AN EXAMINATION OF PROJECT BASED LEARNING IN RELATIONSHIP TO STUDENT SELF-CONCEPT

By Lowrie Fisher

A small U.S. school district explored Project Based Learning (PBL) in response to the problem of disengaged high school students, uninterested in traditional school coursework, structure, and environment. The district implemented PBL to provide an inquiry-based curriculum that focused on individual student interests, autonomous investigative activities, and the development of 21st Century skills that supported communication and interpersonal connections. The participants in this study were high school members of an intact group of students enrolled in a small charter high school. Eighty-six percent of students were eligible to receive free or reduced lunch. A quasi-experimental one-group, pretest-treatment-posttest pilot study examined the possible impact PBL exerted on student self-concept. The Piers-Harris 2 Children's Self-concept Scale measured students' self-perceptions before and after implementation of the 18-week treatment condition (PBL). Seven students participated in the treatment. Results indicated that all students' TOT self-concept scores were higher on the posttest as compared to the pretest. Other increases were found in the Intellectual and School Status subscales for some of the children in the study.

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A Thesis Submitted
In Partial Fulfillment of the Requirements
For the Degree of

Master of Science in Education

Special Education

at

The University of Wisconsin-Oshkosh
Oshkosh WI 54901-8621

May 2010

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CHAPTER I

INTRODUCTION

Many high school students are dissatisfied with their educational opportunities. As a teacher, I have observed them shut down, tune out, and stop making an effort to learn. Research on students' self-perceptions of their academic ability reveals that self-perception can impact school performance and motivation for doing academic and career orientated tasks (Marsh, 1990; Marsh & Yeung, 1998; McInerney, Roche, McInerney, & Marsh, 1997; Elbaum & Vaughn, 2001). Beane, Lipka, and Ludewig report that self-perception is a construct that includes self-concept, and that, "self-concept refers to the description we hold of ourselves based on the roles we play and personal attributes we believe we possess," (Beane et al., 1980, p. 84). Furthermore, Markus and Wurf (1987) defined self-concept, "as a dynamic interpretive structure that mediates most significant intrapersonal processes (including information processing, affect, and motivation) and a wide variety of interpersonal processes (including social perception, choice of situation, partner, and interaction strategy, and reaction to feedback)," (p. 300). Some researchers believe authentic assessment consisting of meaningful tasks designed to improve students' motivation and skill achievement may increase students' self-concept (Lund, 1997).

Karaman and Celik (2008) describe project Based Learning (PBL) in the literature as:

> A model that organizes learning around projects. Learners decide how to approach a problem and what activities to pursue. They gather information from variety of sources and synthesize, analyze and derive knowledge from it. Their learning is inherently valuable because it is connected to something real and involves adult skills such as collaboration and reflection. In the end, students demonstrate their newly acquired knowledge and are judged by how much they have learned and how well they communicate it. (p. 204)

PBL supports authentic student learning activities to engage and motivate students as they strive to answer their own questions. According to Markham, Lamer, and Ravitz (2003), "PBL is the central framework upon which the teaching and learning of core concepts is built, not a supplementary enrichment activity to be undertaken after the hard work of learning is done" (p. viii). Constructivist PBL models allow students to construct knowledge based on a combination of experiences and interactions that result from their questions and ongoing inquiry (Markham et al., 2003). These PBL models, which are primarily student-led and teacher supported, may offer a way to positively affect the self-concept of students, enabling them to become more engaged in school as they experience academic success.

Research Question

Does PBL exert an impact on high school students' self-concept? The author of this pilot study hypothesized that student decision-making, problem solving, and the autonomy involved in PBL investigative activities might exert an impact on student self-concept.

Method and Goal of Study

Students' self-concept was assessed at the beginning of the school year, prior to their introduction to PBL using the Piers-Harris 2 Children's Self-Concept Scale. Students were re-evaluated using the same assessment at the end of the first semester to measure their self-concept after exposure to PBL activities. Chapter III provides a detailed discussion of the methodology, including the formal assessment measure. The goal of this quasi-experimental, one-group pretest-posttest pilot study was to inform the beginning of a long-term examination of PBL's impact on student self-concept, academic and social growth, impact on attendance and behavioral records, and the development of student-generated community connections.

Definition of Terms

Project Based Learning (PBL): involves projects that incorporate "complex tasks, based on challenging questions or problems that involve students in design, problem-solving, decision-making, or investigative activities; give students the

opportunity to work relatively autonomously over extended periods of time; and culminate in realistic products or presentations" (Karaman & Celik, 2008, p. 204).

Self-Concept: is a multidimensional construct clearly defined by Markus and Wurf:

> Self-concept does not just reflect on-going behavior but instead mediates and regulates this behavior. In this sense the self-concept has been viewed as dynamic - as active, forceful, and capable of change. It interprets and organizes self-relevant actions and experiences, it has motivational consequences, providing the incentives, standards, plans, rules, and scripts for behavior, and it adjusts in response to challenges from the social environment". (Markus & Wurf, 1987, pp. 299-300)

21st Century Skills: are skills designed to help students achieve success in the Digital Age, which incorporate digital-age literacies, inventive thinking, effective communication, and high productivity so as to assist students in their ability to communicate, solve real-world problems, and to be better prepared for college and the world of work (The Partnership for 21st Century Skills, 2009).

Authentic: genuine, original, real; as related to PBL, authentic activities are primarily student-generated, teacher supported, and are the result of individual student inquiry. Authentic assessment, as defined by Mintah (2003) is assessment that

> focuses on the product, as well as the quality of performance, and students are more actively involved in the learning process. In addition, students

know how they will be evaluated ahead of the actual assessment, which often results in higher levels of students' interest and motivation". (p. 162)

Project Foundry®: is an Internet based organizational software designed to assist students in planning, organizing, restructuring, and self-monitoring on-going task completion of their PBL work. In the present pilot study, students each had their own account created, monitored, and supported by the teacher.

Overview of Related Research

PBL is defined as an educational approach focusing on projects that incorporate "complex tasks, based on challenging questions or problems that involve students in design, problem-solving, decision-making, or investigative activities; give students the opportunity to work relatively autonomously over extended periods of time; and culminate in realistic products or presentations" (Karaman & Celik, 2008, p. 204). It includes authentic content and assessment, teacher facilitation but not direction, and explicit educational goals (EdVisions 2006-2007). In a PBL classroom, students engage in collaborative and individual research, they make connections with community experts as the strive to answer their driving questions, they learn to recognize when they need assistance with a concept, research topic or project product idea, and they learn organizational and self-regulation skills as they manage their time logs, references, and project proposals.

PBL and 21st Century Skills

PBL may have the potential to positively impact student engagement in the learning process, and the facilitation of student acquisition of 21st century life and learning skills. Twenty-first century skills encompass a variety of technology, collaboration, and thinking skills. Specifically, the Partnership for 21st Century Skills identified five broad categories, including: (a) information, media, and technology skills; (b) learning and innovation skills; (c) life and career skills; (d) global awareness; and (e) financial, health, civic, and environmental literacy (The Partnership for 21st Century Skills, 2009). Students need to develop skills that will enable them to become independent life-long learners who can access, organize, synthesize, and interpret information. Through PBL, students are provided both the structure and flexibility to develop those skills in addition to communication, information, civic awareness, and self-regulatory skills. Because, "self-concept is the way people describe themselves based on the roles they play and the personal attributes they think they possess," (Beane et al., 1980, p. 86), it could be reasonably suspected that PBL & the acquisition of 21st Century skills could contribute to improved student self-concept.

Theoretical Foundations for PBL

Dewey (1938) encouraged experiential learning for adolescents. Vygotsky (1978) suggested a child's development is rooted in society, and that interacting in cooperation with peers awakened various internal developmental processes and

achievements. Both these ideas provide a theoretical foundation for PBL. Brush and Saye (2000) report that Vygotsky suggested the most effective learning environments provided learners with opportunities to negotiate meaning from others in areas that were of personal interest to them (Brush, & Saye, 2000). This is important, as PBL requires the learner's active engagement in the process of constructing meaning. The active engagement may lead to greater academic performance, and possibly a heightened self-concept.

Summary

Self-concept is a unitary construct that is part of self-perception. Self-concept is incorporated from the ideas one embraces about oneself. An individual's personal characteristics or attributes such as how information is processed, emotional affect, motivation, social perception, and strategic interactions with others are all mediated according to feedback received from oneself and others (Markus & Wurf, 1987).

Designed to help students achieve success in the Digital Age, 21st Century skills incorporate digital-age literacies, inventive thinking, effective communication, and high productivity skills in order to assist students in their ability to communicate, solve real-world problems, be better prepared for college, the world of work, and to collaborate with others. Through PBL, students are provided both the structure and flexibility to develop those skills in addition to civic awareness and self-regulatory skills.

PBL is a model that provides students the opportunity to construct authentic questions, which guide their curriculum and requires them to engage in decision-making, problem solving, collaboration, communication, and other real-world adult skills. PBL provides students with the learning environment to develop, and use 21st Century skills through collaborative and individual research, connections with community experts who have knowledge related to the student's driving question, problem solving, and decision-making. Could it be reasonably suspected that PBL and the acquisition of 21st Century skills might contribute to improved student self-concept?

The author of this pilot study wondered if the problem solving, decision-making, investigative activities, and student autonomy inherent in PBL could possibly exert an impact on high school students' self-concept. The method used to assess the possible impact of PBL on self-concept was a quasi-experimental, one-group pretest-posttest pilot study. Using the Piers-Harris 2 Children's Self-Concept Scale, students took a pretest prior to the intervention (PBL), and were given a posttest after 18 weeks of participation in PBL. The goal of the pilot study was to inform a long-term examination of PBL's impact on student self-concept, academic and social growth, impact on attendance and behavioral records, as well as student-generated community connections.

CHAPTER II

REVIEW OF LITERATURE

The impact PBL exerts on student self-concept is an important area to study because self-concept may negatively or positively affect students in their learning process. More diversity in educational format through the inclusion of PBL in schools could prove beneficial for students, especially students who experience school failure or exhibit low self-confidence. An investigation of the relationship between PBL and high school students' self-concept may provide evidence to support using PBL in schools. This chapter defines self-concept, describes PBL in schools, discusses 21st Century skills, provides theoretical foundation for PBL, describes the history of PBL, offers a description of the Constructivist PBL model, explores PBL as a curriculum, and probes student self-regulatory skills and PBL.

Self-Concept and School Success

Self-concept is, "an individual's knowledge about him or herself stored in long-term memory," (Wiesmann, Niehörster, Hannich, & Hartmann, 2008, p. 756). Additionally, "an individuals self-regulated cognitions (e.g. beliefs about one's qualities and attributes) guide his or her information processing and behavior" (Wiesmann et al., 2008, p. 756). An individual can have a low opinion of their ability in one area, such as intellectual capacity and academic achievements, and a high

opinion of their competence or ability in another area, like getting along with peers, popularity, and ability to conform to rules. In a meta-analysis, Elbaum & Vaughn (2001) summarized the literature on school-based interventions used to enhance the self-concept of students with and without learning disabilities. According to their meta-analysis, school experiences affect students' perceptions of their academic ability, social acceptance, popularity, behavior, self-efficacy, and even physical attractiveness. As a result, students' self-perceptions of academic ability can affect their school performance and motivation for academic and career orientated tasks (Marsh, 1990; Marsh & Yeung, 1998; McInerney et al., 1997). In a separate study, Cooley & Ayres (1988) examined self-concept and success-failure attributions of students with learning disabilities with students without disabilities. Two groups of students, ages 10 – 14 were studied. One group consisted of 46 students with learning disabilities (LD), and the other group of 46 students was without disabilities. Self-concept, as measured by the Piers-Harris Self-concept Scale, was correlated with ability and effort attributions. Results suggested:

> that lower overall self-concepts in the students with learning disabilities ($p<.01$) were primarily due to differences in self-concepts regarding intellectual and school status. Attributions regarding internal versus external causes for successes and failures and stable (ability) versus unstable (effort) causes for failures did not differentiate the groups. Subjects with lower self-concepts were more likely to attribute failures to ability. Both self-concept

> and attribution data have implications for academic and motivational interventions. (Cooley & Ayres ,1988, p. 174)

The authors of the study offered that self-concept can directly affect classroom behavior and student approach to academic material, and that student approach to academic material can be affected through interacting factors. Cooley and Ayres's study suggest that interventions aimed at elevating students' self-concepts would be best aimed at their perceptions of their academic abilities (Cooley & Ayres, 1988).

Trying to learn more about the relationship between self-concept and school success, EdVisions, an educational organization, is currently investigating PBL. The long-term study will evaluate the on-going impact of PBL environments on student self-reported feelings of hope (The Hope Study). EdVisions (2006-2007) believes that PBL provides students with a flexibly structured learning environment that fosters student motivation and autonomy. They hypothesize that a PBL learning environment can elevate students' perceptions of their academic abilities, possibly exerting a positive impact on their global self-concept.

Describing PBL in Schools

Although a single concrete definition of PBL was not found in the research base, it has been established that five criteria must be incorporated in the PBL model (Buck Institute for Education, 2003; EdVisions, 2006-2007; Northwoods Community Secondary School [NCSS], 2009). First, an authentic question must drive

the project. This allows students to become engaged in meaningful activities as they struggle to answer the driving question at the root of the project. Second, in PBL the project is the curriculum. State academic standards are at the core of the meaningful activities that constitute the curriculum of a project, instead of the project being peripheral to the curriculum. Third, there are constructive investigations within all projects. Students demonstrate the construction of knowledge, transformation of understanding, and the development of new skills throughout the PBL process. Fourth, the element of autonomy is essential. Ultimately, projects need to be student-driven. Student questions and the inquiry that pursues those questions are what drive PBL projects. Pre-determined outcomes are not part of authentic PBL models, which is why the fifth criteria established that projects do not look like traditional school curriculum products. They are presented to authentic audiences who have meaning to, and are invited by, the students (Buck Institute for Education).

Students with established histories of negative school experiences and who experience feelings of unhappiness and dissatisfaction with school may thrive in a PBL environment. The purposeful and personalized educational environment of a PBL school may impact their self-concept as they experience success. Research indicated that involvement in PBL offered the potential to increase self-esteem, build intrinsic motivation, and provide students with the opportunity to enhance social skills and experience success (Katz, 1994; Wolk, 1994). Central to PBL is the

concept that when students are interested, engaged, and bring prior knowledge or drive to the learning process, they learn more both with regard to content and 21st Century skills development (NCSS, June 2009).

Improving Students' 21st Century Skills

The goal to prepare students with 21st Century skills evolved over time. According to Dewey, "the self is not something ready-made, but something in continuous formation through choice of action" (Cognitive Design Solutions, 2009) Students participating in PBL engage in ongoing development of communication, research, organization, self-regulation, and presentation skills which offers them the opportunity to continuously reinvent themselves. It is conceivable that students' self-concept could be impacted by the skills and opportunities inherent in the constructivist PBL model. The PBL link with 21st Century skills development is rooted in the social process involved in project development, and product or artifact presentation. By engaging students in problem-solving, authentic experiences in which they utilize technology, collaborate with peers, and present their findings, students build 21st Century skills.

The Partnership for 21st Century Skills (2009) summarized that learning and innovation skills (creativity, communication, collaboration, and critical thinking) are recognized as the skills that separate students who are prepared for the complex life and work environments of the 21st century, from those students are not. Table 1

displays McGrath's (2004) summary of the four skills sets of 21st Century skills identified by the *enGuage 21st Century Skills Report.*

Table 1

McGrath's Four Skill Sets Related to 21st Century Skills

	21st Century Skills
Digital Age Literacy	-Basic scientific, economic, and technological literacies -Visual and informational literacies -Multicultural literacy and global awareness
Inventive Thinking	-Adaptability, managing complexity, and self-direction Curiosity, creativity, and risk taking -Higher-order thinking and sound reasoning
Effective Communication	-Teaming, collaboration, and interpersonal skills -Personal, social, and civic responsibility, as well as interactive communication
High Productivity	-Prioritizing, planning, and managing for results -Effective use of real-world tools, and the ability to produce relevant high-quality products

As students progress through a PBL project, they must demonstrate to varying degrees, the acquisition of these 21st Century skills (McGrath, 2004). PBL provided the educational environment that enabled students to learn in relevant, real world contexts through collaboration, creative learning practices, human support, and individual exploration of authentic questions (The Partnership for 21st Century Skills, 2009). This is important because these are skills students will use in the world of work and throughout their lives.

Theoretical Foundation for PBL

Both Cognitive and Constructivist learning theory underlie much of the learning processes involved in PBL. Cognitive theory focuses on the internally governed process of selecting, translating, and recalling information. Additionally, cognitive theory identifies learning as a change in stored knowledge (Cognitive Design Solutions, 2009). Cognitive PBL models have focused on designing projects for high-order thinking processes (Chen & McGrath, 2005).

The Constructivist PBL Model

Constructivist PBL models emphasize that knowledge is embedded in authentic tasks undertaken in meaningful ways, and that learning is a process through which people construct new ideas and concepts based on prior knowledge or experience (NCSS, 2009). Student-generated projects that incorporate calculated guiding questions and answers explored with rigor are hallmarks of constructivist PBL projects (NCSS, 2009). Jones, Rasmussen, and Moffitt (1997) described PBL as based on challenging questions, designed by students, that involved problem solving, decision-making, and investigative activities. Students work autonomously over extended periods of time, resulting in the construction of realistic products and presentations exemplified a constructivist theory of PBL (Thomas, Mergendoller, & Michaelson, 1999). In classrooms, the importance placed on student decision-making, problem solving, and the autonomy involved in the investigative activities

inherent in the constructivist PBL model might exert a positive impact on student self-concept.

Theoretical Distinction

The distinction between a purely cognitive or constructivist model for implementing PBL is not useful because constructivist theory builds on cognitive learning theory. However, constructivist theory places importance on social interaction, discovery, and personal construction of meaning through experience (Cognitive Design Solutions, 2009). PBL models incorporate movement from teacher-directed to student-generated projects. The way to insure that students become proficient at problem solving and inquiry is to simulate the conditions under which experts conduct investigations (Blumefeld et al., 1991), and then to engineer a shift from the cognitive (teacher directed) to the constructivist (student autonomy) method of inquiry.

History of PBL

PBL emerged from the research supporting problem-based learning. The Buck Institute for Education (2003) described the development of Project Based Learning over the past 25 years as the result of two important elements. The first factor that influenced the emergence of PBL was the development of learning theories influenced by cognitive and behavioral models for learning (Buck Institute for Education, 2003). The connection between social learning, background

knowledge, and the acquisition of new knowledge brought about a revolution in the thinking of educators. This research in learning theories gave birth to teaching techniques that took into account the fact that learners use what they already know to interpret, explore, and create in the development of their own knowledge base (Buck Institute for Education, 2003)

The second important development that influenced the promotion of PBL is how different the world is today than it was fifty years ago (Buck Institute for Education, 2003). Teachers who recognized the need for education to respond to the demands of a global economy, and the need for students to be equipped with 21st Century work skills in order to be successful members of the global workforce, developed and worked with PBL (Buck Institute for Education, 2003). McGrath (2004) identified the strong connection between PBL and 21st Century learning skills, as reveled in Table 2.

Table 2

21st Century Skills Connection With PBL

	21st Century Skills			
	Digital Age Literacy	Inventive Thinking	Effective Communication	Highly Productive
PBL Connection	-use of technology-based cognitive and communication tools	-authentic, student-generated driving question	-community of inquiry including rigorous investigations	-construction/ presentation of a project product or artifact

Students engaged in Project Based Learning use communication and presentation skills, organization and time management skills, research and inquiry skills, self–assessment and reflection skills, and group participation and leadership skills (What is Project-Based Learning, 2009).

However, PBL is not a widely accepted pedagogy, despite the claim that it is an effective learning method for prompting disengaged students to become successful learners (Jones et al. 1997). Studies to date have not sufficiently added to the research to provide enough support for the claim that PBL is an effective, research-based learning tool. Rather, the research on PBL has described how PBL links closely with 21st Century work skills, which is positive, but has not empirically demonstrated that PBL works.

In a review of the PBL research, Haight, Kelly, and Bogda (2005) stated that PBL, "has the potential to promote high-level thinking-analysis, synthesis, and evaluation" (p. 7). These learning traits can promote student motivation and achievement. EdVisions (2006-2007) revealed that in over 70 PBL schools students demonstrated increased learning related to 21st Century skills and increased positive student self-concept, as measured by initial results of the Hope Study. This study is an ongoing investigation into the effects PBL has on student self-assessed concepts of hope. Those involved in the Hope Study stated that improved student skills and self-concept positively impacted academic performance and job readiness. Students involved in PBL schools developed problem-solving skills, learned new

technologies, became better communicators, and were more involved in their communities (EdVisions schools, 2006-2007).

Research on PBL as a Curriculum

A limited number of empirical research manuscripts provide evidence of the impact PBL exerts on student self-concept. Rather, much of the literature on PBL is descriptive, providing details of how PBL might be implemented and why it might be effective to raise student self-concept. However, it is unclear as to how PBL relates to curriculum effectiveness, technology, and attitude/skills development. Therefore, a pilot study which leads to further studies to expand the research base on PBL is both timely and warranted. This section describes the limited research that is available.

Kucharski, Rust, and Ring (2005) explored the impact of using a PBL curriculum in an elementary school. They conducted a study of 461, first through sixth grade participants employing both an experimental group and a control group. The effectiveness of a, "comprehensive project-based approach to instruction," (Kucharski et al., 2005 p. 653) called the, "Ecological, Futures, and Global curriculum," (Kucharski et al., 2005 p. 653) was compared with a traditional curriculum. Teachers and students completed post intervention self-report satisfaction surveys. Greater student and teacher rates of satisfaction were reported in the experimental group. Results indicated that grade level was an important

factor in both achievement gains and student attitudes. A weakness revealed by the authors suggested that better control was needed for curriculum participation at each grade level to ensure that more powerful comparisons could be made between PBL and traditional curriculum models (Kucharski et al). The authors established that the degree of individual student participation, per grade level within the curriculum, was necessary to make useful comparisons between the effect PBL and traditional curricula exerted on academic achievement and student attitude (Kucharski et al.). While grade-level participation in the curriculum was shown to be significant, real-world experiences by individuals with a range of cognitive ability was remarkable as reported in the following studies. This study underscored the value of disaggregating data, identifying discrepancies in findings according to a variable such as grade level.

PBL served to provide a bridge between school and the community. Noam (2003) reported observations of a group of third and fourth grade students, of normal cognitive ability, involved in an after school program. PBL created a bridge between school and after-school environments. Students collaborated with school staff to make decisions about their project, choosing to sell their cookies and crafts. Noam (2003) reported:

> this is project-based learning at its best. Here, a group of after-school students democratically conceptualizes goals, learns how to write and revise

> a plan, works together to make creative products, and studies skills that enable them to perform the various tasks. (p. 122)

Noam examined the results of an after school PBL environment that supported collaborative and student-generated projects involving students of normal cognitive ability, which resulted in authentic activities, creative products, and a connection between school and the community.

In a multi-phase experimental study, seven elementary school children with mild cognitive disabilities were selected from a special education class to participate in PBL (Guven & Duman, 2007). Guven and Duman selected this population of students because of the learning limitations they experienced as compared with their non-cognitively disabled peers. Students participated in a variety of activities throughout the three phase PBL intervention. These activities included interaction with family and community members, and visits to local patisserie (a shop where French pastries and cakes are sold). Researchers administered pre- and post-tests to the students, examining whether the PBL activities impacted the students' cognitive abilities. For example, during the authentic pre-post measurement students identified a community location by a picture, and identified of a kind of food that could be eaten at a specific location. Results indicated that students who participated in the three-phase study benefited from the PBL activities (Guven & Duman). The authors concluded:

> As a real life experience was selected as the topic for this study,
> it shows that children can gain benefits through out their life.
> They may use what they learned in their social context and
> this may help their socialization. It is also important because
> it integrates school and social environment in a relevant context. (p. 81)

This study revealed that learning could be enhanced through real-world activities that engage students in events that are authentic and meaningful through connections between school, family, and community. This theme of authentic, meaningful activities that connect students to the world outside of the classroom exemplifies one aspect of PBL.

Allan (2007) also addressed the importance of community and school connections in a study conducted in New South Wales outside Sydney, Australia. The study tried to provide children a voice in the community planning processes because members of the community believed that participation in society is a basic human right. Surveys administered to students nearing the end of sixth grade (comparable with grade six in the U.S.) included both quantitative and qualitative questions. Based on the 311 surveys returned, researchers concluded that, "project-based learning highlights the way theory and constructed knowledge inform each other with a number of benefits to education in the human services field," (Allan, 2007, p. 81). Allan addressed the connection between the construction of knowledge through student engagement in real world activities that connected them to their

community. This indicated that PBL served as a framework for enhancing authentic connections between education and community.

In Israel, researchers examined the contribution of PBL to high-achievers' acquisition of technological knowledge and skills (Mioduser & Betzer, 2008). All participants, 120 high school eleventh and twelfth grade students, were considered high-achievers as evidenced by their academic achievements. The control and experimental groups each consisted of 60 students. The experimental group received three hours per week of traditional instructional methods, followed by PBL instructional methods for six hours per week for two years, providing students with nine hours per week of instruction. The PBL instructional time was added as, "pedagogical means for supporting the students' knowledge acquisition and problem-solving process," (Mioduser & Betzer, p. 60). In comparison, the control group received only traditional learning methods for six hours per week over the two-year period. All participants, in both control and experimental groups, planned and implemented an advanced design project. Researchers asked the question, "do students' achievements (with regard to Machine Control concepts) increase as a result of their engagement in PBL and in comparison with students learning by traditional methods?" (Mioduser & Betzer, p. 67). Student achievement was measured by means of Israeli standardized college entrance exams. Pre-test results revealed that both the control and experimental groups exhibited poor knowledge of the curricular concepts. Post-test results established that while both groups

performed significantly better, the experimental group's gain in, "mastery of the concepts examined," (Mioduser & Betzer, p. 68) was measured at 84% gain in the accuracy of performance on the Israeli standardized college entrance exam given, compared to gains of 52% in the control group.

Mioduser and Betzer's study supports the use of PBL as a teaching pedagogy in high school. It focused on high-achieving students, rather than students struggling academically or students with disabilities. However, the control group received three hours less instructional time per week compared with the experimental group, which may explain the 28% difference in academic gains between the gains of the two groups. Still, the findings do provide empirical support for the use of PBL with high-achieving high school students.

In a study using computer technology, Grant and Branch (2005) conducted a case study at a small, private day school in the southeastern U.S. Five participants were purposefully selected from 61 eighth grade geography students. The study explored how learners incorporated their individual abilities into computer-supported PBL, specifically focusing on learners' points of view. Additionally, the authors analyzed how the computer-mediated artifacts produced in the PBL reflected the learners' individual differences and knowledge gained (Grant & Branch, 2005).

In the geography class, students participated in a PBL project utilizing:

An extensive WebQuest that specifically incorporated Grant's (2002)

> elements of project-based learning and utilized the laptop computers in a more significant manner. In particular, we used the WebQuest site as metacognitive, procedural, and strategic scaffolds (Hill & Hannafin, 2001) to facilitate students' progress through the unit, as well as aid students in managing discrete approaches to tasks, (Grant & Branch, 2005, p. 68)

The case study methodology allowed flexibility for examining the PBL process and the products of learning over time (Grant & Branch). The use of multiple methods, including data collected via self-reported inventories, interviews, and artifacts, helped to triangulate the data and to confirm the findings (Grant & Branch). The authors concluded that the flexibility of the PBL environment allowed participants to make decisions about their abilities, resources and plans.

The use of student self-reporting and the examination of project artifacts should be considered an important contribution to the available data supporting PBL. Grant and Branch (2005) state, "the variety of ways in which the five students in this case study developed their computer-mediated learning artifacts offers significant implications for practitioners and teacher educators, as well as researchers," (p. 90). Researchers judged that the skills discovered and used by these students revealed that opportunities to practice self-regulation and metacognitive skills are necessary for self-managed learning. These skills are "hallmarks of life-long learning and are necessary in the Information Age" (Grant & Branch, p. 93).

Skills necessary for the "Information Age" are synonymous with 21st Century skills development. According to Reigeluth (Cognitive Design Solutions, 2009):

> When we look at the ways society is changing as we evolve deeper into the information age, we can see definite trends in the work place, the family, and decision-making systems. From those changes, we can identify new features that an information-age educational system should have to meet the needs of society. Educators should take this kind of needs-based, system-design approach to improving education. Without such an approach, we will almost certainly be condemned to a system that does not meet society's needs. (www.cognitivedesignsolutions.com, para. 1)

Reigeluth's statement eloquently advocated the need for progressive educational formats such as PBL, which includes self-management skills that are necessary for success in the information-age.

Stewart (2007) examined the self-directed learning skills necessary for success in the PBL environment. Participants were graduate students engaged in an online engineering management course. This study established that high-level self-management skills were necessary at commencement for Masters level engineering students, but did not add to the research base relevant to the impact of PBL at the middle and high school levels. Because graduate students engaged in PBL needed high-level self-management skills in order to be successful in the PBL environment, it might be important to provide high school students with guided support in the

area of self-management with regard to PBL. The roles of task, learner, and mentor of fourth-year interns provided qualitative information regarding how to make the most of the project-based internship programs (Johari & Bradshaw, 2008). This study was important because it extended, "the literature on project based open-ended learning contexts by focusing on the roles of task, learner, and mentor, and whether contemporary motivational theories are applied" (Johari & Bradshaw, 2008, p. 332).

Investigations of Pre-Service Teachers Learning Through PBL

The majority of studies that calculated the impact of PBL on attitude or skills development focused on teachers, rather than on students. These studies are described in terms of their relevance to the impact PBL exerts on student self-concept. One qualitative study included 29 participants in their third year of training at a four-year program in the Department of Computer Education and Instructional Technology at Ataturk University in Turkey. The researchers in this study examined the benefits and challenges of PBL, as well as the solutions to these challenges (Karaman & Celik, 2008). Researchers found that PBL is a convenient learning approach that allows prospective teachers to gain interdisciplinary or multidisciplinary skills. Additionally, Karaman and Celik judged that in order for PBL to be, "an effective learning environment, especially novice learners should be provided guidance and imposed to less responsibility during process," (p. 213). This study demonstrated that novice learners (albeit teachers, not students) need to be

supported during the PBL process. Students in a PBL environment require support, accountability, and guidance to be successful.

A study conducted by Helle, Tynjala, Olkinuora and Lonka (2007) examined incompatibility between students scoring low in self-regulation skills and the demands inherent in the PBL environment. The participants of this study were third year Finnish University students. The authors stated that the work-based project model offered a beneficial impact on the motivation of students who initially scored low in self-regulation (Helle et al., 2008). This is important as university students who scored low in self-regulation skills benefited from PBL and revealed that self-concept may be impacted by low self-regulation skills.

Project Based Learning Model

While PBL may be a way to increase student self-concept and engagement in school activities, it is not meant as an instructional pedagogy for teaching basic skills. Markam et al. (2003) pointed out that, "PBL is not appropriate as a method of teaching certain basic skills such as reading or computation; however, it does provide an environment for the application of those skills" (p. 6). In recent years, many PBL schools reported increased enrollment of students in need of basic skills instruction (EdVisions Schools, 2006-2007). Some PBL schools reported that writing skills were naturally developed through the process of project products or artifacts, but some schools suggested the need for additional writing instruction (EdVisions Schools, 2006-2007). EdVisions Schools, a PBL support network,

suggested that PBL schools incorporate basic skills instruction as necessary. They stated it is important to require a 45-minute block of Sustained Silent Reading (SSR) every day, and that students benefited most when they utilized reading material that they chose.

PBL is more than just hands-on learning; it involves organizing learning around real-life challenges that lead to authentic questions and solutions. PBL spans the divide between teacher-led projects and student-led projects. Presenters at the Northwoods Community Secondary School workshop (2009) for developing and sustaining PBL suggested that PBL promoted essential inquiry skills in students. This process focused on teacher-led projects, which provided students the opportunity to explore the project topic and to demonstrate the ability to produce authentic products.

Self-Regulatory Student Support for PBL

EdVisions (2006-2007) and Project Foundry® (Project-Based Learning Systems [PBLS] © 2009) provide training to teachers utilizing a Constructivist PBL model. They reported that over 70 schools have successfully used their model. They incorporated the five elements of PBL (authentic driving question, projects being the curriculum, constructive investigations with rigor and meaningful activities, student autonomy, and authentic project products or artifacts that are presented to a meaningful audience) in a format that is both structured and flexible. NCSS (2009) reported that through the implementation of Project Boot Camp, and the use of

Internet-based software called Project Foundry®, students moved successfully from teacher-led to student-led projects. Students learned how to use Project Foundry® to develop a PBL proposal, log their work time, research their question, and to complete daily journal questions as required (NCSS, 2009). Project Foundry® is an online software program designed to support PBL. It facilitated student autonomy and provided the vehicle for needed student support. Project Foundry® provided support for teachers challenged with linking content and standards to student projects (NCSS, 2009).

The literature revealed that students who have low self-regulating skills and are involved in PBL need extended support as they worked through PBL projects (Helle et al., 2007). Because Project Foundry® met the need for rigorous support through a variety of software mechanisms, while it preserved student autonomy (NCSS, 2009), it may help to provide needed support for high school students engaged in PBL.

Conclusion

In summary, PBL is an investigative learning model that promoted student autonomy, academic rigor, and relevance. Through PBL activities content can be linked with the 21st Century skills students need to develop as they connect with their communities and become independent learners in a knowledge-based economy (NCSS, 2009). Self-regulation skills need to be supported as students

creatively pursue the answers to their own questions. Although student autonomy is a hallmark of PBL, students need varying levels support as they work through their projects (Markham et al., 2003).

At the same time, PBL lacks substantial influence in education. Teachers entering the profession have not been educated about studies conducted in the area of PBL. According to the Buck Institute for Education (2003) the reason for a lack of administrative and teacher awareness about PBL is because much of the available literature has not been presented in popular periodicals or in books. The research base primarily includes studies that involved post-secondary participants who engaged in technology-based projects that were complicated and largely irrelevant to classroom teachers.

PBL can be supported by increased research attention that examines the breadth and effects of PBL on student academic achievement. The literature identified the need for studies involving measures of learning such as academic achievement, communication, problem solving, metacognitive capability, collaboration, project effectiveness, and student self-reports (Buck Institute for Education, 2003). Because of the perceived potential benefits of PBL environments, there is a need for studies to be conducted on using PBL in schools with participants at the high school level in U.S. public schools.

This pilot study asked the question, does PBL exert an impact on high school students' self-concept? The limited research on PBL involving participants at the

high school level and its impact on self-concept makes such a study timely and worthwhile. As PBL may be an effective learning model for many students, especially students with low academic achievement, it is important to contribute to the research base.

CHAPTER III

METHODS

Through a one-group pretest-treatment-posttest quasi-experimental study, the question of whether PBL exerted and impact on high school student's self-concept was explored. The author of this pilot study hypothesized that student decision-making, problem solving, and the autonomy involved in PBL investigative activities might exert an impact on student self-concept. The Piers-Harris 2 Children's Self-Concept Scale was used to assess student self-concept at the beginning of the school year, and students were re-evaluated using the same assessment at the end of the first semester to measure their self-concept after exposure to PBL activities.

Setting

This pilot study took place at a charter high school including grades nine through twelve in a rural school district in the U.S. Midwest. The students chose to attend this school because they were not satisfied with the traditional school they were attending prior to attendance at the charter school. Most of the students who attended this school exhibited noncompliant behavior, related to a general lack of interest or connection with academics and school, to varying degrees at some point during their prior academic careers.

The pilot study was conducted during the 2009-2010 school year, the school's second year of operation. The school is meant to provide a non-traditional educational environment for students who the district believes would benefit from participating in a small community of learners. The school is located off-site in a building rented by the school district. In addition to the two classrooms, the school consists of three bathrooms, the hallway, a small kitchen, and a small multipurpose room. The kitchen, multipurpose room, and the staff bathroom adjoin the two roughly equally sized classrooms.

Each individual student workspace included a computer, a file drawer, shelves, small bulletin board area, and a chair. The office-like environment is meant to promote engagement in meaningful activities and to develop 21st Century work skills. Other furnishings in the classrooms include tables and chairs for group meetings and presentations, a treadmill for stress reduction and exercise, and two Promethean boards with data projectors and DVD players. For security purposes, five small individual ceiling cameras, which provide live-feed to both the local police station and to the school administrator's computer, film all areas of the school. The administrator occupies an office in another building within the school district.

Participants

All students enrolled in the school participated in the beginning stages of the pilot study. The school kept pretest and posttest academic and behavioral data since

it opened during the 2008-2009 school year. All parents/guardians of the students provided consent for the student data to be used in the pilot study. At that time, the student body consisted of three boys and four girls. The students included two sophomores, one junior, and four seniors. Eighty-six percent of the students who attended the school were eligible for free or reduced lunch; 72% of the students were white, 14% were African American, and 14% Native American/Alaskan Native. PBL was newly introduced to the school.

Method

A quasi-experimental design probed the research question: Does PBL exert an impact on high school students' self-concept? The study followed a one-group pretest-treatment-posttest design, providing an opportunity to analyze the impact of the treatment on self-concept, as measured using the change in participant score on the Piers-Harris 2 Children's Self-concept scale.

Treatment

PBL, the routine curriculum for all students enrolled in the school, served as the treatment for this investigation. Students participated in PBL 2 hours per day, five days per week, for 18 school weeks (one semester). As part of the PBL curriculum, students participated in SSR for 45 minutes per day and logged all PBL and reading time on their Project Foundry® organization/self-management software account. During the remaining hours of their school day, students worked

individually on a standards-based, on-line curriculum working towards their core requirements in math, English/language arts, science, and social studies.

Project Boot Camp, a structured continuum of teacher-to-student-led projects, provided an introduction to PBL. The structure involved daily increments of approximately 1 hour before lunch, and 1 hour in the afternoon prior to the end of the school day. Project Boot Camp was simply the title that identified the structured introduction to PBL during the first 4 weeks of the treatment condition.

During the first 4 weeks of the treatment condition, students were introduced to three key features of the treatment: (a) the advisory group meeting, (b) Personal Learning Plans (PLPs), and (c) Rounding. Advisory group meetings lasted 15 to 30 minutes and consisted of meetings with the entire student body and staff at the start and finish of the day. PLPs, personalized, electronic portfolios, provided students with opportunities to explore their academic and life goals, review their academic and social achievements and progress, and document their PBL accomplishments. The Rounding sessions were in-depth individual conferences with students when self-regulation skills, PLPs, individual issues, questions, and goals were discussed and explored.

During the school day, students were taught the five elements of PBL: (a) identifying an authentic driving question, (b) projects being the curriculum and linked to skill standards, (c) constructive investigations with rigor and meaningful activities, (d) student autonomy, and (e) authentic project products or artifacts,

which were to be presented to a meaningful audience. Additionally, students learned to use the Internet-based software, Project Foundry®, as they moved from teacher-led to student-led projects.

Assessment Measures

During the first week of school students participated in a number of individualized assessments, including standardized reading and math tests and a measure of self-concept. The Piers-Harris-2 Self-concept Scale (Piers, Herzberg, & Harris, 1969, 1969-2002; Piers & Herzberg, 2002) was administered the first day of school to each student. The information from the Piers-Harris provided a measure to assess the impact of PBL on high school students' self-concept. The Piers-Harris was re-administered on the last day of the first semester, after approximately 18 weeks of student participation in the treatment.

The school district psychologist administered and interpreted the Piers-Harris-2 scores because the test manual indicated that a professional with appropriate training in psychological assessment should provide interpretation of results (Piers & Herzberg, 2002). This self-concept instrument provides a wide-band measure that provided insight into students' individual perceptions of their strengths and difficulties (Piers & Harris, 1984). For the purposes of this pilot study the Piers-Harris 2 provided information relative to the major obstacles students' perceived in their lives, which is what was needed. This instrument took only a short time to administer (10 to 15 minutes), and provided measures of students'

concept of themselves according to the domain subscales. Results from this pilot study informed the researcher as to the strength/weakness of the measure, and the possible need for additional or different measures when conducting the full study.

Interpretation of the Piers-Harris-2

Student self-concept was measured using the Piers-Harris-2 Self-concept Scale. The Self-Concept Scale is a 60-item self-report questionnaire designed to assess self-concept in children ages 7 through 18. The test provided a Total Scale Score (TOT) and six domain subscale scores. This raw data approximates a normal distribution, and the normalized raw scores were converted to standardized T-scores with a mean of 50 and a standard deviation of 10 (Piers & Herzberg, 2002, p 17). This is important because it makes allows comparing relative elevations between subscales (Piers & Herzberg, 2002).

Total Self-Concept

The TOT provides a measure of general, or global, self-concept. TOT scores can be interpreted as high, average, and low. Scores interpreted as high (T-scores are greater than or equal to 60), represent individuals who reported a generally positive appraisal of self. The Average Range T-scores (40-59) represent the normal range of a balanced self-concept, which encompasses an awareness of both positive and negative aspects of self. Low Range scores (T-scores less than or equal to 39) represent individuals who generally lack self-confidence, are easily discouraged, and view themselves as less competent than their peers.

Subscale Scores

The domain subscales measure specific aspects of self-concept, and strengths and weaknesses in self-image. On all subscales, higher T-scores indicate a high degree of self-esteem or self-regard, and lower T-scores are associated with a more a negative self-concept. The subscale scores can determine relative strengths and weaknesses. The six domains include: (a) Physical Appearance and Attributes, (b) Intellectual and School Status, (c) Happiness and Satisfaction, (d) Freedom from Anxiety, (e) Behavioral Adjustment, and (f) Popularity. The domain subscales utilize slightly different guidelines for interpretation. Above Average scores are greater than or equal to a T-score 56. The average range includes T-scores from 40-55. T-scores less than or equal to 39 are considered low. Table 3 provides a description of what each domain measures (Piers & Herzberg, 2002).

Table 3

Piers-Harris 2 Children's Self-Concept Scale: Six Domain Sub Scales

Domain	Acronym	Description
Physical Appearance and Attributes	PHY	Self-assessment of the respondent's physical appearance and the attributes of leadership, and ability to express ideas
Intellectual and School Status	INT	Feelings about intellectual abilities and satisfaction with respect to school and personal relationships
Happiness and Satisfaction	HAP	Respondent's overall feelings of happiness with life
Freedom from Anxiety	FRE	Self-reported feelings of unease or generalized dissatisfaction; includes the emotional categories of generally feeling left out of things, and the specific emotional categories of worry, shyness, sadness, nervousness, and fear
Behavioral Adjustment	BEH	Denial or admittance of problematic behavior related to both school and home
Popularity	POP	Respondent's self-perception of his or her popularity, ability to make friends, feelings of inclusion in games and sports activities, and evaluation of social functioning.

Indicators of Reliability and Validity

The Piers-Harris-2 includes two indicators to assess the reliability of the responses (response bias and inconsistent responding). Response bias measures a respondent's tendency to agree or disagree with test questions irrespective of the content of the question. Negative response bias relates to the respondent's tendency to answer no regardless of the content, and positive response bias refers to the respondent's tendency to answer yes, regardless of the content of the question

(Piers & Herzberg, 2002). Inconsistent responding was designed to help discover random response patterns that would be illogical. For example, two questions designed to detect random responses are, "Item 5 ("I am smart") and Item 43 ("I am dumb about most things"). The presence of many inconsistent response pairs may indicate that the child responded randomly" (Piers and Herzberg, 2002, p. 20). The internal consistency score measures the consistency of responses within the measure. Estimates for the TOT and domain scores are considered adequate with Cronbach alpha above .70. Test-retest reliability studies were conducted on the earlier scale and are considered by researchers as acceptable (Benson & Rentsch, 1988; Box & Little, 2003; Mintah, 2003).

Validity of the scores from the Piers-Harris 2 was examined to determine whether the items (questions) deleted from each domain in the original Piers-Harris Children's Self-Concept Scale, continued to be represented by the remaining items in each domain on the Piers-Harris. Examiners reviewed the test, and judged it, determining that the deleted questions were represented in the Piers-Harris 2 Children's Self-Concept Scale. Construct validity was assessed through factor analysis supported the rationally generated domains (Piers et al., 1969, 1969-2002).

Argument for Rigor of This Method

Quasi-experimental designs are considered less rigorous than experimental designs because there is no control group or random assignment, and therefore researchers cannot control for interfering variables. Borg and Gall (1989) reported,

"the one-group pretest-posttest design is especially appropriate when you are attempting to change a behavior pattern or internal process that is very stable," (p. 672). For this study, a one-group pretest-posttest design was appropriate since it measured self-concept, which is considered to be a stable internal process. As analyzed by Marsh and Yeung (1998),

> The global self-concept is stable, but as one descends the hierarchy, self-concept becomes increasingly situation specific and, as a consequence, less stable. Thus changes at the lower level of the hierarchy are probably attenuated by conceptualizations at higher levels, making these specific self-concepts resistant to change, whereas to change global self-concept, many situation-specific instances inconsistent with global self-concept would be required. (p. 509)

Additionally, because the school is an intact group and the routine curriculum of the school is the intervention, it would be impossible to create a control group.

Pretest and posttest self-reporting was the best method to examine the research question. The school psychologist in the district recommended the Piers-Harris-2 Self-concept Scale to measure student self-concept in our school. A school district psychologist administered the test in an effort to control for possible teacher influenced bias as perceived by participants.

Institutional Review Board [IRB]

This study received Institutional Review Board approval from the University of Wisconsin, Oshkosh. Please refer to Appendix A: Permission Form from the school district, and Appendix B: Parent Informed Consent letter, and Appendix C: IRB Approval letter.

Timeline Summary

This pilot study began on the first day of the 2009-2010 school year and concluded at the end of the first semester of school (18 weeks). For an average of 2 hours per day, students participated in PBL. The PBL environment included structured advisory group time, which met twice a day: in the morning for 15 minutes, and in the afternoon for 30 minutes. Advisory group time was dedicated to student needs. Students shared problems and solutions with regard to answering their projects' driving questions, conducting research, working autonomously, and other aspects of their PBL work, which included support for one another during the movement from teacher-directed (cognitive) to student-initiated (constructivist) autonomous project work.

Advisory time was designed to promote the development and support of meaningful tasks that were designed to improve students' motivation and 21st Century skills achievement, including self-assessment of project process and progress. Lund (1997) found that authentic assessment including meaningful tasks increased students' self-concept.

Summary

This one-group pretest-treatment-posttest quasi-experimental pilot study, designed to probe the possibility of PBL exerting an impact on high school students' self-concept, took place at a charter high school in the in a rural school district in the U.S. Midwest. Students chose to go to the charter school because they were dissatisfied with the traditional public school. Most of the students had previously exhibited noncompliant behavior related to attendance or a lack of interest and connection to school and the academic curriculum. The school provided a non-traditional environment, which incorporated individual student workspaces designed to encourage the development of 21st Century work skills and to support a small community of learners engaged in PBL.

The participants were an intact group consisting of seven students, which at the time of the pilot study, the entire student body. The treatment, PBL, was the routine curriculum for all students enrolled in the charter school, and was newly introduced to the school. Students engaged in PBL for 2 hours a day for 18 weeks. During this time, they also participated in SSR for 45 minutes daily, and self-managed their projects. Additionally, students worked on English/language arts, science, math, and social studies core requirements via an on-line standards-based curriculum.

The assessment measure used was the Piers-Harris 2 Children's Self-concept scale, which provides a wide-band measure that offered insight into students'

individual perceptions of their strengths and difficulties. The school district psychologist administered and interpreted the test scores, which provided information about what students perceived to be major obstacles in their lives.

CHAPTER IV

RESULTS

This quasi-experimental pilot study explored the effect of PBL learning self-concept. To assess self-confidence, a school psychologist administered The Piers-Harris 2 Children's Self-Concept Scale provided a quantitative measure of student self-concept before and after implementation of the intervention (Piers et al., 1969, 1969-2002). During the intervention, students engaged in a PBL curriculum, including 45 minutes per day of Advisory time and 2 hours per day of time devoted to engagement in a student-led project. The pilot study lasted 18 school weeks, the first semester of the 2009-2010 school year.

Self-Concept Data

Table 4 summarizes student total subscale scores of the Piers-Harris 2, as interpreted by a licensed psychologist. The higher the number, the more positive self-concept reported in that subscale area of the test. The psychologist's report provided interpretation of the pre-test and post-test information for each student.

Table 4

Student Pre and Post Results of the Piers-Harris 2 Children's Self-Concept Scale

	Subscale Scores													
	Behavioral Adjustment		Intellectual and School Status		Physical Appearance & Attributes		Freedom from Anxiety		Popularity		Happiness & Satisfaction		Total Scale	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Student 1	31	-	44	-	45	-	51	-	36	-	59	-	40	-
Student 2	37	-	44	-	40	-	54	-	44	-	43	-	41	-
Student 3	43	54	59	59	65	52	65	65	60	68	59	59	60	63
Student 4	46	62	40	51	48	52	54	65	47	60	59	59	48	60
Student 5	37	31	44	39	52	48	54	46	47	46	47	59	45	38
Student 6	62	62	46	54	58	48	43	54	47	50	51	59	48	55
Student 7	39	39	44	54	40	52	43	41	44	44	43	43	40	44

Notes. Students and 1 and 2 did not complete the post-test. Student 5's data represents an elevated Response Bias scale (she answered yes to most questions regardless of content), and is therefore to be considered with extreme caution. All Students' TOT self-concept was higher on the posttest as compared to the pretest, but only Student 4 revealed a positive range change in TOT or global self-concept (considered the most stable) from the Average range (positive & negative view of self) to the High range (positive view of self). From Piers, E. V., & Herzberg, D. S. (2002). Piers-Harris children's self-concept scale: Manual (2nd ed.) p. 4. Los Angeles, CA: Western Psychological Services.

Student One scored a total self-concept score of 40 on the pretest, which is in the Low Average range. Before the posttest was administered, Student One was dismissed from the school due to extreme behavioral difficulties, which interestingly may have been predicted based on her low self-assessed Behavioral Adjustment score (31). This suggested that she sees herself as having significant behavioral difficulties, and that sees herself as frequently causing trouble and not being able to meet behavioral expectations of teachers and parents

Student Two scored in the low range on the total self-concept measure (41). Unfortunately, Student two was dismissed from the school due to issues with attendance, and therefore there is no posttest data.

The pretest-posttest data comparison revealed that Student Three's Behavioral Adjustment was in the Low Average range (43) at the pretest time, and the Average range (54) at the posttest time. This data suggested that he perceived himself as having more difficulties managing his behaviors than did peers from the normative group used for the test at the time of the pretest. However, at the time of the posttest he saw himself as well behaved while acknowledging a few difficulties in the area of Behavioral Adjustment. There was little or no change in the pretest and posttest measures of the remaining domains. In summary, Student Three's total self-concept was in the High Range on both the pretest (60) and on the posttest (63), which suggested that he had a positive attitude about himself before and after the implementation of PBL.

Student Four's Total self-concept score increased from the Average range on the pretest (48) to the High range on the posttest (60). This indicated that Student Four recognized both positive and negative aspects of his self-concept as measured by the pretest scale, and suggested that he increased in his confidence of his abilities, and experienced an increase in positive self-concept, as measured by the Total posttest score. Student Four's subscale score in the area of Behavioral Adjustment were in the Low Average range on the pretest (46), and in the Above Average range (62) on the posttest. This indicated that he viewed himself as having more difficulties managing his behaviors at the time of the pretest than he did at the time of the posttest, at which time he viewed himself as well behaved at home and at school. He rated himself in the Low Average range (40) on the pretest in the subscale area of Intellectual and School Status, and in the Average range on the posttest (51).

This change in score suggested that at the time of the pretest, he viewed himself as generally performing well in school despite occasional difficulties, and at the time of the posttest he viewed himself as generally performing well in school. Student Four rated himself in the Average range during both the pretest (48) and the posttest (52) for the domain area of Physical Appearance and Attributes. This suggested that he identifies more positive aspects of his appearance and attributes than negative. The scale of Freedom from Anxiety was in the average range at the time of the pretest (54), and in the Above Average range at the time of the posttest

(65). This suggested that at the time of the pretest Student Four reported mostly positive emotional states with occasional difficulties with mood, and that at the time of the posttest, he reported rarely feeling sad, worried, or having experienced unpleasant moods. In the area of Popularity Student Four scored in the Average range on the pretest (47), and in the Above Average range on the posttest (60). This suggested that Student Four reported general satisfaction with interpersonal relationships with occasional difficulties at the time of the pretest, and at the time of the posttest he reported positive personal relationships with friends.

Finally, Student Four's Happiness and Satisfaction scale was in the Above Average range at both the time of the pretest and posttest (59). This suggests that he viewed his overall life experiences as positive both at the time of the pretest and the posttest. The increase in Student Four's TOT score indicates that his global self-concept increased from the Average to the High range after exposure to the PBL educational environment. While this measure does not infer cause and effect, it does raise the possibility that PBL could possibly have had a positive impact on this high school student's global self-concept.

Student Five's total self-concept was in the average range at the time of the pretest (45), and in the Low Average range (38) at the time of the posttest. The change represents a decrease in positive self-concept at the time of the posttest, but it is important to note that the psychologist stated Student Five's Response Bias Scale was significantly elevated. This suggested that Student Five responded yes to

most responses, which may have impacted the validity of the assessment for this student. Results of Student Five's posttest should be interpreted with caution, as she was very upset when she came to school and took the posttest assessment. The posttest data suggested that she saw her life in a more positive light, but as previously mentioned, posttest results for Student Five should be interpreted with caution due to the Response Bias Scale elevation, which indicated that student five tended to simply agree, or respond yes to test questions.

Student Six's TOT self-concept scale was in the Average range at pretest (48) and posttest (55), indicating that there was slight measurable change in total self-concept. Table 4 displays all domain sub scale scores, as well as the total self-concept score.

Student Seven's Total self concept scale was in the Low Average range at both the pretest (40) and the posttest (44), which suggested that this student saw positive and negative aspects of herself at the time of the pretest and at the time of the posttest, indicating no change in general or global self-concept. The domain subscale scores, which were factored into the Total self-concept score, are reported in Table 4.

Data Summary

It is possible that PBL investigative activities exerted a positive impact on student self-concept, suggested specifically in the area of Intellectual and School Status, as indicated by scores reported by Students Four, Six, and Seven on the

Intellectual and School Status subscale domain. It must be acknowledged that this suggested relationship between PBL activities and student self-concept did not imply causality, but appeared to identify a possible positive influence exerted by a PBL educational environment. Table 4 revealed that 60% of the students who completed the posttest demonstrated increased self-concept as measured by the Intellectual and School Status domain subscale. Excluding Student Five's data due to an elevated Response Bias Scale, increases in student scores on the Intellectual and School Status subscales rises to 75%.

The most reliable and best-researched measure on the Piers-Harris 2 is the Total Score (TOT), measuring general or global self-concept (Piers and Herzberg, 2002). An increase in students' TOT score was reported by 80% of the participants, which represents four out of the five students who participated in the posttest data collection. Student Three's TOT score was in the High range on the pretest (60) and on the posttest (63). Student Four reported enough change in self-concept to raise his TOT score from the Average range (48) on the pretest to the High range (60) on the posttest. Student Four reported increased confidence of his abilities, and an increase in positive self-concept after participating in PBL for 18 weeks, which is interesting even though no cause and effect can be established. Student Five's decrease in TOT after exposure to PBL represents a decrease in self-concept, which should be interpreted with caution because she was emotionally upset at the time of the posttest evaluation, and registered high on the Response Bias Scale. This

indicated that she answered positively or yes to most questions irrespective of content. Student Six reported a TOT score in the Average range at both the pretest (48) and the posttest (55), revealing that there was measurable positive change in total self-concept, but not enough to indicate a change in range category. Finally, Student Seven's TOT score was in the Low Average range at both the pretest (40) and the posttest (44). Her results indicated that although there was measurable positive change in her total self-concept score, her general or global self-concept remained the same after participation in PBL.

Conclusions

In conclusion, 25% of students reported a positive increase in TOT self-concept score from the Average range to the High range. Excluding the unreliable data from Student Five, 75% of students reported an increase in self-concept on the domain subscale of Intellectual and School Status.

CHAPTER V

DISCUSSION

Self-Concept and PBL

The present pilot study asked the question: does PBL exert an impact on high school students' self-concept? Wiesmann et al. (2008), report that "psychologists refer to the *self-concept* as an individual's knowledge about him or herself stored in long-term memory" (p. 756). Self-concept influences students academically and socially (Banks & Woolfson, 2008) and is not a unitary construct. A person can have a low opinion of their ability in one area, and a high opinion of their ability, or perception of competence in another area. Children involved in PBL experienced benefits including increased resource-management skills, research/communication skills, and problem-solving ability (The International Society for Technology in Education, 1997). Participation in PBL could potentially impact student self-concept as individuals developed independence in academic pursuits, and expertise in utilizing 21st Century global economy skills.

The Constructivist PBL model implemented in this pilot study allowed students to construct knowledge based on a combination of experiences and interactions, which required the learner's active engagement in the processes of constructing meaning, decision-making, creative problem solving, communication,

collaboration, and critical thinking. The PBL activities implemented were initially teacher-led, and progressed over the 18-week period of the study into primarily student-led projects. As students began to work independently, they were more willing to research tougher questions, and conduct interviews with community experts. By the time they were ready to present their first projects all students were willing to invite parents, friends, and select community members. They appeared to feel good about their work and wanted to share what they had learned with others. Although a quasi-experimental pilot study cannot determine cause and effect, and should only with caution imply a possible relationship, it certainly can be suggested that PBL activities have the potential to positively impact high school students' self-concept. It's interesting that the two domain subscales in which three out of four participants (Student Five excluded) reported an increase in self-concept are the domains of Intellectual and School Status and Popularity. I view this as important because PBL addresses intellectual curiosity and rigor, as well as incorporating an emphasis on communication skills.

Implications for Future Research

The measured increase in student self-concept supports the need for further research into the effects of PBL on student achievement, happiness, and acquisition of the 21st Century skills needed for successful participation in the global economy. Further research, which should include a larger sample size of participants and

additional measures for the assessment of self-concept, could contribute to the research base exploring educational pedagogy. Self-concept measurements reported over the span of all 4 years of high school may provide a more thorough assessment of global self-concept development, examined in relationship to PBL. Additionally, attendance and behavioral records, academic achievement records, and data revealing engagement in post high school academic programs could be evaluated. Ideally, another high school in the school district could provide a PBL educational environment to a portion of students so a control group could be developed.

Limitations of the Study

There are a number of limitations to this study. The data collected relied on a very small sample size, collected over a short period of time. Other limitations include that only self-concept was measured, using one measurement tool. Furthermore, information from teachers or family members was not sought to provide additional feedback or opinions of how student self-concept changed during the intervention. The lack of a control group also limits the findings of this study. Because PBL was an inextricable part of the school curriculum excluding a group of students from participating in a PBL learning environment was not possible.

Recommendations

In the school where the present pilot study took place, it is recommended that use of the Piers-Harris 2 Children's Self-concept scale be continued on a twice-yearly basis; the first day of school and the last day of school of each school year, so as to collect self-concept data over a longer period of time. Multiple measurements for assessing self-concept should be considered. Additionally, students should be encouraged to self-evaluate on a weekly basis. They could do this by writing at least one sentence about what they learned, or problems experienced during their participation in PBL, and these weekly statements should be included in their PLPs. Students should also discuss ways in which they think PBL has impacted them with regard to both academics, and acquisition of life-long learning skills. Attendance, behavioral, and academic achievement data should be measured at the beginning and end of each school year.

Across a larger education audience, the results of this study suggest that students in a traditional school setting might benefit from being provided with opportunities to develop authentic questions, and provided with the support to execute autonomous research activities in search of answers to their questions. It is recommended that content area instructors provide opportunities and time to allow their students the flexibility to discover some of their own true interests. When a student has formulated a question, the traditional classroom teacher can support the student by helping him link the content of his inquiry to a state standard within

any content area, and then help the student determine how the knowledge gained will be shown (project product or artifact).

It is anecdotally evident in our school, that when students are supported in researching answers to genuine questions they have about something, they begin to develop a sense of personal strength, academic curiosity, and a willingness to search for answers in collaboration with other people. This environment of inclusion, communication, and student-generated questions, which drive their inquiry and intellectual development, can be embedded in most educational environments. A genuine willingness on the part of administration and teachers to provide opportunities that facilitate movement from a primarily cognitive pedagogy to a more constructivist model of learning may increase the motivation and skills of students. PBL offers a wide range of curriculum options to support a more individualized education opportunity for all students.

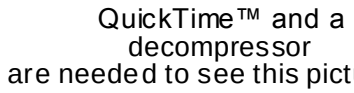
Conclusion

Although this pilot study can only suggest a possible relationship between PBL and high school student self-concept, PBL was successfully introduced into the school, and the hope of motivating and engaging students academically and socially was realized. Based on these research findings, it is conceivable that there may be an unmeasured positive relationship between PBL and student self-concept, which warrants further investigation. Students who participated in the PBL curriculum

clearly enjoyed school more than they did last year, when the curriculum did not include PBL or a non-traditional school environment.

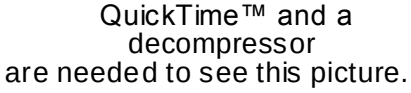
APPENDIX A

Permission From School District



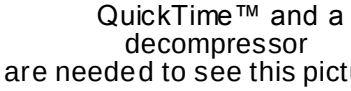
APPENDIX B

Consent Document



APPENDIX C

IRB Letter of Approval



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APPENDIX A

Permission From School District

[redacted] School District

[redacted]

July 14, 2009

U. W. Oshkosh Institutional Review Board
Application for Research approval
Dr. Rylance & Dr. Skoning
Department of Special Education
800 Algoma Boulevard
Oshkosh, WI 54901

Dear Institutional Review Board:

I am writing to inform you that U. W. Oshkosh graduate student, Lowrie Fisher, has school district approval to run a research study at [redacted] Because our district does not have an Institutional Review Board, it is determined that U. W. Oshkosh IRB approval is sufficient approval. It will be beneficial for [redacted] to run this pilot study. We are beginning a new Project Based Curriculum this fall and are very interested in the question this pilot study will be investigating: Does Project Based Learning exert an impact on student self-concept? Lowrie Fisher is the Dean of Students & Lead teacher at [redacted] She has permission to access and use school documents and data for research purposes. Ms. Fisher, in her position at [redacted] has standard access to all school documents.

Sincerely,

[redacted]
Administrator of [redacted]
Director of student Services
[redacted] School District

APPENDIX B

Consent Document

Dear Parent/Guardian:

[redacted] is beginning Project Based Learning (PBL) this school year (2009-2010). We are very excited and anticipate a vigorous and inspiring academic school year for your child. [redacted] will continue the tradition of parent/student surveys for your input regarding various aspects of the [redacted] academic, social, and community-connections activities. With the advent of Project Based Learning [redacted] will begin standardized testing in the areas of academics (MAPS test), and self-concept (Piers-Harris-2 Self-concept Scale, and the HOPE survey). The pre and post test results will help us ensure a rigorous curriculum for [redacted] students, as well as to provide valuable information regarding student progress that will enable us to better inform personalized instruction for students as they progress through their high school years. All test data is confidential, and will help to inform students about their strengths and weaknesses. Students will participate in advisory group meetings (similar to last school year, only more formal and democratic), and will be actively involved in their own Personalized Learning Plans (PLP).

The purpose of this letter is to inform you of a pilot study we will be conducting first semester at [redacted] to answer the question, Does Project Based Learning exert an impact on student self-concept? All students will be participating in the Project Based Learning curriculum, whether or not they are participants in the study, they won't be doing anything different. The survey data that will be collected is part of the normal routine curriculum for [redacted] We are asking for your permission to use your child's self-concept data for research purposes only, to help answer the question, what impact Project Based Learning exert on student self-concept? Consent to participate will help us in our ongoing efforts to improve instructional delivery for [redacted] and our students. If you decide not to allow your child to be a participant in the study he or she will experience no negative impact. All information gathered and analyzed will remain confidential and names will not be released under any circumstances. We encourage you to contact us if you have any questions or concerns.

I give consent for Lowrie Fisher to use the routine curriculum data collected at [redacted] in her field report study. All data will remain confidential, in a locked file cabinet, and names will not be released under any circumstances. If I have any questions, I can contact Lowrie Fisher [redacted] (phone [redacted]) I can also contact a representative from the Internal Review Board for the University of Wisconsin Oshkosh (920-424-1415).

Parent/Guardian signature: _____ Date: _____

Researcher's signature: _____ Date: _____

APPENDIX C

IRB Letter of Approval

THE UNIVERSITY OF WISCONSIN
OSHKOSH

August 21, 2009

Ms. Lowrie Fisher
[redacted]

Dear Ms. Fisher:

On behalf of the UW Oshkosh Institutional Review Board for Protection of Human Participants (IRB), I am pleased to inform you that your application has been approved for the following research: Project Based Learning.

Your research protocol has been classified as EXEMPT. This means you will not be required to obtain signed consent. However, unless your research involves **only** the collection or study of existing data, documents, or records, you must provide each participant with a summary of your research that contains all of the elements of an Informed Consent document, as described in the IRB application material. Permitting the participant, or parent/legal representative, to make a fully informed decision to participate in a research activity avoids potentially inequitable or coercive conditions of human participation and assures the voluntary nature of participant involvement.

Please note that it is the principal investigator's responsibility to promptly report to the IRB Committee any changes in the research project, whether these changes occur prior to undertaking, or during the research. In addition, if harm or discomfort to anyone becomes apparent during the research, the principal investigator must contact the IRB Committee Chairperson. Harm or discomfort includes, but is not limited to, adverse reactions to psychology experiments, biologics, radioisotopes, labeled drugs, or to medical or other devices used. Please contact me if you have any questions (PH# 920-424-7172 or e-mail: rauscher@uwosh.edu).

Sincerely,

Dr. Frances Rauscher

Dr. Frances Rauscher
IRB Chair

cc: Stacey Skoning/Billie Jo Rylance
1650

APPENDIX A

Permission From School District

[redacted] School District

[redacted]

July 14, 2009

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Parent/Guardian signature: _____ Date: _____

Researcher's signature: _____ Date: _____

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IRB Letter of Approval

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OSHKOSH

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Sincerely,

Dr. Frances Rauscher

Dr. Frances Rauscher
IRB Chair

cc: Stacey Skoning/Billie Jo Rylance
1650