, 1996, p. 11-3).

The needs of all students, whether they are taught in the classroom or at home, are varied. Some of those needs can best be met in an alternative setting such as

independent study. The Independent Study Operations Manual (1996) lists the following learners who can benefit from independent study: average students who need to make up a course; specialized students who perform in areas of physical or artistic expertise who may enroll in independent study because of its flexibility and adaptability; students with academic deficits; students with special needs such as hyperactivity and distractibility; students who are at risk for dropping out of school; students who travel to perform; and students who are members of families who prefer to educate their children at home for a variety of philosophical and pragmatic reasons.

A study of a Pennsylvania community of 15,000 conducted by Marshall and Donegal (1996) cites the following reasons for students enrolling in independent study: family cohesion, negative peer influence, religious beliefs and learning concerns. According to the authors of the study, learning concerns was the primary reason students left the traditional classroom (1996).

Approaches to Developing Curriculum
in the Independent Study Setting:
the Textbook-Based Approach

The most convenient way to deliver curriculum to the diverse students who enroll in independent study is through a textbook-based approach. Grade-level books are handed out to students entering independent study, and assignments are doled out via canned lesson plans. Although this method is an efficient and convenient way to process students into, through and out of school, is it what s best for the learner?

The Independent Study Operations Manual (1996) says that the role of the independent study teacher should be a:

dynamic one that allows students to grow through encounters with coursework and human experiences. Piecework and fragmented worksheets isolating a single skill should be replaced with activities and assignments designed to involve the student in active thinking, responding, exploring and shaping ideas teachers should develop creative educational uses of the media and technology that

are an integral part of the student s world and the workplace. (p. 11-5)

The problems associated with assigning only textbook reading with accompanying worksheets, tests and comprehension questions are numerous and well-documented in the literature. One concern is that textbooks tend to separate subjects unnaturally when discipline boundaries are fluid and actually connect with one another (Beane, 2001, f 7). Through textbook-based learning, young people have been led to believe that the purpose of education is to collect or master facts, principles and skills that have been selected for inclusion in one subject area or another (Beane, 2001, f 14). Many textbooks have made worthwhile attempts to integrate subject areas, but disciplines are still divided into separate categories. Traditionally subjects are taught during distinct time periods or blocks (especially at the secondary level), or classified separately on report cards and in state frameworks. Although this style of education is changing, students and teachers are still getting the message that disciplines, such as history, English,

science and mathematics, are disconnected rather than connected.

This division of subject matter mimics the factory model which may have suited student needs at the beginning of the twentieth century, as the population was readied for assembly line work, but does not fit the needs of the citizens of the twenty-first century. Today, as 100 years ago, students still learn as in a factory model. Products (students) are manufactured (taught) on an assembly line (schools). Students still read, take notes and memorize, rather than inquire, discover, create and make connections (Caine, R. & Caine, G., 1994).

The textbook-based approach emphasizes collecting unrelated facts, memorizing them, taking the test and forgetting them (Caine, R. and Caine, G. 1994). This approach only facilitates what Renate and Geoffrey Caine (1994) call surface knowledge. They say that:

Surface knowledge has little meaning, and little connectedness with other knowledge, social and emotional issues, or other aspects of the learner's psyche. It embraces the mechanics of any

subject—all those facts, procedures, and behaviors that can be acquired by memorization. It is the outcome of rote memorization and is the predominant product of education today. (p. 102)

According to Caine and Caine (1994), Tomorrow's successful employees will have to be problem solvers, decision makers, adept negotiators and thinkers who are at home with open-endedness, flexibility and resourcefulness (p. 15). Because the textbook alone only promotes surface knowledge, a much different approach is needed if depth of learning is to take place.

Another concern with the textbook-based approach is its generally uniform approach. Although textbooks do make attempts to address special-needs learners, and a creative, motivated teacher can use the textbook as a good source to address the interests and skill levels of all students, basing the curriculum on the book rather than on what the student needs may be a disservice to the learner. According to John Dewey (1938), the student's interest and ability level the student has concerning the subject matter should

represent the moving force; individual children have specific capabilities, needs and preferences. All minds do not work the same way. Too often subject matter is seen as something complete in itself – just something to be learned or known. Howard Gardner (1993) states that:

We need to reconfigure curricula so that they focus on skills, knowledge, and above all, understandings that are truly desirable in our country today. And we need to adapt those curricula as much as possible to the particular learning styles and strengths of those students.

(p. 79)

A textbook-based approach, for the most part, treats all students the same. But in the real world, inside and outside the classroom, students are very diverse. The current and future job market counts on tapping into those creative differences. An approach that addresses those differences will be discussed next.

The Project-Based Approach

Katz and Chard (1989) say project-based learning is an in-depth study of a particular topic that one or more children undertake. It consists of exploring a topic or theme, such as going to the hospital or building a house. This approach emphasizes the teacher's role in encouraging children to interact with people, objects and the environment in ways that have personal meaning to them (p. 2). In other words, what drives the curriculum is not the textbook or subject, but a particular topic or theme and the interests of the learner.

Particular projects should depend on student ability, interests, grade level and the content and skills that need to be learned. Projects for seventh graders might involve studying and building a model of a castle; researching and preparing Japanese cuisine for his/her family; or investigating an issue, such as the influence of religion on medieval society. These types of projects can be classified as production projects and issue projects (Kapfer, 1978).

Theoretical Foundations of the Project-Based Approach

Three educational theories and approaches that provide a foundation for project-based learning are experiential, constructivist and brain-based learning. In what follows, I will review each of these theories and their relevance to the project based approach.

Experiential Learning

Carl Rogers (1994) distinguished two types of learning: cognitive (meaningless) and experiential (significant). According to Rogers, cognitive learning refers to academic knowledge such as memorization of multiplication tables or vocabulary words. Experiential learning, on the other hand, refers to learning through hands-on experience, such as learning how to repair a car by working on an engine. The key to experiential learning, he said, is addressing the needs and wants of the learner. Experiential learning experiences should involve the learner, be self-initiated and be evaluated by the learner (Rogers, 1994, f 1).

A project-based approach meets Roger s criteria. For example, in the Building a House project

described by Chard and Katz (1989), the project involves personal involvement. Students visit a building site, keep journals and relate the experience to their own lives, draw pictures of their own houses and interview their parents and workers about how houses are constructed. The project is self-initiated. The teacher introduces the topic Building a House, but the students generate the questions and create a discussion web that will guide their research. They research dwellings around the world, explore the environmental impact of construction sites and investigate tools and building materials.

Constructivist Learning

Experiential learning is important because students can see the relevance of what they are learning. But how do they create meaning from what they learn so that they can apply it to their own lives? Constructivist thinkers maintain that learners organize their experience with their own logical structures or understandings, and that they view the world through their own constructs to preserve their autonomy as a part of a whole system (von Glaserfeld, 1996). For

example, a very small child seeing a butterfly for the first time might make sense of the creature by relating it to something she s already seen, such as a bird.

Goodman (1984) states that:

What we call the world is a product of minds whose symbolic procedures construct the world by interpreting, organizing and transforming prior world views, thereby constructing new symbols. These constructs serve as building blocks to new constructs. (p. 21)

In other words, a learner understands new concepts by relating it to something she already knows. Dewey (1938) said It is also essential that the new objects and events be related intellectually to those of earlier experiences (p. 19). Project-based learning is a method of teaching that builds on these constructivist principles because it is driven by student interests and abilities. It draws on student curiosity and what they already know because students develop the questions that drive the curriculum.

Another major tenet of constructivism is that information is best acquired when the learner is

actively involved in the learning process. Jerome Bruner (1977) said that the act of learning was a combination of acquisition, transformation and evaluation of new information. New information, he said, runs counter to or is a replacement to what is previously known. The learner manipulates the knowledge to fit new tasks by analyzing, extrapolating, interpolating and converting. Then she evaluates information by checking whether the information has been manipulated adequately to fit the task (1977). John Dewey (1916), another early constructivist theorist, believed that the world is not passively perceived and thereby known. He said that active manipulation of the environment is completely involved in the process of learning from the start.

Applying constructivist principles through project-based learning actively involves students in the learning process. Constructivist learning is activist learning and requires hands-on involvement. The learner engages in inquiry, discovery and exploration – the learner actively interacts with materials and others (Fogarty, 1977). Students

participating in project-based learning interact with a variety of primary and secondary sources, raw materials and real-world experiences to build on and develop their own constructs. They are not passively receiving subject matter from a textbook. In addition, students using a project-based approach take control of their own learning by drawing on their own curiosity, interests and abilities. Bruner (1960) said that, What a scientist does at his desk or laboratory, what a literary critic does in reading a poem, are of the same order as what anybody else does when he is engaged in like activities if he is to achieve understanding (p. 14). Mastery of the fundamental ideas of a field involves not only grasping of general principles, but also the development of an attitude toward learning and inquiry, toward guessing and hunches, toward the possibility of solving problems on one s own (Bruner, 1960, p. 20).

A constructivist approach can also be consistent with the use of technology. Berg et al. (1998) surveyed 57 technology coordinators representing 120 school districts in southwestern Ohio to determine the

characteristics of an exemplary computer-using teacher. They found that exemplary teachers classrooms were overwhelmingly constructivist and used teaching practices that are consistent with constructivist thought involved in helping learners internalize or reshape new information and make it their own (p. 30). Students in these classrooms used technology as a tool to research, write and explore new information and create new products.

Brain-Based Learning

The principles derived from studies of the brain verify many of the tenets of constructivism and also affirm the value of project-based learning as a teaching strategy. Caine and Caine (1994) believe that brain based learning involves acknowledging the brain s rules for meaningful learning and organizing teaching with those rules in mind (p. 4). The theory of brain-based learning is founded on twelve principles. Project-based learning incorporates many of these principles.

The first principle of brain-based learning is that the brain is a parallel processor (Caine and

Caine, 1994, p. 88). Because the human brain is always doing many things at one time Good teaching so orchestrates the learner s experiences that all aspects of brain operation are addressed (Caine and Caine, 1994, p. 88). When students are involved in project-based learning, they are processing information in multiple ways. In the Building a House project mentioned above, students are not just reading about the subject, which involve a limited part of the brain. Instead, many thinking operations are taking place, including writing, interviewing, discussing, researching and observing.

Caine and Caine s seventh principle states that, learning involves both focused attention and peripheral perception (Caine and Caine, p. 91). The belief behind this idea is that the brain absorbs information of which it is directly aware and to which it is paying attention. It also directly absorbs information and signals that lie beyond the field of attention (Caine and Caine, p. 91). This principle is also demonstrated by the Building a House project. The surrounding environment of the building site

involves a limitless amount of peripheral stimuli. In addition to students focused attention on the assigned projects, they also are using peripheral perception as they observe and interpret the interaction of the workers, the impact of the site on the neighborhood and the function of hand and power tools. Related to this principle, is what the Caines call immersion (p. 6). Through immersion, the learner is engaged in the subject by talking, listening, reading, viewing, acting and valuing. When students are immersed in a subject (such as building a house), they connect the information to themselves and other subject areas (Caine and Caine, 1994). Students participating in the Building a House project might be encouraged to find out how their own dwelling was built (personal meaning). They might research and draw pictures of dwellings in other cultures (social studies). They might classify types of tools by their functions (physical science).

The fourth principle of brain-based learning states that, the search for meaning occurs through patterning (Caine and Caine, 1994, p. 89). Caine and

Caine (1994) say that, the brain is designed to perceive and generate patterns, and it resists having meaningless patterns imposed on it. Meaningless patterns are isolated pieces of information unrelated to what makes sense to the student (p. 89). Requiring students to memorize unrelated facts is an inefficient use of the brain, because the learner has to struggle to create meaningful patterns from the disjointed information. Better approaches, which encourage the brain s natural capacity for patterning, include the integration of the curriculum and life-relevant approaches to curriculum (Caine and Caine, 1994). A quality project-based teaching strategy applies both of these approaches, because disciplines are integrated and the content and activities are authentic.

When implementing project-based learning, the literature demonstrates that it is important to remember learning is more like likely to take place when the project has a meaningful purpose for the learner. New information attaches to the driving question or purpose to create meaningful patterns. A study by Land and Greene (2000) shows that requiring

students to collect unrelated facts on the web is not an effective way to facilitate learning. In their study of pre-service teachers creating web-based projects for students, they found that it was important that the teachers be goal-oriented, rather than data-driven as they created their projects. The teachers who had a coherent project idea were most successful in creating a successful web unit for students. On the other hand, the teachers who were data-driven, or just collecting random information from the Internet, became frustrated and their projects fell apart:

In our study, learners who identified specific goals and project ideas early on and who then used the WWW to find resources were more likely to develop a coherent project. Participants whose final projects did not reflect substantial coherence tended consistently to rely on data-driven strategies and rarely evaluated how WWW resources fit into their project idea. (p. 65)

Land and Green (2000) say that projects should have a driving question or goal that has been generated by the student, because Without generating driving questions

or learning goals, it is unlikely that retrieved information will be meaningful to learners, because it is isolated from a meaningful context (p. 47).

How the brain creates meaning is also the subject of Caine and Caine's (1994) brain-based learning principles nine and ten.

We have at least two different types of memory: A spatial memory and a set of systems for rote learning. Facts and skills that are dealt with in isolation are organized differently by the brain and need much more practice and rehearsal. The more separate information and skills are from prior knowledge and actual experience, the more dependence there must be on rote, inefficient use of the brain. (p. 93)

The project-based approach is a more powerful use of the brain because it taps into the more efficient spatial memory described in principle ten. Caine and Caine (1994) say that:

Spatial memory is generally best invoked through experiential learning. Teachers need to use a great deal of real-life activity, including

classroom demonstrations; projects; field trips; visual imagery of certain experiences Success depends on using all of the senses and immersing the learner in a multitude of complex and interactive experiences. (p. 94)

Studies Supporting the Effectiveness of Project-Based Learning

A study by Penuel and Means (1999) compares project-based classrooms using multimedia technology with traditional classrooms using teacher-directed, lecture-driven approaches. The classrooms compared were project-based and non-project-based and included a range of grade levels. The observers found that teachers in project-centered classrooms, rather than direct-instruction type classrooms, were much more likely to be in a helping or monitoring role rather than a lecture style mode. (Penuel and Means, 1999, f 25). Students in project-centered classrooms also were more likely to be engaged in constructing products and working collaboratively in small groups than students in more traditional, lecture-driven classrooms (Penuel and Means, 1999, f 15). In addition, the study found

that students in project-based classrooms tended to participate in longer, more complex activities involving higher level thinking skills than their peers in traditional lecture-style classrooms. For example, in teacher-directed classrooms student activities included reading silently and listening to the teacher. In project-centered classrooms, where the teacher is more of a coach or a facilitator, students were engaged in designing projects, collaborating in small groups, evaluating information and communicating to an audience (Penuel and Means, 1999, Table 2: Observed Differences).

A Buck Institute study found that students in traditional classrooms using direct instruction covered more material in less time, but the lowest levels of cognitive processing operations were applied by the students. These low-level processes included reviewing and memorizing facts and concepts for worksheets and tests. As a consequence, their knowledge of the subject matter may be topical, fleeting, and superficial. Students can't apply what they've learned and are not stimulated to study on their own or go

beyond the information given (Buck, 1999, f 5). In the project-based classrooms studied, on the other hand, students were observed to engage higher cognitive thinking activities, such as relating concepts and using existing criteria to evaluate new ideas (Buck, 1999, f 6).

Thomas (2000) discusses two school-reform efforts, Co-nect Schools and Expeditionary Learning Outward Bound (ELOB) Schools. Co-nect Schools, a whole-school reform effort that places a strong emphasis on project-based learning, interdisciplinary studies, real-world applications and technology integration, has shown strong achievement gains on standardized tests in all subject areas, according to multiple studies, including one conducted by the University of Memphis Value-Added Assessment System (Thomas, 2000, p. 6). Comparable gains in standardized achievement tests were reported for Co-nect schools compared to district averages in a separate independent evaluation of Co-nect schools in Cincinnati for the period 1995-1999 (Thomas, 2000, p. 6).

Expeditionary Learning Outward Bound (ELOB) is an adventure and service-based education program founded by educator Kurt Hahn. Currently, 99 schools in the United States participate in ELOB. The program emphasizes student-centered, discovery learning. Learning projects, or expeditions, are long-term, multidisciplinary explorations of a single theme, such as the geology of caves, the Civil Rights Movement, water quality, or Galileo's theories. According to Thomas' findings, the gains in academic achievement at several ELOB schools were dramatic (Thomas, 2000, p. 5). In Dubuque, Iowa, three elementary schools implemented the ELOB program. After two years, two of these schools showed gains on the Iowa Test of Basic Skills from well below average to the district average. The third school showed a gain equivalent from well below average to well above the district average. The magnitude of the 1995 to 1997 gains in reading for the three ELOB schools ranged from 15% in one school to more than 90% in the other two schools, while the averages for other schools in the district remained unchanged (Thomas, 2000, p. 5). Thomas cites

many other studies of both Co-nect and ELOB schools that show similar gains. He notes that these gains are particularly impressive because neither of these programs target basic skills or teach to the test. Rather, the emphasis is on the project or expedition. Although skills of reading, writing and computation are involved, they are not the focus of the curriculum. (Thomas, 2000, p. 6), the student-centered project is.

Issues of Implementation

Some of the issues that an independent study teacher will face when implementing project-based learning include: frustrations that students experience when given control of their own learning; methods of integrating technology; and social interaction.

Project-based learning, as stated in the Introduction, is by no means a quick and easy method of teaching. It involves giving up the control of the learning process to the student. The classroom becomes student-centered, with the teacher serving as a facilitator. Teachers, for the most part, have been trained to control the flow of information by leading

discussions and pointing students in the proper, state standards-approved direction. According to Katz and Chard (1994), traditionally, a teacher's role has been to teach from the top down or vertically. The traditional academic curriculum model has vertical relevance rather than horizontal relevance. With vertical relevance, instruction prepares the learner for the next level by teaching grade-level objectives, while horizontal relevance prepares the learner to solve problems inside and outside the classroom (Katz and Chard, 1989). Teaching for horizontal relevance means moving to a student-centered curriculum. It means focusing on the individual needs of the learner, rather than grade-level standards. Students and teachers roles are transformed. The political, social and educational implications of this shift on teaching practices are enormous.

A study by Cohen (2001) focused on whether a technology-rich environment that promotes a constructivist approach to learning can have a significant effect on the learning styles of high school freshman. The study compared two high schools.

One of the schools, (AAST), was a technology-rich school which used the project-based approach school-wide. The other site, a traditional high school, used a direct-teaching approach and incorporated very little technology into its curriculum (RHS). RHS served as the control school. The students were pre- and post-tested before and after completing the ninth-grade. An interesting result was the increased stress levels and decrease of motivation of AAST students compared to RHS students:

The decrease in motivation, persistence, and responsibility for AAST students could be a direct result of the cultural climate and academic environment within the school. The teachers used a project-based constructivist approach to learning. In student interviews, students responded that working with others on a team and unclear expectations and goals were stressful. Perhaps the very nature of constructivism with its unclear goals and outcomes, and an emphasis on competitive teamwork can have a negative effect on students'

motivation, persistence, and responsibility. (p.

365)

By ninth-grade most students are accustomed to a traditional approach. Switching abruptly to a constructivist approach may be disconcerting. Practical considerations for this potentially stressful transition will be addressed next.

Scaffolding

Project-based learning can be a daunting prospect, because it involves putting students in control of their own learning. Scaffolding eases this transition because it entails assisting the learner with tasks until they develop the ability to do the work on their own. Grabe and Grabe (2000) define scaffolding as external support for learning or problem solving; especially applied to a teacher's deliberate structuring of a learning experience so that students receive assistance at appropriate points until they develop their own skills (p. 314). For example, Grabe and Grabe discuss a scaffolded Web project in which a second-grade teacher assigns a project to her class during which students will make a decision on what kind

of class pet to obtain. The teacher creates a series of Web pages that include criteria for selection (i.e., \$30 or less in price; it must be able to live in a ten-gallon aquarium; it must be easy to feed). The teacher-created Web pages also provide links to sites about potential pets. The project is scaffolded (carefully guided) yet student-centered, because the teacher guides the students through the process of choosing a pet, but it is the students who research the selection, generate the questions and make the decision.

If a teacher truly wants to implement project-based learning, Grabe and Grabe (2000) advise that she think carefully about what the students will do. A facilitating teacher in a project-based classroom also must anticipate problems students might have and lay the foundation or scaffolding to make learning a possibility, and not a frustrating, overwhelming experience. For example, for a project in which students create a position paper on a controversial issue such as logging in the northwest, a teacher might make sure sufficient sources are available and/or provide background on evaluating those sources for

bias. Students also can be taught efficient Internet research techniques. Learning is facilitated because students are less likely to be frustrated by the overwhelming amount of information and are more able to recognize propaganda techniques. This type of teaching is also called a cognitive apprenticeship (Grabe and Grabe, 2000). A cognitive apprenticeship model assumes that students will gradually take on more and more skills until they are independent learners.

Okolo and Ferretti (1998) conducted research in inclusive classrooms, (i.e., classrooms that included students with and without mild disabilities). The fourth- through sixth-grade students they studied developed multimedia projects on controversial issues. Okolo and Ferretti found that project-based learning in these classrooms could be successful if students were taught a set of complex and diverse skills. Students must be able to read and comprehend source material about the topic; evaluate evidence for and against a position; prioritize information; and translate their ideas into text, images and sound (p. 56). Okolo and Ferretti suggest that when teachers begin a multimedia-

project-based unit they show an example of a finished product to provide students with a mental model upon which they can draw; teach students how to use the technological tools; create checklists and rubrics for project completion; debrief students at scheduled sessions regarding progress; and plan structured reward systems. Okolo and Ferretti (1998) state that in our work, we have found that project-based investigations may deteriorate unless teachers have well-established routines for gaining and maintaining attention (p. 55).

Technology Integration

Project-based learning often incorporates technology. The literature reviewed for this project will focus on project-based units that integrate multimedia applications and Internet WebQuests. A definition and description of WebQuests will be addressed first.

According to the WebQuest site at San Diego State University, a WebQuest is an inquiry-oriented activity in which most or all of the information used by learners is drawn from the Web. WebQuests are designed

to use learners' time well, to focus on using information rather than looking for it, and to support learners' thinking at the levels of analysis, synthesis and evaluation (Dodge, 2001, p. 2.)

The WebQuest model was developed in early 1995 by Bernie Dodge, a professor at San Diego State University. Sample WebQuests found online include Creating a Mythology Newsletter, and Dinosaur Scientist. A detailed description of a WebQuest, Coast to Coast Virtual Roadtrip, appears in Appendix B. Grabe and Grabe (2001) list the following elements of a WebQuest: A brief introduction to a topic; the description of an inquiry task related to the topic; a set of primary WWW resources that students can use in performing the task; and a description of the specific processes students should employ in performing the assigned task (p. 150-151).

Scaffolding is an important component of WebQuests. The official WebQuest site's rubric for evaluating teacher-created WebQuests states that, every step [in a Web Quest] is clearly stated. Most

students would know exactly where they were in the process and what to do next (Dodge, 2001).

Another way to incorporate technology into the project-based approach is via multimedia software applications. Grabe and Grabe (2000) describe multimedia as a communication format that integrates several media text, audio, video, and animation—most commonly implemented with a computer (p. 245). Multimedia applications typically found in classrooms include HyperStudio, PowerPoint and web page development software, such as FrontPage and DreamWeaver. Rice and Wilson (1999) found that using technology in a social studies classroom to create multimedia presentations was an effective way to engage students in active problem solving and authentic tasks. Students used the Internet to obtain photographs, video and audio clips and other authentic documents to present what they learned.

Okolo and Ferretti (1998) conducted research that explored the potential of project-based learning using multimedia presentations in inclusive classrooms. Sixth-grade students in one classroom that they studied

worked in cooperative, mixed-ability groups to design multimedia projects on a controversial issue, in this case Spanish Colonization of Latin America. The students were required to present an argument supporting their point of view through a multimedia presentation that incorporated text, sound and graphics. The researchers found that the sixth-graders were highly engaged and that they greatly enhanced their knowledge of Spanish Colonization. Another interesting outcome was the students' openness to considering opposing points of view for a controversial issue and their acknowledgement that arguments can often be settled by words rather than by fists. These were outcomes that would be hard to measure with standardized tests. Okolo and Ferretti (1998) noted that no learning standards exist for assessing the impact of project-based learning or multimedia design projects. Measures such as multiple choice tests may be insufficient for documenting the depth and interconnectedness of knowledge that students acquire (p. 56).

Carr and Jitendra (2000) discussed the merits of using multimedia to promote project-based learning for at-risk high school students or those in danger of dropping out. They focused on a group of nine, special education tenth-graders in a public high school. The students created multimedia presentations on poverty after volunteering at a homeless shelter and researching student-generated questions related to poverty, such as what does mental health have to do with poverty and why are people affected by poverty? (p. 43). The final activity involved presenting the multimedia presentations to an audience that included other students, faculty and administration staff. The students not only demonstrated expertise on their topics and developed thoughtful opinions, but also met their Individualized Education Plan goals for reading, writing and speaking.

The nonlinear nature of multimedia presentations, which combines text, sound, video and graphics, appealed to all styles of learners in the study. (Carr and Jitendra, 2000). In addition students were able to

reinforce what they learned by presenting to other students.

Social Interaction

One of the issues facing the independent study teacher is the lack of social interaction experienced by many home-educated students. An important component of constructivist learning theory is social interaction: Three key principles emerge from constructivist views: (a) People learn from new experiences based on prior knowledge and beliefs; (b) new knowledge is always situated in a context; and (c) learning is socially mediated and acquired within learning communities (Lundeberg et al., 1997, p. 2). Lundeberg et al. studied a geography class that emphasized higher level thinking activities. Fourth through seventh grade students in the class were required to work in groups to develop a multimedia project about a country. In the course of the study one teacher noted that: "What also worked best was putting kids together and giving them the opportunity to work with each other and discover other people in the class who had talent and skills that they could use" (p. 13).

2

Literature regarding methods of fostering social interaction among independent study students was scant. Therefore this topic will be addressed in the Conclusion chapter.

CHAPTER THREE

METHODOLOGY

The purpose of this project was to develop criteria for quality projects for independent study students. The Methodology chapter will describe the steps that were taken to achieve this end. This chapter will also describe the subjects who participated in the project and the questionnaire that was developed and distributed to the subjects. Finally, a brief description of the procedures taken to carry out the methodology will be discussed.

The following steps were taken to develop criteria for quality projects:

1. Based on a review of the literature develop preliminary criteria.
2. Choose a sample project that meets this preliminary criteria.
3. Develop questions and ask three or more teachers to evaluate the sample project so that the preliminary criteria could be refined, added to or changed.

4. Revise the criteria.

The review of literature (see above) focused on books, journals and online sources to develop the criteria. The topics reviewed were independent study, constructivist, experiential and brain-based learning theory, project-based learning and integrating technology into the curriculum.

Subjects

The subjects were five teachers, including two independent study teachers and three classroom teachers. The classroom teachers included a first-grade teacher, an eleventh-grade English teacher and a high school technology teacher. All of the teachers had more than 15 years of teaching experience.

Instrument

A questionnaire was designed to gather more data for refining the preliminary criteria (See Appendix B).

Procedure

A sample project was selected from the literature. The project was analyzed and selected based on the

preliminary criteria. The selected project was modified both to meet the criteria and the needs of the independent study student. (See sample project, Coast to Coast Virtual Road Trip in Appendix B). Next, the project was presented to the subjects. They were asked to evaluate the project by completing the questionnaire (See Appendix B).

CHAPTER FOUR

RESULTS

In the Results chapter I will discuss the preliminary criteria chosen for evaluating quality projects. This chapter will also explain how the preliminary criteria are justified by the literature review. Next, the sample student project, chosen for distribution to the subjects, will be described and evaluated against the preliminary criteria. The Results chapter will then evaluate the responses of the subjects and explain why the additional criteria are justified by the methodology.

Based on the literature review, the following preliminary criteria were used to select a sample project.

1. Project is goal-oriented and largely student-directed (Student generates driving questions or goals, conducts research, creates products).
2. Teacher serves as facilitator rather than generator of information.

3. Project is scaffolded to meet needs of students.
4. Student uses Internet and other software.
5. Project is multi-disciplinary (Project promotes links among subject matter).
6. Project engages some or all higher-level thinking skills (see Bloom s Taxonomy in Appendix C).
7. Students create a culminating product that is evaluated against a rubric (products may include oral or written presentations, visual art, a garden, model, display, portfolio, etc.).
8. Students reflect on their own learning through self-assessment.
9. Some or all aspects of the project involve social interaction.

An explanation of why each criteria was chosen based on the literature review follows:

Criteria one: (Project is goal-oriented and largely student-directed.) Much of the literature regarding project-based learning states that what

drives the curriculum is not the textbook or subject, but a particular topic, theme or driving question and the interests of the learner (Katz and Chard, 1989). Without a driving question or learning goal, students are just answering questions and not delving beneath the surface, and it is unlikely that retrieved information will be meaningful to learners, because it is isolated from a meaningful context (Land and Greene, 2000, p. 47). Other authors noted that students do not just receive information when engaged in project-based learning. Rather, they are expected to be actively involved in finding, organizing, presenting and reflecting on information (Lundeberg et al., 1997). Criteria Two: (Teacher serves as facilitator rather than generator of information.) Grabe and Grabe (2000) discuss a teacher's deliberate structuring of activities to foster learning as students complete projects. In a study by Lundeberg et al. (1997) teachers provided a framework in which they facilitated student learning.

Criteria Three: (Project is scaffolded to meet needs of students.) Scaffolding project-based learning

is closely related to the teacher as a facilitator concept. In regards to WebQuests, a type of technology-based project that is described above, every step is clearly stated. Most students would know exactly where they were in the process and what to do next (Dodge, 2001, f 2).

Criteria Four: (Student uses Internet and other software.) Although integrating technology into a project is not an absolute requirement, (since project-based learning was taking place successfully long before computers and the Internet were here), neglecting this powerful resource is a disservice to students. The Internet is an enormous database comprised of authentic research materials including documents, photographs, video and sound clips (Rice and Wilson, 1999). In addition, multimedia software allows students to organize information so that it makes sense to them. Students further reinforce what they have learned via multimedia presentations to others (Carr and Jitendra, 2000).

Criteria Five: (Project is multi-disciplinary.) Caine and Caine (1994) say that when students are

immersed in a subject, they connect the information to themselves and other subject areas. Beane (2001) expressed the concern that textbooks tend to separate subjects unnaturally when discipline boundaries are fluid and actually connect with one another (f 7).

Criteria Six: (Project engages some or all higher-level thinking skills.) A Penuel and Means (1999) study found that students in project-based classrooms tended to participate in longer, more complex activities involving higher level thinking skills than their peers in traditional, lecture-style classrooms.

Criteria Seven: (Students create a culminating product that is evaluated against a rubric.) Berg et al. (1998) found that exemplary teachers classrooms were overwhelmingly constructivist and used teaching practices that are consistent with constructivist thought involved in helping learners internalize or reshape new information and make it their own (p. 30). Students in these classrooms used technology as a tool to research, write and explore new information and create new products.

Criteria Eight: (Students reflect on their own learning through self-assessment.) Lundeberg et al. (1997) found in their study of two teachers using project-based learning that their students were expected to reflect on information.

Criteria Nine: (Some or all aspects of the project involve social interaction.) Katz and Chard (1989) say that the project-based approach involves encouraging children to interact with people. Lundeberg et al (1997) say that one of the key aspects of constructivism (a theoretical basis for project-based learning) is that learning is socially mediated and acquired in communities.

A Coast to Coast Virtual Road Trip (Appendix B) was the project chosen for evaluation based on the literature review and the above criteria. The project met the preliminary criteria for the following reasons: Students conduct research (#1: student-directed) while virtually traveling around the United States on the Internet (#4: students use the Internet). The teacher scaffolds the project by providing guided questions, assignments and resources (#3: project is scaffolded,

#2: teacher as facilitator). They create art (collages and postcards), compose essays and reports, keep journals, and produce a weather/climate chart (#5: multi-disciplinary, #8: culminating product). Students analyze information by comparing two cities. They also analyze and interpret weather and climate data and apply what they learn to create graphs using Microsoft Excel (#6: higher level thinking skills). Students answer reflection questions after completing their project (#8: Students reflect on their own learning). Students travel with a partner or alone and make personal contacts through email regarding their research (#9: Social interaction).

Once the project was chosen, it was submitted to five teachers. The five teachers evaluated the project and additional criteria were added based on their evaluations. A summary of their responses follow:

Julie has been a primary teacher for 16 years. She teaches her first graders through lecture and guided practice. Students learn in both a whole group and a cooperative group setting.

Julie said that the Coast to Coast project was doable but would need to be simplified a great deal. Her first graders would also need a lot of assistance from the teacher and parents. She liked that the project was comprehensive and included a variety of activities. Julie felt that a lot of learning would take place.

Julie would improve the project by adding other resources, materials and activities such as audio recordings and interviews. For first graders she would also adapt the project by simplifying and reducing the process so that it is grade level appropriate. First graders typically have a short attention span, so Julie thought that the project would need to be downsized or shortened.

Betty teaches high school junior English and beginning computer tech. She has been teaching for 21 years. Betty thought that the Coast to Coast project could be implemented with her students, but she felt that the unit was very lengthy. She prefers shorter units. Betty liked that the project gave clear directions and that the criteria and expectations were

well explained. She also liked how it integrated many skills and allowed students the freedom to be creative. To improve the unit Betty would have students research other countries to develop cultural awareness and appreciation.

Fred teaches ninth through twelfth grade independent study. He has taught for 28 years. Fred said that the Coast to Coast project is something he could use with his independent study ninth graders. He liked the variety of delivery methods, which he said would keep students interested. Fred also liked the scope of the project and how it involved reading, English, social studies and some math. To improve the project Fred would include weather as part of the unit. Students could research forecasts using the Internet and TV. They could then adjust their routes due to inclement weather.

Jim V. teaches high school computer graphics, multimedia, web design and post-production. He has taught for 21 years. His students complete individual and group projects.

Jim said he could not use this unit because his, course of study is oriented in using computers to create content. He did like the variety of activities contained within the assignment and the various opportunities students were given to generate content to demonstrate their learning. He felt that all of the finished components would be difficult to evaluate unless a very definitive rubric was used. Jim also said that semester-long projects could be difficult, in terms of keeping students interested over an 18-week period. He would break up the project into short one-to two-week assignments that would be evaluated independently.

Jim C. teaches ninth- and tenth-grade independent study students. He has been teaching regular and alternative education at the secondary level for nine years.

Jim liked how the Coast to Coast project integrated several subjects including geography, economics, Internet research and English. He also liked the budgeting and decision making aspects of the project. To improve the project Jim would establish a

generous but limited spending limit, because he believed this would make the project more practical.

Based on the responses of the surveyed teachers, five additional criteria were added to the original nine:

10. Long-term projects are broken up into shorter assignments to meet student needs.
11. Project is evaluated at designated intervals.
12. Evaluation rubric tailored to the selected project is included.
13. A variety of resources and materials are used (i.e. Internet, books, magazines, maps, interviews, TV, etc.).
14. Project is grade appropriate or can be adapted to meet grade-level needs.

The first nine criteria were justified by the Literature Review and reinforced by the teacher surveys. Criteria ten through fourteen were added based on the teacher surveys. An explanation of how that criteria was derived from the teacher surveys follows:

All of the teachers surveyed, with the exception of one, said that they could implement the Coast to

Coast Virtual Road Trip unit. (The exception was a high school computer graphics and multimedia teacher.) All of the teachers liked the variety of activities, and the comprehensive and integrative nature of the project.

A major concern of some of the teachers surveyed was the length of time it would take students to complete the project. Both the primary teacher and two of the high school teachers felt the project needed to be broken up into manageable units or assignments. Criteria ten addresses this concern.

Some of the teachers were also concerned about the difficulty of evaluating student products and progress with this type of project. Criteria eleven and twelve address these concerns.

One of the teachers surveyed felt that more resources and materials would improve the project. I found this to be a good suggestion and in line with the brain-based research discussed in the literature review. This research shows that the brain is activated by novel stimuli. Using a variety of resources and

materials would meet this brain-based principle.

Criteria thirteen addresses this recommendation.

The primary teacher said that this was a project she could use, but that it would need to be simplified and downsized for her first graders. Her comments made me realize the importance of grade-level appropriateness when choosing a project. Therefore, criteria fourteen was added.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Based on the literature review, the preliminary criteria were:

1. Project is goal-oriented and largely student-directed (Student generates driving questions or goals, conducts research, creates products).
2. Teacher serves as facilitator rather than generator of information.
3. Project is scaffolded to meet needs of students.
4. Student uses Internet and other software.
5. Project is multi-disciplinary (Project promotes links among subject matter).
6. Project engages some or all higher-level thinking skills (see Bloom s Taxonomy in Appendix C).
7. Students create a culminating product that is evaluated against a rubric (products may include oral or written presentations, visual

art, a garden, model, display, portfolio, etc.).

8. Students reflect on their own learning through self-assessment.
9. Some or all aspects of the project involve social interaction.

Additional criteria based on the teacher surveys were added:

10. Long-term projects are broken up into shorter assignments to meet student needs.
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12. Evaluation rubric tailored to the selected project is included.
13. A variety of resources and materials are used (i.e. Internet, books, magazines, maps, interviews, TV, etc.).
14. Project is grade appropriate or can be adapted to meet grade-level needs.

The following recommendations are based on the methodology, which included the literature review and the teacher survey results.

My research was an effort to incorporate project-based learning and technology into the independent study curriculum at my school. One of the most valuable resources I discovered in the literature was the WebQuest. The WebQuest is an ideal project format for independent study students. As stated in the Literature Review, a WebQuest is an inquiry-oriented activity in which most or all of the information used by learners is drawn from the Web (Dodge, 2001, *f* 2).

Web addresses for WebQuests and other online projects appear in Appendix F.

Since the caseload of an independent study teacher can include students across grade levels, the teacher can develop or choose WebQuest projects that cover subject matter, skills, concepts and standards tailored to each student's needs. Teachers can assign the projects to their students via the school's website and answer questions regarding the projects by email. The need for face-to-face interaction can be limited to the regular weekly meetings. If WebQuests are highly scaffolded, the physical presence of the teacher is not as critical. A good WebQuest is designed to be student-

directed, with the facilitator (teacher) available for guidance, which makes it an ideal learning strategy for the independent study student.

The challenges of implementing project-based learning surfaced repeatedly in the literature and in the teacher responses. Some of these challenges included strategies for assessing students, motivating students, scaffolding projects and providing for social interaction.

The teachers surveyed noted the importance of breaking up lengthy projects into smaller units and assessing progress continually. Regularly assessing student progress on projects with a variety of measures such as contracts, student-kept logs and journals, portfolios, and teacher- and/or student-created rubrics is critical. These measures must be built into the projects. One way to do this is by drawing up a student contract that divides the project into stages and sets several deadlines along a timeline. The timeline for a project can range from two weeks to an entire semester. For example, if the project is to design and build models of Egyptian and Mexican pyramids and then

compare and contrast them in a research report, the project may require a written proposal, a drawing of the models, an initial outline of the report, a rough draft of the research report, a final draft of the research report and the completed models turned in on specific dates. Part of the contract can include the requirement of a daily log or journal of progress and a student/teacher created rubric that defines the criteria for an excellent completed project.

As part of the assessment process, it is vital that teachers maintain regular contact with their students. Contact, through email and written responses on journals and assignments, improves the communication and rapport between student and teacher. Regular face-to-face meetings are also important.

Motivating students who are unaccustomed to a project-based approach can be another concern--especially for upper elementary and secondary students who have experienced several years of textbook-based learning. Primary students are easily excited by the prospect of creating, building or discovering something via a project. But a lack of buy-in from older students

is often an issue. Many times upper elementary and high school students want to know what they can do to get the work done quickly and easily to pass and earn the grade or credits. If that means reading a textbook and answering questions, that s all they want to do. Convincing them to take on a long-term project, which will require them to think critically and be actively involved in the learning can be frustrating for a teacher.

One key to motivating older students is to find interests and passions of the student that can be developed into a project. For example, many secondary students are fascinated by cars. A teacher might work with the student to develop a project in which the student starts her own car company. This project could require research into the history of companies such as Ford and Toyota, design of the product and developing of a marketing plan. Physical science concepts related to machines and environmental science issues related to automobile pollution and use of natural resources can also be incorporated. Technology can be integrated with presentation, spreadsheet and design software and

research on the Internet. This would be a huge project, so a teacher might facilitate by connecting students with like interests to complete the project as a team. Older students have varied interests. Many students love dogs, music, computers and sports. Getting to know one's students and becoming familiar with their interests can be a wonderful resource for teachers looking for project ideas. In addition, giving older students choices can be motivating. For instance, students required to create a project on a literary era or an author will be much more motivated if they are not assigned a particular era or author, but are able to choose. Introducing the project with the words, "You are going to choose an author to research for your next project" is much more motivating than, "You are assigned Ernest Hemingway for your author project," because no one else has chosen him.

Another challenge of project-based learning is that long-term projects can be overwhelming to students (and teachers). Therefore, it's a good idea to begin project-based learning with short-term projects which can be completed in three to five class periods, or one

week. A short-term project might involve creating a three- to five- slide PowerPoint presentation on a current event, which includes answers to the five W s (who, what, when, where and why) and expresses an opinion or feeling about the event. Another way to keep projects from becoming overwhelming is through scaffolding. Scaffolding the car company project, which was described above, would involve assigning it in stages, with each component due on specific dates. The teacher could also arrange meetings between students and professionals in the auto industry via the Internet or in person, provide a list of websites, and teach students how to use necessary software.

A key issue and challenge for implementing project-based learning with independent study students is the lack of social interaction among students in this setting. Much of literature demonstrated that project-based learning is best carried out in an atmosphere of collaboration, which can be fostered by a skilled classroom teacher. It takes considerable creativity and determination for an independent study teacher to incorporate that spirit of collaboration

into an independent study student s lesson plans. In reviewing the literature I found scant material addressing this issue. I have often questioned independent study as a best learning practice because of the lack of social interaction. My research has reinforced these doubts and has also led me to the conclusion that independent study is best used as an alternative for some students when the classroom is no longer an option. Independent study can never be a replacement for a well-run, project-based classroom where the possibilities for collaboration and social interaction are only limited by the teacher s philosophy and motivation.

In my own experience as an independent study teacher, I found that working with parents and students to arrange field trips, school-based get-togethers and to build a website fostered collaboration and a sense of community. Also pairing students with like interests on projects was somewhat successful, but difficult to coordinate. Forming a social club and recruiting willing volunteers to organize regular social events was one strategy that I found to be successful. The

first step was to recruit willing students. Next, I had the students brainstorm a list of social events that they would like to organize. I then helped them narrow this list down to feasible activities. A party for students in sixth grade and up was one of the events they chose. The students then brainstormed what needed to be done to carry out their plan (e.g. set date, invite guests, find suitable location, arrange for food, music and entertainment). The teacher facilitated all of these details, but students planned and implemented the event.

Other activities that these students arranged were field trips. With the help of a teacher or parent, students brainstormed places they wanted to go and then worked with an adult on the details such as transportation and cost.

A web site with built-in communication features such as email, discussion boards and live chat can stimulate communication across the school community. Not only can teachers stay in touch with parents and students, but a discussion board can facilitate an exchange of ideas between families. WebQuests, which

involve a particular grade level or subject area, can be built into the school web site and accomplished by groups of students. Student, family and parent-created web pages can be posted along with school-created web pages. There is infinite potential for building a community of learners among independent study students with a website.

Although I gained a lot of insight into project-based learning through my literature review and teacher surveys, if I were to continue with this study, I would modify some parts of the methodology. Rather than survey teachers from various grade levels, I believe it would have been more effective to submit the Coast to Coast project to teachers who taught Social Studies at the sixth- through ninth-grade levels. This project was designed for this subject area and grade span, so I believe teachers who specialize in Social Studies and teach these grades would be better prepared to evaluate the unit. Also, comparing the responses of teachers with similar teaching assignments might have been more meaningful, and less like trying to compare apples and oranges. One of the teachers, Jim V., said that he

could not even use the unit with his high school multimedia students. In addition, Julie V. felt that the unit was too advanced for her first graders. I think teachers who have actually taught similar units with sixth- through ninth-graders would be in a better position to make more realistic, and less hypothetical, comments.

One of the limitations of the study was the lack of literature regarding independent study students. I was particularly interested in strategies for implementing a project-based approach with students I might only see once a week or less. I also searched for literature about providing for the social interaction of independent study students. Unfortunately I could find very little research on independent study. If I were to continue this study, I would like to survey and/or visit some of the hundreds of independent study and home education programs that exist throughout the state. Since there is a lack of literature on the topic of independent study, I think this is the best way to gain insight into these students educational environments. Yet despite the questions I still have

regarding implementing project-based learning with independent study students, I m convinced that project-based learning is a stimulating and engaging approach for students to learn about themselves and their world.

APPENDIX A:
COAST TO COAST VIRTUAL ROAD
TRIP PROJECT ANALYSIS

Coast to Coast Virtual Road Trip Project Analysis

(see project in Appendix B)

(Justification for choice of project was based on the original criteria listed below)

1. Project is largely student directed
Students choose destinations route, vehicle, manner of presentations and conduct their own research.
2. Teacher serves as facilitator Teacher is available for questions, but the student generates the information.
3. Project is scaffolded Overall framework for the project includes measurable benchmarks (i.e. journals, route map) which are assigned. Helpful Websites are provided.
4. Student uses Internet and other software
Students use the Internet for research, and word processing, desktop publishing and spreadsheet software to prepare their presentations.
5. Project is multi-disciplinary Students research geographical locations and analyze demographics (social studies), keep a journal (English), compute travel costs (math), research and analyze climate and environment (science), create postcards, maps, and photo albums (art).
6. Project engages some or all higher level thinking skills Knowledge: Students collect information and describe geographical locations; Comprehension: Students summarize and interpret information and data in research reports; Students compare

information; Application: students use information to classify and compare locations; Analysis: Students analyze climate data, compare/contrast cities, select destinations and vehicles based on personal preference and needs; Synthesis: Students combine ideas into a research report and other presentation vehicles including albums, charts and albums. Evaluation: Students answer reflection questions.

7. Students create a culminating product. Students create visual art, reports, journals, etc. garden, model, display, portfolio, etc.)
8. Students reflect on their own learning through self-assessment students answer reflection questions
9. Some or all aspects of the project involve social interaction Students may work in partners or groups

Preliminary Criteria

1. Project is goal-oriented and largely student-directed (Student generates driving questions or goals, conducts research, creates products).
2. Teacher serves as facilitator rather than generator of information
3. Project is scaffolded to meet needs of students
4. Student uses Internet and other software
5. Project is multi-disciplinary (Project promotes links among subject matter)
6. Project engages some or all higher level thinking skills (see Bloom s Taxonomy in appendix)
7. Students create a culminating product which is evaluated against a rubric (products may include oral or written presentations, visual

- art, a garden, model, display, portfolio,
etc.)
8. Students reflect on their own learning
through self-assessment
 9. Some or all aspects of the project involve
social interaction

APPENDIX B:
TEACHER QUESTIONNAIRE AND
SAMPLE PROJECT

Dear Teacher:

My Master s Project is to develop criteria for evaluating projects with technology integration for independent study students. I am developing these standards so teachers will have a guide when selecting from the thousands of projects available commercially and on the web. Teachers also will be able to use this guide as a blueprint for creating projects.

The following project was taken from the SCORE web site. Please read this project (or review it online if you wish:
<http://score.rims.k12.ca.us/activity/c2c/>) and answer the questions, as best as you can, that follow. Although this is a 9th grade classroom activity, try and imagine ways it can be adapted to your teaching situation.

Thank you for all your help. If you have any questions, you can reach me at home, by email or at work.

Thanks again!

Laura Sturman

Coast to Coast Virtual Road Trip

Adapted from: <http://score.rims.k12.ca.us/activity/c2c/>

TEACHER NOTES

Grades 9 and up

Geography: Human Environmental Interaction

Lesson purpose:

Students will understand the impact of the environment on peoples lives.

Students will plan and organize a long term project.

Lesson length:

This is a semester-long project

Academic Standards: Historical and Social Sciences

Analysis Skills

(9th Grade Geography)

¥ Chronological and Spatial Thinking

¥ Historical Interpretation

Management and Assessment Tips:

It will be good to spot check progress, and collect journal notebooks at regular intervals to iron out difficulties, make revision suggestions, and keep them on the road to success.

Set clear tasks and monitor Internet use of students to ensure maximum on-task behavior, and minimal surfing or downtime.

Extra Materials/Resources:

Chart or butcher paper

Markers

Maps of the United States

determined by using <http://www.mapquest.com> or the cyber router found on the search.com page.

You are responsible for keeping a journal using word processing software that describes each day of your trip, including your car shopping excursion. Journals must be appropriate: no sex, drugs, or alcohol. The journals should include the following information for each day:

- Where you ate
- What you saw
- Where you stayed
- How much money was spent (running record of expenses)

Be sure to locate lodging on the Internet and find sights to see and things to do. The running record of expenses must include gasoline expenses - figured at an average price of \$1.50 a gallon for gas and an average of 20 mpg.

You are also responsible for a report on the destination city that includes information about that city: history, demographics, government, landmarks, famous things to see and do, etc. The report must be prepared using word processing or presentation software such as Microsoft Word or PowerPoint.

You will also create two postcards that you write to the NSGE from two of your stops. The cards can be drawn or created by using images from the Internet.

Part of your project will be to compare two cities that you visit. To demonstrate the difference between the two cities you chose to compare on your road trip, you must complete the following projects:

1. Create a collage delineating the differences in each geographical location. Include photographs, articles, poetry, e-mail from the two cities residents, statistical documentation, newspaper ads, etc.

2. Produce a weather/climate chart that graphically documents the differences of the two cities using spreadsheet software such as Microsoft Excel.
3. Map the cities and their surrounding areas. Include physical, topographical and places of interest.
4. If you know people in your chosen cities, make personal contacts with them, and interview them regarding the human/environment interaction.
5. Make a photo album displaying the difference between the two cities using downloaded pictures from the Internet. Create the album using desktop publishing software such as PageMaker or Microsoft Publisher.

The big day is here! You have your blank check and the task is laid out before you: it is nothing but wide-open highway, and the wonders of America ahead of you. Get that car of your dreams, investigate your destination city, and put it in drive. You're on your way!

LEARNING ADVICE

Make sure you address all aspects of your trip in your journal, and lay it out so the trip unfolds in order of your daily progress. Be creative, colorful, neat and complete. The NSGE is depending on you!

REFLECTION (Answer the following questions in your journal after finishing all of the above projects.)

1. What skills, concepts and knowledge did you gain through this geographical experience?
2. What was most difficult to research? What was easiest? Why?
3. What would you do to improve the road trip in the future?

4. Of the places along the way that you visited virtually, which would you most like to visit in person? Why?

EVALUATION

You will earn points for each of the following:

- ¥ Butcher paper route map (30)
- ¥ Each component of the coast to coast journal (30)
- ¥ Cities comparison / contrast projects (50)
- ¥ Two postcards (20)
- ¥ Report on your destination city (50)
- ¥ Answers to reflection questions (20)

Maximum points possible: 200

RESOURCES:

U.S. atlases and the Internet lab

Geography

<http://www.for.nau.edu:80/~alew/ustxtwlc.html>

<http://members.aol.com/bowermanb/101.html>

<http://www.odci.gov/cia/publications/factbook/geos/us.html>

<http://plasma.nationalgeographic.com/mapmachine/index.html>

Map of the USA

<http://www.for.nau.edu:80/~alew/uslndfrm.gif>

http://www.lib.utexas.edu/Libs/PCL/Map_collection/Map_collection.html

<http://fermi.jhuapl.edu/states/states.html>

http://www.yahooligans.com/Around_the_World/U_S__States
[/http://www.mapquest.com](http://www.mapquest.com)

Specific Cities and Points of Interest

To locate information on specific cities and points of interest, use the following search engines:

<http://www.excite.com>
<http://usacitylink.com>
<http://www.citynet.com>
<http://www.search.com>
<http://www.webcrawler.com>

National Scenic Byways

<http://www.byways.org/>

Teacher Questionnaire

Teaching Assignment/Grade(s): _____

Length of time in

teaching: _____

Please describe how you typically deliver curriculum.

(i.e. lecture, textbook, cooperative groups,

independent student projects, online, etc.) (Use the

back of this paper if you need more

space.): _____

After reviewing the above project, please answer the following questions. (Please use the back of this questionnaire if you need more space.):

1. Is this project something you could implement with your students? Why or why not?

2. What specific aspects of this project did you like? Why?

3. What specific aspects of this project did you not like? Why?

4. What changes would you make to adapt this
project for your learners?

APPENDIX C:
BLOOM S TAXONOMY

Bloom s Taxonomy

- Knowledge: observation and recall of information
knowledge of dates, events, places
knowledge of major ideas, mastery of
subject matter
Question Cues: list, define, tell,
describe, identify, show, label,
collect, examine, tabulate, quote, name,
who, when, where, etc.
- Comprehension: understanding information, grasp meaning
translate knowledge into new context
interpret facts, compare, contrast
order, group, infer causes
predict consequences
Question Cues: summarize, describe,
interpret, contrast, predict,
associate, distinguish, estimate,
differentiate, discuss, extend
- Application: use information
use methods, concepts, theories in new
situations
solve problems using required skills or
knowledge
Question Cues: apply, demonstrate,
calculate, complete, illustrate, show,
solve, examine, modify, relate, change,
classify, experiment, discover
- Analysis: seeing patterns
organization of parts
recognition of hidden meanings
identification of components
Question Cues: analyze, separate, order,
explain, connect, classify, arrange,
divide, compare, select, explain, infer
- Synthesis: use old ideas to create new ones
generalize from given facts

relate knowledge from several areas
predict, draw conclusions

Question Cues: combine, integrate,
modify, rearrange, substitute, plan,
create, design, invent, what it?,
compose, formulate prepare, generalize,
rewrite

Evaluation: compare and discriminate between ideas
assess value of theories, presentations
make choices based on reasoned argument
verify value of evidence
recognize subjectivity
Question Cues: assess, decide, rank,
grade, test, measure, recommend,
convince, select, judge, explain,
discriminate, support,
conclude, compare, summarize

APPENDIX D:
SURVEY RESULTS

TEACHER RESPONSES TO QUESTIONNAIRE

Julie

Teaching Assignment/Grade(s): *First Grade*

Length of time in teaching: *Sixteen years*

Please describe how you typically deliver curriculum. (i.e. lecture, textbook, cooperative groups, independent student projects, online, etc.)(Use the back of this paper if you need more space: *Lecture/guided practice (total group) textbook — read & discuss, cooperative groups — divide students into three or four per group (center) / workshop. Curriculum is delivered with a great deal of guided practice at this grade level.*

After reviewing the above project, please answer the following questions. (Please use the back of this questionnaire if you need more space.):

1. Is this project something you could implement with your students? Why or why not? *Yes — The concept is doable at this grade level. In order for this project to be successful at this grade level the project would need to be simplified and a great deal of parental / teacher assistance would be required.*
2. What specific aspects of this project did you like? Why? *I really liked the aspect that the project is very comprehensive. A lot of learning is going to be taking place.*
3. What specific aspects of this project did you *not* like? Why? *What about the possibility of adding additional materials / resources, ex. audio recording (interviews) etc. Other resources besides chart / butcher paper, markers and maps — Not to limit.*
4. What changes would you make to adapt this project for your learners? *For my first graders — I would have to adapt the project by simplifying the requirements and reducing the process so that the work is grade level appropriate. (To downsize and simplify) Also the time span of the*

assignment would also have to be greatly reduced (first graders have a short attention span.)

Jim V.

Teaching Assignment/Grade(s): *Computer Graphics, Post Production, Multimedia and Web Design*

Length of time in teaching: *Twenty-one years*

Please describe how you typically deliver curriculum. (i.e. lecture, textbook, cooperative groups, independent student projects, online, etc.)(Use the back of this paper if you need more space: *Presentation method is demonstration and lecture. Student activities include individual and group projects.*

After reviewing the above project, please answer the following questions. (Please use the back of this questionnaire if you need more space.):

1. Is this project something you could implement with your students? Why or why not? *No, my course of study is oriented toward using computers to create content.*
2. What specific aspects of this project did you like? Why? *The variety of activities and the various opportunities students were given to generate content to demonstrate their learning.*
3. What specific aspects of this project did you *not* like? Why? *May be difficult to evaluate all of the finished components unless a very definitive rubric is used.*
4. What changes would you make to adapt this project for your learners?
Semester long projects can be difficult in terms of keeping students focused over an 18-week period. I would break up the project into short one to two week assignments that could be evaluated independently.

Fred

Teaching Assignment/Grade(s): *Ninth through twelfth grade*

Length of time in teaching: *Twenty-eight years*

Please describe how you typically deliver curriculum. (i.e. lecture, textbook, cooperative groups, independent student projects, online, etc.)(Use the back of this paper if you need more space: *A variety of curriculum delivery methods were used including lecture, textbook, cooperative learning, independent study, projects and online.*

After reviewing the above project, please answer the following questions. (Please use the back of this questionnaire if you need more space.):

1. Is this project something you could implement with your students? Why or why not? *Yes. students like to travel even if it s not real. Using a variety of delivery methods will keep students interested.*
2. What specific aspects of this project did you like? Why? *The scope of the project involving reading, English, social studies and some math.*
3. What specific aspects of this project did you *not* like? Why? *None*
4. What changes would you make to adapt this project for your learners?
This would be a good project for both independent study, as well as regular class. I d include weather as part of the project. Finding our weather forecasts (Internet and TV) for travel and insert a need to change routes due to inclement weather.

Betty

Teaching Assignment/Grade(s): *High School Junior English; regular and honors and beginning computer*

Length of time in teaching: *Twenty-one years*

Please describe how you typically deliver curriculum. (i.e. lecture, textbook, cooperative groups, independent student projects, online, etc.)(Use the back of this paper if you need more space: *I use several methods: Lecture, textbook, cooperative groups, online.*

After reviewing the above project, please answer the following questions. (Please use the back of this questionnaire if you need more space.):

1. Is this project something you could implement with your students? Why or why not? *Yes — Students are given clear directions and criteria / expectations are well-explained.*
2. What specific aspects of this project did you like? Why? *The project integrates many skills and allows students freedom to be creative.*
3. What specific aspects of this project did you *not* like? Why? *The project is very lengthy. I prefer shorter units.*
4. What changes would you make to adapt this project for your learners?
I would have students research other countries to develop cultural awareness and appreciation. Also, I would encourage groups and class presentations.

Jim C.

Teaching Assignment/Grade(s): *Grades 9 and 10*

Length of time in teaching: *Nine years*

Please describe how you typically deliver curriculum. (i.e. lecture, textbook, cooperative groups, independent student projects, online, etc.)(Use the back of this paper if you need more space: *I work in the Independent Studies program. My students see me every two weeks. They receive assignments, receive instruction and materials as needed and go over current work. One-on-one instruction, textbooks, online research and projects are used in student assignments.*

After reviewing the above project, please answer the following questions.
(Please use the back of this questionnaire if you need more space.):

1. Is this project something you could implement with your students? Why or why not? *I would like to incorporate this project or one similar to it into my students studies. I like the integrated nature of the project: geography, economics, Internet research and English composition are all developed in this project.*
2. What specific aspects of this project did you like? Why? *I believe the budgeting and decision- making process is very good. Also, I think the practical geographic information is very beneficial.*
3. What specific aspects of this project did you *not* like? Why? *I would prefer an established spending limit, because I believe it would make the project more practical.*
4. What changes would you make to adapt this project for your learners?
I would establish a generous by limited spending amount.

APPENDIX E:
SAMPLE PROJECTS

SECONDARY LEVEL:

To Kill a Mockingbird: Growing up in the 1930s (a WebQuest)

<http://www.slc.k12.ut.us/webweavers/jillc/mbird.html>

By Jill Clark and Jan Hedberg

Introduction

Welcome to the world of Harper Lee's novel *To Kill a Mockingbird*. You are living in the 1930s. Your home, neighborhood, school, activities, clothes and social interactions are vastly different than anything you are familiar with in the 1990s. This WebQuest will take you back in time to learn what your life is like as a young person growing up in the 30s. Using what you learn, write a series of pen pal letters to someone living in 1998.

The Task

You are going to begin by researching the resources listed below to learn about your life in the 1930s. Using the information you learn, you will write four letters to your pen-pal living in 1998. Each letter will focus on the following four aspects of your life.

In your first letter, describe your home and neighborhood in detail. Include lots of specific and interesting information so that the reader of your letter can visualize your environment.

In your second letter, tell about your family. What types of activities do you enjoy as a family? What is your standard of living? How do your parents make a living?

In your third letter, tell about your school and your friends. Describe your school, classes and teachers. Who are your friends, and what are some activities you enjoy doing together?

In your fourth letter, describe what's going on in the world around you. What's happening in the nation politically and economically? Tell about popular fashions, music, radio programs, and other interesting facts.

Resources

To Kill A Mockingbird, Chapter One.

Interview: Growing Up White in the South in the 1930s

<http://library.thinkquest.org/12111/girl.html>

The women in this interview grew up in the deep South of the 1930s. All three were members of prominent southern families.

Interview: Growing Up Black in the 1930s

<http://library.thinkquest.org/12111/mculley.html?tqskip=1>

Interview of Mrs. Peacolia Barge who grew up just outside Birmingham, Alabama, in the 1930s.

"I Remember . . . " Reminiscences of the Great Depression

<http://www.sos.state.mi.us/history/museum/techstuf/depressn/teacup.html>

During the Great Depression of the 1930s, some Michiganians bartered and traded for food, clothes, shelter and services.

Sharing and "making do" became a way of life. People who lived during the Depression have interesting stories to share about how they coped with hard times. The following reminiscences were published in Michigan History Magazine, January-February, 1982 (Vol. 66, No. 1).

Federal Writer's Project: Interview Excerpts

<http://lcweb2.loc.gov/wpaintro/exinterv.html>

The Federal Writers' Project of the 1930s recorded more than 10,000 life stories of men and woman from a variety of occupations and ethnic groups. This site is a sampling of these interviews.

Then and Now: Prices

<http://www.sos.state.mi.us/history/museum/kidstuff/depressn/costlist.html>

This site compares 1930s prices with prices today.

The Great Depression and the New Deal

<http://lcweb2.loc.gov/wpaintro/intro01.html>

Read about the Federal Works Progress Administration started by the federal government during the Depression.

The Great Depression

<http://bend.k12.or.us/jewell2/history/depress.htm>

Read a report written by a student on life during the Great Depression.

The Process

The following instructions will make completion of your task easy!

1. Read the first chapter of To Kill a Mockingbird to familiarize yourself with the setting and characters in this novel. This preparation will help you as you begin to research life in the 1930s.
2. You are going to write four letters in the voice of a person growing up in the 1930s. Before you begin your research, consider the sex, race, and age of the "character" that you will become as you write these letters. You may also want to decide on a name for your character. Also decide who you are going to address your letters to. You might consider writing to a friend, family member or even to your teacher.
3. Begin your research by writing the following topics on the top of 5x8 index cards: Home and Neighborhood; Family and Standard of Living; School and Friends; and Social and Political Events in the 1930s.
4. Begin exploring the resources listed above. You will find that the first four sites focus on personal interviews of people who grew up or lived in the 1930s in various parts of the United States. The last three sites focus on information concerning social and political events in the 30s.
5. As you explore the sites record facts on the appropriate card. Some tips to make note taking more effective include printing excerpts from sites that

you find useful and using highlighters to mark pertinent information. This information can then be recorded, in your own words, on your note cards.

6. When you have collected information about each of the four topics, you are prepared to begin the writing process. This process begins with brainstorming and prewriting followed by the actual drafting of your letters. Remember, you are writing from the perspective of a person living in the 30s. You are explaining your life to a person living in 1998. Your letters should include enough detail and description for your reader to gain a good sense of what your life is like.
7. When you have drafts of all four letters, you will share your letters in two conferencing sessions, one with your teacher, and the other with a member of your class. After conferencing, you will have time to revise your letters and enter them into a word processing program.
8. After your revisions, you and a classmate will work to edit your letters before final publication.
9. You will be required to turn in your four published letters, your note cards, all writing drafts, notes, and highlighted copies of your research. These materials should be presented in an organized, labeled folder.

Evaluation

This WebQuest will be evaluated according to the following criteria:

1. Do you have four complete, revised, edited and typed letters?
2. Is each letter focused on the subjects described in the Task section of this WebQuest? Do your letters accurately describe facts about life in the 30s?
3. Has each letter been written using the writing process? (Brainstorming, Prewriting, Drafting, Response, Revision, Editing, Publication). Do your letters show improvement from first draft to final copy?

ELEMENTARY LEVEL:

THE FOOD PROJECT

From the Project Approach website: <http://www.project-approach.com/>

by Carmelle Workun

This project was undertaken in the fall of 1996 by twenty-seven grade three students at Beau Meadow School in Beaumont, Alberta.

Preliminary Planning

The topic of study was selected based on the children's interests, their daily connection with the topic and the range of curriculum objectives the topic would cover. The teacher brainstormed her own personal knowledge and ideas in a food topic web. The web provided a strong framework for planning, developing and recording the progress of the project.

Phase One

The topic was introduced with the teacher telling a simple story about her favorite meal. The children were encouraged to share their favorite meals and to share their knowledge about food through talking, drawing, writing and construction. Through these avenues the teacher was able to find out what the children knew about the topic.

After the sharing of the children's work the students and the teacher brainstormed and categorized words for a class food web which was displayed on a bulletin board in the classroom. The web was added to and referred to throughout the course of the project.

Early on in the project a newsletter was sent home to the parents by the teacher to inform them about the topic of study and ways that the parents could help contribute to the project. Towards the end of Phase One the teacher helped the children formulate questions about food that they would be interested in finding answers to. A list of these questions was compiled and displayed on the walls of the classroom.

Teachers' Concerns

- Who might be able to help the children with their study on food?
- What resources could we locate for the classroom?

- How could parents be involved?

Phase Two

The teacher arranged for a field visit to the IGA grocery store. The children toured the different departments in the store and interviewed various employees. Using their clipboards the children made drawings and recorded observations while on their visit to the IGA store.

The teacher also arranged for several "experts" to come into the classroom and talk to the children about food related topics. Some of the people that came to talk to the children were; a dietician, a nurse, a volunteer from the Food Bank, and a parent who had a great deal of knowledge about physical fitness and holistic medicine.

The children participated in a variety of activities during the second phase of the "food project." Some of the activities were grinding wheat to make flour, making cinnamon buns, learning about "holistic medicine," engaging in cooking activities, creating surveys, writing research reports, and purchasing groceries.

With the teacher's guidance the children began to represent their new knowledge in a variety of ways. The children made posters, composed class books, wrote stories, made venn diagrams, constructed models, gathered information and created a graph to display the information. These were just a few ways that the children represented the information that they had collected.

Many of the children were interested in cooking. Time was allotted for the children to research recipes and engage in the cooking of these recipes.

Teacher's Concerns

- How many activities should the children undertake in Phase 2 of the project?
- What kind of assessment strategies could be used to monitor the children's learning?
- What could they do to represent what they are learning in the classroom?

Phase Three

The teacher and the children discussed and planned a culminating activity to help celebrate the learning that had taken place during the project. The teacher assisted the children in selecting material to share with Grade One children. The children shared their baking, food games, store models and research with their Grade One friends.

The teacher set up a display in the hallway of the school during parent-teacher interviews that depicted a variety of work that had been accomplished by the children throughout the project.

The children produced a class cookbook that contained all of the children's favorite recipes. As well the children composed a "Class Memory Book." The teacher set out a variety of pictures that she had taken throughout the project. Each child chose a picture and wrote about the picture in detail. The children recreated the life of the food project in its entirety through their eyes and words.

Teacher's Concerns

- How could the food project be brought to a close?
- How to share our project with our parents?
- What are some assessment and evaluation strategies to use?

APPENDIX F:
PROJECT WEBSITES

WebQuests

<http://edweb.sdsu.edu/webquest/webquest.html>

This site is designed to serve as a resource for those who are using the WebQuest model to teach with the web.

S.C.O.R.E.

<http://score.k12.ca.us/>

The acronym “SCORE” stands for Schools of California Online Resources for Education. The site provides teacher-developed lessons that support California content standards and curriculum frameworks.

ThinkQuest

<http://www.thinkquest.org/index.html>

According to the website, “ThinkQuest is a global network of students, teachers, parents and technologists dedicated to exploring youth-centered learning on the Net.”

Through ThinkQuest, “young people work together in teams, use the Internet to research a topic in science, mathematics, literature, the social sciences or the arts, and publish their research as an educational web site for peers and classrooms around the world.”

The Project Approach

<http://www.project-approach.com/>

In addition to descriptions of the project approach and the theoretical foundations of PBL, this site has several examples of projects for grades K-6.

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