Stakeholder Perceptions of the Implementation of Project-based Learning in Pennsylvania Middle Schools

by

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ABSTRACT

This study examined the perceptions of students, parents, teachers, and administrators regarding the implementation of project-based learning in Pennsylvania middle schools. A multiple case study design was chosen for this study. Using this qualitative design was purposeful in order to tell the rich, detailed story of three Pennsylvania middle schools. The three schools, with very different demographic profiles, were chosen based on their advanced use of project-based learning. The researcher sought to answer the questions of how project-based learning was implemented in each school site, including the barriers and keys to success. In addition, stakeholder perceptions were gathered with regard to advantages and disadvantages of project-based learning, as well as the impact project-based learning has on the process and products of learning.

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Chapter 1

INTRODUCTION

A school bus carrying seventh graders from Avonworth Middle School pulls into the Avonworth Community Park on a crisp, April morning. As the students depart the bus, the president of the park board, Ed Gould, meets them and their teachers. Mr. Gould greets the students and takes them on a tour of the park that includes a brief history. "This park dates all the way back to the early twentieth century," Mr. Gould remarks. "It has a rich history that is tied to the name of the road that led you here – Camp Horne Road." Mr. Gould further explains the challenges and potential of the park, "We have 140 acres here. We want this to be the hub of the community. It has incredible potential, but unfortunately also some challenges. We are counting on you to help us bring this to fruition. We have the money. What we need are your ideas."

This is the beginning of a planned project-based unit for the seventh grade at Avonworth Middle School. Before it is finished, students will use the problem of how to make Avonworth Community Park a viable destination for community families the driving force behind their learning. By the conclusion of this project-based unit, students will be able to identify the native flora of Pennsylvania, as well as invasive species of plants. They will understand how to develop marketing plans to showcase the park, and how to use geometry to investigate the best parking configuration to maximize capacity and safety. Students will use interior design concepts to refurbish the buildings on the park property and artistic design to attract attention to the park. Students will be able to properly handle primary source documents for research purposes. They will use digital

media tools to create vodcasts for the park website, chronicling its history and recording memories of visitors to the park.

As ambitious as this project sounds, it has been planned out by the seventh grade team of teachers representing math, English, science, social studies, art, family and consumer science, and, health and physical education. The learning concepts have been based on the Pennsylvania Common Core Standards. These teachers, supported by the building principal and curriculum director, challenged themselves to think differently about how to engage their students in the learning process. They chose to blur the lines between their subject areas, and to use the real-world problems of the park as the motivating force to facilitate learning. They challenged their own comfort zones by changing their role from dispensers of information to facilitators of learning. The teachers also stressed the importance of emphasizing student collaboration, communication, creativity, and critical thinking in the project, recognizing their value in today's society and workplace.

While this approach sounds innovative and new, the concept of project-based learning is not. The principles of learning through experience date back well over 100 years, although its universal acceptance has failed to take hold. Even today, it is the exception rather than the norm regarding traditional instructional practice in America's public schools (Barron et. Al., 1998; David, 2008; Thomas, 2000; Waks, 1997). However, project-based learning is regaining momentum as research delivers evidence of its effectiveness to engage students and prepare them for the unique challenges of the 21st century (Bell, 2010; Rotherham & Willingham, 2009; Pacific Policy Research Center, 2010).

The Commitment to the Creative Classroom

In 2010, Bronson and Merryman published "The Creativity Crisis in America" in Newsweek magazine. This article reported a decline in the creativity of American students based upon the work of psychologist E. Paul Torrance and his colleague, Garnett Millar. The Torrance Test of Creative Thinking, originally developed in the 1960's, received an excellent rating by the Center for Creative Learning for reliability, validity, and interpretation and is the most widely used assessment of creative talent (Sternberg, 2006; Stewart, 2007). Over the last 50 years, creativity scores of students and their related accomplishments have been tracked. Nearly 300,000 subjects have been tested over this time period. Following testing for creativity, the accomplishments of subjects were tracked. These accomplishments included patents, entrepreneurial endeavors, awards, and published. Subjects who performed well on the Torrance Test often displayed a great deal of success in professional life. Most recently however, continued analysis of Torrance Test subjects has revealed the first ever decline in creativity. Researcher Kyung Hee Kim at the College of William and Mary found a dramatic and steady decline in the creativity of American schoolchildren since 1990. Possible explanations for this decline include children spending too much time watching television and playing video games and a lack of commitment to creativity development in schools (Bronson & Merryman, 2010).

Torrance dedicated his career to the research of creativity and found that intelligence and creativity had little correlation. Furthermore, through his research, Torrance determined that public schools by and large have done little to embrace creativity. Torrance found that many teachers are uncomfortable with the unruliness that

often accompanies creativity, as well as the unconventional approaches to problem solving exhibited by creative students. Teachers value intelligent students who display work ethic and take a predictable path to solve problems (Torrance, 1959). Compliance is the valued characteristic instead of fostering an environment that encourages novel thinking (Fasko, 2000-2001; Sternberg, 2006).

Creativity is viewed as the expression of some new or novel thought or idea (Runco, 2008; Sternberg, 2006). According to Sternberg and Lubart (1991), creativity can be developed in individuals; it is not just inborn (p.139). Although creative talent in the arts is certainly one form of creative expression, schools shouldn't confine their commitment to creativity solely to this format. Fostering critical thinking and problem-solving activities should be an essential part of every classroom (Geist & Hohn, 2009). It is essential for schools to cultivate creativity skills by designing classroom environments that welcome novel approaches to learning. This most certainly includes pedagogies that embrace creative thought (Geist & Horn, 2009). In order to enhance and support the creativity of students, teachers need to also be creative. This begins with training pre-service teachers in college-level teacher preparation programs. Research on the perceptions of teacher candidates indicates that the candidates place a high value on supporting creativity in the classroom. However, these same candidates also indicated that they felt less than prepared to support student creativity at the conclusion of their preparation program (Fasko, 2000-2001; Geist & Hohn, 2009).

This is not surprising given that society often perceives challenge to traditional and conventional thinking as offensive and oppositional (Fasko, 2000-2001; Sternberg, 2006).

According to Runco (2008), educational practice should be based upon theory, which in turn, should be based on solid research (p. 97). Chief among these practices should be the establishment of classroom experiences that embrace original ideas and support time for self-expression. Children also need to be surrounded by good models of creative thought. Teachers can fulfill this important role by expressing creative ideas and interpretations themselves (Runco, 2008). Every child has the potential for original thoughts and ideas, therefore, creative talent lies within every child, not just those who have been identified as gifted. For this reason, it is essential that regular classroom practice include creative pedagogy such as time for collaboration, opportunity to transfer and apply knowledge to multiple situations, and providing an appropriate level of challenge. Teachers need to also be mindful of encouraging the commitment to tasks, the acceptance of multiple perspectives and solutions to problems. It is also noteworthy that appropriately rewarding students is essential. Research has shown that engagement and motivation are powered by intrinsic motivation and not extrinsic rewards such as grades (Geist & Hohn, 2009; Runco, 2003; Sternberg, 2006).

Creativity vs. Standardization

A commitment to supporting creative environments in classrooms faces external obstacles as well. The standards and accountability movement of the last decade has had a detrimental effect. In 2002, President George W. Bush signed into law the United States Congress's latest version of the Elementary and Secondary School Act, also known as No Child Left Behind. Criticisms of the law abound. The goal of No Child Behind was to close the achievement gap for students of minority and low socio-economic background, and to increase the competiveness of high school graduates with their counterparts from

other developed countries (retrieved March 7, 2012 from http://www2.ed.gov/nclb/overview/intro/execsumm.html).

Eleven years later, while there have been benefits, major criticisms of the law exist. Global technology scholar Yong Zhao (2007) states "we are becoming obsessed with test scores in a limited number of subjects, which in essence is the adoption of a single criterion for judging the success of students, teachers, and schools. Once we adopt this single criterion and we are well on our way, we kill the single most sought after commodity in the 21st century – creativity" (p. 5). Everything rides on a student's performance on a standardized test. "The regime of standardized testing has led us to believe that if you can't count it, then it doesn't count" (Azzam, 2009).

Analysis of the impact of No Child Left Behind does reveal some positives. Curriculum alignment has been a major area of focus, and much more attention has been placed on the school performance of minority and other subgroups students (Jennings and Renter, 2006). However, the law restricted the curriculum, and placed the emphasis on assessments that measure little critical thinking (Darling-Hammond, 2007). Campbell states, "a March 2006 survey by the Center on Education Policy found that, since the passage of NCLB in 2002, 71% of the nation's 15,000 school districts had reduced the amount of time spent on history, music and other subjects to open up more time for reading and math" (p. 441).

Hargreaves and Shirley (2008) state, "high-stakes and high-pressure standardization, where short-term gains in measurable results have been demanded at any price, have turned many U.S. schools not into learning-enriched environments, but into enervating Enrons of educational change"(p. 136). This is even more concerning in the

very schools that No Child Left Behind was meant to impact. Although a great deal of attention has been drawn to high minority, low-socioeconomic schools, according to Jarrett and Stenhouse (2011) "compulsion to teach exclusively to the test has inhibited the production of engaging and meaningful learning opportunities particularly in schools dominated by culturally, linguistically, and economically marginalized populations" (p. 1465). This is especially true in urban settings, where scripted lessons, benchmarks, and little curricular control have diminished teacher attitudes toward their profession (Crocco & Costigan, 2007).

Correspondingly, international competition has also been a major concern of those who are critical of public school performance in the United States. There are several measures of academic performance that compare students from the United States to their peers from other countries. Among these are the Trends in International Mathematics and Science Study (TIMSS), and the Programme for International Student Assessment (PISA). On both measures, students from Asia and Europe outperformed students from the United States. The latest TIMSS assessment from 2007 reported "there was a lower percentage of U.S. fourth-graders performing at or above the advanced international benchmark in science in 2007 than in 1995 (15 v. 19 percent). At grade eight, there was a lower percentage of U.S. students performing at or above the advanced benchmark in science in 2007 than in 1999 (10 v. 12 percent), but not between 1995 and 2007" (TIMSS, 2007). PISA results from 2009 placed United States fifteen-year old students 17th when compared to their counterparts from around the word in reading, mathematics and scientific literacy (PISA, 2009).

While these other countries consistently outperform students from the United States, Darling-Hammond (2007) states, "high-achieving nations focus their curriculums on critical thinking and problem solving, using exams that require students to conduct research and scientific investigations, solve complex real-world problems and defend their ideas orally and in writing" (p. 3). High achieving Asian countries in the international studies such as South Korea, Singapore, Chinese-Tapei, and China-Shanghei have scored well in part because of a shift away from didactic teaching methods to ones that encourage creativity and problem-solving (Gumbel, 2007).

Researcher Yong Zhao (2012) challenges the perception that results on international measures such as TIMSS and PISA result in nurturing the creative, innovative students that will be successful in the 21st century. His analysis reveals that an inverse relationship exists when comparing scores in TIMSS and PISA with innovation and entrepreneurship measured in the Global Entrepreneurship Monitor (GEM). Countries such as Singapore, China, Japan, and South Korea, while consistently scoring near the top of the international measures, are ranked near the bottom in the awarding of patents for innovations, and engagement in entrepreneurial ventures assessed by GEM (p. 58).

According to Zhao, until recently the education systems in the countries that have scored well in the TIMSS and PISA have been obsessed with standardization, rote learning, and compliance. Singapore, China, Japan, and South Korea are now shifting their instructional focus to integrate creativity, problem-solving, and critical-thinking. Meanwhile, the countries that have scored at the lower end of the TIMSS and PISA assessments, the United States, the United Arab Emirates, and Spain all rank near the top

according to GEM (p. 60). “While the United States is investing resources to ensure that all students take the same courses and pass the same tests, the Asian countries are advocating for more individualization and attending to emotions, creativity, and other skills. While the United States is raising the stakes on testing, the Asian countries are exerting great efforts to reduce the power and pressure of testing” (Zhao, 2009).

Preparing for a Challenging Future

In 2005, Thomas Friedman authored *The World is Flat*, which illustrated the globalization that has placed America’s dominance as a leader of innovation into question (Friedman, 2005). Also in 2005, Daniel Pink published *A Whole New Mind: Why Right-brainers Will Rule the Future*. Both Pink and Friedman focus on globalization, automation, and the emergence of cheap labor markets as a theme to drive the message that traditional left-brained jobs that require little creativity have been outsourced to developing countries of the world, and in order for individuals in the United States to be competitive with regard to innovation, right-brained, creative skill sets will be particularly desirable (Pink, 2005). This creative skill set is linked to the ability to think critically, collaborate, communicate, and problem-solve. Thinking creatively requires the ability to analyze, reason, and discriminate, and is essential in the application of knowledge (Torrance, 1959; Brandt, 1986).

The challenges of a competitive globalized world calls for an education that prepares students for a complex world where they need to be collaborative, creative, problem-solvers (Sheridan-Rabideau, 2010). An instructional approach that embraces the elements called for to enhance this creativity skill set is demonstrated in project-based learning. Thomas (2000) states, “Project-based learning (PBL) is a model that organizes

learning around projects. According to the definitions found in PBL handbooks for teachers, projects are 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" (p. 1). Project-based learning also encourages collaboration. David (2008) states, "Project-based learning creates opportunities for groups of students to investigate meaningful questions that require them to gather information and think critically."

Mehta and Fine (2012) advocate for schools using a project-based approach to learning based on the following advantages: they motivate students because of the high level of student choice, they are academically rigorous due to the focus on "analysis, synthesis, and creation", and because public exhibition of products is a central feature of PBL, student and school-level accountability carries much more significance than traditional approaches to learning (p. 33).

Preparing students for the future requires a different approach to instruction. According to Boss and Krauss (2007), a shift in the way we teach students is necessary (p. 11). "The business world demands employees who know how to work as a team, access and analyze information, and think creatively to solve problems" (Boss and Krauss, 2007).

Learning Needs of Adolescents

While all students can benefit from project-based learning, it can be particularly beneficial to children in the middle level. These students, ranging from age 10-14, known as pre-adolescents, require a varied approach to teaching that captures their interest and

engages them in learning. Furthermore, they are at an age and maturity level when complex problems can be successfully explored with success (Kolodner et al, 2003). The rationale for the establishment of the middle school concept was partly based on the need for students to be engaged in an experience that was far beyond skill building and enabled them to wrestle with complex problems (Eichhorn, 1966).

The middle school concept has existed since the mid-twentieth century. It was developed based on research that led educational theorists to structure an approach to educating 12-15 year olds in a way that was socially, physiologically, and cognitively responsive to their unique needs (Eichhorn, 1966). Previously, the model that existed as the standard for this age level student was the junior high. In its original form, the junior high model shared many aspects and goals with the middle school model, however, in practice and implementation oftentimes the result was a mirror of a high school educational program on the junior high level. Correspondingly, the grouping configuration for grades most often followed a six-grade elementary, three-grade junior high, and three-grade high school pattern (Lounsbury, 1991).

The Association of Middle Level Education, formerly known as the National Middle School Association, stated in its publication *This We Believe: Keys to Educating Young Adolescents* that the ideal for middle level education programs was for them to be developmentally responsive, challenging, empowering, and equitable.

Likewise, the goal of the National Forum to Accelerate Middle Grades Reform, an alliance of over 60 educators, researchers, national associations, professional organizations and foundations is to promote the academic performance and healthy development of young adolescents. The Forum also identifies and disseminates best

practices, articulates and promotes effective policies, recognizes and develops enlightened leadership, and informs and engages the public. The Forum also recognizes exemplary middle schools through its Schools to Watch designation. There are currently 28 middle schools in Pennsylvania that have received the Schools to Watch designation. The state program has been in existence since 2006 (Retrieved April 14, 2012 from http://www.middlegradesforum.org/).

The National Forum to Accelerate Middle Grades Reform uses 37 criteria in its evaluation process for the Schools to Watch program. These criteria highlight elements related to project-based learning, as well as creativity, collaboration, critical-thinking, and communication. Examples are:

- Teachers make connections across the disciplines to reinforce important concepts and assist students in *thinking critically* and applying what they have learned to solve *real-world problems*.
- To reach students, all teachers draw from a common subset of instructional strategies and activities such as direct instruction, cooperative learning, *project-based learning*, simulations, hands-on learning, and integrated technology.
- Teachers use a variety of methods to assess and monitor the progress of student learning (e.g., tests, quizzes, assignments, exhibitions, *projects*, performance tasks, portfolios).
- Flexible scheduling enables students to engage in academic interventions, *extended projects*, hands-on experiences, and *inquiry-based learning*.

- Teachers foster curiosity, *creativity* and the development of social skills in a structured and supportive environment.
- Students take action, make informed choices, work *collaboratively*, and learn to resolve conflicts.
- Teachers use an *interdisciplinary* approach to reinforce important concepts, skills, and address *real-world problems*.
- Students take on *projects* to improve their school, community, state, nation, and world. (retrieved from http://www.middlegradesforum.org/index.php/about/our-criteria February 13, 2013)

Conceptual Underpinnings of This Study

Project-based learning is based on the learning theory of constructivism, which is rooted in psychology and social science research as an approach based on the learner constructing knowledge through experience (Windschitl, 2002). In their review of the role of constructivism in education, Green and Gredler (2002) refer to psychologist Jean Piaget's thoughts. "According to Piaget, schooling should include spontaneous student experimentation, both independent and collaborative. Group situations, in which one's views are challenged and must be defended, can contribute to development of objectivity in thinking" (p. 56). Piaget further explained that "the teacher must (a) create and organize classroom experiences that challenge students' thinking, (b) become attuned to the spontaneous mental activity of learners as they address these situations, and (c) provide examples and probing questions that lead students to rethink their hastily developed ideas (p. 56)." Piaget's theories of learning clash with traditional approaches to

teaching. Lebow (1992) states, "traditional pedagogy values replicability, reliability, communications and control, while constructivist pedagogy values collaboration, personal autonomy, generativity, reflectivity, active engagement, personal relevance, and pluralism (p. 64)."

Likewise, Lev Vygotsky's social constructivist theories of learning describe the process by which children learn while interacting with the world around them. Vygotsky expands Piaget's theories to move beyond experimentation and the development of the learner as an individual to accentuate the importance of social interaction in the development of learning (Gillen, 2000). According to Vygotsky, children gain cognitive skills through social learning, internalizing information, and personalizing it for their own means. (Davydov & Kerr, 1995; Gauvin & Cole, 1997; Gillen, 2000; Prawat, 2002).

Vygotsky's theories endorse project-based learning's focus on collaboration, problem-solving, and communication, especially in tackling real-world problems that engage students in the hopes of impacting positive social change. Vygotsky's theory of zone of proximal development captures the essence of project-based learning, describing the varying levels of supports that children require as they transition from a more dependent role in their learning to one of more autonomy (Davydov & Kerr, 1995; Gauvin & Cole, 1997; Gillen, 2000; Prawat, 2002).

The culture that is created in a project-based classroom that encourages questioning and investigation truly defines constructivism. It is more than instructional strategies and techniques. Constructivism is about beliefs that form the fabric of the classroom (Windschitl, 1999). Approximately a century ago philosopher and educational reformer John Dewey advocated for education that not only focused on a rigorous

curriculum but also placed emphasis on the interests and experiences of the student. Dewey believed that students learn best when they interacted with the environment (Dewey, 1938). He further argued against the inactivity of the student. From Dewey's work grew the progressive educational movement and methods that included hands on learning, inquiry based learning, experiential learning, and project-based learning. All share the common bond of placing the learner at the center of the experience (Boss, 2011).

Over the last several decades, new information has been gained from brain research that has provided a greater understanding of learning and has had implications for practice. In 1983, Howard Gardner published his work *Frames of Mind: The Theory of Multiple Intelligences*. In his book, Gardner presents his theory of an individual's predisposition to one of seven intelligences, or ways of knowing: logical-mathematical, linguistic, musical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, and an eighth later added intelligence, naturalistic. Gardner proposed that no individual's intelligence lies solely in one of his categories, but instead are unique combinations that make each person's path to learning a bit different. With this in mind, Gardner's theory describes and advocates for using a variety of teaching methods to capture the interest and to connect with a child's learning preferences (Gardner & Hatch, 1989; Gardner, 1983; Gardner, 2003).

Contemporary educational psychologists support the role of student inquiry and intrinsic motivation in learning. Kuhn (2007) states, "we have only a brief window of opportunity in children's lives to gain (or lose) their trust that the things that we ask them to do in school are worth doing (p. 111)." Students need a sense of how the world around

them works and how to make a case or argument for something that they feel passionate about. This will, in turn, enable them to tackle the complicated problems of the future" (Kuhn, 2007). In order for students to learn to think critically, they must be given complex, meaningful learning experiences that are engaging.

Mihaly Csikszentmihalyi's theory of flow has implications for designing educational experiences that are challenging, engaging and meaningful for students. Students motivated by such environments enter into a zone or consciousness, referred to as flow by Csikszentmihalyi (Snyder & Lopez, 2009). Individuals experiencing flow are not only in an extreme state of happiness, but are also learning to a high degree. Much like Vygotsky's zone of proximal development, the theory of flow is dependent on matching the level of challenge with an individual's ability or predisposition to learning (Shernoff & Csikszentmihalyi, 2009).

Project-based learning is also supported through the foundations of constructivist related critical theory. Roessingh and Chambers (2011) state, "social context, process, and the quest for meaning take precedence. The fluidity of diologic, the relational, voice and identity, lived experience, and the interpreted together direct real-life problem posing that emerges from the needs of the learners" (p. 62). The unpredictable nature of project-based learning supports risk-taking, encouraging collaboration and trust (Roessingh & Chambers, 2011).

Author and creativity advocate Sir Ken Robinson champions the notion that all individuals can be creative and that schools can do more to accentuate the arts and cultivate classrooms that help students to learn to be creative. Robinson's criticism of traditional school practice extends to a narrow curriculum and an overreliance on

standardized testing as a measure of success. Much like Daniel Pink and Thomas Friedman, Robinson cites globalization and increases in technology as driving forces calling for change (Robinson, 2001).

Research Questions

The research questions for this study focus on the perceptions of stakeholders regarding the implementation and outcomes of project-based learning. The research questions are as follows:

1. What are the barriers to implementation of project-based learning for teachers? Students? Parents?
2. What are the key elements that impact successful implementation of project-based learning for teachers? Students? Parents?
3. What is the perception of parents regarding project-based learning and its advantages/disadvantages?
4. What impact does project-based learning have on the process and products of learning?

The following background questions will be posed to the principal and teachers to elicit the story detailing the adoption of project-based learning at the school:

1. How long has project-based learning been utilized as an instructional strategy in the school?
2. What were the factors that led to the adoption of project-based learning?
3. How often is project-based learning utilized as an instructional strategy?
4. What innovative practices and methods do teachers use to integrate project-based learning into learning activities?

The researcher hypothesizes that middle school teachers who use utilize project-based learning as an instructional approach perceive that it is effective in emphasizing creativity, collaboration, critical-thinking, and communication. Teachers and administrators will reveal that project-based learning was implemented because of its power to motivate and engage students. The researcher also hypothesizes that the successful use of project-based learning is strongly influenced by professional development, principal and teacher leadership, and time for collaboration. Teachers and principals will also feel that it is best supported by organizational structures such as flexible scheduling, co-teaching, interdisciplinary themes, and service learning. Teachers and principals will provide in-depth evidence from each particular case that illustrates in rich detail the story behind their implementation of project-based learning.

The researcher believes, because of its complex nature, teachers and principals will outline various obstacles and difficulties instituting project-based learning as an instructional approach. They will also share innovative practices utilizing project-based learning activities that serve to emphasize creativity, collaboration, critical-thinking and communication.

The researcher hypothesizes that parents will reveal that they don't fully grasp the rationale of their school moving from a more didactic approach to teaching, an approach they more than likely experienced as a student, to a project-based approach. The researcher believes that they find value in the products that their children produce, but will also express frustration with the open-ended nature of project-based learning. The researcher does believe that they will report positively regarding their children's motivation to engage in project-based learning. The researcher also believes parents will

report positively regarding project-based learning's emphasis on creativity, critical-thinking, collaboration, and communication.

Methods

This dissertation will employ qualitative case study research to illustrate the story behind middle schools that utilize project-based learning as an instructional method. Case study method is a valuable approach to social research that provides inquiry to better understand and illustrate particular aspects of a program or event (United States General Accounting Office, 1990; Stake, 2005). The value of case study research is the in-depth examination of programs or phenomena from multiple aspects in the natural setting to determine how and why something is occurring in a real-life context (Bassey, 1999; Yin, 2009). It is through this rich detail that information is revealed that adds to the body of research concerning, in this case, project-based learning educational programming. By using multiple cases, generalization and particularization for certain aspects of the phenomena can be achieved (Yin, 2009).

The middle schools have been selected for inclusion in the study based upon their successful use of project-based learning. Identification of these schools was made with the assistance of Mrs. Rosanne Javorsky. Mrs. Javorsky, who is the Assistant Executive Director of the Allegheny Intermediate Unit in charge of teaching and learning, has over 25 years' experience in public education. The Intermediate Unit operates as an educational service agency for the 42 school districts in Allegheny County, Pennsylvania. Mrs. Javorsky facilitates professional development activities, reform initiatives, and school improvement for the school districts served by the Allegheny Intermediate Unit. Mrs. Javorsky has received a grant from the Benedum Foundation to establish the Center

for Creativity at the AIU known as TransformED. The space is known as a digital playground where teachers can explore and design engaging project-based learning activities for their students. She has also received grant funding from the Grable Foundation to support science, technology, arts, and mathematics (STEAM) initiatives in regional schools. Through her role at the Intermediate Unit, Mrs. Javorsky is exposed to innovative schools that are utilizing project-based learning to accentuate creativity, collaboration, critical thinking and communication. With the assistance of Mrs. Javorsky, potential schools for the study were identified. Their selection was based upon the schools' successful use of project-based learning, which Mrs. Javorsky was able to highlight through her role at the AIU. In particular, schools selected are all members of the Kids + Creativity Network. Located in the Pittsburgh region, Kids + Creativity is a collaborative network of k-12 schools, higher education institutions, foundations, and cultural organizations, that support innovative learning practices that accentuate the intersection of science and technology, the arts, digital media, through projects to promote creativity, critical thinking, collaboration and communication.

Responses from the subjects of this study: parents, teachers and administrators, will be elicited through interviews of focus groups, and individuals. Interviews will be held with one principal from each case study site. Interviews will be held with teacher focus groups of interdisciplinary grade level teams. The team will be comprised of one teacher from each subject area: math, social studies, science, and language arts. Additionally, three teachers will be asked to participate from the following specials/related arts classes: art, computers, technology education, family and consumer science, health, music, physical education. A gifted education teacher and a learning

support teacher at each site will also be asked to participate in the focus group interview. The principal will be asked to choose the teaching team that has the most advanced use of project-based learning. Focus groups made up of parents will be interviewed from each site. The parent focus groups will be made up of five individuals, with one representing a learning support child, and another a gifted child. Care will be taken to select parents with children taught by the teacher focus groups.

The duration of the interviews will be approximately 45 to 60 minutes for the adult focus groups and 20 minutes for the student focus group. The expectation will be that all the needed data will be gathered in one session; however, additional sessions will be scheduled if needed. All interviews will be recorded for accuracy and later transcribed, analyzed and reported as results in chapter four of this study. The conclusions and implications will be presented in chapter five.

Other forms of evidence such as observations, documents from professional development sessions, assignments, rubrics, reflections, and project products will be gathered for analysis. This will provide a triangulation of the data to ensure a detailed, illustrative story is told from each case. By utilizing three schools for this study, comparisons of evidence can be made, thereby providing further analysis of the case studies and the development of common themes.

Significance of Study

This study will provide important evidence that project-based learning is perceived by teachers, principals, and parents to be an effective instructional method to prepare middle school students for a future that will necessitate the skills of creativity, critical-thinking, collaboration and communication. The anecdotal story of three middle

schools' experiences with project-based learning will provide rich information to be used for study, professional development, and educational programming supports for middle school practitioners across the Commonwealth of Pennsylvania, the United States, and the world. Those seeking to incorporate aspects of 21st century skills into the learning experiences of their students will find the research of particular value.

Previous research has not specifically focused on the implementation and use of project-based learning in middle schools. Likewise, very little research has been compiled on the impact of project-based learning to accentuate creativity. It is also noteworthy that there is an absence of any data collection from parents regarding the use of project-based learning as an alternative to traditional instructional practice. By including qualitative data gathered from parents, middle school teachers and principals will be able to develop transition activities for parents and families regarding the shift to an instructional program that utilizes project-based learning.

In addition, project-based learning is the recommended instructional approach to best teach the newly adopted Common Core Standards. The Common Core Standards have currently been adopted by 46 states. The Common Core calls for increased rigor, analysis of information, and application of knowledge. An interdisciplinary, project-based approach that actively engages students is endorsed as the favored approach (Bender, 2009; Boss, 2012; Larmer & Mergendoller, 2013; Mehta and Fine, 2012). This study will add to the body of research regarding project-based learning as schools as transition to the Common Core Standards.

Limitations and Delimitations

This study is focused on three separate middle schools in the Commonwealth of Pennsylvania regarding their use of project-based learning. The results from these three studies present a challenge generalizing findings to all settings. This research study is utilizing qualitative case study methodology. The results from these three studies present a challenge generalizing findings to all settings. However, the use of a qualitative approach, analyzing the lessons learned from each case, including similarities and differences may provide common themes that are generalizable. Other limitations may include the honest reporting of those interviewed. This challenge will be met by the thoroughness of data collection. Reliable results will provided through the triangulation of data (Tight, 2010; United States General Accounting Office, 1990; Baxter & Jack 2008). The research will not be specifically focused on the statistical analysis of student achievement data or quantifiable results such as attendance or discipline referrals.

Chapter 2

LITERATURE REVIEW

History

The importance of the experiences of the individual in the process of learning can be traced back to the beginning of formal education with the epistemological learning philosophies of Socrates, Confucius, John Locke, Sir Francis Bacon, and Jean Jacques Rousseau (Archer, 1964; Smith et. al., 2005; Henson, 2003; Polman, 1997). Socrates modeled inquiry and critical thinking for his students (Boss, 2011). The Chinese proverb, "Teach me and I forget; show me and I understand; involve me and I understand" is credited to Confucius (Smith, 2005, p. 4).

The idea that the mind is active and makes meaning from experiences is not new. Bacon introduced the scientific method as a means to use experience as a guide to solve problems, and Locke began speaking of experiential learning as the means to how the mind gains understanding. The learner-centered, experiential model grew in popularity throughout history. Rousseau produced his landmark book *Emile* based on the child-centered, experiential philosophy. Later, Johann Pestalozzi and Frederick Froebel used the learning by doing approach as the basis for the first kindergarten (Henson, 2003).

The emergence of the progressive education movement in the United States began with Colonel Francis Parker in the late 1800s. Parker studied the learner-centered work of Pestalozzi and Froebel in Europe. His work with public schools in Massachusetts, Cook County, Illinois and later at the University of Chicago provided a counter philosophy to the traditional rote learning that was popular at the time (Windschitl, 2003; Henson, 2003).

A colleague of Parker's at the University of Chicago was John Dewey, who advanced the idea of the importance of experience in the education of children. Dewey's learner-centered theory was that problems formed the stimulus and motivated children to learn, and that the solving of each problem would lead to new questions (Dewey, 1938). Dewey was critical of the traditional education that students received as being isolation of life from education, "where what is learned in each is not applied to the other" (p. 46).

The first formal mention of the project as a unit of study came from William Heard Kilpatrick, a contemporary of Dewey. Kilpatrick (1918) wrote of the project method as an approach that brought to light the importance of purpose and interest as the driving forces in a child's education instead of compulsion or coercion by authority. He organized his project method pedagogy into four types:

> Type 1, where the purpose is to embody some idea or plan in external form, as building a boat, writing a letter, presenting a play; type 2, where the purpose is to enjoy some (esthetic) experience, as listening to a story, hearing a symphony, appreciating a picture; type 3, where the purpose is to straighten out some intellectual difficulty, to solve some problem, as to find out whether or not dew falls, to ascertain how New York out grew Philadelphia; type 4, where the purpose is to obtain some item or degree of skill or knowledge, as learning to write grade 14 on the Thorndike Scale, learning the irregular verbs in French. (Kilpatrick, 1918)

Kilpatrick (1918) advocated for the intrinsically purposed project to be the primary unit of study for schools. There is some speculation that Kilpatrick derived his project method from agricultural education (Alberty, 1927; Beckett, 2002; Waks, 1997).

The advantages of the project method, according to Roark (1925), who was a superintendent of schools in Montana during the emergence of the project method, include the "development of self-reliance, responsibility, inquiry, and research, while it promotes energy to an otherwise monotonous classroom" (p. 202-203). At the same time, the project method is difficult to institute due to the demand on teachers as well as the conservative attitudes of students, parents, and school boards (Roark, 1925).

W. W. Charters advanced a narrower and clear description of the project method. Charters, an educational researcher who was advised for his doctoral study by John Dewey, advocated for three conditions to be met in student projects: that the project was driven by a problem, that the project was carried through to completion, and that the project was conducted in a natural setting (Waks, 1997).

Educational philosopher Boyd Bode also criticized Kilpatrick's project method as being insufficient because it failed to cover all the necessary aspects needed when considering all that students need to learn. While he valued the inclusion of projects as an essential element in a student's school experience, Bode felt it was imperative to supplement the project experience with other modes of instruction (Waks, 1997).

Project-based learning, as it now is referred, emerged and waned throughout the twentieth century along with other student-centered reforms, never gaining a substantial foothold due to the complex nature of the pedagogy, the necessary classroom supports and resources, and acceptance from the public (Blumenfeld, 1991; Windschitl, 2003). Optimistic progressive reformers felt that their ideas and practices would work their way into schools simply because others would recognize their value and effectiveness. This naïve view proved to be completely false, underestimating the complex nature of putting

ideas into practice. Reformers failed to foresee the connection between adoption and local views on education, the powerful connection between textbook companies and the adoption of new curricula, and incentives for teachers to change practices. Even large-scale government led initiatives such as flexible scheduling, team-teaching, and inquiry-based, project oriented programs like PSCS physics, BSCC Biology, MACOS social science proved in the end to have very little impact in producing significant change (Fullan, 2009).

Further complicating efforts to reform educational practice were the major social issues of the time. The difficulty of challenging domestic power structures related to civil rights, prejudice with class and gender, and at the same time reacting to the fear and concern raised by the Cold War rivalries led to isolated gains at best with regard to reform (Fullan, 2009, Henson, 2003).

In the late 1960's McMasters University in Canada reconstructed the curriculum of its medical school to take a project-based approach to training medical professionals instead of the traditional information oriented approach that most medical schools employ (Mergendoller, et. al., 2010, Thomas, 2000). Since this time, powered by reform initiatives such as the Bill and Melinda Gates Foundation for Education, project-based learning has reemerged as an effective constructivist approach to learning at a time when it is recognized that the needs of students in the 21st century are far different than previous times (Ravitz, 2008; Rotherham and Willingham, 2009).

In 2006, the National Center on Education and the Economy published *Rethinking and Redesigning Curriculum, Instruction, and Assessment: What Contemporary Research and Theory Suggest* for the New Commission on the Skills of the American

Workforce. Written by Dr. James Pellegrino, a distinguished professor of education and psychology at the University of Illinois, the report details the improvements needed to educate youth in America to ensure their competitiveness in the global economy (p. 1). Among the recommendations in the report is the use of a project-based approach to learning to challenge students to think deeply and apply skills and concepts to solve interesting, real-world problems (p. 5).

The U.S. Department of Education published *A Blueprint for Reform* in 2010 as a plan for the reauthorization of the Elementary and Secondary Education Act. The report promotes five overall goals: college and career ready students, great teachers and leaders in every school, equity and opportunity for all students, raise the bar and reward excellence, promote innovation and continuous improvement (p. 6). STEM education, ensuring a well-rounded education and activities to strengthen a complete education are specifically mentioned as areas of emphasis (p. 28). This report was followed in 2012 by *U.S. Education Reform and National Security*, published by the Council on Foreign Relations. The Council's Independent Task Force on Education Reform outlined recommendations including creating exams that simulate real-world applications of knowledge, and weaving creative thinking and problem-solving into all parts of the curriculum (p. 1).

Today's students will be entering a workforce that will judge them on their abilities in the areas of collaboration, negotiation, planning and organization, applied skills that are emphasized in project-based learning (Bell, 2010). In 2006, *Are They Ready for Work*, an in-depth study conducted as a collaborative effort of The Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills,

and the Society for Human Resources Management provided data on the perspectives of corporations with regard to the readiness of new entrants to the workforce. The survey collected responses from over 400 employers across the United States. Results indicated that although employers felt that basic skills such as writing, math, and reading comprehension were important, they placed much greater value on applied skills such as collaboration, critical thinking-problem solving, and creativity-innovation (p. 9). In 2007, the Partnership for 21st Century Skills conducted another study titled *Beyond the 3 R's: Voter Attitude toward 21st Century Skills*. Results in this study stated that 99% of respondents say that teaching students a wide range of skills including critical thinking and problem-solving, computer and technology skills, and communication and self-direction is important to our nation's future economic success (p. 1).

In 2010, the American Management Association, along with P21, an advocacy group that promotes 21st century readiness for every student, conducted a survey of 2, 115 managers and executives from over 40 major corporations. Over 75% of the respondents indicated that critical thinking, communication skills, collaboration, and creativity will be more important in the next three to five years in business and industry. Those surveyed also indicated that the need for these applied skills is being driven by the pace of change, global competitiveness, how work is accomplished, and changing organizational structure (p. 4).

In addition, as global citizens, our young people face challenges that will require them to be problem solvers, critical and creative thinkers in complex situations. Barell (2010) states,

> But what makes the 21st century special? What are the new and threatening problems we face, both domestic and foreign, that necessitate more attention to how we think and solve problems? In addition to the complexities of energy production and conservation, preserving the planet, and fighting terrorism, we face almost intractable situations when it comes to providing health care, ensuring equity within all of our educational and judicial systems, and figuring out how to preserve our financial markets after the worst economic meltdown since the Great Depression. (p. 177)

Project-based learning was also highlighted as a characteristic of learner-centered instruction in the Alliance for Excellent Education's 2012 publication *Culture Shift: Teaching in a Learner-Centered Environment Powered by Digital Learning*. The Alliance of Excellent Education is a Washington D.C. based advocacy organization that encourages high school reform to ensure students are ready for college, work, and citizenship in the 21st century. The report states project-based learning is a way to prepare students for global economy by focusing on collaborating and applying knowledge to real-world situations (p. 7).

Embedded within the literature of 21st century skills advocacy groups are recommendations for a project-based approach to learning. In 2009, the partnership for 21st Century Skills published *Learning Environments: A 21st Century Skills Implementation Guide.* This publication encourages schools to use flexible units of time that enable project-based work, interdisciplinary themes, and competency-based measures of student progress.

Descriptions

Literature associated with project-based learning also demonstrates that many instructional approaches are considered to fall under the umbrella of project-based learning or are closely related. Among these approaches are problem-based learning, inquiry learning, discovery learning, learning by design and Science, Technology, Engineering, and Mathematics (STEM), and others referred to as authentic learning approaches (Thomas, 2000; Savery, 2006).

Many teachers incorporate projects into their instructional activities. However, there is a large distinction regarding project-based learning that separates it from simply having students complete projects. Traditional projects are done at the end of a lesson or unit, as a culminating activity to demonstrate what they had learned, often-emphasizing activities more than assessment. Project-based learning integrates process and product, utilizing formative assessment to provide guidance to the learners (Markham, 2011).

Literature on the subject of project-based learning has revealed different elements that are viewed as being necessary parts of the approach. Thomas (2000) provided five criteria to determine if an approach qualifies as project-based learning:

> projects as central not peripheral to the curriculum, projects are focused on questions or problems that drive students to encounter and struggle with the central concepts and principles of a discipline, projects involve students in a constructive investigation, projects are student driven to some significant degree, projects are realistic, not school-like. (p. 4)

Larmer and Mergendoller (2010) described their seven essentials to successfully implementing project-based learning. Engagement is driven by a need to know, which

activates the initial motivation and makes it meaningful for the student; students create a driving question that is thought provoking and gives a sense of purpose for their investigation; students choose a variety of formats that fit their interest and to communicate their findings; the project facilitates communication, collaboration, and problem-solving using current technologies; the project promotes student inquiry and the development of new solutions to the problems; work is reviewed and edited by peers and the teacher to focus revisions; findings are presented in a public forum to stakeholders (p. 35-37).

Barron et al. (1998) stated that there are four principles of design for project-based learning that ensure that students are "doing with understanding and not just for the sake of doing" (p. 273). These principles are utilizing learning appropriate goals in order to focus investigations on the findings and not simply on the activities; providing supports for both student and teacher learning; providing opportunities for reflection, self-assessment, and revision; and establishing a social community within the classroom that encourages collaboration, peer review, and communication (p. 273-275).

Project-based learning is guided by principles that facilitate successful implementation. Because of its complex nature, the instructor must be a content area expert and have firm grasp on pedagogy, the design of the project activities must be learner-centered and flexible, a problem is used to focus and drive the learning, objectives are clear, learning activities are authentic and engaging, instructional activities are integrated, and the project promotes critical reflection and higher-order thinking (Roessingh & Chambers, 2011; Markham, 2011).

The project-based environment encourages students to engage in problem-solving and to also develop their reasoning skills. During the project they also work to accurately represent and communicate their ideas and explanations. This all occurs in context across subject disciplines (Wilhem, Sherrod, & Walters, 2008).

It is critical for students to share ideas throughout a project-based unit. This includes during and after the investigation, after the project solution has been planned, during the implementation and at the conclusion (Kolodner, 2003).

The recurring theme in the literature describing project-based learning is that utilization of project-based learning as an instructional approach engages students in real world problems in a culture that promotes collaboration and problem-solving and will result in meaningful learning experiences that prepare students for the workplace and the real world (Barron et al, 1998; David, 2008; D'Orio, 2012; Larmer and Mergendoller, 2010; Markham, 2011; Thomas, 2000; Wolk, 1994).

Results

A variety of studies have researched the impact of project-based learning using both students and teachers as the focus of research. This research has concentrated on attitudes, perceptions, engagement, motivation and student achievement, as well as obstacles and strategies for successful implementation.

Motivation, Engagement, and Efficacy

Teachers often struggle with the questions of, "How can I motivate my students? How can I establish conditions in my classroom to engage and inspire learning?" A project-based learning pedagogy has been shown to have a positive effect on student motivation (Lam, Cheng 2009; Hernandez-Ramos, De La Paz, 2009; Grant, 2011; Seet,

Quek, 2010; Belland, Glazewski, Ertmer, 2009). Many studies note that student choice and empowerment are important factors that led to increased motivation. Specifically, Belland, Glazewski, and Ertmer (2009) discovered that the motivation and social confidence of special needs students increased when experiencing project-based learning in mixed-ability classrooms. Their case study utilized data gathered through conversation analysis, interviews, and video of 10 class sessions of three students, one of which had mild learning disabilities, while the others were regular education (p. 19).

A qualitative study of middle school geography students identified factors that influenced the projects that they had undertaken: their interests and learning styles, the involvement of the teacher, their beliefs about projects, the tools available for use, such as technology, and the learning outcomes and products. Students appreciated that project-based learning afforded them the opportunity to demonstrate their knowledge differently than tests (Grant, 2011).

The impact of the attitude of the teacher in a project-based classroom has also proven to be important. Lam, Cheng, and Ma (2009) found that there was a direct relationship between the intrinsic motivation of teachers and students in their Hong Kong study of 126 secondary students and their 631 students in project-based classrooms.

In their paper presented at the American Educational Research Association in 2005, Grant and Branch shared that their case study of five students from an eighth grade middle school geography class found that students taught in a project-based learning environment were empowered to make decisions about abilities, resources, and plans that met their learning styles.

Petrosino (2004) also noted in his case study of a veteran science teacher and his class that students develop self-efficacy and are empowered by project-based learning. He recorded student responses such as "we don't act like scientists, we are scientists," and "this class teaches you how to go about learning anything" (p. 457).

Student Achievement

Compared to traditional didactic approaches, project-based learning performed as well or better when standardized tests were the measure, and consistently outperformed traditional approaches when it came to application of knowledge (David, 2008; Mergendoller, Bellisimo and Maxwell, Ravitz, 2009).

Ferretti, MacArthur, and Okolo (2001) found that the inclusive setting led to student achievement gains for both regular education and learning disabled groups. The mixed methods study they conducted of four 5th grade classrooms resulted in both groups also showing gains in self-efficacy (p. 70). Cheng, Lam, and Chan (2008) found corresponding results in a study of 1921 students in Hong Kong heterogeneously arranged classrooms, organized in 367 project-based learning groups. Their research results showed that a project-based learning environment resulted in high quality group processes benefitting high and low achievers. The study reported positive independence, accountability, participation, and social skills (p. 216). Project-based learning has also been noted to have a positive effect on reading comprehension, fluency, and vocabulary recognition in a case study of 132 Hong Kong primary students (Chu et al., 2011).

Eighth grade students using multimedia project-based learning in a United States History class were found to show growth in thinking skills, motivation, and choice. The quasi-experimental study of 100 students in two middle schools analyzed results on pre

and post-tests comparing one school that used technology-integrated project-based learning and the other traditional instructional methods (Hernandez-Ramos, De La Paz, 2009). Prevel and Means (1999) also conducted a study measuring classrooms using project-based multimedia tools and found that students in these classrooms were more likely to be engaged in complex, long-term assignments.

These findings were further reinforced by a three-year study of two British secondary schools, one using traditional instructional strategies and the other using project-based learning. Results from this study demonstrated that the school utilizing project-based learning outperformed the traditional school in skills, conceptual and applied knowledge (David, 2008). A University of Vanderbilt study evaluated the use of video-based adventures providing a structure for work on real-world problems. Students in this environment were found to score higher solving word problems and also planning (David, 2008).

These results were reinforced in a study of 7,000 12th grade students taught by 76 teachers in 66 schools that found that project-based learning proved to be more effective than traditional methods especially for average to below average learners. This study examined the impact of summer professional development on project-based teaching methods and the use of five project-based modules (Mergendoller, Maxwell and Bellisimo, 2006; Ravitz et. Al. 2010). Two additional international studies, one in Hong Kong and another in Turkey, noted positive results with both attitude and achievement for students in a project-based environment (Bas and Beyhan, 2010; Chu, Tse, Loh, and Chow, 2011).

21st Century Tools and Skills

Project-based learning utilizes 21st century tools that lead to engagement in learning (Markham, 2011). Spires et al (2012) report using video production technology to create student products that demonstrate reading, writing, and content knowledge across the curriculum. Cinema Veriteen, based on a 1950's concept that emphasized content over production, uses student interest and media technology such as Movie Maker, iMovie, Animoto, JayCut, and Photo Story to create meaningful products that move beyond simply understanding how to use tools to following a process that includes analyzing and synthesizing information, critically evaluating and revising products, and publishing and sharing in a multi-faceted exposition that includes face to face and online presentation of products (p. 488).

Student perceptions regarding their Cinema Veriteen experience posted on the class wiki shed light on the impact of this mode of instruction:

- "Cinema Veriteen helped me understand my topic of world hunger. I had to actually take my research findings, change the information into something creative, and put it into the video. To do all of that, I had to really know what I was talking about." (Alexis)
- "We learned to do research in better ways. I will need to know how to do research – to get into college, to succeed in college, and to get a job." (Eric) (p. 491)

In 2012, Ravitz et al., presented research to the American Educational Research Association regarding using project-learning to teach 21st century skills. The study identified two teacher groups that had similar backgrounds by demographics, grade

taught, and subject taught. The experimental group received professional development on project-based learning instructional strategies and was expected to put these strategies into practice. The control group did not receive the project-based learning professional development and were not expected to utilize project-based learning. The study addressed two research questions: Do teachers who have used PBL with extensive professional development teach and assess 21st century skills to a greater extent than teachers who have not had similar professional development or use PBL? How is PBL use and teaching of 21st century skills influenced by other variables such as subject and grade, class achievement level, block scheduling, etc.? The authors of the study noted that the teaching of 21st century skills was emphasized in other initiatives, meaning that all teachers were expected to be teaching and assessing these skills (p. 1).

The study identified the following items as 21st century skills: critical thinking, collaboration, communication, creativity and innovation, self-direction, global connections, local connections, using technology as a tool for learning (p. 3). Survey method for the study was used to collect data on the subjects. The survey asked about the frequency of instructional practices pertaining to the 21st century skills, as well the teachers' perceptions regarding having taught and assessed the skills.

The statistically significant results of this study matched the hypothesis that teachers who received extensive professional development would be more likely to effectively teach and assess 21st century skills.

Barriers and Obstacles

Several international studies reported that student subjects were frustrated with the autonomy that project-based learning afforded them (Liu et. Al., 2002; Beckett,

2002). The authors of these studies, one in Canada and the other in Singapore, surmised that these results might be due to cultural differences and a lack of preparation with students moving from a didactic classroom setting to a project-based, autonomous environment (Liu et al., 2002; Beckett, 2002). Another Singapore based study gathered student feedback regarding project-based learning and found that students preferred open-endedness, resources that function properly, social presence, and teamwork (Seet & Quek, 2010).

Literature pertaining to the implementation of project-based learning speaks to the intricate nature of this instructional approach. Project-based learning requires various supports to in order for it to be successful including extensive professional development, instructional materials, access to technology, and time (Bradley-Levine et. Al. 2010; Clark, 2006; Ertmer & Simons 2005; Mergendoller et al., 2006; Mitchel, 2009; Rosenfeld & Rosenfeld, 2006; Toolin, 2004; Park Rodgers, 2011; Ravitz, 2008; Windschitl, 1999).

In order to embrace the project-based learning approach, teachers must first shift many long-held beliefs regarding teaching and learning. Neglecting this crucial stage will often contribute to resistance (Blumenfield et al., 1994; Mitchel, et al., 2009, Windschitl, 1999). Providing teachers time to grow and accept differences about themselves as learners will lead to greater understanding and a sustained environment that embraces change (Rosenfeld & Rosenfeld, 2006).

Project-based methods also present classroom management problems for many teachers. Because project-based units are driven by ill-defined problems, encourage collaboration, and varied forms of assessment, the classroom structure may appear

chaotic. This lack of control can challenge many teachers who struggle with making in the moment decisions as the unit progresses (Rotherham & Willingham, 2009).

Park Rodgers (2011) notes that changing the curriculum to one that utilizes project-based learning does not change practice. In order to truly change practice takes intensive, sustained professional development. In addition, teachers new to the project-based approach may adapt to content changes and the products that are produced as artifacts of learning; however, it is the process of their role that they will find most difficult (Clark, 2006; Ertmer & Simons, 2006). Teachers who are more professionally engaged in their practice are more frequent users of project-based learning (Ravitz, 2008).

Suggestions for Implementation

In order for project-based learning to be successfully implemented, resources, including staffing, equipment, and funding are essential (Toolin, 2004). Bradley-Levine (2010) also suggests community-business partnerships, university partnerships, and real world technology as necessary for a sustained environment.

The approach to implementing project-based learning effectively requires attention to management of the process. Through the planning, launch, inquiry, product creation, exhibition, assessment, and reflection, utilizing management strategies will enable the teacher to ensure that the project to meet expectations (Mergendoller et. Al., 2006). It is also necessary to understand culture and context when considering models and supports for implementation (Hmelo-Silver, 2012).

Teachers new to project-based learning can often find easily identified problems in their current curriculum that lend themselves to project-based learning (Ertmer and

Simons, 2006). They also find that collaboration with peers, either team-teaching, or in planning and reflection, results in higher satisfaction and motivation (Chang and Lee, 2010; Krajcik et. al., 1994).

Because project-based learning is a student-centered approach to teaching, it facilitates the use of 21st century skills such as critical-thinking, collaboration, problem-solving, community engagement, information literacy, and global awareness (Rotherham and Willingham, 2009; Ravitz, et. al. 2011). Advocates of project-based learning tout the engagement of students in real world problems where their interest can drive learning. Embedded within this context is that project-based learning compels teachers to explore political and social issues that enable students to gain insight into critical examination and analysis which often leads to service, advocacy, and activism (Jarrett and Stenhouse, 2011; Roessingh and Chambers, 2011).

Chapter 3

METHODOLOGY

Introduction

The researcher's career in education spans over twenty years. Over this time period, the researcher has served as a classroom teacher, coach, activity sponsor, building principal, and most recently, a superintendent. The vast majority of this career has been spent working in middle level education. Experiencing change has had a significant impact on the researcher. As a novice science teacher, he was engaged in significant professional development to transform his method of teaching science from a very didactic approach to one that focused on thematic student inquiry. Likewise, the researcher was fortunate to have taken part in the school-wide evolution of a traditional junior high program to a middle school pedagogical approach very early in his teaching career. He was transformed by these experiences and became an advocate for teaching practices that accentuated engagement, utilizing inquiry as the catalyst that drove learning. As an instructional leader, the researcher has been intrigued by the nuances of initiating successful change in a school. Having worked in several districts, he has found that each has a unique culture all its own that has been shaped by its history, events, and the people who make up the school-community. The members of the school-community hold certain beliefs that have been formed by their own experiences and extend to perspectives on student instruction. Changing these long–held beliefs can be an incredibly challenging task requiring a focused, systemic approach to achieve success.

Through continuing education, the researcher has found the greatest value in stakeholder's thoughts and feelings regarding their experiences at school. Education is, at

its foundation, a people business. This has led the researcher to use qualitative methodology for the research of this study. At the beginning stage of constructing his study, the researcher considered the choice of research methods. He ruled out using quantitative methods because he wanted the study to be more than a statistical analysis of a treatment or survey. In order to get the detail that the researcher wanted, he needed a method that would provide the opportunity to interact with the subjects of the study and to analyze several forms of data for triangulation. Therefore, qualitative methodology was chosen. Qualitative research methods place the researcher in the field in the natural setting of the study. Using multiple techniques and instruments to collect, analyze, and interpret data, the researcher attempts to make sense of the subject of the study (Creswell, 2007). Because of its in-depth approach, qualitative methodology answers the questions of what and how regarding a topic, thereby providing a richness to the study (Stake, 1978; Tight, 2010).

Several different types of qualitative methods were considered for selection for the study. Ethnographic research focuses on a specific cultural group in an extended examination of their response to some type of action or event. With its roots in anthropology, the ethnographic researcher embeds himself in the culture recording first-hand accounts of interactions with the study subjects for data collection (Creswell, 2007). While ethnography suited the researcher's need to identify specific behaviors and responses of a shared cultural group, in this instance Pennsylvania middle schools utilizing project-based learning, it also requires data collection from extended periods at research sites where the researcher embeds himself into the culture (Creswell, 2007). Because of work, family responsibilities, and travel restrictions, the researcher rejected

ethnography as a suitable choice. An ethnographic study also requires the researcher to passively observe behaviors, reporting on them objectively (Creswell, 2007). In order to gain the rich story that the researcher desired in this research, he needed a methodology that would enable me to take a more active role in the triangulation of data collection.

The researcher also considered grounded theory as a possibility for this research. This methodology requires the researcher to collect and examine extensive data from stakeholders in order to develop a theory (Creswell, 2007). The researcher using this methodology typically makes multiple visits to sites to collect data as he saturates the item studied. A framework or theory then emerges from the analyzed data (Creswell, 2007). Grounded theory methodology is often used in education research, however, in the case of this study, there is not a desire to develop a theory, but to establish and articulate best practices when implementing project-based learning in middle schools.

Case study research methodology was chosen for this study because of the researcher's desire to tell the rich, in-depth story of the implementation of project-based learning in Pennsylvania middle schools. The implementation of a new instructional pedagogy, such as PBL, requires a significant shift in philosophy for a school. It touches all aspects of the school community including teachers, administrators, students, and parents by challenging the beliefs of the stakeholders, which have been formed through their experiences of schooling. Most often, these experiences were very traditional. Equal importance is given to the phenomenon, in this case project-based learning, and the context, the middle school setting (Yin, 2003). Using case study methodology, each case can be thoroughly examined through the analysis of multiple sources of data such as interviews of multiple stakeholders, examination of professional development materials,

documents, and parent communications. Case study methodology, because of its experience based, interaction focused approach, facilitates a process that is engaging for the participants. It also provides a down-to-earth final report that can be easy to understand and apply for practitioners. Because the vast majority of educators are not social researchers, it is essential that results be communicated in a way that will bring understanding, acceptance, and most importantly utility (Stake, 1978).

There are several types of case study methodology that are used by researchers. The United States General Accounting Office describes six types of case study methodology that are primarily used for research: *exploratory* is an examination of a case prior to implementing a program or treatment, *illustrative critical instance* is the in-depth study of a single, particular event, *program implementation* measures the compliance or effectiveness of an approach that requires the allocation of resources, *program effects* examines the impact of a condition on a population, *cumulative* is a meta-analysis of the results of multiple studies. Using the GAO criteria, the approach selected for my study is illustrative case study. Illustrative case studies are used to explain why or how something is happening (GAO, 1990). Researcher Robert Yin (2009) describes case study research as being utilized in four ways:

> to explain the presumed causal links in real-life interventions that are too complex for the survey or experimental strategies, to describe an intervention and the real-life context in which it occurred. Third, case study research can illustrate certain topics within an evaluation, again in a descriptive mode. Fourth, the case study strategy may be used to enlighten those situations in which the intervention being evaluated has no clear single set of outcomes. (p. 19)

Using Yin's (2009) criteria, the case study method will be used to describe how stakeholders perceive how project based learning was implemented at Pennsylvania middle schools.

Researcher Robert Stake (2005) organizes cases into three separate categories: studies focused on understanding one particular case are referred to as intrinsic cases, cases examined for better understanding of an issue are considered illustrative studies, and when a phenomenon or condition is studied at a number of cases, according to Stake, it is a multiple or collective case study (p. 445). The latter best describes the study the researcher will be undertaking.

The choice of multiple-case design strengthens this study by analyzing replications of the successful implementation of project-based learning in Pennsylvania middle school (Yin, 2009). Multiple cases will be used to compare the experiences of three school communities. Although generalization across cases is difficult, it is hoped that the analysis of the research will elicit certain themes that resonate between the cases, including any similarities or differences (Yin, 2003). Yin (2009) refers to this as literal replication, and suggests the use of multiple-case design when possible to refute any criticism to the uniqueness of single case that does nothing more than describe a phenomenon (p. 58). Analysis of the transition of a constructivist based approach like project-based learning will elicit important lessons for future practitioners.

The researcher will focus on conducting the research in a thorough and efficient manner. Asking good questions, listening, adapting to the circumstances and opportunities, and having an open mind will be of key importance to complete a meaningful study (Yin, 2009). In addition, the researcher will be following an organized

format that will contain components that will result in a rigorous study. These components include the identification of propositions, the development of a conceptual framework, identification of data sources, analysis of data, and the reporting of the study results.

Propositions

Certain propositions have been identified that will help guide the research in the multiple cases. These propositions are similar to hypotheses, and are tied to the intricate contexts that exist in case study research and help to guide the conceptual framework of the study (Yin, 2009). Because the propositions are contextual, they are highly impacted by culture, personal perspective, and politics (Stake, 1995). Especially in the case of qualitative research, developing propositions also helps to provide boundaries for the research study (Baxter & Jack, 2008). The propositions in this study are:

- Middle school teachers who use utilize project-based learning as an instructional approach perceive that it is effective in emphasizing creativity, collaboration, critical-thinking, and communication.
- Teachers and administrators perceive that project-based learning was implemented because of its power to motivate and engage students.
- The successful use of project-based learning is strongly influenced by professional development, principal and teacher leadership, and time for collaboration.
- Teachers and principals feel that it is best supported by organizational structures such as flexible scheduling, co-teaching, interdisciplinary themes, and service learning.

- Because of its complex nature, teachers and principals will outline various obstacles and difficulties instituting project-based learning as an instructional approach.
- Teachers and principals will share innovative practices utilizing project-based learning activities that serve to emphasize creativity, collaboration, critical-thinking and communication.
- Parents will reveal that they do not fully grasp the rationale of their school moving from a more didactic approach to teaching, an approach they more than likely experienced as a student, to a project-based approach.
- Parents will find value in the products that their children produce, but will also express frustration with the open-ended nature of project-based learning, and especially group work.
- Parents will report positively regarding their children's motivation to engage in project-based learning.
- Parents will report positively regarding project-based learning's emphasis on creativity, critical-thinking, collaboration, and communication.

Data Sources

Data will be gathered from three separate cases of schools that have implemented project-based learning. The middle schools have been selected for inclusion in the study based upon their successful use of project-based learning. Identification of these schools was made with the assistance of Mrs. Rosanne Javorsky. Mrs. Javorsky, who is the Assistant Executive Director of the Allegheny Intermediate Unit in charge of teaching and learning, has over 25 years' experience in public education. The Intermediate Unit

operates as an educational service agency for the 42 school districts in Allegheny County, Pennsylvania. Mrs. Javorsky facilitates professional development activities, reform initiatives, and school improvement for the school districts served by the Allegheny Intermediate Unit. Mrs. Javorsky has received a grant from the Benedum Foundation to establish the Center for Creativity at the AIU known as TransformED. The space is known as a digital playground where teachers can explore and design engaging project-based learning activities for their students. She has also received grant funding from the Grable Foundation to support STEAM (Science, Technology, Arts, Mathematics) initiatives in regional schools. Through her role at the Intermediate Unit, Mrs. Javorsky is exposed to innovative schools that are utilizing project-based learning to accentuate creativity, collaboration, critical thinking and communication. The researcher met with Mrs. Javorsky in the spring of 2013 to discuss the details of the study. With the assistance of Mrs. Javorsky, potential schools for the study were identified. Their selection was based upon the schools' successful use of project-based learning, which Mrs. Javorsky was able to highlight through her role at the AIU. In particular, schools selected are all members of the Kids + Creativity Network. Located in the Pittsburgh region, Kids + Creativity is a collaborative network of k-12 schools, higher education institutions, foundations, and cultural organizations, that support innovative learning practices that accentuate the intersection of science and technology, the arts, digital media, through projects to promote creativity, critical thinking, collaboration and communication.

In addition to receiving Institutional Review Board approval for the study, permission from the school board of each of the chosen schools will be sought. Data will be gathered from each site from a number of sources. Data from interviews will make up

the majority of the data collected for this study. Interviews will be conducted with the following individuals/groups: building principal, teachers, parents, and students. The interview with the principal will be completed in an individual format. The teacher focus group will be conducted with a grade level teaching team, including representatives from core academic, special area, learning support, and gifted education. The parent focus group will consist of parents of students from the same grade level as the teacher focus group. Effort will be made to have equal representation of parents of regular education, learning support, and gifted students. Correspondingly, students will be selected to participate in the focus group will be from the same grade level as the teacher focus group.

Focus group interviews can be an especially effective method of data collection for qualitative research. The focus group interview encourages interaction not only between the interview and subjects, but also between the subjects. Subjects will often comment on each other's responses, building on experiences and points of view resulting in a rich collection of interview data (Kitzinger, 1995). The interviews will be conducted on site at each middle school in the fall of 2013. The interview sessions will be prescheduled and last approximately 45 minutes to one hour. The audio from the interview sessions will be digitally recorded and then later transcribed. An interview protocol will be used to ensure efficiency, consistency, and thoroughness. Consent from the subjects of the study will be obtained prior to the interview sessions via a written form. Included in the consent will be a statement protecting the confidentiality of the subjects' identity.

Additional data will be gathered from artifacts such as documents recording communications with staff and parents, professional development materials, student assignments and project products will also be used as sources of data. The use of multiple sources of data allows for triangulation and increases the validity of the study (Baxter & Jack, 2008; GAO, 1990).

Data Analysis

After data has been collected, it will be placed into a database that will help to track and organize the information. This structure will increase the reliability of the study by ensuring that there is a system for tracking and organizing the several of forms of data (Baxter & Jack, 2008). The data will then be analyzed using pattern matching and cross case synthesis. These techniques, which are often used in multiple case studies, strengthen internal validity of the study by ensuring that that there is an organized process comparing predicted propositions to actual findings to either verify the propositions, disprove them, or identify alternative explanations (Yin, 2009). Cross case synthesis uses word tables for comparison of data from multiple cases. Word tables, which organize and display the data, utilize coding to identify patterns, similarities and differences. The detailed analysis will identify relationships between the focus groups of each individual case, as well as compare responses across the cases, including data from communications and professional development. This will result in the identification of any generalizations that can be made and lead to the final conclusions of the study (Yin, 2009; Stake 2005).

Research Questions

1. What are the barriers to implementation of project-based learning for teachers? Students? Parents?
2. What are the key elements that impact successful implementation of project-based learning for teachers? Students? Parents?
3. What is the perception of parents regarding project-based learning and its advantages/disadvantages?
4. What impact does project-based learning have on the process and products of learning?

The following background questions will be posed to the principal and teachers to elicit the story detailing the adoption of project-based learning at the school:

1. How long has project-based learning been utilized as an instructional strategy in the school?
2. What were the factors that led to the adoption of project-based learning?
3. How often is project-based learning utilized as an instructional strategy?
4. What innovative practices and methods do teachers use to integrate project-based learning into learning activities?

Interview Protocol

Date:_____ Time:_____

Location:_____

Release form signed: Y/N

Institution:_____

Interviewee (name and

title):_____

Interviewer:_____

Notes to interviewee:

Thank you for your participation. I believe your input will be valuable to this research and help grow professional practice. Confidentiality of responses is guaranteed. Your name will not appear in the publication of this research. I anticipate the time for this interview to take approximately 30-45 minutes.
I would like to talk to you about your experiences with project-based learning. I will ask you a few questions, but I would like to make our discussion as conversational as possible. Do you have any questions before we begin?

Background experience with PBL

Questions:

How long have you used project-based learning?
Why did the school adopt PBL as an instructional approach?
How often do you use PBL?
Tell me about some of the innovative strategies that have resulted in your use of PBL.

Implementation of PBL

Questions:

Describe how you were trained to start using project-based learning as a teaching tool.
Looking back on the process, what worked well and what would you change based on what you know now?

Parent perception

Questions:

How have parents reacted to the use of project-based learning?
Have you used any strategies to help them understand project-based learning?

Learning process and products

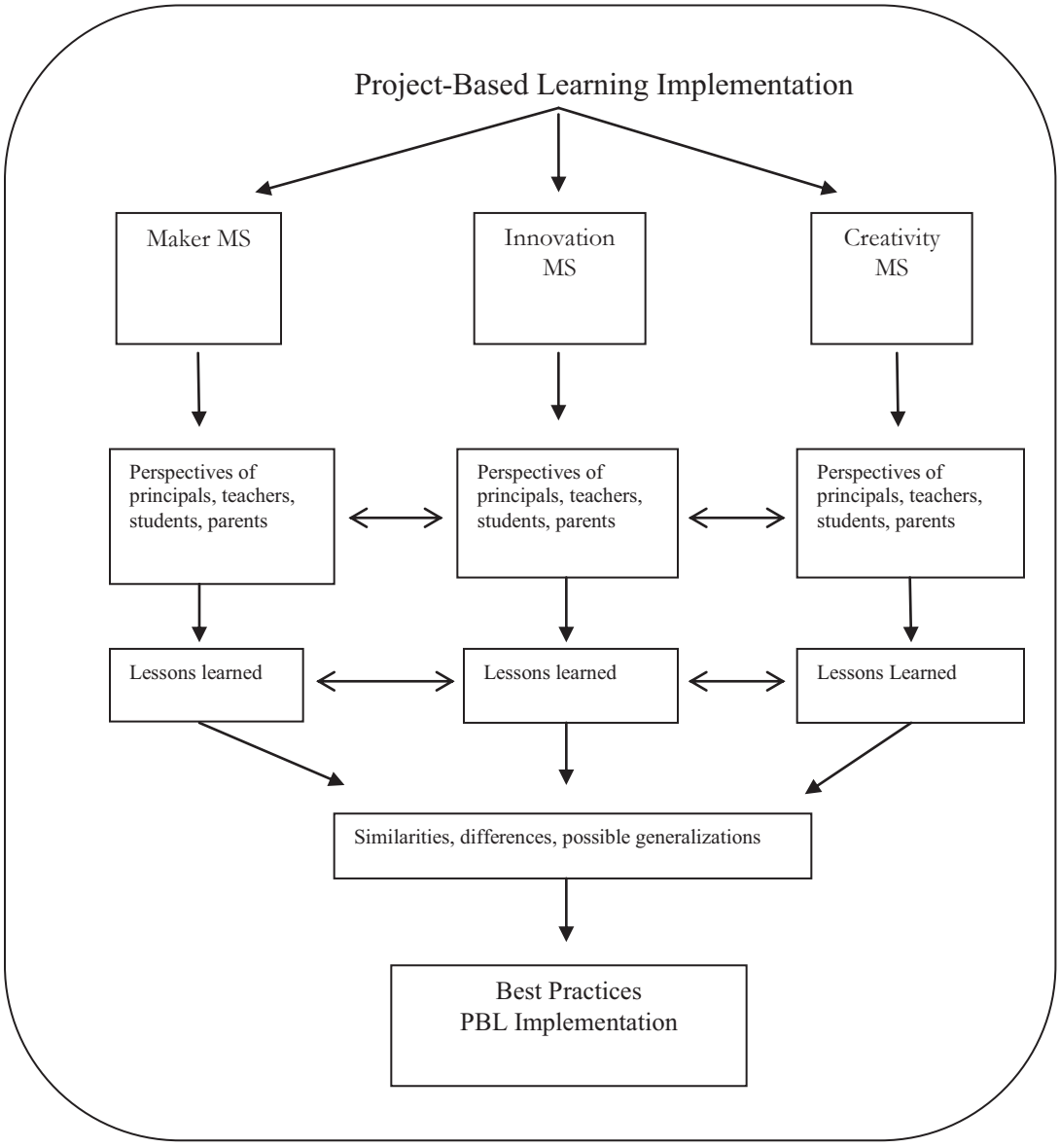
Questions:

How has the use of project-based learning changed the way classroom instruction works now?

Describe how you assess students now?

What kinds of interesting products have they produced?

Conceptual Framework



Chapter 4

DATA ANALYSIS

What Is the Problem?

The goal of this research study is to examine the implementation of project-based learning in three Pennsylvania middle schools. What worked with the implementation? What are the advantages and disadvantages of using project-based learning? How does project-based learning impact the process and products of learning? To answer these questions, a multiple case study design of three Pennsylvania middle schools was chosen. The selection criteria for the schools involved in this study was based upon their advanced usage of project-based learning. All three schools are members of the Pittsburgh Kids + Creativity Network, a cadre of k-12 schools, higher education institutions, the private sector, the philanthropic community, and public institutions with the goal of infusing creativity into the lives of children. The Kids + Creativity partnership results in numerous in-school and out of school experiences for students. Kids + Creativity Network also supports innovation in schools through grant programs for member schools, which are focused on transforming spaces of learning within schools to infuse creativity. All three schools in this study have multiple partnerships with outside entities due to their involvement in the Kids + Creativity Network. They have also all received grant funding from the Kids + Creativity's Sprout Fund, which provides financial support to steward the Kids + Creativity Network's innovative endeavor's in schools.

The selection of the schools was done in consultation with Mrs. Rosanne Javorsky, Assistant Executive Director of the Allegheny Intermediate Unit. Mrs.

Javorsky's advanced knowledge of these schools' emphasis on creativity was important in their selection for the study. Mrs. Javorsky is also a member of the Kids + Creativity Network. She coordinates the annual Science, Technology, Engineering, Art, and Math (STEAM) grant that is made available through the Kids + Creativity Network's Sprout Fund. The schools selected for this study were also chosen because of their very different demographic profiles, varying in their percentage of economically disadvantaged students, race and ethnicity, size and school structure. Comparing the stakeholder perceptions of the implementation of project-based learning from these three very different school environments was considered important to provide a rich, detailed study.

In each of the three case study sites, semi-structured focus groups were held with the following groups: teachers, students, parents, and administrators. The sessions were scheduled with assistance of the building principals from each case site. The sessions were digitally recorded and transcribed. Field notes were also taken after each session. The notes were not taken during the sessions, as the focus was placed on making a personal connection and maintaining a flow to the interviews. In addition, artifacts such as lesson plans, professional development materials, and student products were used to triangulate the data regarding the implementation of project-based learning.

The site visits to the case schools began on November 22, 2013, and concluded on February 11, 2014. The school contacts at each case site proved to be very accommodating by providing assistance with constructing and scheduling the focus groups. There was slight difficulty meeting the dynamics of the representative individuals for the focus groups. This was especially true with the parent focus groups, with the school contacts experiencing trouble finding available parents for gifted, learning

support, and regular education students who were all able to attend on the scheduled day and time. As the focus groups continued over time, the facilitation of the sessions became more comfortable. While the interviews were focused on the research questions, the discussion was best facilitated by following where the conversation naturally led.

In this chapter, the results, analyses, and interpretations of the data collected for this study are presented. In order to interpret the data, descriptive coding of the transcripts from the focus groups was used. Coding permits the researcher to classify and organize the substance of the data (Saldana, 2009). The particular technique used was to color code words and phrases from the transcripts. The highlighted areas were then organized using the background questions and research questions. In vivo coding was also used in order to accurately depict the voice of the focus group subjects. This is most appropriate and useful when children are participants in a focus group (Saldana, 2009).

Who Are the Schools?

Fictitious names were chosen for the three middle schools. The names chosen reflect a specialized area of emphasis related to project-based learning. Maker Middle School has a focus on utilizing the maker movement in project-based learning. The making approach to learning engages students in problem-solving, creative activities that involve invention, innovation, and marketing. In this self-directed learning experience, student products vary from scraps of unused or recycled material fashioned into a unique functional artifact to newly created items printed from a 3-D printer.

The second school in the study was named Innovation Middle School because the school has a particular focus on innovation. The school challenges the traditional process of learning by introducing new ways of teaching often by breaking down the traditional

methodology and pedagogy. The administrators of Innovation Middle School's district emphasize that they do not want students to play school, but instead engage in authentic learning that captures their imagination. "We are listening to our students and they are teaching us about how they learn and what they are interested in," comments the director of technology and innovation.

Creativity Middle School was selected based upon the emphasis the school places on student as well as teacher creativity. "Our administration encourages us to be as creative as possible in our classrooms," stated one teacher during the visit. This mindset extends to arts offerings at the school that are facilitated through the surrounding arts community. "We want our students to think of themselves as artists," noted the Chief Educational Officer, explaining the value of involving practicing artists as instructors in the district's schools.

Due to scheduling, a total of five visits were needed to the three case sites to complete the data collection. Two visits were made to both Maker Middle School and Creativity Middle School. Only one visit was needed to collect Innovation Middle School's data.

What Are the Profiles of the Schools?

Maker Middle School is located in an economically depressed area approximately 35 minutes' drive from a Pennsylvania metropolitan area. The communities previously depended on the steel and coal mining industry for their income base. Since the collapse of these industries in the 1980s, the area has been on a steady economic decline. According to the superintendent, much like the area, the families that live in the area that serves Maker Middle School are challenged with limited resources.

Maker Middle School is a traditional middle school that embraces interdisciplinary teaming as an organizational structure, with a daily grade level team-planning period to facilitate coordination and collaboration. The mission of Maker Middle School is to establish a collaborative working relationship with its families and communities to create learning environments for all students that nurture the academic, social, and emotional skills of each student through high expectations of excellence that produce life-long learners, world ready leaders, and citizens who are prepared to meet the ever-changing challenges of a global society.

The enrollment of the school is 550 students in grades 6, 7, and 8. Maker Middle School has a moderate number of students that are considered economically disadvantaged with a percentage of 32.73. Maker Middle School lacks racial diversity as 93.73% of its student population classified as white, 4.36% black or African American, and 2% multiracial. Fourteen percent of the student body qualifies for special education services and 6.55% classified as gifted and talented. The average teacher experience of 16.52 years reflects a mix of experienced and novice staff Maker Middle School. One hundred percent of these teachers are classified as highly qualified, holding certifications in their areas of teaching. The Pennsylvania Department of Education's School Performance Profile calculates the academic score of Maker Middle School at 78 out of 100. The School Performance Profile academic score encompasses the school's performance on the state assessment, student growth academic data, and attendance rate.

Despite facing numerous challenges, Maker Middle School was designated as a Pennsylvania Donald Eichhorn School to Watch in 2013 by the National Forum to Accelerate Middle Grades Reform. Also in 2013, Maker Middle School's district was

also named to the Digital Promise League of Innovative Schools, a coalition of school districts across the United States that are dedicated to leveraging innovation to power learning to improve the education of students.

Innovation Middle School is in an opposite scenario than Maker Middle School. It is located in what was once a rural area with a small population. Located approximately 25 minutes' drive from a Pennsylvania metropolitan area, it has now experienced an extreme degree of growth due to its proximity to the interstate highway and available land that was once used for farming. Innovation Middle School's school district has been identified as being the fastest growing school district in the region. Suburban housing developments are transforming what were once individual family farms. According to the district superintendent, the parents of students in the school have mostly professional degrees and careers.

Innovation Middle School is a traditional middle school with interdisciplinary teaming and a daily team-planning period for grade level core academic teachers. The mission of the school district for Innovation Middle School is "in partnership with the community, to cultivate academic, artistic, and athletic excellence by instilling a spirit of collaboration and communication to develop confident, ethical, and responsible leaders."

Innovation Middle School has an enrollment of 797 students in grades 5, 6, 7, and, 8. The school has a very small number of students that qualify as economically disadvantaged with only 10.41% of the population meeting the guidelines. The school lacks racial diversity as 85.07% of the students are white, 8.03% are Asian, and 3% are black or African American. Only 6.15% of the student body is classified as special education and .25 qualify as gifted and talented. The average years of teaching

experience of Innovation Middle School's teaching staff is 9.88, reflecting many younger teachers. One hundred percent of these teachers are classified as highly qualified. The School Performance Profile academic score of Innovation Middle School is 91.9 out of 100.

Creativity Middle School came into existence in 2007 after the birth of the charter school movement in Pennsylvania. Located in the urban areas around a Pennsylvania metropolitan area, and frustrated with the poor performance of the public school districts that served underprivileged students, the community leaders of these urban areas partnered with parents and private educational entrepreneurs to launch the charter district. Creativity Middle School's district offered an alternative for families with virtually no option but to send their children to schools that were pervasive with discipline problems, low academic performance, and high dropout rates.

The mission of Creativity Middle School's district is "to catalyze the transformation of public education so that all children have access to high performing public schools." Creativity Middle School received the Charles Gray Award from the Pittsburgh Civic Light Opera recognizing its commitment to arts education and for having one of the most unique arts programs in the region. In 2011, the school also received recognition from New Leaders from New Schools, receiving the Effective Practice Incentive Award as one of the top charter schools in the nation.

Creativity Middle School is a smaller school, with an enrollment of 416 students in grades kindergarten through eight. At 71.15%, a significant majority of Creativity Middle School's student body is classified as economically disadvantaged. The school also reflects the diversity in its community, as 57.7% of students are white, 32% are black

or African American, and 9% are multiracial. 10% of Creativity Middle School's students qualify for special education services and none of the student body qualifies as gifted and talented. Creativity Middle School's teaching staff has 7.23 years of average experience. 98.8% of these teachers are highly qualified. Creativity Middle School's School Performance Profile academic score is 80.4 out of 100.

Data retrieved from the Pennsylvania School Performance Profile displayed in Table 1 provides a demographic profile for the three schools.

Table 1

Demographic School Profiles

	Maker Middle School	Innovation Middle School	Creativity Middle School
Enrollment	550	797	416
Grades	6, 7, 8	5, 6, 7, 8	K-8
% Economic disadvantaged	32.73	10.41	71.15
Race/Ethnicity	93.73% White 4.36% Black or African American 2% Multiracial	85.07% White 8.03% Asian 3% Black or African American	57.7% White 32% Black or African American 9% Multiracial
% Special Education	14	6.15	10
% Gifted and Talented	6.55	.25	0
Average experience of teaching staff	16.52	9.88	7.23
% Highly Qualified Teachers	100	100	98.8
Pennsylvania School Performance Profile Building Level Academic Score*	78	91.9	80.4

Note. * The Building Level Academic Score of the Pennsylvania School Performance Profile calculates the academic score from the school performance on the state assessment, academic growth data, and attendance rate (retrieved March 3, 2014 from http://paschoolperformance.org).

Maker Middle School

Observations and Records Review

As one enters Maker Middle School it is evident that the appearance of the school is nontraditional. The classrooms and hallways are bright and colorful. On the walls are artwork and innovation-themed photographs. It looks much more like a children's museum than a school. Although the building is clearly an older facility, the school is intently sending the message that creativity and innovation are important. The environment would certainly not be described as institutional. Student work is also readily displayed throughout the school. Paintings, three dimensional art, bulletin board displays, and student inventions are in many hallways and commons areas.

The classrooms and learning spaces also are different than a traditional school. Classroom seating is arranged to encourage collaboration with the use of tables or desks grouped in small pods. Both in specialized areas or classroom settings, students were observed collaborating and teachers were operating as facilitators. Teachers appeared comfortable with many things going on in the classrooms at the same time. Teachers were acting as facilitators during instructional time. Maker Middle School's superintendent refers to this change as a shift from, "the sage on the stage to the guide on the side."

Maker Middle School has been using project-based learning extensively for the last three years. It was introduced by the current superintendent, who has been the chief educational officer for three years. Previous to his current post, he served as an assistant superintendent, building principal, and English teacher. He has a total of 29 years' experience as an educator. During his time as a teacher, the superintendent of the school

district utilized creative teaching methodologies and cooperative learning. In his administrative career, he has made the use of innovative teaching strategies a centerpiece of his vision.

When the superintendent began his tenure, the school district was losing many students to charter schools and also had a rising dropout rate. Recognizing the need for action, the superintendent built a committee of business people, representatives from the technology community, and members of the gaming industry to attack the problem. What emerged from this congress was a focus on engaging students in a technology-rich environment using project-based learning. The district joined the newly formed Kids + Creativity Network and began to transform the school experience for its students. Educational grants from the Grable Foundation, Heinz Endowments, Sprout Fund, and the Allegheny Intermediate Unit provided funding for renovation costs, technology hardware, and professional development.

Partnerships were formed with Carnegie Mellon University, the California University of Pennsylvania, Schell Games, and the Pittsburgh Children's Museum to connect experts with the school community. This resulted in out of district experiences for students, teachers, and administrators, as well as the establishment of outreach programs within the district involving representatives from these institutions.

Students from Carnegie Mellon University's Entertainment and Technology Center developed games and simulations for students to play test. A collaborative agreement from Schell Games also provided the opportunity to play test games, both at the school and at the Schell Games factory. In addition, owner Jesse Schell provided feedback to the transformation of the school and shared his gaming expertise with

students through teleconference and face to face interactions. The Pittsburgh Children's Museum also provided professional development to teachers and administrators focused on the pedagogy and methodology of making. They hosted professional development sessions at the Museum and visited the school on multiple occasions to assist staff.

Through funding provided by a science, technology, engineering, arts, and math (STEAM) grant from the Allegheny County Intermediate Unit, Maker Middle School has integrated a Situated Multimedia Arts Learning Laboratory (SMALLab) into the school. Using motion capture technology and projectors, the same technology made popular with Xbox Kinect, the SMALLab is an actual game environment with students embedded in the game. Students interact with each other and the content within this environment. The SMALLab connects students to learning in an interdisciplinary, technology-rich environment that is highly kinesthetic, collaborative, and engaging.

Figure 1. SMALlab at Maker Middle School.

Instituted this school year, Maker Middle School has infused creativity, design-thinking, and marketing through its Dream Factory. The Dream Factory utilizes the maker philosophy of learning to engage students. This innovative approach to learning blurs the lines among technology education, art, family and consumer science, and

computers. Teachers act as facilitators as students work in collaborative design teams to make products. These products are conceived using computer aided drafting (CAD) software and then are created using 3-D printers. During a site visit, the students were observed collaborating to design a mold for a candy bar.

Figure 2. Dream Factory at Maker Middle School.

Other projects in the school showcased creativity, technology, and important content. One unique project was displayed on a bulletin board about the American Civil War. The project utilized Quick Response (QR) codes that when used by a QR reader on a smart phone, will take the user to a website. By accessing the codes, a person is able to access, via the website, simulated role-played audio and video recordings students constructed regarding important content from the war.

Maker Middle School has also provided iPads to all teachers and students in the school. These iPads have many applications that facilitate the demonstration of learning in a project-oriented format. Students often use iMovie and Garage Band as options to showcase their mastery of content and skills. Maker Middle School has provided professional development to its teachers to enable them to utilize the iPads to the greatest extent possible. This professional development is done in team planning periodically, facilitated by the principal, the assistant superintendent, and superintendent, and an Apple

certified teacher. A non-traditional format focused on time for personal exploration and sharing instead of a scripted training program is also used during district in-service time. The superintendent feels that teachers learn best in this collaborative approach. “They know how to use the device. We just need to give them the time and get out of their way. If they find something valuable, then they are excited about sharing it with their colleagues,” noted the superintendent. Because of their advanced use of iPads, the school district has been recognized as an Apple Distinguished Educators Program.

Figure 3. Use of technology at Maker Middle School.

Project-based learning is embedded within every disciplinary area of the curriculum. Core academic teachers report that 50-75% of their classrooms’ learning activities are organized around projects. Special area teachers report that nearly everything is taught in a project-based manner.

Focus Group Interviews

In order to gain detailed insight into the implementation of project-based learning at Maker Middle School, focus groups were conducted. The focus groups for Maker Middle School were comprised of a cross section of the school community. The

administrative group was represented by the building principal and the superintendent. The building principal is a female in her first year as the head principal. Previously she served as the assistant principal of the middle school. The superintendent is a male in his third year as the educational leader of the district. Prior to his current post, he was an assistant superintendent, building principal, and English teacher. He has a total of 29 years' experience as an educator.

The teacher focus group was represented by sixth, seventh, and eighth grade core academic subjects of English, science, mathematics, social studies, reading, and special area teachers of art, family and consumer science, computers, technology education, and music. A special education and gifted teacher also participated in the focus group. The experience for the group ranged from a first year teacher to a teacher with 29 years' experience. The group was equally represented by males and females.

Four students in the seventh grade participated in the student focus group. Three of these students were females and one was male. One of the females was a special education student and another was a gifted student. The parent focus group also included a parent of a gifted child and a parent of a special education student. The children of these parents were in grades 7 and 8, two of whom were male and two were female.

The conversations in the focus groups concentrated on the perceptions of stakeholders with respect to the advantages and disadvantages of project-based learning, implementation of project-based learning, and the impact of project-based learning on the process and products of learning.

Advantages and Disadvantages of PBL According to Teachers

Teachers focused on creativity and collaboration as the main advantages of project-based learning. A teacher stated,

> Within different groups in my own class, it's awesome because it leads you to think, all right they're going to do this, and then they do something different and they do a complete 180 on you and they turn it in and it's something that, 'Wow, I didn't expect that', and it's awesome in its own way.

Another teacher said,

> I just look back and sort of marvel with that because you don't know that a kid would go there with this. It's not limited to what you think. You set the guidelines and the structures and they can become extremely creative. It's not restrictive.

Seeing kids develop leadership roles was also noted in relation to collaboration. A teacher stated, "Seeing kids that you think are actually shy actually step up as leaders is another awesome, you know, portion of the student project." Another teacher commented, "I think once you give it over to the kids, it's really enlightening, because you see other parts of their personality. Like, you'll see some of them come up and develop roles and you'll see them teaching each other."

A disadvantage mentioned by teachers was the amount of time project-based learning takes and the stress of preparing for state standardized tests. "There's not enough time to create and that's not the fault of necessarily anybody. It's I guess, the nature of the beast." They were also concerned because of the pressure to perform well on the state standardized tests. "You know you have to fit it all in and that's a really difficult balance to fit in and also traveling through all the skills that you want to do."

Advantages and Disadvantages of PBL According to Parents

Parents were very enthusiastic about their support of project-based learning. They felt that it suits the needs of middle school learners, especially those with special needs. One parent stated,

> My son is in middle school, he's in seventh grade. He has ADHD, so to have classrooms where it's completely hands on, where he can move about the classroom and manipulate things, that is a huge, huge plus for him.

Another parent commented,

> My son is a visual learner, so he can walk over and pick up that tool and use it to make this car, or go to the computer and take this picture and do something with it, it's completely hands-on. It's a completely great way to touch kids who are, there's kids that can do book work and also those that need hands-on.

Parents also shared mixed thoughts about cooperative groups. They felt that assessments needed to be fairer for group work. "I think the evaluation in the end is unfair," said one parent. Parents also noted in reference to group work, "They feel like their opinions are not heard and that students do not do their part of the project." Others felt that navigating through the dynamics of cooperative groups is an important life lesson. "My son always has kids over doing projects in groups and it's wonderful how they're interacting with one another and they're going to have to do that for the rest of their lives," stated one parent. Another parent noted,

> Yeah, that coordination of different opinions is huge and I'll be the first to tell you my kids will complain, 'I got so and so in my group' and I say, guess what, there

is going to be a so and so for the rest of your life and it works out and it comes for the best.

Parents felt that the attitudes of the teachers with regard to project-based learning had a positive impact on their children's engagement at school. One parent commented, "They're really excited about their jobs. They're really excited about what they are doing. When you walk into a meeting on parent night, my husband and I left here and were talking and we said, 'that guy really likes his job.'" Another parent stated, "My eighth grader is still interested in school because of his teachers. He loves his teachers and they're keeping him engaged."

Advantages and Disadvantages of PBL According to Students

Students noted that they feel that they learn more through project-based learning. "I think I learn better with actually doing something rather than reading from a book and having it go in one ear and out the other, said one student. Students also expressed feelings about working in cooperative groups. One student stated,

> I like it in a group setting, it just depends on who's in my group. I understand you need to work with people you don't exactly like, but like it depends on if they're really going to give an effort or not, which sometimes they don't,

Students were very familiar with rubrics used to assess their projects. These rubrics sometimes have a self-evaluation and an evaluation of project teammates. "So, like each person in the group like evaluates another person themselves, but its anonymous, so that if someone's not doing the project, and they're like playing games on the iPad, then they get a bad grade," stated one student. Students also expressed their satisfaction when choice is incorporated into projects.

Implementation of PBL According to Teachers

The implementation of project-based learning at Maker Middle School was discussed with the focus groups. Individuals within the groups had interesting thoughts to share during these discussions. Teachers felt that school and district level administration was very supportive. A teacher commented, "I feel like we are being educated to do this. The administration is flexible and has given us time and space to figure things out. It's not that they are telling us to do it, they're educating us." Another teacher stated, "They encourage us to take risks," and "It starts from administration, I think." This teacher also felt that the addition of new teachers to school has also helped: "Although the newer teachers bring a lot of great ideas. So, it's a good mix. Absolutely, I think so."

Implementation of PBL According to Parents

Parents were very positive about the school's implementation of project-based learning. The parents noted that the school had numerous activities to involve parents, although they expressed that the school needs to find ways to engage more parents to understand the educational value of project-based learning. As a group, they felt that they were the exception in being highly involved in their children's education.

All parents in the group highly valued presentations, although one parent felt that students were unprepared to do oral presentations and that the school could do a better job understanding how to do a speech properly. "I'm not sure they give them quite the tips they need in the presentation style," stated one parent. Another parent felt that students can naturally present to an audience with very few problems because the school district has incorporated presentations in the regular work done in all grade levels.

Implementation of PBL According to Students

Students were very positive with regard to the technology available to support project-based learning. “One thing I loved about the dream factory was the 3D printers and the laser engraver,” stated one student. Another student noted, “And as for the 3D printer, it’s very cool. You can basically go online and design whatever you want and it will print out and it’s made entirely of plastic, so it won’t break easily.”

Process and Products of Learning for PBL According to Administration

The superintendent feels that the number one priority to ensure learning is to engage students. “I think we spend too much time dealing with just the single assessment that kids take and we don’t look at the total package of what kids are learning,” stated the superintendent. He further commented, “How can they apply those things to the real world situations, real learning opportunities and then go on and create.” The principal noted,

> kids want to be moving and doing. My kids in the middle school are so excited about the Dream Factory and the SMALLab. They want to come to school. They want to go to Dream Factory. They want to make something.

Technology is part process and product in the growth of project-based learning at Maker Middle School. The use of technology to facilitate PBL is evident in so many aspects of the curriculum. The Dream Factory, SMALLab, and iPads are all key tools that are used by teachers and students in their use of project-based learning.

Process and Products of Learning for PBL According to Teachers

Teachers also feel that project-based learning serves as a strong teaching pedagogy to engage students. “They’re more interested in what they are building or what

they are creating as opposed to researching something or taking the test on it. They find doing something, building something, or whatever, as more exciting," stated one teacher. Other teachers commented, "They can really show a different kind of knowledge when they get to do something that is hands-on" and "It gives kids that chance to shine that normally don't." Another teacher commented,

> students can be creative and self-directed. They care about their work and they are building skills that they don't realize that they're building. I think too with the whole idea of the Dream Factory is that they can come up with their own dreams of how they want to imagine or create the chocolate bar instead of centering it around a holiday. They could create their own theme for our Dream Factory based on what was important to them.

Teachers feel that it is ultimately much more about the process of learning than the product.

Process and Products of Learning for PBL According to Parents

Parents also feel that students having power over their own learning is a strong engagement tool. A parent stated,

> they don't need us to…they can go on Youtube or whatever they need to find out how to do something. It's taking the place really of the traditional role of the teacher as the depositor of knowledge and thrown them more into the facilitator where they're providing opportunities for kids.

Innovation Middle School

Observations and Records Review

Innovation Middle School is a bright and vibrant environment. The school is one of the older facilities in the district. It was previously the district high school. With the high degree of growth the school district has experienced, the elementary schools and high school are both newly built facilities. The middle school has been renovated in the last several years. The renovation resulted in a building that is newly updated, but has maintained the character of an older building. Classroom spaces were arranged to facilitate collaboration with seating arrangements in small groups instead of traditional rows. Students were witnessed working in groups in several classes, including an eighth grade math class, eighth grade social studies, and sixth grade art class. They transitioned between activities and centers needing very little direction. Students were also observed engaging in project work in a seventh grade art class.

Figure 4. Classroom learning space at Innovation Middle School.

Innovation Middle School has historically been a high-achieving school. District officials attribute this success to a supportive, educated community that values education, as well as a solid curriculum and a dedicated, caring staff. In 2009, the school district

hired the current superintendent. At the same time, Pennsylvania was integrating a statewide initiative known as Classrooms for the Future, which provided technology resources and professional development to public schools. Through this program, the superintendent was exposed to the pedagogy of project-based learning. She met a high school principal of a project-based learning magnet school. She was inspired by this principal's vision of a project-based curriculum that prepared students for the world. Based on the establishment of this relationship, the superintendent set a course to bring the project-based learning concept of education to her district. One of her first steps was to hire a director of technology and innovation. The person selected for this position had the educational background, experience, and expertise to transform the pedagogy and curriculum of the school district to emphasize innovation.

The director of technology and innovation was hired to integrate project-based learning pedagogy into the curriculum. This individual held degrees in sociology, interior design, and instructional technologies. In particular, the director of technology and innovation felt that her background in interior design was particularly impactful. It assisted in the discussion of how the physical environment is a major factor when evaluating learning experiences for students. It also was a powerful lens to view lesson and curriculum design. Her expertise in instructional technologies helped to embed the use of technology into classroom design, curriculum, and after school activities. The director of technology and innovation shared an extensive, detailed digital document that provided a landscape view of the professional development activities related to the integration of project-based learning across the school and school district.

The school website provides further evidence to detail the focus on projects. Project-based learning, science, technology, engineering, and math (STEM), and STEAM activities are explained on the website. A special area to showcase projects is accessible via the website. The link has pictures of student products as well as an explanation of the projects. News stories detailing the innovative practices of the school are also linked to the website.

Students are engaged as self-directed learners through STEM learning activities such as robotics and Scratch, which is an open source programming software designed by the Massachusetts Institute of Technology Media Lab. Students were observed using the robotics technology to create moveable sculptures and displays. Students were enjoying themselves and working with one another while the teacher circulated throughout the lab working with students. The Scratch program enables students to create their own stories using simple programming concepts. Teachers explained that the students engaged by Scratch in the middle school have moved onto the high school and are now designing applications with the assistance of Google and presenting them to local companies and businesses.

Figure 5. RoboArt project at Innovation Middle School.

The technology education teacher is clearly the leader in the building regarding the use of project-based learning. The school principal scheduled special time for him to showcase the laboratory that he had designed and to explain the many projects that facilitates in his class. One project was a simulated city that required students to collaborate to solve problems using design thinking. They presented their projects in this unit to an audience. The most impressive project that he has designed for his students is an invention unit that engages students in brainstorming, design, manufacturing, and marketing. Students were challenged to design and manufacture a clock without any of directions for its construction with the exception of a prototype of the final product. They then had to use problem-solving skills, communication, and collaboration to construct the clock.

Figure 6. Public presentation at Innovation Middle School.

The technology education teacher also came up with the idea of presenting a community learning night. Several teachers and parents mentioned this night during the focus groups as a key element to communicate to parents the difference between project-based learning and traditional educational practice. The community learning night was one of several outreach programs for parents. Parents are invited to a meet and greet at

the beginning of the school year for the purpose of developing a rapport and relationship between teachers and parents. A curriculum night is also scheduled to focus on content, practice, procedures, and modes of communication.

An intentional emphasis to encourage female students to engage in STEM was also noted. An after school club that was exclusively for female students clearly was a source of pride for the female students. The teacher sponsor for the club detailed the growth of the club over its three-year existence. She further explained how the students had progressed into the high school with a similar high school club. These students traveled to Pepperdine University to participate in a STEM conference as the only high school students invited to present.

Focus Group Interviews

Multiple stakeholder groups represented the focus groups of Innovation Middle School. The building principal and director of technology and innovation served as the administrative focus group. The building principal is a male in his third year as the building principal. He previously served as a social studies teacher, elementary principal, and middle school principal in another school district. The director of technology and innovation has been with the Innovation School district for four years. Previous to this she served as an instructional technology coordinator in a neighboring school district for six years. She also has experience working in higher education in the area of instructional technology.

The teacher focus group for Innovation Middle School was made up of sixth, seventh, and eighth grade core academic teachers from the subjects of English, reading, science, social studies, and mathematics. In addition, a separate focus group was arranged

to meet with special area teachers from art, music, technology education, computers, and family and consumer science. Individual time was also scheduled with the technology education teacher as he is considered a leader in the building with the use of project-based learning. Several members of the teacher focus group have achieved the status of National Board Certification. The range of experience for the teacher focus group was five years to 26 years.

The student focus group was comprised of five students, one of whom was a special education student. Three of these students were female and two were male. The students were all from the sixth grade and seventh grade. The parent group was made up of four individuals, one male and three females. They were all parents of the students in the focus group.

The conversations in the focus groups concentrated on the perceptions of stakeholders with respect to the advantages and disadvantages of project-based learning, implementation of project-based learning, and the impact of project-based learning on the process and products of learning.

Advantages/Disadvantages of PBL According to Teachers

The teachers participating in the focus groups felt that project-based learning is particularly effective because students hold onto the learning. Teachers also felt that you have to be flexible as an educator: “you have to be comfortable with being uncomfortable.” With project-based learning, there is a shift with who is in control of the learning. “Students are the agents of learning in PBL,” noted a teacher. A colleague added, “It’s not the teacher imparting the information or knowledge. “They don’t need me. I’m here to help, but they can do it on their own,” another teacher also commented.

Teachers also discussed the positive residual impact of project-based learning. “I think that it just makes them feel more confident with the material,” mentioned one teacher. “The goal we want kids to be able to accomplish as learners at the middle school and high school to get that feeling of ‘I got it on my own,’” stated another teacher. He continued, “All the soft skills of collaboration, communication, technology, having disagreements and working it out, it helps them learn independence.” A teacher commented, “If it’s something that they came across, they internalize it, they’re going to connect experiences that they have already had.”

Project-based learning also presents some challenges for teachers. Students are rarely at the same point as they work on projects. A teacher lamented,

> In class projects you have a block of time and you have some groups that are finishing in twenty minutes and other groups that have barely started in an hour because they’ve been brainstorming and disagreeing, and trying to work things out,

One teacher felt that her average and below average students do better with PBL. The teacher commented, “Sometimes higher level students have difficulty working in a team.” In addition, some bright students often want step by step directions, not liking the open-ended nature of PBL. However, another teacher felt that her gifted students thrived with project-based learning.

Some of the teachers also felt that particular parents are too concerned with the grade the student earns instead of focusing on the learning. “They don’t have the ability to handle how the grade is truly the kids grade,” commented one teacher. A math teacher felt that state assessments make it difficult to do as much project-based activities as he

would like. “It’s a hindrance, it’s a hindrance. Right now we are serving two masters with the PSSA’s and the Keystone Exam. We just went through our rewrite with math, now we’re dealing with all of that with Common Core.”

Advantages/Disadvantages of PBL According to Parents

Parents state that one main benefit of project-based learning is the level of engagement for students. “You see a level of engagement that you wouldn’t see otherwise,” mentioned one parent. Another parent noted that students come home talking about school more when they are participating in a project. Parents also feel that PBL is beneficial because it is more active for students. “Hands on is a lot better for kids, especially when you see ADD or autism, or things like that. I think it’s really reaching more of those kids and giving them the opportunity to actually do something,” stated one parent. Another parent of a male student added, “I think for boys, they need to get up.”

One parent stated that she believes group projects are beneficial: “I think group projects are key because in life, as you get older, you’re constantly interacting, you have to know how to engage with others.” Another parent added that projects, “give them an opportunity to work together, which they need today with their focus on social media.” She also believes that group projects have helped to develop important advocacy skills for her daughter:

> Kids complain about their group members not doing their part of the project. I told her, ‘Well you have to do what you have to do, what you feel is best’ because she felt they were getting short changed. So, she advocated for herself. She did. So that’s another skill that’s really important that came out of a project.

Another parent stated that she preferred individual projects because her son can work at his own pace and explore his own interests. She also added that group projects are hard to manage with all the different personalities of the members of the group and the time required outside school when students need to meet to complete the project.

Advantages/Disadvantages of PBL According to Students

Students stated that they prefer project-based learning over more traditional modes of classroom learning. One student commented,

> You are engaged in a project, you learn and understand it better." He added, "It's more realistic too, especially for the workplace. You're not going to be, you know, sitting there with a book and memorizing facts, you're going to be working with others hands-on so that's what I've always liked about it.

Another student added, "If you have more people, it's more opinions, it's more knowledge that you can piece together, different ideas get shared, so if you propose an idea and then someone else, 'oh yeah, then we could add this too.'"

Students also like the creative aspect of project-based learning. "I like that you can express your own creativity in what you are doing," noted one student. Students also feel that assessment of their work is fair. "It's always straight forward with the teachers on what you're graded on," commented a student. Another student added, "They use a rubric." One female student felt strongly about the school's emphasis on promoting math and science with girls: "The girls STEAM team. That was probably one of the greatest experiences of my life and the most influential because as a female you're never really encouraged to go into engineering." She continued, "It was all eighth grade girls learning

about different type of engineering, rockets, and robotics. It was really fun. We also learned a program called Scratch."

Implementation According to Administrators and Teachers

Teachers discussed professional development as a key component to successful implementation of project-based learning at Innovation Middle School. This professional development has occurred within the district, and also at workshops and conferences where teachers and administrators have been sent:

> I got a chance to go to this one thing where we were the kids and they did PBL and we got to see it from the kids' perspective, what it looks like, what it sounds like, how it takes place like beginning to end, the whole thing. That one experience was more valuable than any other PD.

According to administrators, their use of focused professional development was particularly effective. Specialists were brought into the district to work with certain teachers to strategically have the greatest impact. "We use that kind of onsite, in the classroom support and professional development," stated the director of technology and innovation. Likewise, the technology literacy coach focuses the development of skills to assist with project-based learning. He commented, "I would sit with the teachers, plan out a unit, and say, ok, here's the technology that we can use to enhance your project, to make the project better." Administrators also choose to put a strong emphasis on after-school programs as the starting point for specific project-based programs such as Scratch. The administrator explained,

> In 2010 for instance, if you are just concentrating on Scratch, we had a series of after school activities that went directly into the curriculum the following year because the art teacher saw what was happening and she decided it was a good fit.

Teachers also mentioned the importance of including project-based learning in the discussions taking place during curriculum rewrites. "During curriculum rewrites we had meetings with all of the history teachers or at least representatives from all grade levels… and I think that helps to align some of our projects," commented a teacher. Another teacher spoke to the importance of connecting project-based learning to previous professional development concepts: "Bringing it back in time, and talking about Understanding by Design and curriculum design should also have the discussion of integrating some type of project-based/inquiry based constructivism approach into that instead of separate discussion." While teachers emphasize the importance of professional development, they also are outspoken on the feeling of being overwhelmed at times. "When you roll something out give people time to implement it" and "It's too many things cookin' on the stove at the same time" were statements heard from teachers.

Instructing teachers on the development of sound assessments for project-based learning has also been a contributing factor to successful implementation. "I think you really have to sit down to really help the teachers develop sound assessments, make sure you are able to tie the learning to each individual student and you don't have student's grades negatively impacted by others," stated one teacher. "I think parents like rubrics" and "I think creating rubrics helps students stay on track throughout the project" were other comments from teachers related to the importance assessment.

A social studies teacher spoke to the importance of emphasizing non-content related skills to the success of project-based learning:

> We brought back all the different habits that are essentially a prerequisite for learning which I think make a connection with PBL, like soft skills ideas, the things they have to learn how to do, persistence, like taking risks, sense of humor.

Several teachers also spoke of the importance of working with parents and families as a critical component to successful project-based learning implementation. One teacher noted,

> The last few years we've had a meet and greet with the seventh grade [teachers], and we don't go over curriculum really or anything else. It's just come and meet us, let's talk, this is who we are, build relationships, so that they're comfortable that whenever these things do come up, and they do need to speak to us about, I don't understand why they have this assignment.

He continued, "When you see them again at curriculum night, you can tell that there is a big difference, because you can tell the people that you've talked to already." A colleague remarked, "I think we forget that we need to educate the parents and build a relationship."

An additional successful component of implementation was teacher-led, community learning nights that were focused on educating parents: "We would set up a lot of project-based, you know, easy things we could do in one night. Inquiry-based things, so we would invite parents, families to come in and we had probably five to six of those sessions." Another teacher involved in the community learning nights commented,

"It wasn't anything with our curriculum. Not content, it was process. We could now expose the parents to the types of things students are learning."

Administrators also added, "We are really reaching out to parents, which starts down in elementary school, so parents have a good understanding of project-based learning by the time they reach middle school." The director of technology and innovation also noted the commitment to implementation that the district has displayed, stating, "I've worked in different districts and I have encountered so many barriers and I came here – no barriers. If I find a barrier, a challenge, the administration removes it."

Implementation According to Parents

Parents agreed with the impact of a district-wide focus on educating parents: "The school [district] has educated us over the years that PBL is a part of every school in the district. You see and hear it at open house and the celebrations of learning." One parent advocated for having teachers break projects down into manageable parts and due dates for these segments. This parent also felt that students need guidance from teachers of how to navigate through group work, commenting, "Teach them how to work within a group. My son struggles with naturally saying 'here is an idea and here's why I think it is good.'"

Process and Products of Learning According to Administrators

Administrators believe that the process of project-based learning is effective for several reasons. The principal explained,

> We use it because we feel it's the best way for students' to learn. So problem-based learning allows us to have a constructivist based approach and that is again,

> the most powerful way for students to learn and we also believe that we are connecting students to their world.

She further explained, "Career vision is the piece where we take the context of what they are learning and help them understand how it fits into a career focus."

Process and Products of Learning According to Teachers

Teachers agree that creativity and collaboration work hand in hand as process and product when using project-based learning. An art teacher commented, "My goal is that there are 30 maybe 25 kids in the classroom with 25 different outcomes and they're all going to be using their creativity." She continued,

> They learn to get along with each other and discuss problems together and they learn creativity isn't just being an artist, it's all kinds of problem-solving. It's a real world skill. In the real world, we know we have to work together."

A science teacher stated, "Just letting kids be creative and when they are being creative, sometimes they tend to enjoy working together, because you're solving problems, you're discussing things, there's a lot of enthusiasm and excitement." Students engage these creativity and collaboration skillsets in projects such as Mission Montserrat, a project-based unit coordinated through NASA's Challenger Learning Center. Students, working in collaborative teams, engage in a simulation activity of an approaching hurricane to the island of Montserrat. Students analyze data, plan evacuation routes, and coordinate communication and supplies. Their success with the mission is dependent on their ability to collaborate effectively to problem-solve an intense and complicated problem in a time-sensitive framework.

Another such example of this creativity and collaboration is the 8th grade art enrichment course that engages students in a Robo Art unit. Using technology made available by Carnegie Mellon University's Community Robotics, Education And Technology Empowerment (CREATE) Lab, students combine art, engineering, and computer programming as they create kinetic sculptures based on their personal interest. Their sculptures, programmed to move in predetermined patterns, also incorporate light and sound as they capture the essence of characters such as Oscar the Grouch, Bob Marley, and LeBron James. Another creative product utilizes the open-source programming software Scratch. Designed by the Massachusetts Institute of Technology Media Lab, Scratch enables students to master the basics of computer programming using a drag and drop format. After learning Scratch, students use their personal interest to create animated products such as fairy tales, cartoons, and invitations.

The technology education lab at Innovation Middle School is completely focused on project-based learning activities. The technology education teacher, universally accepted by his teaching peers as the leader in the building with project-based learning, uses the principles of brainstorming, designing the prototype, testing, and communicating the findings to engage his students. His invention unit is particularly impressive. In this unit, students identify a problem, research information related to the problem, they then use cardboard for rough design followed by the computer program AutoCAD to design the solid modeling. The prototype is then created on the 3-D printer. Students then write an abstract for a patent with a description of their invention. Some of the inventions that students created were a wall-mounted adjustable back scratcher, a wall-mounted bicycle repair rack, and a boat designed to hold multiple remotes for a family living room.

Creativity Middle School

Observations and Records Review

Creativity Middle School is operated from a facility that is a converted office building. For this reason, it has a very different feel to it. It lacks the atmosphere that both Maker Middle School and Innovation Middle School have as educational spaces. As a charter school, the options are limited with regard to facility availability. However, the physical appearance of the school does not reflect the creative activities taking place within its classrooms. The classroom spaces are all set up as centers of learning instead of traditional classrooms. Upon entering the rooms, it is difficult if not impossible to detect where the front of the room is located. In many rooms, tables are used for work spaces. In the rooms where there are desks, they are clustered together in small work groups.

In an effort to bring a sense of pride to the students for the work taking place in classrooms, a student in each room is trained and designated to welcome guests as they enter classrooms and to explain what the guest may be witnessing on that particular day. Without direction, and upon the guest's entrance, the student greets them with a handshake, introduces him or herself and begins to detail the classroom activity. Teachers readily shared their lesson plans that indicate the project design, content and skills, products, and assessment. They also shared student products and were able to explain special aspects to the products that demonstrated the creativity that students had exhibited. Professional development materials related to the annual technology professional development day were also shared. The materials detail a program that is designed much like a breakout conference style format. Teachers have the ability to select workshops that will best meet their classroom needs.

The Chief Education Officer and co-founder of the Creativity School charter organization was a former curriculum director, assistant superintendent, and superintendent who had a great deal of experience and personal interest in working with high-needs student populations. She knew that in order to change the culture of desperation that existed for the students in their home districts, the approach to learning had to change. Using research, project-based learning was chosen as the primary approach to teaching and learning for grades 4-12. She cultivated connections with philanthropic groups such as the Heinz Foundation, the Grable Foundation, and the Benedum Foundation to provide the funding that resulted in an educational program that provides a rich experience for students focused on basic skills, science, technology, engineering, art, and mathematics (STEAM), service learning, and the arts.

Project-based learning has been a part of the pedagogy of Creativity Middle School since its inception in 2007. As a charter school serving a high-needs population, project-based learning was identified as a desirable teaching methodology because of its propensity to highly engage learners, provide deep understanding of concepts, and teach 21st century skills such as creativity, critical-thinking, collaboration, and communication.

Creativity Middle School's award winning arts program is facilitated through partnerships with local professional organizations such as the Pittsburgh Civic Light Opera, local dance troupes, and the Pittsburgh Musical Theater. The arts experience includes dance, music, theater, photography, puppetry, and pottery. Hip Hop Walk is one collaborative arts project that incorporates writing as students construct scripts for dance music videos. The Pittsburgh Children's Museum partners with Creativity Middle School's teachers to design art experiences for parents and their children at special events

held several times a year at the museum. The arts program at the school is facilitated as an artist in residency program, with professionals from the Pittsburgh area teaching in the school for six week rotations. This configuration ensures that all students receive an hour of arts instruction every day of the school year. Several times during the school year, parents, friends, and family members are invited to the school for an arts showcase that features students sharing their talents. The arts initiative also includes a special scholarship program that provides for private lessons and summer activities for students who express an interest in advanced study.

Figure 7. Arts Celebration at Creativity Middle School.

Creativity Middle School also has established partnerships with a number of Pittsburgh area entities to facilitate project-based experiences for their students. The Pittsburgh Parks assists with stream and ecology studies in the park system. Let's Move Pittsburgh and the Food Revolution both focus student studies on the preparation and consumption of healthy meals.

Nearly all of the instruction at Creativity Middle School can be interpreted as non-traditional. The curriculum is based on hands-on activities, center activities, and

project-based learning. The teachers' report that project-based learning is used 75-85% of their instructional time. Teachers begin units of study by discussing with students what they would like to learn and what projects they might like to complete. The teachers have found that students have high levels of engagement and ownership when they have a say in the projects. Teachers also have the students help to construct the assessments for the project. They usually include a self-assessment and an assessment of their team members if it is a group project. The teachers have found students to have very high expectations when they are involved with the construction of rubrics and the assessment.

There is extensive use of technology in Creativity Middle School. Teachers utilize interactive white board technology in all classrooms, as well as tablets, document cameras, and the Autodesk suite. Students participate in Carnegie Mellon University's Robots in Motion program, which integrates technology into project-based classroom activities. The program uses a project-based approach to teach students algebra, while also emphasizing creativity, collaboration, and communication. Students construct the robots and then learn to use algebra to problem-solve how to move the robot from one location to another. Creativity Middle School students are also involved with play testing web and mobile applications for Play Power Labs, a Carnegie Mellon University research initiative focused on improving algebra skills.

Common planning time has a positive impact on integrating projects. Having an opportunity to collaborate as colleagues raises the bar. Likewise, professional development has helped teachers to advance their practice. The district has two full weeks of professional development, with one week before the school year begins, and one after. One full day of professional development is dedicated to technology

integration. Professional development is often offered in a menu format with teachers choosing what they want to learn about.

Figure 8. Professional development at Creativity Middle School.

In order to build pride, confidence, and a sense of civic responsibility, some of the school projects are linked to service learning. In a program known as Discovery Aces, students work on community oriented projects such as planning fundraisers to support food pantries, displaying of community-based art work, or examining the health of Pittsburgh's streams and rivers. Members of Discovery Aces also visit local sites within the Pittsburgh area that expand cultural, environmental, and civic understanding. Students also engage in local and national competitions that are project-based. Activities such as the fluid power challenge and future city competition emphasize critical-thinking, collaboration, communication, and creativity.

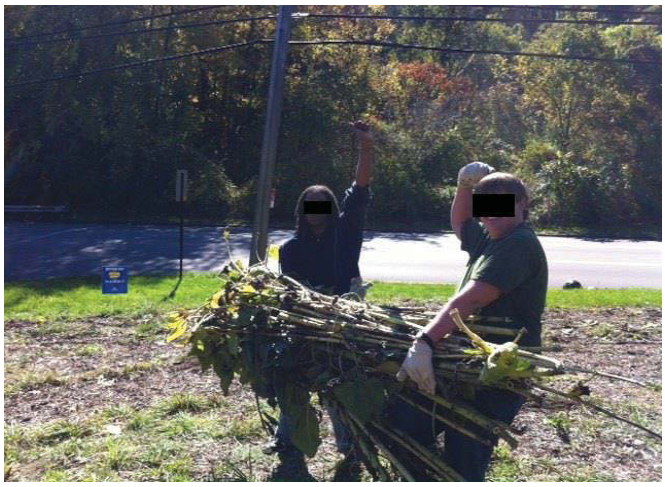


Figure 9. Service learning at Creativity Middle School.

The school website also showcases the project focus of the school. Links are provided to project explanations as well as photographs that show students working on their products. The website also includes the guiding principles behind the instructional approaches utilized at the school. This includes video of school stakeholders explaining the approach and its advantages.

Focus Group Interviews

The focus groups for Creativity Middle School were composed of individuals who provide a representative perspective of the school and its implementation of project-based learning. The administrative focus group included the assistant principal who is in her first year serving in that capacity. Previously, she served as a teacher in the school since its inception. The former chief education officer also participated in the focus group. She was a co-founder of the charter district. Prior to this she served as a public school superintendent, assistant superintendent, curriculum director, building principal, and science teacher.

The teacher focus groups comprised of teachers from the fourth and sixth grades from the areas of science, math, social studies, and English. The years' experience from

this group ranged from one to eight years. Two student focus groups were arranged to correspond with the teacher groups. Each group had six students, with three boys and three girls in each group. The student group was represented by African American and white students. Three individuals served in the parent focus group. Each of these persons was female and had sons and daughters in the student focus groups.

Advantages and Disadvantages According to Teachers

The teachers from Creativity Middle School were excited to discuss project-based learning, noting that PBL is fun for everyone. "It's not boring for the kids and it's not boring for me either. So when you compare it to just standing in front of the class and teaching, it's better for everyone in that sense. Everyone's kind of engaged," a teacher commented. Teachers at Creativity Middle School feel that part of that engagement comes from giving students choice. "They're able to pick, in most cases, they're able to pick their type of project so they have already picked something that they are interested in," one teacher stated. A colleague added, "Before I did the last project, I kind of interviewed my students saying, 'what are some projects that you would like to work on?'" "It's another way for them to demonstrate what they've learned in a fun and creative way," said another student.

Teaching with PBL requires teachers to think differently about teaching and learning, which ultimately benefits students. "It gives them a chance to think outside the box. You know, we always put them in a box and you have to do things a certain way and the way we teach it kind of gives them more freedom," noted one teacher. A colleague mentioned that her special education students have benefitted a great deal from PBL commenting, "Our IEP students really shine through this because it built their confidence

and it's something that they felt they could do and were proud presenting. I was really happy with what they did."

Teachers cited several disadvantages to project-based learning, including time to implement projects in class and coming up with the needed project materials. One teacher stated, "I think resources, finding resources is a challenge for me." Another teacher mentioned how exhausting project-based learning can be on teachers, commenting, "Facilitating projects is a great deal of work. It is mentally and physically taxing."

Advantages and Disadvantages According to Parents

Parents state that their children are excited and engaged in learning through project-based learning. They also understand with greater depth with PBL. With many projects incorporating presentations, parents feel that this aspect of PBL is particularly important. "My daughter is fairly backwards, so you know, she doesn't like to do that kind of stuff, so getting her out of her shell to present to her classmates is, I think, important," stated one parent. Another parent felt that PBL fits her daughter's learning preference commenting, "My daughter is learning in the way that best suits her."

Parents also mentioned that group work with PBL can sometimes be a problem for their children. "My daughter is working on a project and there is one person in her group that she complains about, but I explained to her that it's always going to be like that," commented one parent. Another parent sees that her daughter struggles with her choices for group partners adding, "She will choose to work with her friends, and some of her friends fail to pull their weight."

Advantages and Disadvantages According to Students

Students explained that they like projects for many reasons. “I like them because they let you get some creativity into your learning,” stated one student. Other students mentioned that they like having choice. “We just did a project and we got to pick which one we wanted. There were five options that we could pick,” noted another student. One student simply said, “Um, it makes learning interesting.” Another student felt that project-based learning is beneficial for relationships stating, “It’s like a teambuilding thing we do you know, that’s what projects are supposed to do, team building.” While he enjoys projects, one student warned against procrastination commenting, “Don’t wait until the last minute to do your project!”

Students had varied opinions on project-based learning in cooperative groups. One student commented, “I liked that we bounce ideas back and forth and I liked that the grade was equal so that if somebody didn’t work, they didn’t deserve a better grade than somebody who just kind of sat out,” while another student said, “I like working independent because you can think of your own ideas and then you don’t have to agree with anyone else and stuff. In groups, the pushiest kids win.” Another student agreed stating, “So like when you are in a group, there are some people who don’t like your ideas. Ideas going back and forth and it’s hard to pick one.”

Students in the focus group were excited to discuss creative projects that they had completed. One student commented,

> Like my group we made a flip book out of paper, where we had one of my friends, like he’s the best artist in the group, Caleb, he like drew the stuff and we

like colored it, worked on it, and then we recorded it like flipped the pages and then we narrated it.

Students also understood the importance of presentations with projects. “A really fun project and you think you worked really hard on it and you just want to present and you want to show everybody your hard work that you worked on for weeks,” stated a student.

Implementation According to Teachers

The teachers at Creativity Middle School expressed that the professional development offered has a positive impact on the implementation of project-based learning. One teacher who has worked in several traditional public schools commented, “They definitely have more professional development than any other school I’ve ever been, two full weeks; one at the beginning of the year and a week at the end of the year.” Many of the professional development days are set up in a conference style format, with the participants having the ability to choose the workshops they would like to attend. Facilitators for the workshops come from inside the organization, as well as outside. In addition, teachers also can attend out of district conferences such as the annual meeting of the National Council of the Teachers of Mathematics. One novice teacher noted her appreciation of time to discuss ideas with more veteran teachers. “You know that if they’re using it and it works, it’s something you can take with you and implement it in your classroom,” said the young teacher.

Teachers also spoke about the importance of collaboration time with their colleagues. An English/language arts teacher stated, “I think common planning and the ability to work with my math coach, my literacy coach, and I never feel embarrassed to ask for help or ask ‘how do you think I can teach this project in a fun and engaging

way?'" Having time to hold professional discussions can help to provide support noted the teachers. "You see that there is an issue, or problem, or question that you didn't anticipate, with any project, in anything you teach, it's a learning experience. It's a learning experience for us as much as the kids I think," said another teacher.

Properly planning is also a key component for a successful project according to a science teacher. "I think the important thing is that I have the expectations before the project starts and giving them the rubrics that they are going to be graded on so that they know exactly what it is you are looking for and what's expected of them," commented the teacher. Teachers also spoke of using technology to focus class time on projects. Some teachers at Creativity Middle School have embraced the concept of flipping their classroom instruction. Using video capture technology such as Camtasia, teachers record voice-overs of on screen instruction to enable students to watch lecture and practice examples at home. Using this approach, their in-class time is then focused on collaborative, project time.

Teachers, parents, and administrators all mentioned the parent academies as having a positive impact on the implementation of PBL. An administrator explained, "We have parent academies that run 3-4 times throughout the school year, and it's teacher-led. So, teachers run different sessions that they think would benefit parents to understand school a little better." The administrator continued, "What I've loved is just the initiative that the teachers are taking. They're excited to talk to parents about what's happening in their classrooms and so it's sort of just infectious." A teacher who has facilitated the academies noted, "I personally have been doing things that they've done in class so that they can get a feel for the type of the way that they are learning."

Process and Products of Learning According to Administrators

The focus groups all discussed the value project-based learning adds to Creativity Middle School regarding how students learn as well as the products they create. The school principal enthusiastically stated, “A project is a great way for teachers to understand if students really are getting the material.” She further explained that leadership and encouragement of the teachers to be creative is of vital importance commenting, “What do you want your students to do, what is the end goal in mind, and how are you going to get them there?”

Process and Products of Learning According to Teachers

Teachers state that the influence of project-based learning to engage students is noteworthy. One teacher said, “The kids come to class and the first thing they say is, ‘Are we working on our projects today?’” A special education teacher expressed that she feels PBL has motivated and inspired her students. “I notice that my students with special needs that are working in the classroom, especially on a project, being successful pushes them to be successful in other classes also.” A colleague added that she feels that PBL meets the needs of all her students stating, “I mean some people are more creative. They would really thrive with making a model, or like that kind of thing. I think it suits many learning abilities.”

Process and Products of Learning According to Parents

Parents agreed that project-based learning is a powerful engagement tool. One parent discussed her daughter’s excitement with school:

> Like her mind is always going, thinking about it, which I think is good. So, it’s not just 8:00 to 3:30, when she is in school. It’s constantly thinking about projects

and what we are going to do for this one. ‘Oh this is something else I want to do for my Andy Warhol presentation.’

Another parent spoke of the change that has occurred in the school experience she received as compared to her daughter. She commented,

> It’s to me like, you know, that’s not like when I was in school and I used to learn multiplication. You know, so for her to learn and actually make it hands-on, she gets math in a way that I never got math. You know, which I think is so helpful to them.

Another parent also felt that project-based learning has helped her daughter to become more organized and responsible and improved her communication skills. She stated that students need to be able to articulate ideas, advocate for their ideas, and learn to compromise noting, “You know understanding that our ideas might not be the same and coming to a compromise.”

Process and Products of Learning According to Students

During the student focus group session, the young students discussed their understanding of the relevance of the project work that they do in school. One student mentioned, "My dad kind of does projects every day.” Another student agreed noting, “My mom works at Children’s Hospital. She’s like a scientist there and so she works on project stuff and so she has to make presentations on what she found and how it can help.” A student felt that project-based learning group work will prepare them for work stating, “When you get a job, you don’t get to pick the people you work with.”

Cross Case Comparisons

The analysis of the cases of Maker Middle School, Innovation Middle School, and Creativity Middle School elicit distinctive themes. These themes are partnerships with outside entities, professional development, perceptions of cooperative group work, educational supports for parents, district and school leadership, school/classroom environment, perceptions of engagement of learners. Table 2 organizes these themes as they are manifested within each school.

Table 2

Data Themes

Themes	Maker Middle School	Innovation Middle School	Creativity Middle School
Partnerships with Outside Entities	Partnerships with Carnegie Mellon University, California University of Pennsylvania, Schell Games, Children's Museum of Pittsburgh	Partnerships with Carnegie Mellon University, Schell Games, NASA, Google, local businesses and corporations	Partnerships with Carnegie Mellon University, Pittsburgh Civic Light Opera, Pittsburgh Musical Theater, local dance troupes and artists, Pittsburgh Children's Museum,
Professional Development	District-wide focus on PBL-Innovation, administration involved, out of district PD supported	District-wide focus on PBL-Innovation, out of district PD supported, Director of Innovation designs PD	District-wide focus on PBL-technology integration-creativity, differentiated model of PD, out of district PD supported
Perceptions of Cooperative Group Work	Valued by all stakeholders, but leads to conflict between students	Valued by all stakeholders, but leads to conflict between students	Valued by all stakeholders, but leads to conflict between students
Educational Supports for Parents	Parent nights to showcase innovative programs	Community Learning Nights, Parent Meet and Greets, Curriculum Nights	Parent Academies, Parent, Parent and family arts showcases
District/School Leadership	Strong district and school leadership that articulates the vision for innovation	Strong district and school leadership that articulates the vision for innovation	Strong district and school leadership that articulates the vision for innovation

Table 2

Data Themes (continued)

Themes	Maker Middle School	Innovation Middle School	Creativity Middle School
School/Classroom Environment	Reflects innovation and creativity, facilitates collaboration	Reflects innovation and creativity, facilitates collaboration	School environment is limited because of facility but classrooms reflect innovation and creativity and facilitate collaboration
Perceptions of Engagement for Students	PBL highly engaging for students	PBL highly engaging for students	PBL highly engaging for students

The collection and analysis of the data from the cases of Maker Middle School, Innovation Middle School, and Creativity Middle School have provided a rich, detailed picture that captures the perceptions of the stakeholders regarding the implementation of project-based learning at each school. In the following chapter, the themes that rose to the surface from the cross-case analysis will be further developed, resulting in a recommended plan of implementation of project-based learning for schools to utilize.

Chapter 5

SUMMARY OF FINDINGS, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

This chapter will provide a brief summary of the research study, a summary of the findings, implications for research and practice and directions for future research.

Summary of Study

This study examines the perceptions of stakeholders regarding the implementation of project-based learning in Pennsylvania middle schools. A multiple case study design was chosen for this study. Using this qualitative design was purposeful in order to tell the rich, detailed story of the three middle schools selected for the study. The schools were chosen based on their advanced use of project-based learning. In addition, the three schools chosen for the study also had very different demographic profiles. This was done to provide fertile ground for cross-case comparisons of the results. However, it should be noted that case study results, because of their unique nature, are not normally generalizable. Maker Middle School, a school with a predominately white student population, is located along a river valley in an economically depressed area approximately 35 minutes' drive from a Pennsylvania metropolitan area. Innovation Middle School is a wealthy, suburban school located in an area that is gaining population approximately 25 minutes' drive from a Pennsylvania metropolitan area. Innovation Middle School has a predominately white student population, with its second largest ethnic group being Asian. Creativity Middle School is a charter school drawing students from an urban area located around a Pennsylvania metropolitan area's borders. A significant portion of Creativity Middle School's students are classified as economically

disadvantaged, and it has a much more diverse population of students than Maker Middle School or Innovation Middle School.

The research questions for the study are: What are the barriers to implementation of project-based learning for teachers? Students? Parents? What are the key elements that impact successful implementation of project-based learning for teachers? Students? Parents? What is the perception of parents regarding project-based learning and its advantages/disadvantages? What impact does project-based learning have on the process and products of learning? In order to answer the research questions, data was gathered during site visits to the schools. During these site visits, focus groups, observations, and a review of records of the three schools were conducted. Audio recordings of the focus groups were made and later transcribed. Field notes were also made recording observations made of the physical environment of the sites, as well of artifacts such as lesson plans, websites, professional development materials, and student products.

Summary of Findings

A number of themes emerged from the analysis of the data from the three middle schools. Each of these themes can be connected with the research questions and propositions that were presented as part of the methodology in chapter 3. These themes are identified because they were points of emphasis that resonated in the data analyzed in each of the cases. Although they may have been manifested in different ways, the themes are present in the data gathered from each middle school. Though caution should be made that results from case studies should not be generalized, these themes provide important information for research, and practice.

Perceptions of Cooperative Group Work

Perceptions of group work can be connected back to two research questions: What are the barriers to implementation of project-based learning for students and parents? What is the perception of parents regarding project-based learning and its advantages/disadvantages? The students, parents, and teachers of Maker Middle School, Innovation Middle School, and Creativity Middle School all placed great value on cooperative group work because it teaches students to work together, a skill that they will need later as adults. “My son always has kids over doing projects in groups and it’s wonderful how they’re interacting with one another and they’re going to have to do that for the rest of their lives,” stated one parent from Maker Middle School. Another parent from Innovation Middle School commented, “I think group projects are key because in life, as you get older, you’re constantly interacting, you have to know how to engage with others.” Cooperative learning helps students to navigate through difficulty, reinforcing important social skills and group problem-solving dynamics (Schul, 2011).

Teachers also endorse project-based learning because of the benefits of cooperative group work. A teacher noted, “You’ll see some of them come up and develop roles and you’ll see them teaching each other.” Some students, such as a student from Innovation Middle School, saw benefit from students working together: “If you have more people, it’s more opinions, it’s more knowledge that you can piece together, different ideas get shared, so if you propose an idea and then someone else, ‘oh yeah, then we could add this too.’” A student from Creativity Middle School responded with an opposite view: “I like working independent because you can think of your own ideas and

then you don't have to agree with anyone else and stuff. In groups, the pushiest kids win."

Students and parents also noted that group work can often result in an inequity of workload because some group members do not complete their share of the assignment. "My daughter is working on a project and there is one person in her group that she complains about, but I explained to her that it's always going to be like that," commented one parent from Creativity Middle School. A parent from Maker Middle School commented, "They feel like their opinions are not heard and that students do not do their part of the project." A student from Maker Middle School also responded,

> I like it in a group setting, it just depends on who's in my group. I understand you need to work with people you don't exactly like, but like it depends on if they're really going to give an effort or not, which sometimes they don't.

The research and corresponding literature states that cooperative group work will be most beneficial when groups exercise attention to positive interdependence, individual accountability, social skills, and equal participation (Wing-yi Cheng et. al, 2008).

Partnerships With Outside Entities

A powerful theme that emerged from the data analysis was that Maker Middle School, Innovation Middle School, and Creativity Middle School all have well developed partnerships with outside entities. These entities included higher education institutions, businesses, arts organizations, and museums. All three schools in the study are members of the Kids + Creativity Network, an organization whose sole purpose is to encourage partnerships between schools, businesses, higher education institutions, and civic organizations to provide creative opportunities for students. All three schools have

partnerships with Carnegie Mellon University, which has served to bring gaming and robotics programs to the schools, such as Innovation Middle School's Robo Art program that combines three-dimensional sculptures with technology. Maker Middle School's partnership with the Children's Museum of Pittsburgh has resulted in the integration of a maker space where students can engage in true inquiry in their new Dream Factory. Creativity Middle School has an award-winning artist in residency program that enables students to learn from real practicing artists. Arts programs such as this strengthen the bond between school and community because artists also share a cultural aspect to their craft that serves to connect students and the places they live (Carlisle, 2011).

Answering one of the research questions, these partnerships are a key element to the successful implementation of project-based learning. These outside entities provide resources, training, and opportunities for students and teachers to engage in creative activities that accentuate critical-thinking, collaboration, and communication.
In all three schools, Students from Carnegie Mellon University's Entertainment and Technology Center developed games and simulations for students to play test. Jesse Schell, the founder of Schell Games served as an advisor to the administration to help chart Maker Middle School's vision to integrate project-based learning through gaming. The Children's Museum of Pittsburgh provided Maker professional development to the faculties of Maker Middle School, Innovation Middle School, and Creativity Middle School.

The high level of involvement of the schools and their partners was an unanticipated finding in the research that was not addressed in the propositions. Strong partnerships with universities and community-business partners were suggestions found

in the literature for successful implementation of project-based learning (Bradley-Levine, 2010). Experts in the field are able to share a level of expertise that educators simply cannot replicate because of their lack of specialized experience in fields outside education (Boettcher, 2014). As a result of these partnerships, students gain real experiences that are exciting and non-school personnel experts are engaged in an experience with schools that results in a meaningful and long lasting relationship (Portz, 2014).

Professional Development

Professional development was articulated in similar ways in Maker Middle School, Innovation Middle School and Creativity Middle School. It was an important aspect of the successful implementation of project-based learning in each school. This theme of professional development relates to the research question: What are the key elements that impact successful implementation of project-based learning for teachers? It also supports a proposition that was made in chapter three. All three schools used a district-wide approach to professional development that was led by administration. Professional development also included out of district opportunities for teachers. Teachers in all three schools responded effusively regarding the support that they have been provided. “I feel like we are being educated to do this,” commented a teacher from Maker Middle School. Another teacher from Innovation Middle School stated,

> I got a chance to go to this one thing where we were the kids and they did PBL and we got to see it from the kids’ perspective, what it looks like, what it sounds like, how it takes place like beginning to end, the whole thing. That one experience was more valuable than any other PD.

Creativity Middle School's dedication to professional development has impacted its teachers. One teacher commented, "They definitely have more professional development than any other school I've ever been: two full weeks. One at the beginning of the year and a week at the end of the year." According to Capps, et. al (2012), research of best practices for professional development for teaching with inquiry reveals that an ideal program includes adequate time, extended support, authentic experience with inquiry, coherency, inquiry lesson development, transference of skills and knowledge to the classroom and reflection (p. 302). Effective, sustained professional development is a key component of successful implementation of project-based learning instructional strategies (Park Rodgers, 2011; Ravitz et. at, 2012).

Educational Supports for Parents

This theme relates to the research question: What are the key elements that impact successful implementation of project-based learning for Parents? Stakeholders from Maker Middle School, Innovation Middle School, and Creativity Middle School reported strong supports for parents to educate them on the pedagogy and process of project-based learning. Curriculum nights, parent academies, learning celebrations, and community learning nights serve to orient parents to the differences between project-based learning and traditional teaching methods. When parents are engaged in the pedagogy and teaching methods in schools, they can be powerful supporters of progressive education (Daniels, 1996).

An administrator from Creativity Middle School stated, "We have parent academies that run 3-4 times throughout the school year, and it's teacher-led. So, teachers run different sessions that they think would benefit parents to understand school a little

better." A teacher at Innovation Middle School commented similarly about their community learning night: "We would set up a lot of project-based, you know, easy things we could do in one night. Inquiry-based things, so we would invite parents, families to come in and we had probably five to six of those sessions." A parent from Innovation Middle School offered her reaction to the district's parent education outreach: "The school [district] has educated us over the years that PBL is a part of every school in the district. You see and hear it at open house and the celebrations of learning." Literature indicates that parents have the greatest influence on the achievement of their children when they fully understand, and are engaged in the learning rather than simply are involved in school activities (Harris & Goodall, 2008; Dunlop, 2013).

District/School Leadership

Teachers and parents in Maker Middle School, Innovation Middle School, and Creativity Middle School noted the strong leadership from district and school-level administration. This theme relates to the research question: What are the key elements that impact successful implementation of project-based learning for teachers? Students? Parents? Effective instructional leaders are proficient in establishing a supportive culture that is purposeful in the strategies to impact change (Sergiovanni, 2001). Teachers spoke of the vision and support that the district leaders provide personally. A teacher from Maker Middle School commented, "The administration is flexible and has given us time and space to figure things out. It's not that they are telling us to do it, they're educating us." While a colleague added, "They encourage us to take risks." A teacher from Innovation Middle School was impressed by the district's commitment to integrate PBL into the curriculum: "During curriculum rewrites we had meetings with all of the history

teachers or at least representatives from all grade levels… and I think that helps to align some of our projects." Instructional leadership is characterized by individuals who set organizational structures that support teacher collaboration and growth, and have the knowledge and expertise to coach and intervene, can access resources, and build relationships (Jaquith, 2013).

The district and school leaders themselves were very passionate when discussing the implementation of project-based learning. The principal of Creativity Middle School stated, "A project is a great way for teachers to understand if students really are getting the material." District-level leaders are knowledgeable regarding the rationale and process of implementing project-based learning. The superintendent of Maker Middle School's district stated, "We just need to give them the time and get out of their way. If they find something valuable, then they are excited about sharing it with their colleagues."

School/Classroom Environment

The school and classroom environments for all three schools would themselves be described as creative, innovative, and engaging. They are colorful, full of technology, and are designed to encourage collaboration, creativity, critical-thinking, and communication. This theme was based upon the observations conducted during the site visits and relates to the research questions: What are the key elements that impact successful implementation of project-based learning for teachers? Students?

Maker Middle School, Innovation Middle School and Creativity Middle School's classrooms are nontraditional; with color on walls and hallways and clustered seating arrangements that encourage collaboration. Learning activities taking place in the spaces

are active and social with the teachers serving as facilitators. An administrator for Maker Middle School states that the classroom arrangement encourages inquiry. This type of classroom shifts the teacher from the "sage on the stage, to the guide on the side," according to the administrator.

Maker Middle School, Innovation Middle School in particular used multiple, bright colors in hallways and classrooms. Colorful classrooms provide the sensory stimulation that increases student engagement, positive emotion, and collaboration (Grube, 2013). Student work products are readily displayed throughout classrooms, hallways, commons areas, and the website. This was a highlight of Creativity Middle School, which had multiple student work displays in the entry area to the school and commons areas. Classrooms that display student work give students a sense of pride (Erikson, 2014). According to Jones and Sterling (2011), classroom environments need to encourage collaboration and inquiry, while at the same time give students a sense of safety and acceptance (p. 26).

The presence of technology was abundant in Maker, Innovation, and Creativity Middle Schools. The SMALlab at Maker Middle School is the essence of a technology inspired environment. Students are virtually a part of a video game in the environment that uses motion capture technology. Students at Innovation Middle School explore the basics of programming as the use the open-source software Scratch to enhance Project-based experiences. Creativity Middle School participate in play testing for Carnegie Mellon University's Play Power Labs program, which teaches students algebra skills through a project-based approach. Literature states that the availability of technology plays an essential role in the successful use of project-based learning (Toolin, 2004).

Perceptions of Engagement of Students

Students, teachers, and parents in Maker Middle School, Innovation Middle School, and Creativity Middle School all spoke at length regarding the positive influence project-based learning has on the motivation and engagement of students. This theme relates to the research questions: What is the perception of parents regarding project-based learning and its advantages/disadvantages? What impact does project-based learning have on the process and products of learning?

"It's not boring for the kids and it's not boring for me either. So when you compare it to just standing in front of the class and teaching, it's better for everyone in that sense. Everyone's kind of engaged," a teacher from Creativity commented. A parent from Maker Middle School spoke about project-based learning's impact on students, like her son, who have different learning preferences:

> My son is a visual learner, so he can walk over and pick up that tool and use it to make this car, or go to the computer and take this picture and do something with it, it's completely hands-on. It's a completely great way to touch kids who are, there's kids that can do book work and also those that need hands-on.

A parent from Innovation Middle School also stated, "You see a level of engagement that you wouldn't see otherwise." Students understand the power of project-based learning to engage. A student from Innovation Middle School commented,

> You are engaged in a project, you learn and understand it better. He added, It's more realistic too, especially for the workplace. You're not going to be, you know, sitting there with a book and memorizing facts, you're going to be working with others hands-on so that's what I've always liked about it.

Project-based learning's power to engage is connected to authentic, application oriented learning experiences for students that are academically rigorous (Lattimer & Riordan, 2011). Students enjoyed having choice in what they learned and how they demonstrated what they had learned. Teachers stated that it made teaching more interesting for them and likewise, parents noted that they were able to sense the excitement of teachers who are utilizing project-based learning. A review of literature on the engagement of project-based learning supports these findings (Belland, et al., 2009; Grant, 2011; Petrosino, 2004).

Conclusions

A number of hypotheses or propositions were presented in chapter 3 regarding the expected findings in the data analysis of case studies. Some of these propositions were confirmed, while others were found to be contrary to expectations.

1. Middle school teachers who use utilize project-based learning as an instructional approach perceive that it is effective in emphasizing creativity, collaboration, critical-thinking, and communication. Confirmed.

Teachers in all three schools stated that they believe project-based learning effectively emphasizes creativity, collaboration, critical-thinking, and communication. This was also observed during the site visits to the schools and through the review of records. A teacher from Maker Middle School remarked,

> I just look back and sort of marvel with that because you don't know that a kid would go there with this. It's not limited to what you think. You set the guidelines and the structures and they can become extremely creative. It's not restrictive.

When reflecting on the experiences students gained from the Dream Factory, a Maker teacher added,

> Students can be creative and self-directed. They care about their work and they are building skills that they don't realize that they're building. I think too with the whole idea of the Dream Factory is that they can come up with their own dreams of how they want to imagine or create the chocolate bar instead of centering it around a holiday. They could create their own theme for our Dream Factory based on what was important to them.

A teacher at Innovation Middle School also emphasized the collaborative aspect of PBL:

> They learn to get along with each other and discuss problems together and they learn creativity isn't just being an artist, it's all kinds of problem-solving. It's a real world skill. In the real world, we know we have to work together.

2. Teachers and administrators perceive that project-based learning was implemented because of its power to motivate and engage students. Confirmed.

Teachers and administrators in all three schools cite project-based learning's power to engage students as a rationale for implementation and use. This proposition is addressed in the theme regarding the *Perceptions of Engagement of Students*. The superintendents in the districts of Maker Middle School, Innovation Middle School, and Creativity Middle School all discussed the rationale behind the implementation of project-based learning. The superintendent from Maker's district recognized that the school district needed to change course to re-engage students. With the district losing enrollment to charter schools and experiencing an increasing drop-out rate, the time had come for to change course.

The superintendent from Innovation's school district experienced an epiphany of sorts after meeting the school leader from High Tech High and educators from the Buck Institute for Education. Recognizing project-based learning's power to engage students, she planned a deliberate approach to implementation that included the addition of a director of innovation and district-wide professional development.

The Chief Academic Officer of Creativity Middle School's district identified student engagement as a top priority as she formulated her district-wide approach to educating an at-risk population of students. With a background in inquiry education as a former science teacher, she made project-based learning the foundation to the educational philosophy of the district.

3. The successful use of project-based learning is strongly influenced by professional development, principal and teacher leadership, and time for collaboration. Confirmed.

During the focus groups, the teachers and administrators in the schools in the study mention professional development and leadership as important factors in the successful implementation of project-based learning. This proposition is related to the themes: *Professional Development and School/District Leadership.*

4. Teachers and principals feel that it is best supported by organizational structures such as flexible scheduling, co-teaching, interdisciplinary themes, and service learning. Confirmed.

Co-teaching, common planning, and vertical teaming were all organizational structures that were identified in the responses of the teacher stakeholders. "During curriculum rewrites we had meetings with all of the history teachers or at least

representatives from all grade levels… and I think that helps to align some of our projects," commented a teacher from Innovation Middle School. An English/language arts teacher from Creativity Middle School stated, "I think common planning and the ability to work with my math coach, my literacy coach, and I never feel embarrassed to ask for help or ask 'how do you think I can teach this project in a fun and engaging way?'" Flexible scheduling, interdisciplinary themes, and service learning were not mentioned specifically, or noted in observations or records reviews.

5. Because of its complex nature, teachers and principals will outline various obstacles and difficulties instituting project-based learning as an instructional approach. Confirmed.

During focus groups, teachers mention time, as well as stress about standardized test results as complicating factors to instituting project-based learning. "It's a hindrance, it's a hindrance. Right now we are serving two masters with the PSSA's and the Keystone Exam. We just went through our rewrite with math, now we're dealing with all of that with Common Core." A teacher from Maker Middle School commented, "There's not enough time to create and that's not the fault of necessarily anybody. It's I guess, the nature of the beast." A colleague added, "You know you have to fit it all in and that's a really difficult balance to fit in and also traveling through all the skills that you want to do."

They also discuss access to resources, parental focus on grades, and the effort it takes to facilitate a well-articulated project. One teacher stated, "I think resources, finding resources is a challenge for me." Another teacher mentioned how exhausting project-

based learning can be on teachers, commenting, “Facilitating projects is a great deal of work. It is mentally and physically taxing.”

6. Teachers and principals will share innovative practices utilizing project-based learning activities that serve to emphasize creativity, collaboration, critical-thinking and communication. Confirmed.

In the focus groups, teachers and principals discussed innovative practices that emphasize creativity, collaboration, critical-thinking, and communication. This was also noted in observations and records review. Teachers and the principal from Maker Middle School talked about their experiences with the SMALLab and Dream Factory. A Maker Middle School teacher commented,

> Students can be creative and self-directed. They care about their work and they are building skills that they don’t realize that they’re building. I think too with the whole idea of the Dream Factory is that they can come up with their own dreams of how they want to imagine or create the chocolate bar instead of centering it around a holiday. They could create their own theme for our Dream Factory based on what was important to them.

Teachers and principals from Innovation Middle School discussed their focus on creativity with programs such as RoboArt and Scratch. A teacher from the school stated, “My goal is that there are 30 maybe 25 kids in the classroom with 25 different outcomes and they’re all going to be using their creativity.”

7. Parents will reveal that they do not fully grasp the rationale of their school moving from a more didactic approach to teaching, an approach they more than likely experienced as a student, to a project-based approach. Rejected.

Focus groups with parents from all three schools revealed that parents have a solid understanding of the rationale of their schools using a project-based approach to learning. Each school had multiple programs to educate parents as to the methodology of project-based learning. A parent commented, "The school [district] has educated us over the years that PBL is a part of every school in the district. You see and hear it at open house and the celebrations of learning."

8. Parents will find value in the products that their children produce, but will also express frustration with the open-ended nature of project-based learning, and especially group work. Confirmed.

In focus groups, parents did express a great deal of pride in the projects that their children had completed. There was frustration expressed by some parents with regard to group work, while other parents endorsed the complications that group work presents because they felt that it prepares students to work with others later in life. One parent complained, "They feel like their opinions are not heard and that students do not do their part of the project." While other parents endorsed project-based learning because it teaches students skills they will need later in life:

> Yeah, that coordination of different opinions is huge and I'll be the first to tell you my kids will complain, 'I got so and so in my group' and I say, guess what, there is going to be a so and so for the rest of your life and it works out and it comes for the best.

Self-advocacy was another aspect that a parent felt her daughter had gained from the experience of a project-based unit:

> Kids complain about their group members not doing their part of the project. I told her, 'Well you have to do what you have to do, what you feel is best' because she felt they were getting short changed. So, she advocated for herself. She did. So that's another skill that's really important that came out of a project.

9. Parents will report positively regarding their children's motivation to engage in project-based learning. Confirmed.

Parents from all three schools reported that their children were highly motivated by project-based learning. "My eighth grader is still interested in school because of his teachers. He loves his teachers and they're keeping him engaged." Another parent added,

> Like her mind is always going, thinking about it, which I think is good. So, it's not just 8:00 to 3:30, when she is in school. It's constantly thinking about projects and what we are going to do for this one. 'Oh this is something else I want to do for my Andy Warhol presentation.

10. Parents will report positively regarding project-based learning's emphasis on creativity, critical-thinking, collaboration, and communication. Confirmed.

Parents of all three schools noted the positive emphasis that project-based learning placed on creativity, critical-thinking, collaboration, and communication as important skills. "You know understanding that our ideas might not be the same and coming to a compromise," noted one parent. Another parent commented on project-based learning's emphasis on communication, which she felt her daughter needed: "My daughter is fairly backwards, so you know, she doesn't like to do that kind of stuff, so getting her out of her shell to present to her classmates is, I think, important."

Implications and Recommendations

Research

The findings of this study are significant in that they bolster research regarding the implementation and use of project-based learning in middle schools. Although case study design is typically not recommended to produce results that are generalizable, Yin (2009) suggests that replication through multiple case study design does serve to refute this criticism (p. 58). The replication of cases and their findings are even more significant when one considers the differences in the profiles in the schools selected for this study. Maker Middle School is a school from a struggling community with a mostly white population of students with a moderate number of students who are economically disadvantaged. Innovation Middle School is a wealthy school in a thriving community with few students of need. The population of students is mostly white, with a smaller percentage of students classified as Asian and African American. Creativity Middle School is a charter school with a high percentage of minority, economically disadvantaged students. Three schools with drastic differences in demographic backgrounds produced consistent themes across the case studies. These themes were: partnerships with outside entities, perceptions of group work, professional development, educational supports for parents, district/school leadership, school/classroom environment, perceptions of engagement of students. However, each of the schools did have one major similarity in their organizational structure. They all embraced the middle school concept and correspondingly had organizational structures such as grade level teaming and common planning. The results suggest that integration of the middle level philosophy in these schools had some impact on successful implementation.

The findings suggest that the approach to implementation that led to these themes was somewhat purposeful and could be linked to the strong district-level leaders, who were all experienced educational practitioners who had inclinations to advance their schools via innovative ideas, risk-taking, and a hands-on style of leadership.

Practice

This research study has several implications for professional practice. First, the results confirm previous research on the impact project-based learning to engage students and to emphasize creativity, collaboration, critical-thinking, and communication. The literature reviewed for this study indicates that these skills, as well as the ability of students to apply knowledge and create, are essential elements that all schools need to incorporate. The results of this study have produced a road map of sorts of the essential elements for schools to incorporate to successfully implement project-based learning in middle school.

Outside partnerships. Schools should engage outside partners such as institutions of higher education, businesses and corporations, museums, and civic organizations to provide resources, educator training, and educational programming. The involvement of partners outside the school results in a plethora of opportunities for teachers and students that enrich the educational experience with authenticity. This real world experience for students also serves to heighten awareness to issues, giving students a greater sense of citizenship.

Effective professional development. Professional development that is sustained and differentiated has a lasting impact. Implementing a teaching methodology such as project-based learning is challenging. It calls for a time-intensive, focused approach that

often challenges teacher's and principal's previous beliefs about teaching and learning. In order for these changes to become permanent, educators need time for study and experimentation in a risk-free environment.

Educational supports for parents. Parents can be a tremendous asset and resource if schools choose to educate them as to the ways that their children are learning. In most instances, the experiences parents had as students were very different than their children. To gain their understanding, support, and involvement, schools integrating project-based learning should include programming that educates parents to the philosophy and process of project-based learning. Community learning nights, parent academies, and celebrations of learning will serve to create a professional learning community that includes parents as key members.

District/school leadership. District and school leaders need to provide a well-articulated, sustained vision for the school when implementing project-based learning. Leaders set the tone and back up rhetoric with a hands-on approach to training and support. Visibility, empowerment, encouragement, and accountability are all essential elements in the process of implementation. It is essential for leaders to listen to needs and know when to provide resources and intervention.

Cooperative group work. The advantages of group work make it an important component of project-based learning. It encourages students to brainstorm, share ideas, and problem-solve. Engaging in group work with project-based learning also builds important social skills such as communication and self-advocacy. While the advantages of group work are clear, it also comes with challenges. Group work can often result in conflict between students. Students who are less confident may have difficulty

advocating for their ideas. There also can be an inequity of workload that may result in an unfair assessment of the project. It is essential that teachers and school leaders understand these challenges of group work. Problems can be mitigated by providing training to teachers to properly implement, supervise, and evaluate group work. Correspondingly, it is prudent to train students regarding how to be an effective group member and to establish classroom protocols and procedures for group work.

School/classroom environment. Likewise, it is essential that district and school leaders advocate for transforming the school and classroom environment. Places of learning that incorporate creative, collaborative instructional practices such as project-based learning need to be exciting, colorful places to learn that have comfortable spaces that naturally encourage experimentation and collaboration. Instead of being described as institutional, schools need to be described as fun, vibrant, and energetic. In addition, enhancing the environment with technology will serve to provide the tools to create innovative products. Technology is also important for research and communication with partners outside the school environment.

Student engagement. In order to successfully implement project-based learning, it is necessary for schools to change the school culture from one that values student compliance to one that endorses, encourages, and measures student engagement. The power of project-based learning is manifested in its power to engage students. Students are eager to explore, experiment, and create. Creating such a culture and environment is often challenging to the beliefs of some educators. It calls for a change in teaching methodology from dispensing information to facilitating experiences. Because of its

complex nature, changing professional practice in this area only comes from sustained study and training.

Limitations of the Study

Although this study provides significant findings to add to the literature regarding project-based learning, and also has recommendations for practice for school leaders with a desire to implement project-based learning instructional strategies, there are noted limitations. The most prominent of these is due to the methodology of this study. Multiple case study design was chosen for this study in order to tell the rich, detailed story of three Pennsylvania middle schools' experience with implementing project-based learning. The results of case study design, because they are highly individualized are not typically recommended for generalization.

This study also focused on stakeholder perceptions and the collection of data through observations and a review of various artifacts such as lesson plans, professional development materials, website, and student products. Specific information regarding student achievement was not reviewed to measure the impact of project-based learning on the achievement of students on standardized tests. In addition, the location of the study should also be considered a limitation. The schools included in this study are all located in the region around Pittsburgh, Pennsylvania. This study was also limited to only middle schools.

Recommendations for Future Research

It would be interesting to replicate this study in middle schools in various states to compare and contrast results. Using an organization such as The National Forum to Accelerate Middle Grades Reform, research could be funded and facilitated to complete

nationwide studies. In turn, the Forum could then construct materials to assist schools to utilize best practices to successfully implement project-based learning. Additional areas ripe for research would be the impact of the implementation of project-based learning has on student behavior, student achievement, the enjoyment of learning, and the change in the role of a teacher in a project-based classroom.

The various themes that emerged from the results of this study are all potential topics for further research in a more in-depth manner. In particular, the potential for further study of group work is intriguing. During the student and parent focus groups, the discussions related to group work evoked the most intensive feelings, as well as opinions. Further research into the effectiveness of group work may result in important implications for professional practice that could potentially increase its effectiveness and mitigate the downsides.

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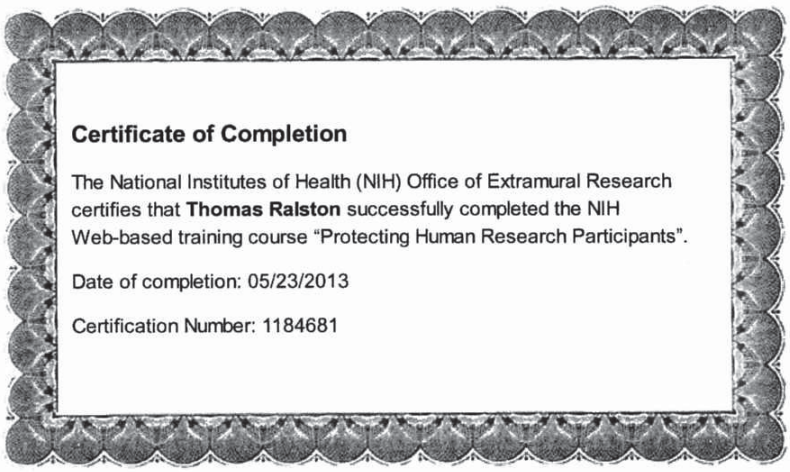
APPENDICES

APPENDIX A

NIH APPROVAL LETTER



Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Thomas Ralston** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 05/23/2013

Certification Number: 1184681

APPENDIX B

IRB APPROVAL

Youngstown State University
Institutional Review Board
Office of Grants & Sponsored Programs
Coffelt Hall
Phone: 330-941-2377

9-26-13
Date

Protocol Number

FULL/EXPEDITED REVIEW PROTOCOL APPLICATION

A. INVESTIGATOR INFORMATION			
Please list all study personnel involved in the conduct of this study. All study personnel must complete required training in human subject research and provide to the IRB office documentation verifying completion of the requirement. The IRB will not review a study without such forms on file for all research personnel. Only YSU faculty, staff, students, or registered volunteers are considered YSU affiliated and thus covered by the YSU IRB review. All non-affiliated study personnel must have their participation reviewed by the appropriate IRB. (Attach a separate sheet if more space is needed.)			
STUDY TITLE	Stakeholder Perceptions of the Implementation of Project-Based Learning in Pennsylvania Middle Schools		
PRINCIPAL INVESTIGATOR OR FACULTY ADVISOR	Dr. Charles Vergon	Phone Extension 1574	Email Address cbvergon@ysu.edu
DEPARTMENT	EFRTL		
CO-INVESTIGATOR OR STUDENT INVESTIGATOR	Mr. Thomas Ralston	Phone Extension 412-874-6747	Email Address tralston@avonworth.k12.pa.us
CO-INVESTIGATOR OR STUDENT INVESTIGATOR		Phone Extension	Email Address
CO-INVESTIGATOR OR STUDENT INVESTIGATOR		Phone Extension	Email Address

B. SPONSOR/FUNDING INFORMATION			
Will this project be supported by an external funding agency?		☐ Yes	☒ No
If yes, please identify the source and contact information			
Agency:	Contact Person:	Phone:	Email:

C. LOCATION OF RESEARCH			
Where will the study take place?	YSU	Other Facility X	
If not at YSU, attach a letter of cooperation on the letterhead of the facility and provide contact information. If there are multiple facilities, attach an additional page with the information for each.			
Facility Name: Elizabeth Forward Middle School	Contact Person: Dr. Bart Rocco	Phone: 412-896-2310	Email: brocco@efsd.net
Propel Montour	Ms. Tina Chekan	412-325-7305	tchekan@propelschools.org
South Fayette Middle School	Dr. Bille Rondinelli	412-221-4542	brondinelli@southfayette.org

1

APPENDIX C

IRB LETTER

Youngstown
STATE UNIVERSITY

One University Plaza, Youngstown, Ohio 44555
Office of Grants and Sponsored Programs
330.941.2377
Fax 330.941.1580

November 20, 2013

Dr. Charles Vergon, Principal Investigator
Mr. Thomas Ralston, Co-investigator
Department of Educational Foundations, Research, Technology and Leadership
UNIVERSITY

RE: HSRC PROTOCOL NUMBER: 046-2014
TITLE: Stakeholder Perceptions of the Implementation of Project-based Learning in Pennsylvania Middle Schools

Dear Dr. Vergon and Mr. Ralston:

The Human Subjects Research Committee of Youngstown State University has reviewed the above mentioned protocol and determined that it fully meets YSU Human Subjects Research Guidelines. Therefore, I am pleased to inform you that your project has been fully approved.

Any changes in your research activity should be promptly reported to the Human Subjects Research Committee and may not be initiated without HSRC approval except where necessary to eliminate hazard to human subjects. Any unanticipated problems involving risks to subjects should also be promptly reported to the Human Subjects Research Committee.

Sincerely,

Dr. Scott Martin
Interim Associate Dean for Research
Authorized Institutional Official

SCM:cc

c: Dr. Lenford Sutton, Chair
Department of Educational Foundations, Research, Technology and Leadership

www.ysu.edu YSU

APPENDIX D

RESEARCH STUDY CONSENT FORM

Stakeholder Perceptions of the Implementation of Project-Based Learning in Pennsylvania Middle Schools
A Dissertation Study for Completion of Doctoral Requirements
Youngstown State University

Parental Consent on behalf of Minor Child/Ward
Minor Child Assent Form

Introduction

Your child/ward has been invited to participate in a research study to look at project-based learning. Please take whatever time you need to discuss the study with family, friends, or whomever you like. The decision to let your child/ward join, or not to join is up to you.

In this study I am evaluating the implementation of project-based learning at your school. Project-based learning is a teaching method that organizes student learning around projects. The views of students in this study are very important.

What Does the Study Involve?

Your child/ward will be asked to participate in a small group interview with other students called a focus group. The group will be made up of five or six students. The length of the focus group interview will be approximately 20 minutes. During the interview I will ask the students a series of questions regarding their use of project-based learning. The interview will be audio recorded for later transcription to ensure the accuracy of their answers. The interview will take place in the conference room at the school for privacy. A school official with whom your child is familiar will be present at all times during the interview. The interview will take place during the school day on (date inserted).

What are the Risks?

There is no greater risk in participating in this study than there is in attending a regular day of school. If at any time your child/ward wishes to stop participating in the interview they may do so by indicating to the interviewer that they wish to leave. They then can report to the office to indicate that they have exited the interview and request permission to return to class. There is minimal risk that they may feel nervous at the time of the interview.

What Benefits are there for Participating in the Study?

There are no extrinsic benefits to participating in this study. By participating in the focus group interview, your child/ward may build their self-confidence by sharing their thoughts and feelings about their school experiences. However, I cannot guarantee that your child/ward will personally benefit from participating in the study.

Others may benefit from your child/ward's participation in the study. The results of the study will be published and may be used by schools if they choose to use project-based learning as a tool for learning.

Will My Child/Ward's Identity be Confidential?
Yes. Anyone choosing to participate will have his or her identity held confidential. Your child/ward's name will not appear when data from this study are published. Every effort will be made to keep the research records of this study confidential. Data will be kept on a computer that is password protected or in a secure file cabinet. When the data is published, fictitious names will be used instead of the actual names of the subjects.

What are Your Rights as a Research Participant?
Participation in this study is voluntary. Your child/ward has the right not to participate at all or to leave the study at any time. Deciding not to participate or choosing to leave the study will not result in any penalty or loss of benefits to which your child/ward is entitled, and it will not harm his/her relationship with your school.

Who Should I Contact if I Have Questions?
The researcher for this study is Thomas Ralston. His phone number is 412-874-6747 and email address is tralston@avonworth.k12.pa.us.
You may also contact Dr. Charles Vergon, the YSU faculty member supervising this study. His phone number is 1-330-941-1574 and email address is cbvergon@ysu.edu. Another person that can be contacted is Dr. Edward Orona, director of research at YSU whose phone is 330-941-2377.

Permission for a Child/Ward to Participate in Research
As a parent or guardian, I authorize _____
(child/ward's name) to participate in the study described in this form. I agree to allow my child/ward to participate with his/her assent when possible.
As a parent or guardian, I authorize _____
(child/ward's name) to be audiotaped for transcription purposes. The digital recording of the audiotape will be stored on a password protected computer.

Child/Ward's Date of Birth _____

Parent or Legal Guardian's signature _____

Date _____

I understand what I must do in this study and I want to take part in the study.
Child/Ward signature _____

Date _____

*After signing, parent or guardian will receive a copy of this form. The original will be kept researcher's research records.

APPENDIX E

RESEARCH CHILD ASSENT PARENTAL CONSENT FORM

Stakeholder Perceptions of the Implementation of Project-Based Learning in Pennsylvania Middle Schools
A Dissertation Study for Completion of Doctoral Requirements
Youngstown State University

Parental Consent on behalf of Minor Child/Ward
Minor Child Assent Form

Introduction

Your child/ward has been invited to participate in a research study to look at project-based learning. Please take whatever time you need to discuss the study with family, friends, or whomever you like. The decision to let your child/ward join, or not to join is up to you.

In this study I am evaluating the implementation of project-based learning at your school. Project-based learning is a teaching method that organizes student learning around projects. The views of students in this study are very important.

What Does the Study Involve?

Your child/ward will be asked to participate in a small group interview with other students called a focus group. The group will be made up of five or six students. The length of the focus group interview will be approximately 20 minutes. During the interview I will ask the students a series of questions regarding their use of project-based learning. The interview will be audio recorded for later transcription to ensure the accuracy of their answers. The interview will take place in the conference room at the school for privacy. A school official with whom your child is familiar will be present at all times during the interview. The interview will take place during the school day on February 11, 2014.

What are the Risks?

There is minimal risk that they may feel nervous at the time of the interview. If at any time your child/ward wishes to stop participating in the interview they may do so by indicating to the interviewer that they wish to leave. They then can report to the office to indicate that they have exited the interview and request permission to return to class.

What Benefits are there for Participating in the Study?

There are no extrinsic benefits to participating in this study. By participating in the focus group interview, your child/ward may build their self-confidence by sharing their thoughts and feelings about their school experiences. However, I cannot guarantee that your child/ward will personally benefit from participating in the study.

Others may benefit from your child/ward's participation in the study. The results of the study will be published and may be used by schools if they choose to use project-based learning as a tool for learning.

Will My Child/Ward's Identity be Confidential?

Yes. Anyone choosing to participate will have his or her identity held confidential. Your child/ward's name will not appear when data from this study are published. Every effort will be made to keep the research records of this study confidential. Data will be kept on a computer that is password protected or in a secure file cabinet. When the data is published, fictitious names will be used instead of the actual names of the subjects.

What are Your Rights as a Research Participant?

Participation in this study is voluntary. Your child/ward has the right not to participate at all or to leave the study at any time. Deciding not to participate or choosing to leave the study will not result in any penalty or loss of benefits to which your child/ward is entitled, and it will not harm his/her relationship with your school.

Who Should I Contact if I Have Questions?

The researcher for this study is Thomas Ralston. His phone number is 412-874-6747 and email address is tralston@avonworth.k12.pa.us.

You may also contact Dr. Charles Vergon, the YSU faculty member supervising this study. His phone number is 1-330-941-1574 and email address is cbvergon@ysu.edu. Another person that can be contacted is Dr. Edward Orona, director of research at YSU whose phone is 330-941-2377.

Permission for a Child/Ward to Participate in Research

As a parent or guardian, I authorize _____
(child/ward's name) to participate in the study described in this form. I agree to allow my child/ward to participate with his/her assent when possible.

As a parent or guardian, I authorize
_____(child/ward's name) to be audiotaped for transcription purposes. The digital recording of the audiotape will be stored on a password protected computer.

Child/Ward's Date of Birth _____

Parent or Legal Guardian's signature _____

Date _____

I understand what I must do in this study and I want to take part in the study.
Child/Ward signature _____
Date _____

*After signing, parent or guardian will receive a copy of this form. The original will be kept researcher's research records.

APPENDIX F

ADULT SUBJECT CONSENT FORM REVISIONS

Stakeholder Perceptions of the Implementation of Project-Based Learning in Pennsylvania Middle Schools
A Dissertation Study for Completion of Doctoral Requirements
Youngstown State University

Adult Subject Consent Form

Introduction
You have chosen to participate in a research study to look at project-based learning. In this study I am evaluating the implementation of project-based learning at your school. Project-based learning is a teaching method that organizes student learning around projects. The views of stakeholders in this study are very important.
What Does the Study Involve?
You will be asked to participate in a small group interview with other like stakeholders called a focus group. The group will be made up of five or six individuals. The length of the focus group interview will be approximately 60-90 minutes. During the interview I will ask a series of questions regarding the use of project-based learning. The interview will be audio recorded for later transcription to ensure the accuracy of their answers. The interview will take place in the school conference room to ensure privacy.
What are the Risks? . All efforts will be made to ensure the responses of all participants are held in confidence. The audio recording will be deleted after transcription. In addition, all field notes will be taken with a number identifier to protect the identity of participants. A breach of confidentiality could potentially cause risk if the participants have differing views of the topic. If at any time you wish to stop participating in the interview you may do so by indicating to the interviewer that you would like to leave..
What Benefits are there for Participating in the Study?
There are no known benefits to participating in this study. Others may benefit from your participation in the study. The results of the study will be published and may be used by schools if they choose to use project-based learning as a tool for learning.
Will My Identity be Confidential?
Yes. Anyone choosing to participate will have his or her identity held confidential. Your name will not appear when data from this study are published. Every effort will be made to keep the research records of this study confidential. Data will be kept on a computer that is password protected. A number identifier will be substituted for the name of a subject for any field notes taken. When the data is published, fictitious names will be used instead of the actual names of the subjects.
What are Your Rights as a Research Participant?
Participation in this study is voluntary. You have the right not to participate at all or to leave the study at any time. Deciding not to participate or choosing to leave the study will not result in any penalty or loss of benefits to which you are entitled, and it will not harm your relationship with your school.

Who Should I Contact if I Have Questions?

The researcher for this study is Thomas Ralston. His phone number is 412-874-6747 and email address is tralston@avonworth.k12.pa.us.

You may also contact Dr. Charles Vergon, the YSU faculty member supervising this study. His phone number is 1-330-941-1574 and email address is cbvergon@ysu.edu. Another person that can be contacted is Dr. Edward Orona, director of research at YSU whose phone is 330-941-2377.

Consent

I have read this consent form and have been given the opportunity to ask questions. I give my consent to participate in this study. As a participant in this study I agree to not share or discuss the responses of myself or other subjects. I also agree to be audio recorded for transcription purposes

Participant's signature_____

Date:_____

APPENDIX G

PARENT FOCUS GROUP PROTOCOL

Stakeholder Perception of the Implementation of Project-Based Learning in Pennsylvania Middle Schools
Parent Focus Group Protocol

Date:_____ Time:_____
Location:_____
Release form signed: Y/N
Institution:_____
Interviewee number:_____
Interviewer:_____
Notes to interviewee:
Thank you for your participation. I believe your input will be valuable to this research and help grow professional practice. Confidentiality of responses is guaranteed. Your name will not appear in the publication of this research. I anticipate the time for this interview to take approximately 60-90 minutes. You may conclude this interview at any time.
I would like to talk to you about your experiences with project-based learning. I will ask you a few questions, but I would like to make our discussion as conversational as possible. Do you have any questions before we begin?
Background experience with PBL
Questions:
Are you familiar with project-based learning?
Who first introduced the idea of using project-based learning to you?
Why did the school adopt PBL as an instructional approach?
When did the school begin using project-based learning as an instructional approach?
How many and how often do your child's teachers use PBL?
Tell me about some of the innovative project-based learning lessons/units that your child has been involved.

Implementation of PBL
Questions:
Describe how you were made aware of your school's adoption of project-based learning?
What strategies has the school used to educate you on how project-based learning is different from traditional instruction?
Is there anything you would suggest to the school to enhance parent understanding of project-based learning?

Parent perception
Questions:
How have parents reacted to the use of project-based learning?
What are the advantages/disadvantages of project-based learning?

Learning process and products
Questions:
How has the use of project-based learning changed the way classroom instruction works now?
Describe how student assessment has changed because of PBL?
What kinds of interesting products has your child produced?
How would you describe your support of project-based learning now?
How would you react if your school decided to discontinue use of project-based learning?

APPENDIX H

PRINCIPAL INTERVIEW PROTOCOL

Stakeholder Perception of the Implementation of Project-Based Learning in Pennsylvania Middle Schools
Principal Interview Protocol

Date:_____ Time:_____
Location:_____
Release form signed: Y/N
Institution:_____
Interviewee number:_____
Interviewer:_____
Notes to interviewee:
Thank you for your participation. I believe your input will be valuable to this research and help grow professional practice. Confidentiality of responses is guaranteed. Your name will not appear in the publication of this research. I anticipate the time for this interview to take approximately 60-90 minutes. You may conclude this interview at any time.
I would like to talk to you about your experiences with project-based learning. I will ask you a few questions, but I would like to make our discussion as conversational as possible. Do you have any questions before we begin?
Background experience with PBL
Questions:
Who first initiated the idea of using project-based learning?
How receptive were you to the idea of project-based learning when it was first introduced?
How long has your school used project-based learning?
Why did the school adopt PBL as an instructional approach?
When did your school begin use of project-based learning?
How many and how often do your teachers use PBL?
Tell me about some of the innovative strategies that have resulted in your teacher's use of PBL.

Implementation of PBL
Questions:
Describe how you provided training to prepare your teachers to use project-based learning as a teaching tool.
Looking back on the process, what would you change based on what you know now?
What did you/the school do that was particularly important in the implementation of project-based learning?

Parent perception
Questions:

How have parents reacted to the use of project-based learning?
Have you used any strategies to help them understand project-based learning?

Learning process and products
Questions:
How has the use of project-based learning changed the way classroom instruction works now?
Describe how student assessment has changed because of PBL?
What kinds of interesting products have they produced?
How would you describe your support of project-based learning now? What would your reaction be if the school decided to discontinue use of project-based learning?

APPENDIX I

STUDENT FOCUS GROUP PROTOCOL

Stakeholder Perception of the Implementation of Project-Based Learning in Pennsylvania Middle Schools
Student Focus Group Protocol

Date:_____ Time:_____
Location:_____
Release form signed: Y/N
Institution:_____
Interviewee number:_____
Interviewer:_____
Notes to interviewee:
Thank you for your participation. I believe your input will be valuable to this research and help grow professional practice. Confidentiality of responses is guaranteed. Your name will not appear in the publication of this research. I anticipate the time for this interview to take approximately 20 minutes, however, you may conclude the interview at any time.
I would like to talk to you about your experiences with project-based learning. I will ask you a few questions, but I would like to make our discussion as conversational as possible. Do you have any questions before we begin?
Background experience with PBL
Questions:
Are you familiar with project-based learning?

How often do your teachers use PBL?
Tell me about some of the innovative project-based learning lessons/units that you have experienced.
How receptive were you to project-based learning when it was first explained to you?
Implementation of PBL
Questions:
How did your teachers explain project-based learning to you?
Is there anything you would suggest to your teachers to help you to understand project-based learning?

Parent perception
Questions:
How have your parents reacted to the use of project-based learning?

Learning process and products
Questions:

Do you like project-based learning? Why or why not?

Describe how you are graded differently with PBL lessons/units?
What kinds of interesting products have you produced?
? What would your reaction be if your school decided to discontinue using project-based learning?

APPENDIX J

TEACHER FOCUS GROUP PROTOCOL

Stakeholder Perception of the Implementation of Project-Based Learning in Pennsylvania Middle Schools
Teacher Focus Group Protocol

Date:_____ Time:_____
Location:_____
Release form signed: Y/N
Institution:_____
Interviewee number:_____
Interviewer:_____
Notes to interviewee:
Thank you for your participation. I believe your input will be valuable to this research and help grow professional practice. Confidentiality of responses is guaranteed. Your name will not appear in the publication of this research. I anticipate the time for this interview to take approximately 60-90 minutes, however, you may conclude the interview at any time.
I would like to talk to you about your experiences with project-based learning. I will ask you a few questions, but I would like to make our discussion as conversational as possible. Do you have any questions before we begin?
Background experience with PBL
Questions:
Who first introduced the idea of using project-based learning and when?
Why did the school adopt PBL as an instructional approach?
How receptive were you to the adoption of project-based learning when it was first introduced?
How long have you used project-based learning?
How often do you use PBL?
Tell me about some of the innovative strategies that have resulted in your use of PBL.

Implementation of PBL
Questions:
Describe how you were trained to start using project-based learning as a teaching tool.
Looking back on the implementation process, what would you change based on what you know now?
What was particularly important that the school did in the implementation process?
Was there anything that you did personally that impacted the implementation of project-based learning?

Parent perception
Questions:
How have parents reacted to the use of project-based learning?

Have you used any strategies to help them understand project-based learning?

Learning process and products
Questions:
How has the use of project-based learning changed the way classroom instruction works now?
What are the advantages/disadvantages of project-based learning?
Describe how you assess students using project-based learning?
What kinds of interesting products have they produced?
How would you describe your support of project-based learning now? What would your reaction be if the school decided to abandon it?