

Making Learning Authentic: An Educational Case Study Describing Student
Engagement and Motivation in a Project-Based Learning Environment

by

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ABSTRACT

This educational case study looked at student engagement and motivation in a collaborative environment, one that provided students the freedom to be critical thinkers and problem solvers. In order to create this collaborative environment, students in a third-grade elementary classroom participated in a Project-Based Learning unit. The unit culminated in hands-on projects. Sociocultural theory and Self Determination theory were used to guide the development of the innovation and the formulation of the research design. The qualitative data collection tools that were used in this study consisted of observations through video and audio recordings, researcher's field notes, student interviews, and artifacts. The artifacts gathered consisted of student journal entries reflecting on their experiences within the innovation and their learning process throughout. Data were collected, transcribed, and analyzed using multiple rounds of both deductive and inductive coding. This research suggests that a Project-Based Learning environment positively impacts student participation both within a single lesson and throughout the unit by increasing students' background and competence. Additionally, within a Project-Based Learning environment, students co-construct new meaning through goal-oriented group work designed by the teacher. The teacher also supports student thinking through clarifying and questioning statements designed to support students' learning and development of ideas. Finally, this educational case study suggests that students demonstrate an increase in intrinsic motivation over time as demonstrated by an eagerness to apply their new learning beyond the Project-Based Learning lessons. Students applied the learning within their classroom, school, and even their homes.

This dissertation is dedicated to the hundreds of students

I have taught in my career as a third grade teacher.

You have cemented in me the belief that

all children can achieve great things

when the people who surround them believe in them.

You have inspired me to devote my life to strengthening our education system.

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Introduction and Context

The accountability era in education, intended to increase student-achievement for all students, has instead resulted in negatively impacting student engagement and motivation in learning. The current standards-based education reform movement was prompted by The National Commission on Excellence in Education's (1983) publication of *A Nation At Risk: The Imperative for Education Reform* (Lee & Wong, 2004). In this extensive report, the NCEE asserted that America's education system was in great peril. The report claimed, "Our once unchallenged preeminence in commerce, industry, science, and technological innovation is being overtaken by competitors throughout the world" and urged the public and government to reform schools (National Commission on Excellence in Education, 1983).

In 2001, President George Bush signed into effect the No Child Left Behind Act (NCLB Act) which called for "bipartisan solutions based on accountability, choice, and flexibility in Federal education programs" (United States Department of Education, 2001). The NCLB Act was intended to motivate teachers and districts to decrease the achievement gap between students of color and their more affluent peers. As a result of the growing accountability era, many states raised their performance standards and began utilizing high-stakes testing to measure student performance. Schools failing to perform or demonstrate Adequate Yearly Progress are at risk for loss of funding and even closure. The schools at greatest risk for not meeting AYP and thus feeling the pressures of high-stakes testing and the possible ramifications of NCLB are high-poverty schools with high percentages of students of color. This type of accountability based reform has continued with Obama's presidency and has taken on a new shift towards common standards and

assessments across the nation (United States Department of Education, 2010). In December of 2015, the Every Student Succeeds Act was passed (United States Department of Education, 2015). Due to the recent implementation of the Act, it remains to be seen as to the extent that the focus on accountability will change.

The Problem

NCLB marks a shift in the use and intended purpose of state testing. Tests moved from being a measurement tool, designed to provide teachers and administration with information about student performance, to a high-stakes test intended to influence policy and teacher instruction (Hamilton, 2003). As a result of this shift, teachers feel more pressure to make their students perform on state testing. In order to ensure success, a phenomenon known as the “narrowing of curriculum” has occurred in some states and districts. The narrowing of curriculum is the concept that fewer subjects are being taught in schools where the pressure is high to perform (Berliner, 2011). Onosko (2011) refers to this as a “hyper focus” on the two subjects of math and reading, the subjects most frequently tested in high-stakes exams. Many teachers are spending more time teaching math and reading and less time teaching science or social studies (Berliner, 2009; Hamilton, Schwartz, Stecher, & Steele, 2013).

Studies have shown that science and social studies are not disappearing from all grade levels; instead they are being deferred to the upper grades of middle school and high school (Jerald, 2006; Milner, 2013). In a brief issued by the Center for Comprehensive School Reform and Improvement, Jerald (2006) notes that schools that decrease science and social studies content in lower-elementary schools are actually doing a disservice to their students. Students are being denied the opportunity to build

essential vocabulary and background knowledge needed to understand more complex writings in future grades. In order for students to understand articles and readings in older grades, they must be able to comprehend at least 90% of the vocabulary (Jerald, 2006). By reducing time spent on science and social studies, schools are decreasing the amount of content vocabulary learned and acquired each year by students, thus influencing their success in later grades (Milner, 2013).

In addition to altering what is taught in school, the accountability era has altered the very essence of how teachers teach. Hamilton (2013) states, “The test-based accountability reforms that have been enacted in the U.S. over the past few decades have had a profound effect on the cultures and practices of schools across the nation” (p. 453). These effects include a shift in teacher pedagogy. In a national survey, 72% of teachers in states with high-stakes testing agreed that testing influenced how they were instructing their students and the amount of seat time in their classroom. Additionally a majority of teachers surveyed noted that testing influenced the amount of cooperative learning and critical thinking taught in their classroom (Pedulla, Abrams, & Madaus, 2003). High-stakes tests usually come in the form of multiple-choice assessments; essays and performance assessments would be more expensive to score. Due to formatting, it is difficult to assess the higher-level learning and skills in a subject-area, so many items test lower-level skills (Berliner, 2009). Teachers in high-stakes areas are largely focusing their teaching on preparing students for the test, resulting in an increase of instructional time spent on lower-level skills (Berliner, 2011; Hamilton, Schwartz, Stecher, & Steele, 2013; Jones, 2007). Berliner (2011) warns us that by doing so, schools are continuing to divide wealthier children from poorer children: “curriculum decisions of this kind ensure

that intellectual capital is cultivated more in some groups of students than in others” (p. 285).

In an attempt to increase scores many districts, particularly low-income districts with a high percentage of students of color, which are often most concerned with high-stakes testing, are purchasing scripted-curriculum and encouraging or requiring teachers to use it in their instruction. Onosko (2011) labeled such curriculum as “teacher proof” and warns that such curriculum could destroy students’ love of learning (p. 8).

Researchers caution that negative consequences associated with scripted curriculum may include a decrease in students’ ability to develop creativity and skills in other areas (Milner, 2013) and a decrease in creativity and the feeling of autonomy in teachers (Crocco & Costigan, 2007).

As a result of narrowed curriculum and altered pedagogy, student engagement and motivation in the classroom is at risk. Research shows that the attempt to control student learning through high-stakes assessment undermines student self-motivation (B. D. Jones, 2007; Nichols & Berliner, 2008). The learning environment influences student engagement and motivation and certain activities such as cooperative learning and projects are more likely to generate participation and engagement from students. Environments that are hands-on, project-based, relevant to students’ lives, and multi-disciplinary are more likely to engage and motivate students as learners. Students feel a sense of purpose and ownership over their learning when given the opportunity to participate in authentic experiences (Skinner & Pitzer, 2012). Faced with the pressures of high-stakes environments, current classroom environments are not facilitating an environment that fosters engagement and motivation.

By focusing solely on math and reading, we are decreasing cross-curricular connections and multidisciplinary studies. Additionally in the test-prep environment, less time is spent engaging students in hands-on or Project-Based Learning. This problem permeates all schools but particularly low-income schools with high populations of students of color who face the most negative consequences associated with high-stakes testing. In my district, learning is restricted due in part to the pressures of the accountability era. To address this problem, my innovation altered the pedagogy I designed in my classroom. I designed learning opportunities that were project-based. The engagement and motivation of students were addressed through hands-on learning, the incorporation of science and social studies topics, and the use of collaboration and critical thinking skills.

Background and Context

For the past nine years, I have taught third grade at Wilson Elementary School. I started teaching through the organization Teach for America, where we constantly discussed the need to close the achievement gap. Wilson Elementary is a Title I school in a predominantly Latino neighborhood. Title I, previously under the No Child Left Behind Act and now the Every Student Succeeds Act, is a government program that financially assists schools with educationally disadvantaged students in meeting the state academic standards. Title I money is used to support special programs such as tutoring, supplemental academic programs, or increased personnel (Arizona Department of Education, 2013). Wilson's demographics include 84% Latino students and 10% African American students. Additionally, 37% of students are English Language Learners (ELL) and 96% of students qualify for reduced or free lunches.

Wilson is one of 17 schools in the Granada Elementary School District (GESD); like many other low-income districts Granada feels the pressure of high-stakes testing. In 2002, after the implementation of NCLB, schools were assigned a ranking. Granada had 0 “Excelling” schools, 5 “Maintaining” schools, 1 “Improving school” and 7 “Underperforming” schools (Arizona Office of the Auditor General, 2002). In the last 11 years, there has been little change in the district’s labels. Though the labels look a little different, the results do not show a huge growth in student achievement; a majority of schools are still ranked in the middle rankings or lower. In 2012, there were 0 “A” schools, 3 “B” schools, 11 “C” schools, and 3 “D” schools (Arizona Office of the Auditor General, 2013).

Throughout the past nine years, I have watched Granada implement a number of curriculum changes in math and reading intended to increase student achievement. From a balanced-literacy framework that encouraged teachers to build 90-minute reading blocks to the recent implementation and requirement of 40-minute Response to Intervention (RTI) blocks. Additionally, the district has adopted new math and reading curriculum. The recent math adoption, Go Math, is aligned to Common Core and provides teachers with daily math instruction, practice sheets, and teacher directions. Although teachers block out science and social studies blocks on calendars submitted to district, few teachers have time to teach full science and social studies lessons when there is so much pressure and emphasis on reading and math.

The district’s prioritization of math and reading are noticed not only through the newer adoptions of reading and math curriculum but also the professional development (PD) offered through district. Granada offers a series of six PD sessions that teachers can

sign up for each semester. In the 2014 PD catalog, when looking at subject-based classes offered to K-8 general education teachers, 40% of classes pertained to math content, 30% to reading, 20% to writing and 10% split between science and social studies content. The three science and social studies professional developments were intended for middle school self-contained teachers.

In place of experimental lessons in science or projects in social studies, students are spending more time in direct instruction lessons focused on isolated math and reading content. The most frequent type of lesson observed in a Granada classroom involves a strict model, guided practice where the students work with some support from the teacher, followed by an independent practice that matches the guided practice and model. The concern with this form of direct teaching is that it limits students' ability to be creative, to discover cross-curricular connections, and to become truly engaged in meaningful learning. Engagement is more than listening to a lesson. Engagement is being an active participant who is eager to know more. Similarly an "I do, We do, You do" lesson is not going to motivate a student to seek out additional information or become a life-learner. Our now-limited pedagogy is restricting students' engagement and motivation in the learning process.

Purpose of the Study

The purpose of this educational case study was to improve student engagement and motivation for a single third grade classroom at Wilson Elementary through a Project-Based Learning environment. Project-Based Learning is a hands-on interactive unit of study that centers all learning on students (Wolk, 1994). Students go from being the receptacles of information to the drivers of instruction. This study looked at student

engagement and motivation in a collaborative environment, one that provides students the freedom to be critical thinkers and problem solvers.

Engagement in the classroom is defined as active participation through behaviors such as being on-task or joining activities or learning. Engagement can be broken down into behavioral, cognitive, and emotional components. Behavioral engagement is the physical participation in academic or social situations, cognitive engagement relates to an individual's personal investment in a situation, and emotional engagement refers to students' positive and negative emotions as related to interactions with teachers, classmates, and their environment (Ainley, 2012). One study describes student engagement as the glue that allows students to connect their home, school, and social contexts, allowing students to fully engage in the learning process (Amy & Christenson, 2012).

In the context of this study, it is important to understand the connection and differences between engagement and motivation. Engagement is often viewed as the physical evidence of motivation. For example engagement is characterized by enthusiasm, interest, and determination in a task or event. Motivation would then refer to the underlying sources of this enthusiasm, interest, or determination. In other words, motivation is what is leading the student to show physical behaviors associated with engagement (Skinner & Pitzer, 2012).

There are a number of different types of motivation, or being moved to do something: amotivation, intrinsic motivation, and extrinsic motivation. Amotivation is a lack of motivation or interest in a specific task or series of tasks. Intrinsic motivation occurs when an individual completes a task because they are interested in it or find it

enjoyable, while extrinsic motivation is being motivated by external forces. Intrinsic motivation is desired in order to increase student academic performance and engagement in school. There are a number of essential elements associated with intrinsic motivation: competence, autonomy, and relatedness (Gagné & Deci, 2005).

The Innovation

Project-Based Learning is defined as an authentic and challenging learning experience for students that involves self-directed learning and results in a culminating project or product (Parsons, Metzger, Askew, & Carswell, 2010). The projects are often centered around investigative or guiding questions (Mitchell, Foulger, Wetzel, & Rathkey, 2008). The idea of Project-Based Learning originated with William Kilpatrick, an education professor at Georgia College in the early 1900's. Kilpatrick emphasized child-chosen projects that would stimulate purposeful activities and promote intrinsic motivation in students (Wolk, 1994). In a speech at Georgia College, Kilpatrick (2011) said "each stated, 'Each child learns what he lives and he learns it in the degree that he live it, in the degree that he accepts it as his way of living'" (Schweinle, Meyer, & Turner, 2006). Barron, Schwartz, Vye, et al. (1998) note one design principle in successful Project-Based Learning is learning-appropriate goals that lead to a deeper understanding of the content. The teacher develops learning opportunities based on state standards and promotes cross curricular connections (Karchmer-Klein & Layton, 2006; Wolk, 1994). Project-Based Learning promotes a learning environment that fosters collaborative interactions between students and promotes active participation of all students (Karchmer-Klein & Layton, 2006; Parsons et al., 2010; Wolk, 1994).

To improve engagement and motivation, I designed a unit that followed the PBL model. This seven-week unit integrated Project-Based lessons focused on collaboration, critical thinking, and inquiry. Some lessons pertained to researching skills, others to how to work together or how to persuade an audience with the words you choose. The purpose of the unit was to increase student engagement and motivation.

Research Questions

To better understand the role engagement and motivation plays in a Project-Based Learning environment, I examined the following research questions:

1. In what ways does Project-Based Learning facilitate the development of student engagement?
2. How does Project-Based Learning change student motivation over time?
3. How do students (in a third grade classroom) interact with their teacher and their peers in a Project-Based Learning environment?
4. Within the Project-Based Learning, what practices do students employ to construct learning?

Literature Review

In this chapter, the theoretical frameworks guiding this study were discussed. These frameworks include Sociocultural Theory and Self Determination Theory. Additionally I will discuss the links between these two theories and their role in enhancing the understanding of the innovation Project-Based Learning. Finally, an overview of the existing empirical research on engagement, motivation, and Project-Based Learning were discussed.

Theoretical Framework

Sociocultural Theory

Sociocultural theory is rooted in the work of Lev Semyonovich Vygotsky, a soviet psychologist who conducted research in the early 1900s. Vygotsky believed that the “mental functioning in the individual can be understood only by going outside the individual and examining the social and cultural processes from which it derives” (Palmer, 2001, p. 35). He asserted that learning and development happen both at the intermental plane, interactions between people, and on the intramental plane, what happens within someone.

Learning aligned with sociocultural theory is in direct contrast with the *assembly-line instruction* so common in education (Rogoff, Paradise, Arauz, Correa-Chavez, & Angelillo, 2003). The assembly-line model views knowledge and learning as something transmitted from an expert, the teacher, to students; children are seen as receptacles in which knowledge or information is deposited by an “all-knowing” source. In this model, teachers strive for efficient delivery of knowledge, utilizing punishments and incentives to ensure children participate. Alternatively sociocultural theory views learning and development as something that occurs when individuals interact with one another in sociocultural activities in their community. Students can thus be considered participants in a community of learners (Rogoff et al., 2003). In order to better understand this research, I will focus primarily on participation, one strand of socio-cultural theory.

Nasir and Hand (2006) summarized four key principles that comprise sociocultural theory:

1. Learning and development occur simultaneously on multiple levels. These levels include moment-to-moment changes in learning, changes over time, and historical changes.
2. The developmental process can be understood using cultural practices as units for analysis. These cultural practices take the form of activities or actions. All activities conducted by a group are inherently goal-oriented and can be analyzed to better understand the development of learning in the group.
3. Cultural tools and artifacts, such as language, symbols, or physical objects, affect learning and are mediators of thinking. Students may use tools or artifacts to solve local problems or demonstrate learning in the goal-oriented activities discussed above.
4. Social interactions play an essential part in learning and development. Learning is in fact developed through changing relations with others and the world around them (Nasir & Hand, 2006).

Through sociocultural theory Rogoff (2008) explored in-depth the varying planes on which learning occurs, labeling them as guided participation, participatory appropriation, and apprenticeship. As discussed above, learning occurs through goal-oriented actions conducted with groups of people learning from and with one another. Rogoff's planes allow us to explore the varying structures those interactions can take. For the purpose of this study, guided participation and participatory appropriation were explored more. During guided participation, individuals must communicate and organize their actions while they participate in a meaningful cultural activity. Guidance is provided by cultural and social values existing in the social environment and the help that is

offered through social interaction. In this case, learning is interpersonal and occurs through participation or active involvement. Additionally participatory appropriation refers to how individuals change within themselves as they participate in a cultural activity. This is the process of “becoming” and as they experience cultural activities they develop skills and experiences that better prepare them for later events and activities. This inherent transformation happens as a result of the guided participation, or their involvement in interacting with others in a cultural activity (Rogoff, 2008).

Rooted in sociocultural theory is the idea that learning and development happen in a culture of learners. In this environment, learning is a process of transformation in which participation evolves as members’ roles transform and their understandings develop and change. Individuals desire responsibility and autonomy in their participation in and interactions with sociocultural activities. Within a community of learners all participants share the responsibility of “knowing or directing, no role is by definition passive” (Rogoff, 1994, p. 213). This is in direct contrast with more traditional views of education, like *assembly-line instruction*, where students do not play a major role in the management of their own learning.

Participation cannot be viewed without considering social and cultural processes. This argument justifies the need to root learning in local activity and the local setting. Within sociocultural theory, culture is produced and reproduced through daily life. It is created in moment-to-moment interactions with other individuals and while participating in cultural practices such as school. Rogoff et al. (2003) note that participants’ sense of importance and interest in activity are driven by their motivation related to that activity.

Building on sociocultural theory, we can look more closely at the construction of meaning through processes within groups of people. A community of learners, as mentioned above, forms when groups commit to shared activity towards a common goal. Individual's efforts and practices are established by and with all other members of the group. Together they create their own shared practices and understandings. Individual participants may change but that change cannot be separated from the interactions of the group as a whole. These shared practices comprise the learning. In a group of students, this would mean that students are not learning from the teacher. Instead they are learning from the process itself. This process is comprised of specific group practices or actions (Rogoff, Baker-Sennett, Lacasa, & Goldsmith, 1995).

Self-Determination Theory

Motivation, any force that energizes and creates action, plays an essential role in student success in learning. Motivation is comprised of energy and direction. It is the energy that gives action a sense of strength or determination and the direction that gives action purpose. Motivation can result from needs, thoughts, emotions, and events (Reeve, 2012). Those who experience authentic motivation versus experiences that are externally controlled, forces outside of their own internal self, show more interest, excitement and confidence in their tasks. In addition, an increase in authentic motivation can lead to enhanced performance, persistence, creativity, self-esteem, and general well being (Ryan & Deci, 2000b). Multiple research studies demonstrate that student intrinsic motivation is positively correlated with students' grades (Corpus, McClintic-Gilbert, & Hayenga, 2009; Niehaus, Rudasill, & Adelson, 2011). Further, motivation is positively correlated with student engagement in the classroom, students who are motivated by learning are more

engaged and vice versa (Corpus et al., 2009; Skinner, Furrer, Marchand, & Kindermann, 2008).

According to self-determination theory (SDT) there are a number of different types of motivation, or being moved to do something: amotivation, intrinsic motivation, and extrinsic motivation. Amotivation is a lack of motivation or interest in a specific task or series of tasks. Intrinsic motivation occurs when an individual completes a task because they are interested in it or find it enjoyable, while extrinsic motivation is being motivated by external forces. Intrinsic motivation is desired in order to increase student academic performance and engagement in school. There are a number of essential elements associated with intrinsic motivation: competence, autonomy, and relatedness. Competence refers to individuals' confidence and belief that they are capable of doing what they are asked to do; autonomy is the concept of choice or control within an activity or experience; and relatedness is the relationships developed between, in the case of schools, teachers and their students. These elements are psychological needs of all people and self-determination theory focuses on one's ability to satisfy these needs within a certain social situation (Gagné & Deci, 2005).

Autonomy-supportive classrooms foster and encourage students' psychological needs, values, and personal interests. They are classrooms that support student voice, provide rationale for learning, and create opportunities for students to have the freedom of choice in their education (Reeve, 2013). Many studies provide evidence that autonomy-supportive classrooms are positively correlated with increased intrinsic motivation (Gillet, Vallerand, & Lafrenière, 2011; Ng, Guthrie, Van Meter, McCann, & Alao, 1998; Reeve, 2013; Rozendaal, Minnaert, & Boekaerts, 2005; Schweinle et al.,

2006). In addition, autonomy-supportive environments lead to an increase in students' self-efficacy (Gillet et al., 2011; Reeve, 2013) and engagement (Reeve, 2013; Skinner et al., 2008).

SDT recognizes that there are social and environmental factors that can facilitate or inhibit intrinsic motivation. Cognitive Evaluation Theory (CET) is a subtheory of SDT. It argues that external factors such as positive praise and feedback can actually increase intrinsic motivation because it increases the element of competence (Ryan & Deci, 2000a). According to CET, all external events that affect students' perceived autonomy or competence directly impact student intrinsic motivation. Reeve (2012) explains that all events are comprised of two parts: the controlling aspect and the informational aspect. An event that is designed with a specific outcome often has a controlling aspect, which in turn diminishes intrinsic motivation. Alternatively, non-controlling events preserve a students' feeling of control and thus intrinsic motivation. Additionally, positive information-sharing, such as praise, promote competence and therefore intrinsic motivation. This is important when considering education and the development of learning experiences. Experiences that are non-controlling would give students more choice and autonomy over their learning activities and would therefore increase student engagement and intrinsic motivation. Examples of this include choice, self-direction, real-world explanations or connections, and acknowledgement of student feelings (Reeve, 2012).

Additionally self-efficacy, or confidence in one's ability to succeed, is also an essential element in intrinsic motivation (Gagné & Deci, 2005). In one study, Niehaus et al. (2011) found that self-efficacy was a predictor of academic success as measured by

student math achievement. Further, Skinner and colleagues' study (2008) demonstrated that self-efficacy contributed to behavioral engagement in the classroom. Children with higher levels of self-efficacy were more likely to exert effort in class and demonstrate moderate increases in their level of enjoyment. Alternatively, students with low self-efficacy were more likely to withdraw from class and express feelings of anxiety (Skinner et al., 2008).

Motivation and learning structures are linked. Students have the capability to fully and positively engage themselves in a learning environment. Within every student are the motivational resources necessary to engage behaviorally, emotionally, and cognitively in an activity. In turn, the learning environment itself can either provide the means for igniting this inner motivation or creating roadblocks to it reaching its potential. Student motivation and the learning environment are directly related and affect one another. The learning environment can provide a student with new sources of motivation and in turn a motivated student can alter or change their learning environment. Earlier I discussed Rogoff's interpretation of sociocultural theory and the need for students to participate in learning processes with one another. It is this structure of learning that fosters intrinsic motivation. Students who are given the opportunity to become a community of learners and participate in a meaningful cultural activity will evolve and grow, as will their motivation. Essentially the learning environment plays an influential role in the development and encouragement of student motivation. Within this environment, a teacher's motivational style plays a strong role in whether an environment fosters or prevents the development of motivation. Teacher's styles can either be autonomy

supportive or controlling; when their style is autonomy supportive, motivation increases, allowing students to grow and learn with the help of one another (Reeve, 2012).

Empirical Literature

As discussed above, there are two theories guiding this research: sociocultural theory and self-determination theory. Within sociocultural theory, Rogoff utilizes the concept of participation in culturally meaningful activities to explore the development of learning. In this section, I will use empirical literature to better understand what this participation or engagement looks like. Additionally the concept of motivation and the innovation guiding this research, Project-Based Learning, were explored through related literature as well.

Related Literature on Engagement

One essential aspect of sociocultural theory is participation through social interactions with one another for the purpose of creating meaning. I propose that the broader concept of participation encompasses engagement. In order to learn from one another, students must be actively engaged in the learning activities. Inherently engagement is an essential element in the promotion of student learning. In academic tasks, it is comprised of active, energetic, and approach-oriented involvement (Pekrun & Linnenbrink-Garcia, 2012). Although motivation and engagement are distinctly different ideas, they are intricately linked. Engagement is the physical, mental, or emotional action that is driven by a person's motivation. In other words, motivation is the private or unobservable internal process that results in the public behaviors of engagement (Amy & Christenson, 2012; Skinner et al., 2008).

Engagement comes in many forms: behavioral, cognitive, emotional, and agentic. Behavioral engagement is defined as the active participation in an activity or event, cognitive engagement consists of personal investment in something, and emotional engagement is the positive or negative affect when interacting with people and the school environment. Pekrun and Linnenbrik-Garcia (2012) defined behavioral engagement as effort and persistence and add the additional category of cognitive-behavioral engagement, self-regulation, and social-behavioral engagement, social on-task behaviors. An additional form of engagement is discussed in some research: agentic engagement which is the proactive or intentional contribution to an event or learning experience (Reeve, 2012).

There are several factors that contribute to an increase in engagement in the classroom. In the learning environment, students can experience a range of emotions from excitement and interest to boredom and frustration. Research shows that a students' emotion can affect their engagement in a lesson or experience. Students who are more interested in a lesson, either because they have had experience with the content before or because the material has been presented in a way that activates interest, are more likely to be engaged (Ainley, 2012). Another study found that when students feel emotional disaffection, such as boredom, there is a negative impact on their effort. Alternatively when they feel positive emotions associated with autonomy or competence they are more likely to be positively engaged (Skinner et al., 2008).

Related Literature on Motivation

Research has been conducted that aligns specific teaching approaches with an increase in student motivation; more specifically the act of incorporating construction of

knowledge in a range of subjects: Math, reading, and writing (Gambrell, Hughes, Calvert, & Malloy, 2011; Ginsburg-block et al., 1998; Kim, 2005; Stipek, Givvin, Salmon, & MacGyvers, 1998). Kim's (2005) research supports the positive relationship between constructivist mathematical instruction and student motivation and self-monitoring as a learner. The constructivist instruction focused on active learning where students constructed mathematical concepts versus direct instruction. Within constructivism, the learner is the focus and the teacher supports the learner's processes for understanding new concepts through methods such as questioning (Kim, 2005). Students utilize their prior knowledge, hands-on experiences strategically planned by their teacher, and a cooperative process with their peers to build understanding of new ideas (M. G. Jones & Brader-araje, 2002). Ginsburg-Block et al. (1998) found a correlation between small-group interventions based on constructing knowledge to be positively correlated with motivation. The groups consisted of peer supported learning, student generated strategies, and extrinsic rewards for achievement (Ginsburg-block et al., 1998). Stipek et al. (1998) conducted research that provided that math reform had a positive correlation to student self-confidence and resulted in an increase in student engagement. Gambrell et al. (2011) conducted research that established that student motivation in literacy increased when students were engaged in authentic literacy tasks. The study implemented a pen pal program where students reflected on literature by writing letters to adults. Authentic literacy is defined as utilizing text outside of the reading-to-learn context and using literature for the same purpose it was written for (Gambrell et al., 2011).

Related Literature on Project-Based Learning

Project-Based learning is an authentic and challenging learning experience for students that involves self-directed learning and results in a culminating project or product (Parsons et al., 2010). The projects are often centered around investigative or guiding questions (Mitchell et al., 2008). The idea of Project-Based Learning originated with William Kilpatrick, an education professor at Georgia College in the early 1900's. Kilpatrick emphasized child-chosen projects that would stimulate purposeful activities and promote intrinsic motivation in students (Wolk, 1994). In a speech at Georgia College, Kirpatrick (2011) stated that each child learns from what he or she lives in and learns it to the degree that he or she lives in, thus accepting it as his or her way of living. Barron, Schwartz, Vye, et al. (1998) noted one design principle in successful Project-Based Learning is learning-appropriate goals that lead to a deeper understanding of the content. The teacher develops learning opportunities based on state standards and promotes cross curricular connections (Karchmer-Klein & Layton, 2006; Wolk, 1994). Project-Based Learning promotes a learning environment that fosters collaborative interactions between students and promotes active participation of all students (Karchmer-Klein & Layton, 2006; Parsons et al., 2010; Wolk, 1994).

Contribution

The purpose of this research is to add to existing research on the subject of learning environments that foster engagement and motivation, particularly within the setting of a Title I school. This research is intended to continue to explore the link between enabling active participation through communities of learners and its impact on student engagement and motivation.

Methods

The purpose of this educational case study is to influence student engagement, student motivation, and the learning environment by altering my pedagogy. A new pedagogy of Project-Based Learning was implemented in my classroom and tools were used to measure student perspectives and interactions throughout the process. This chapter explains how the study was informed by ethnographic approaches, describe the development and implementation of the innovation, and provide information on the role of the researcher. In addition, the chapter gives an in-depth description of the qualitative research design that was used, including methods, data analysis, and the issue of validity.

Innovation

The innovation in this research is a change in the pedagogy used in my classroom. Reading and writing instruction were reformatted utilizing a Project-Based Learning model. Project-Based Learning (PBL) is defined as an authentic and challenging learning experience for students that involves self-directed learning and results in a culminating project or product (Parsons et al., 2010). The projects are often centered around investigative or guiding questions (Mitchell et al., 2008).

To guide the creation of a PBL unit, I used the Buck Institute's eight critical attributes: significant content, 21st century skills, a driving question, need to know (a list of questions students must address to answer their driving questions), student choice and voice, revision and reflection, in-depth inquiry, and a public audience (Hallermann, Larmer, & Mergendoller, 2011). In order to identify significant content, I reflected on student interest, science and social studies standards appropriate for third grade, and issues that are important in the lives of Granada students. In past research cycles, PBL

units have included the issue of immigration, the Monarch butterfly, and school campus sustainability.

To improve engagement and motivation, I designed a unit that followed the PBL model. Students explored how they could reduce waste at Wilson Elementary. The PBL unit was a six-week unit beginning the first week of October (see Appendix A for the Unit Plan). It was essential that prior to the beginning of the unit, strong classroom procedures were in place and that a strong classroom community had been established. For this reason the innovation did not get implemented in August or September. During this time, I worked to ensure procedures such as partner sharing and group work were comfortable and flexible. Lessons were developed around a driving question: How can we, as students reduce waste at Wilson Elementary? At the beginning of the unit, students assisted in generating a list of need-to-knows. These need-to-knows guided the creation of lessons. Lessons were student-centered and provided ample time for students to conduct research, work with classmates to develop new ideas, and explore the topic of conversation.

Utilizing their prior knowledge and teacher-selected pictures, students developed “I wonder” statements about recycling, reusing, and reducing. They then conducted research through the internet, videos, articles, books, and hands-on stations to learn more. Working together in teams, students interviewed experts and explored resources in order to develop a project of their choice. Together students chose to address two problems on campus. They wanted to reduce breakfast waste by encouraging recycling during classroom breakfast time and reduce the waste of energy by encouraging conservation of lights and electricity. Three groups addressed the issue of breakfast waste through a green

team, cartoon, and recycling contest. The green team defined themselves as a group of students who were in charge of creating awareness of recycling. The green team paired with the recycling contest students to teach classrooms how to recycle and gave them the opportunity to practice through a two-week contest. The cartoon was developed with voice-overs and cartoon-like drawings intended to teach kindergarteners and first graders how to recycle at breakfast. To address energy conservation, one team developed a play with superheroes and villains that was presented to 10 classrooms. In the play, the superheroes supported the use of renewable resources and the villains wasted energy. Another team rewrote a rap song with energy conservation tips. This nine-week unit integrated Project-Based lessons focused on collaboration, critical thinking, and inquiry. Some lessons pertained to researching skills, others to how to work together or how to persuade an audience with the words you choose. The purpose of the unit was to increase student engagement and motivation.

Research Design

The primary focus of this study was to explore the effect that the innovation of Project-Based Learning (PBL) has on student learning in a third grade classroom. In order to better understand the effects of the innovation, I conducted a case study in which ethnographic methods and data collection tools were utilized. Ethnographic methods are beneficial when studying the shared patterns of a group of individuals. The researcher describes and interprets the shared and learned patterns of behavior, values, and beliefs experienced by participants. The researcher relies heavily on the observation of and the dialogue with the participants to better understand the group's experiences (Creswell, 2013). Ethnographic methods were chosen because of their capacity to provide a better

understanding of a component of a culture-sharing group (Savin-Baden & Howell Major, 2013). The third grade students in this study are taking part in the shared experience and culture of Project-Based Learning (PBL). In-depth observation, interviews, and the use of student artifacts allowed me to better understand how the students encountered and depicted PBL. This case study was used to answer the following research questions:

1. In what ways does Project-Based Learning facilitate the development of student engagement?
2. How does Project-Based Learning change student motivation over time?
3. How do students (in a third grade classroom) interact with their teachers and their peers in a Project-Based Learning environment?
4. Within the Project-Based Learning community, what practices do students employ to construct learning?

Positionality, Participants, and Setting

This section addresses the unique positionality I, as the researcher, have in this study and looks at the setting in which this case study took place.

Positionality

My positionality played an important role in the implementation of this innovation, the collection of data, and most importantly the data analysis process. Having the dual role of teacher and researcher was both a powerful tool and a difficult challenge. As the students' teacher, I have a deep understanding of their background, their strengths and weaknesses, and the ability to recognize the significance behind what they say and do. This deep understanding and the relationship developed in the first two months of school allowed me to quickly create a comfortable environment where students could

share their thinking and attitudes more freely. In addition, it allowed me a unique lens and perspective when analyzing and coding data collected.

On the reverse side, the relationship developed with third graders is often one where they want nothing more than to “please” their teacher. . It is possible that this inhibited honest feedback during interviews and student reflections or contrived behavior during observations. In order to decrease the likelihood of false representation, I will constantly and consistently emphasized the importance of honesty and reminded the students of the purpose of the research being conducted. Additionally, there were no grades associated with their reflections and I informed the students that their names were not attached to anything they said or did.

My positionality played a particularly significant role in the data analysis process. The role of engagement and motivation in student learning plays a significant role in my life. I want students to love learning and I want nothing more than to create an environment that fosters that. Therefore it was challenging to balance the fierceness and defensiveness associated with a passionate teacher with the evidenced-focused lens of a researcher. In order to address the challenge of being a teacher and researcher, I blended the roles and looked at each experience as data to be collected and processed. The data analysis tool of grounded theory (GT) allowed me to link codes together in an impartial way. Instead of solely applying the thinking of engagement and motivation directly to the data collected; GT will allow these ideas to sift to the surface from the ground up by starting with the data instead of the theory.

Also it is important to note that PBL is very different than the more traditional teaching routes I have been exposed to and learned about in the past. It transforms the

teacher from the sole carrier of knowledge and learning to a co-learner with her students. It requires the relinquishment of some control and the ability to allow students to play a role in determining their learning path. This transition was difficult and required constant self-awareness and constant reflection in order to ensure that student-choice and freedom were evident throughout the innovation. In order to address this concern, field notes were focused both on my observation of student interactions and learning but also on the structure and content of the innovation itself.

Finally, it is important to recognize that I am very different than most of the third graders I instruct. I am a middle-class, Caucasian woman who has traveled all around the world, visited countless states, and had many world experiences. My students are predominantly low-income and most are students of color who may have limited exposure to the world outside of their neighborhood or city. A vast majority of my students are from Mexican-American families and each family invests time and energy in what they value most. These differences are important because both my innovation and the data collection and analysis process are centered on engaging students in the learning process. It was important that I remain open to the fact that what motivates or excites me, as an individual, may be different than what motivates them, as students in this community.

Participants and Setting

Students. The participants in this study will be my third graders in the 2015-2016 school year at Wilson Elementary. Wilson is a Title I school located in the Granada Elementary School District. The school is comprised of 84% Latino students and 10% African American students. Additionally, 37% of students are English Language Learners

(ELL) and 97% of students qualify for reduced or free lunches. Participants in this study included gifted students and reclassified ELL students.

Role of the researcher. I was the students' general education teacher and I was the implementer of the innovation. I have been a third grade teacher at Wilson Elementary for nine years as an instructor in math, reading, writing, and science on a daily basis. I worked with all of the student participants for the entire day and taught all lessons using the Common Core standards. I had complete autonomy over how the lessons were structured and taught as long as they were based on the standards.

Data Collection Tools

In this qualitative study I utilized a number of instruments to gather data necessary to address the research questions driving this study. Description of and the procedures for classroom observations, student interviews, artifacts, and a researcher's journal are addressed. To see a calendar of all of the data collections tools used, see Appendix B.

Classroom Lesson Observations

Video and audio. During the course of the Project-Based Learning innovation, opportunities for cooperative learning were intentionally included in every lesson. I chose a table group of six students, comprised of mixed ability levels based on reading assessment scores. The group was randomly selected from the five classroom table groups using an internet-based random number generator. During six and lessons, videoed and audio-recorded the table group's work together. The PBL unit took place over a span of six weeks; data were gathered during seven of these weeks. Each week, one lesson was videoed and audio recorded. On average, lessons ran between 45 and 75

minutes. In order to ensure that a variety of lesson types were recorded, video and audio recordings were done during every Wednesday lesson. Lessons included introductory lessons sessions, and final-project work sessions. This variety of lesson structures allowed me to gather data throughout the PBL process. Plano Clark and Creswell (2010) defined observation as “the process of gathering open-handed, first handed information by observing people and places at a research site” (p. 261). My purpose for using this data tool was to explore the students’ interactions, both physical and verbal, when the teacher was not around, or around less frequently. Student engagement and the learning environment are best explored through uninterrupted student interactions with their peers. As the researcher, I was a participant observer because I actively engaged with students throughout the learning process (Plano Clark & Creswell, 2010).

Video and audio recording were both used in order to ensure that all student interactions were recorded. The camera was set up in a way that captured all movement in the group. The microphone was placed in the center of the group. This data tool aligns well with ethnographic methods and supported the exploration of learning in the PBL culture because it allowed for rich descriptions and experiences. Full dialogue was captured versus just what the researcher could remember.

Field notes. In addition to audio and visual recording, I took extensive field notes following two lessons weekly for the duration of the PBL unit. These notes were semi-structured as I was guided by my research questions during the data collection process. I wrote notes using Microsoft Word and created a single document for all field notes. Each field note was titled with the date and the lesson objective. Notes were taken about my personal interactions with the students, their behaviors, and my observations

and thoughts as the innovation unfolded. In order to ensure that my field notes were as descriptive and detailed as possible, I utilized a number of writing techniques. As a participant in the innovation, I was unable to jot notes during the daily lessons themselves. However, immediately following the PBL lessons I composed notes or ideas that I then expanded later that day. These notes pertained to individual students, events, or snippets of dialogue I know were foundational in capturing the day's experiences. Additionally I used a hand-held audio recorder to capture student and teacher dialogue throughout the lessons. During the lessons, I would leave the audio recorder out when I was working with a group of students or students were partner sharing. This allowed me to capture rich and detailed quotes from students. Moreover it helped me expand on the notes I took after the lessons.

At the end of each field note day I spent an extensive amount of time writing the field notes. The central purpose of ethnographic field notes is to “portray a social world and its people” (Emerson, Fretz, & Shaw, 1995, p. 57). In order to do this, I focused my field notes on description, dialogue, and characterization. Description is the use of concrete sensory details to describe the setting, the people, and the events. The intention is to create a visual image for the reader. Description was particularly important in this study because the research questions focus on student engagement and interactions with peers and the teacher. I described the physical and verbal interactions I witnessed between students and groups. Additionally I described the physical and verbal interactions between the students and myself. Visual and audio recordings were focused on a single group; field notes were required to capture the bigger picture and significant events beyond the camera's lens. Furthermore as discussed above, dialogue was captured

using a hand-held audio recorder. This allowed student interactions and responses to the new learning to be captured in a more authentic way. Finally, care was taken to depict the characterization of the students in the study. Characterization is intended to capture a participant's personality beyond the obvious details of physical dress or appearance. My field notes strived to portray students' personality through their gestures, facial expressions, the way they talked, and how they acted (Emerson et al., 1995). Using these strategies my field notes better captured the PBL lessons and allowed me to answer the research questions guiding this study.

Interviews. Three students were interviewed using a semi-structured one-on-one frame. I interviewed each student alone away from distractions, such as other students or teachers. Students were interviewed during the school day. I worked with other teachers to cover the classroom while I pulled students for interviews or pulled students during times that all other students were working on a separate task. The same students were interviewed three times during the PBL unit for approximately 10-20 minutes each time. The interviews were conducted in the second week, the fourth week, and in the seventh week of the PBL unit. Some additional students were interviewed in the seventh week in order to get a better picture of the innovation as a whole. The interview lengths were less than other ethnographic interviews because the students are only 8 or 9 years old and are less able to engage in meaningful conversation for long periods of time. Each interview was audio recorded using a hand-held audio recorder in order to ensure complete and accurate transcription.

In order to represent the full range of student ability, students were grouped into three groups based on reading fluency data: above proficient, proficient, and below

proficient. It should be noted that this level does not represent the student's success in all learning or engagement in the learning process. This was one measurement of student success and was not intended to label the students. These groups were used to ensure that a variety of learners were selected without bias. One student from each group was randomly selected for the series of interviews using an online random name generator. The students were given the opportunity to accept or decline being interviewed.

Interview questions were designed to gather information on PBL's influence on the learning environment and classroom culture as well as its influence on student engagement and motivation in learning. Questions encouraged students to describe their thoughts, experiences, and feelings about the PBL unit. One example question asked, "What has it been like participating in the Reducing Waste Unit?" See Appendix C for a complete list of questions. Both the students' answers and the students' interactions with the researcher were used to answer the research questions guiding this study. Each interview involved the same questions, but as the researcher I used my discretion to decide how to best prompt the student to share their observations and insights.

Additionally, questions were added when deemed necessary. For example during the fourth week of the innovation I noticed that students were starting to feel more confident in their knowledge. I had noted some changes in my researcher journal. This prompted me to add a question to the week four and week seven interview: "Do you feel like an expert?" This allowed me to get a better understanding of how students perceived themselves during the unit.

Artifacts

Throughout the seven weeks of data collection, students maintained a journal of reflection. The reflective notebook was written in once a week. Students were asked questions to help them reflect about the content, the learning process, and their experiences within the PBL unit. Students were asked guiding questions that were designed based on the research questions. See Table 1 for a list of four reflection questions and the research question they correlate to. A time limit was set due to the limitations of classroom schedules but there was no page minimum or maximum in order to allow students to freely share their thinking. I collected the notebooks twice during the study, once at three weeks in order to ensure that the reflective notebooks were being used and that reflective thinking was being captured and finally at the end of the study for analysis.

Table 1

Artifact Questions Correlated to Research Questions

Research Question	Question asked in students journals
RQ1: In what ways does project-based learning facilitate the development of student engagement?	<ul style="list-style-type: none">• What do you enjoy most about learning about reducing waste?• What do you hope we do more of during our reducing waste project?
RQ2: How does project-based learning change student motivation over time?	<ul style="list-style-type: none">• Do you think our reducing waste project is important? Why do you think it is or is not important?
RQ4: Within the project-based learning community, what practices do students employ to construct learning?	<ul style="list-style-type: none">• Do you understand the three R's better? What have we done in class that has helped you understand them better?

Researcher Journal

Throughout the research process I kept detailed notes about the data collection, initial coding, and innovation in a researcher's journal. This allowed me to constantly reflect on the research process and document any changes made during the innovation. Additionally initial codes were documented and decisions made in terms of field note focus or changes made in how video observations were taken, uploaded, or coded. This journal played an essential role in the analysis of data, conclusion, and validity discussions.

Data Analysis

Data Preparation

In order to prepare for the data analysis process, data were collected and stored in an organized way. Observations included a single file with both audio and video. Files were uploaded weekly and saved as the date they were collected. They were saved on a hard drive and external drive. To begin the data analysis process, I uploaded the video to a program called HyperTRANSCRIBE. This allowed me to pause and play the video using simple keys on the keyboard. For each video, I created a log that captured video in approximately five-minute chunks. I used time stamps through HyperTRANSCRIBE to keep track of time within the lesson. I played most of the video without stopping, taking anecdotal notes of student dialogue and physical actions. I stopped and replayed sections of the video that involved student-to-student interaction or teacher-to-student interactions. These interactions were transcribed verbatim. I created this document in Microsoft Word and added to it with each new observation. Each additional chunk was labeled with the name of the video file and the date it was collected. All parts of the logs were coded and

used during analysis (Derry et al., 2010). See Table 2 for an overview of data collection tools and analysis methods aligned to the research questions guiding this study. All data collected were analyzed using first and second round coding.

Table 2

Research Questions, Data Collection Tools, and Analysis Methods

Research Question	Data Collected to Answer Research Question
RQ1 In what ways does project-based learning facilitate the development of student engagement?	<ul style="list-style-type: none"> • Video observations • Field notes • Student interviews • Artifacts
RQ2 How does project-based learning change student motivation over time?	<ul style="list-style-type: none"> • Video observations • Field notes • Student interviews • Artifacts
RQ3 How do students (in a third grade classroom) interact with their teachers and their peers in a Project-Based Learning environment?	<ul style="list-style-type: none"> • Video observations • Field notes • Student interviews
RQ4 Within the project-based learning community, what practices do students employ to construct learning?	<ul style="list-style-type: none"> • Video observations • Field notes • Student interviews • Artifacts

Coding

Video, interview, and field note transcripts were gathered and uploaded to a coding program called HyperRESEARCH. Table 3 shows the richness of this data set.

Table 3

Description of Qualitative Data Sources

Data Source	Word Count
Video observations transcription	11,904
Extended field notes	30,189
Student interview transcription	3,596
Researcher journal	2,304
Total word count	47,993

Transcripts were coded individually in multiple phases. First-round codes were determined using both inductive and deductive methods. It was impossible to separate myself from the theory and research questions guiding this study. As such, I knew I wanted to look for student behavior and dialogue associated with student motivation using a more deductive approach. Competence and autonomy are two elements related to motivation. These became predetermined codes and were coded as “student confidence” and “teacher provides choice.” Additionally, some of the most salient codes were those related to engagement. As discussed previously, engagement comes in many forms, including behavioral and cognitive (Pekrun & Linnenbrink-Garcia, 2012). For the purpose of analysis, behavioral engagement was coded when students were physically engaged as “participation.” This took the form of students volunteering to share their ideas or answer questions in front of the group. Cognitive engagement was coded when students were engaged in on-topic conversations with one another or when their response to a question demonstrates that they are actively listening and utilizing information

presented or discovered in the lessons. These were coded as “student references new learning” and “students share ideas.”

In first-round coding, I was also informed by an indicative, grounded theory approach (Charmaz, 2006). I read through all transcripts a single time before beginning coding. As I read through transcripts, I jotted down codes that best represented the data. Initially I had approximately 155 codes. I then went through these codes and grouped them in order to create 35 codes. These 35 codes were then added to the three predetermined codes above to form my codebook with a total of 38 codes. All data from transcripts were coded using these 38 codes. See Appendix D for a complete list of codes used. Additionally I noticed that the codes could be organized into three main categories of codes: student individual codes, student-to-student interaction codes, teacher-to-student interaction codes. I considered these categories as I began looking through transcripts.

Upon completion of first-round coding, codes were grouped together into themes. I looked for codes that were related or described similar occurrences. During this stage, the goal was to reassemble the information gathered during first-round coding in order to better understand the data collected. Codes from first-found coding were organized into categories called themes. These codes then became subcategories, which I will refer to as theme-related components. These themes and theme-related components were analyzed to better understand what happened in the research process. Through this analysis, I worked to describe the students’ interactions and determine an interpretation that answers the guiding research questions. Eleven themes were determined: Participation, beyond the classroom, struggle, students co-create meaning, transfer new learning, clarify directions,

teacher role, teacher models thinking, teacher structures learning time, students work together as a team, and student thinking. I then analyzed these themes to determine the central assertions or findings from the data collected (Wetzel, Buss, Foulger, & Lindsey, 2014).

Assertions were determined in two ways. One of the central assertions in this research study was determined using a deductive approach. In each of my researcher journal entries I noted my thoughts about the innovation and my observations of the data I was collecting. During this time, I noticed some trends related to participation. These trends were revisited during the coding process. One assertion, discussed in Chapter 4, was written based on these observations. In order to “test the evidentiary warrant” of this assertion I went through all of the data collected and gathered confirming and disconfirming evidence (Erickson, 1986). Once evidence had been collected, I looked through the disconfirming evidence and modified the assertion so that it would include the disconfirming evidence. After a couple cycles of revision, the assertion was complete.

The other three assertions found in this research study were developed using a more inductive approach. The themes discussed above were grouped together to help explain behaviors or patterns observed in the data. These groupings were then used to form an assertion (Wetzel et al., 2014). In order to ensure credibility of the assertions, I revisited the data and pulled confirming and disconfirming evidence. Similar to the deductive approach discussed above, disconfirming evidence was considered and assertions were altered to minimize the amount of disconfirming evidence. All analysis was done in a reflective, process-driven way. All steps were documented and evidence collected was saved in order to support credibility. It should be recognized that there are

other valid ways of interpreting the data found. These assertions will be further discussed in Chapter 4.

Trustworthiness

In order to ensure validity, trustworthiness, and credibility of the results found in this qualitative study, a number of validity strategies were applied. First, multiple data gathering methods were utilized in this research study. These methods are complimentary to one another and were combined to identify themes and codes to better understand students' experiences with PBL. This is a form of triangulation (Meijer, Verloop, & Beijaard, 2002). Themes were established utilizing data from multiple data sources, observation, artifacts, and interviews, and from the perspective of multiple participants (Creswell, 2013). When analyzed together, the data allowed me as the researcher to answer the research questions. Additionally, in order to increase internal validity, a procedural approach was taken. All data analysis steps were documented so that readers could understand the approaches taken.

In alignment with the ethnographic approach being used in this study, rich, thick descriptions from field notes and interviews were used to show and support results found in the study (Emerson et al., 1995). This ensured results were valid and well supported. Additionally the positionality of myself, the researcher, was discussed throughout the data analysis and results sections. By recognizing possible bias I was able to create "an open and honest narrative" that assisted in validating results found in the study (Creswell, 2013). Finally, a form of member checking was used. Parts of the findings, particularly possible themes identified, were presented to students interviewed in the study. For example I added a question pertaining to feeling like an expert to the questions asked of

students in the interviews for week four and week seven. This question was added based on observations I had made in my researcher's journal. Students had the opportunity to agree with or refute possible findings in order to ensure an accurate portrayal of their experiences (Creswell, 2013). By utilizing the qualitative validity methods of triangulation, rich description, recognition of bias, and member checking I ensured that results presented are accurate and trustworthy.

Findings

In order to explore the impact a Project-Based Learning environment has on student engagement and motivation over time, I implemented a Project-Based Learning unit in my classroom. I collected data through multiple qualitative methods, and analyzed the data through a series of reflective cycles. Video observations and field notes were used to better understand the way students interacted with one another and with myself in a Project-Based Learning environment. In addition to the observations, interviews with students and artifacts collected from student journals showed how students were constructing meaning, which allowed me to better understand the students' thoughts and feelings about the project. This research was guided by a series of research questions. I wanted to know how Project-Based Learning facilitated the development of engagement and how it changed student motivation over time. Also, I was interested in better understanding how students interacted with their peers and with their teacher in a Project-Based Learning environment and what practices they employed to construct learning. Collectively the following sections address the findings for these research questions. In table 4 I demonstrate the relationship between the themes, theme-related components, and the four assertions found in this study. As discussed in chapter 3, these assertions

were found using deductive and inductive methods. The first assertion in the table was found using a deductive approach and the other three assertions were found using an inductive approach.

Table 4

Themes, Theme-Related Components, Assertions

Theme	Theme-Related Component	Assertion
Participation	<ul style="list-style-type: none"> • Students participated in activities • Students demonstrated confidence • Students were considered or considered themselves experts • Students took on the role of leader 	As students develop background, their competence and confidence in their thinking increases. With this increase comes an increase in participation. This change happened both within lessons and across the unit as a whole.
Beyond the Classroom	<ul style="list-style-type: none"> • Students apply learning at home • Students feel learning is significant • Teacher discusses the importance of the new learning • Students apply learning at school 	Students apply learning outside of the designated learning time, often in their home or school. This application beyond the classroom demonstrates a motivation to use the new learning in their lives.
The Struggle	<ul style="list-style-type: none"> • Students struggle with understanding • Students argue or disagree • Students struggle with working together as a team 	Learning in a Project-Based Learning environment is messy; students struggle to grasp the new learning and how to successfully work together as a team. Through this struggle, students create meaning as they learn from one another, clarify, and expand on each other's ideas.
Students Co-Create Meaning	<ul style="list-style-type: none"> • Students negotiate meaning • Students expand on ideas 	
Transfer Learning	<ul style="list-style-type: none"> • Students repeat ideas • Students learn from each other • Students share out with peers 	
Clarify Directions	<ul style="list-style-type: none"> • Students ask each other questions • Students provide academic and team-related feedback 	

Table 4 continued on next page

Table 4 (continued)

Themes, Theme-Related Components, Assertions

Theme	Theme-Related Component	Assertion
Teacher Role	<ul style="list-style-type: none"> Teacher clarifies student thinking using specific feedback Teacher asks students guiding questions to shift student thinking 	Teacher structures learning for students through partner work and group work. This structure creates a foundation for student thinking to develop. Both procedural and academic mistakes are then “fixed” preemptively through modeling and reactively through questioning and clarifying statements.
Teacher Models	<ul style="list-style-type: none"> Teacher models strategies or new learning for the students Students learn new information from the teacher 	
Teacher Structures Learning	<ul style="list-style-type: none"> Teacher structures whole group instruction Teacher utilizes a teaching strategy to direct student learning 	
Students Work as a Team	<ul style="list-style-type: none"> Students learn from resources Teams use strategies to work together Students assign roles Students reference teamwork 	
Student Thinking	<ul style="list-style-type: none"> Students develop an inference or make a connection Students refer to new learning 	

An Increase in Competence and Participation

Initially in the Project-Based Learning unit, many students hesitated to share ideas or actively participate in daily lessons. As I looked more closely at the data, I realized that the hesitancy seemed to be rooted in a lack of confidence. Data associated with this concept were labeled as “students participate in class and group activities.” The structure of the lessons placed more ownership on the students and the content required an extensive vocabulary, both uncomfortable changes to daily routine. However this trend in

participation changed as the unit progressed. As students developed a background on reducing waste, their understanding of the content increased along their confidence. New theme-related components were developed: Students demonstrate confidence in group work and individual thinking; students were considered or considered themselves as experts; and students took on the role of leader or teacher. These theme-related components came together to form the themes of participation. Students began to participate more actively and vigorously in daily lessons. By the end, fewer students hesitated to share their ideas or express their views to their peers or outside sources. As demonstrated in Table 4, this assertion was driven by the theme of “participation.”

The increase in participation was noted across the seven-week research cycle but was also noted within single lessons. During the first week of instruction, students were conducting research on the three R’s: reducing, reusing, and recycling. Students learned how to research using a method called read-cover-write where students would read a couple lines of text, cover the text with their hand, ask themselves what they had learned, and then write down relevant facts. After 10 minutes or so of practice, students came back together to share out new learning. At the beginning of the lesson, I called the class together to discuss what they had learned. When asked to share, only six students raised their hands. One student shared some information about the recycling of glass. The student noted that “glass could be sorted” and another student added that it was then “shipped to companies.” This brought up a discussion about how researchers often use captions, tables, and graphics to better understand new content. The information the students had mentioned was explained in a simpler way in a graphic on the page. Groups

were sent back to continue their research. During this second chunk of work time, I noted the following in my field notes:

There is a louder buzz in the classroom as students work and talk to one another. Students seem more confident this time. I walked up to Valentina and asked her what she had learned about recycling. While looking at a graphic of a playhouse with a caption beneath it, she replied that milk bottles get recycled and make new things. I told her that was an interesting fact but asked if she could make it more specific. She kept reading and found that it made playhouses. She was smiling broadly, clearly impressed with her research skills. (Field notes, Week 1)

At the end of the research time, students came back together. More hands reached into the air to share their ideas, most notably Valentina, who could not wait to share her new learning about recycled plastic. Students needed time to apply their new learning in order to develop a better understanding. Once they understood one or two ideas clearly, they continued to develop ideas more quickly. Their understanding of recycling increased, which enabled them to make additional connections.

As the unit progressed, students had the opportunity to apply new skills multiple times. Research, using the read-cover-write strategy is a difficult skill for third graders to grasp. In an interview during the second week of the unit, Aileen was asked what she enjoyed least about the unit or what was most difficult. Aileen responded that it was difficult “to get down some ideas from the book cause sometimes I kinda copy.” Aileen and other students continued to practice and refine this skill. Research is one of the cornerstones of Project-Based Learning. In the fourth week, Aileen was interviewed again. When asked if she felt like an expert she replied,

Yes it’s like now I cover it [the text] and I can restate and use my own words now. I can try to get some stuff by myself like I don’t need help from my friends anymore. I can use this sentence without using any words from the real sentence. It’s been really fun learning about more and more things, like how we can recycle cans, juice boxes, and plastic by putting them in the blue bins. (Interview, Week 4)

Later in the interview I asked her what was most difficult or what she enjoyed the least. She replied, “I think the most difficult thing is like when people have trash cans. Never mind, I don’t think anything is difficult.” Aileen was referring to the use of trash cans in place of recycling bins on our campus. This change in thinking demonstrates how skills that were difficult became easier as the unit progressed. This resulted in an increase in student confidence. Aileen explained that she did not need help from her peers and did not need to copy the author in order to understand new facts that she found.

It is important to note that students did not just become more confident throughout the unit; they became more competent (Gagné & Deci, 2005). Their ideas were stronger and better rooted in a thorough understanding of content. During the fourth week of the Project-Based Learning Unit, I wanted to help students understand that they were becoming experts. We were preparing to interview an employee of the city of Granada who worked with recycling. Additionally we were beginning to develop our solutions to the waste problem on campus; this marked an important shift from researchers to practitioners. I put three topics on the board and set a two-minute timer. Students were assigned a topic and asked to speak about the topic with their elbow partner, the person in the desk next to them. Aaron was assigned the topic of recycling. When the timer began, he said,

We waste like, um, sometimes we waste like breakfast stuff. We waste food and breakfast materials but the good thing is that we are noticing that we’re doing this stuff so we are fixing it by recycling materials such as our juice boxes . . . and the plates. (Audio recording, Week 4)

His elbow partner steps in and says, “Wait, remember we don’t recycle the plates, we just reuse them,” to which Aaron replied by saying, “Oh, yeah, yeah, but we are recycling the

plates at lunch too.” Another pair of students was assigned the same question. Jose shared the following with his partner:

I noticed there are a lot of things that can be recycled but no one recycles them but maybe sometimes because they are too tired but in our class some people in our class have been like looking under the plates and seeing what number it is to recycle so that’s why we’re helping.

These two responses demonstrate competence and confidence. Students do not hesitate to discuss their new learning. They understand the topic of recycling and are able to organize the information and share it with their peers. Furthermore, their ideas showed that they understood the application of recycling. Students referenced looking for the recycling symbol to indicate whether something was recyclable and noted the ways students in their class were already applying their new learning.

My research showed that as students gained new learning they demonstrated competence not only in their speech but also in their actions. At the beginning of the unit as discussed in the beginning of this chapter, they hesitated to raise their hands in the classroom to share their new learning. After a couple weeks of researching related topics, they felt comfortable sharing their learning with others and in some cases gave advice to adults in their lives.

During the fourth week of the Project Based-Learning unit, I noted a series of events in my field notes that happened over the span of a couple days. Ms. Garcia, a school employee who works with the students at recess, mentioned that many of the students had been discussing recycling in the cafeteria. She asked if I had reached out to the cafeteria staff about getting recycling bins for the cafeteria. The same day a second grade teacher approached me and complimented two of my students whom she worked with in the morning. “Two of your students, Aileen and Leticia, were teaching me about

fossil fuels this morning. They were sounding really smart” (Field notes, Week 4).

Another teacher the same week sought me out during prep. She was a third grade teacher and explained that one of my students, Nicole, had seen her carrying a box of plastic water bottles. Nicole told her that she should get her students reusable plastic water bottles so they could be used again and again. These examples demonstrated that students felt confident enough to not only discuss their new learning with teachers but to also give teachers advice. They understood the material, and this understanding revealed itself in an increase in participation and competence.

It is important to recognize that not all evidence confirmed this finding. Early in the fourth week of the study, the students were studying different sources of energy. The students had just completed group research and had come back together to share out their thinking. I asked students, “Which energy source do you think we use the most of?” and they replied “nuclear” (Audio recording, Week 4). I continued to ask them questions but noticed that

very few students raise their hands. . . . You can tell they hesitate to share their ideas. Some of the students are doing off-task student behavior. For example, two students play in their desk. A couple of students lean on their desk in a way that shows they are disinterested. Their head is leaning on their arm or they are leaning forward. (Extended field notes, Week 4)

This example demonstrates that although participation increased in most lessons, there were some exceptions. Examples of increased participation heavily outweighed examples such as the one above.

Students Create Meaning Together

This research project was designed to determine how students were interacting in a Project-Based Learning environment and how they were constructing new knowledge.

At first glance, field notes and video transcriptions seemed full of seemingly off-task behavior. Students would argue or disagree. Ideas were often ignored or incomplete. These interactions and the codes associated with them were labeled as the theme “The struggle.” After careful analysis the research showed that learning in a Project-Based Learning environment is messy. There is difficult vocabulary, new learning strategies, and more rigorous expectations. Students struggled to grasp the new learnings and how to successfully work together as a team. However, this struggle was essential in their learning process. Through this struggle, students created meaning as they learned from one another, clarified, and expanded on each other’s ideas. These students behaviors formed the themes of “Student co-create meaning,” “Transfer new learning,” and “Clarify directions.” Together these themes demonstrated how students struggled together in order to co-construct new learning in a Project-Based Learning environment. Table 4 further demonstrates these connections.

This struggle appeared frequently when students would be asked to work together in pairs or teams. During the first lesson of the Project-Based Learning unit, students were asked to do a walk-around with their teammates. Around the room, posters were hung with pictures that captured the essential ideas of the problems being addressed in the unit. For example there was a picture of a refrigerator being left open, trash on the ground, a recycling center, a car run by electricity, windmills, and other images that addressed reducing waste. Students were given time at each station to add to a collective ICW chart. The chart allowed students to note impressions using the phrase “I notice . . . ,” make connections using the phrase “I can connect this to,” or to ask

questions using the phrase “I wonder . . .” During this time, students struggled with how to work together as a group. In my field notes I wrote the following:

Natalie, Haley, Emiliano, and Yessenia were working in a group. All four students were forming a line. When Emiliano tried to approach the poster the other students [Yessenia and Haley] got upset and told him to get back in line. (Field notes, Week 1)

Students interpreted taking turns as working independently and therefore wanted to stand in line. Instead I wanted students to listen to one another’s ideas. After observing this interaction, I stepped in and discussed how when you are working as a team you want to hear everyone’s ideas and be an active participant the entire time. I suggested standing around the poster in a semi-circle, which would allow everyone to be a part of the learning.

Group work was a struggle throughout the innovation. During Week 2, students were working with their elbow partner in stations pulling out facts about recycling, reusing, and reducing. Nicole and her partner Earnest were working together:

Nicole seemed really frustrated. She got my attention and explained that she was reading out loud to her partner. “I keep reading and rereading to my partner and then I cover it up and I ask him what he learned.” I asked if what he was saying didn’t make sense. She said, ‘No I think he’s using it from his schema because the article didn’t say it.’ Earnest said it was hard to remember everything that was read. (Audio recording, Week 2)

The student Earnest was relying on what his partner called *schema*. This is a term we learned earlier in the year to describe information we already know or the things we have experienced in our lives. This struggle to work together as a team and the struggle to pull meaningful information from the text was repeated over and over again in the research. Students had to learn both social and academic skills and at first both were very difficult.

This type of struggle resulted in some arguments between students. In Week 5 of the unit, students were working in their solution-committees. Each committee member had self-selected to work on a reducing waste project was that most aligned to their skills and interests. One group chose to write a rap about reducing energy use on campus. Teams made small, manageable goals with me and then worked on the goal together. When they finished a goal, they would meet with me again to set their next goal. The rap group had been assigned to write their hook and prehook, the parts of the rap song that are repeated multiple times. They were rewriting the words to the popular rap song “Watch Me” by Silento. The group sat down to meet with me but there was clearly a problem:

Yessenia: Haley didn’t want to help with the group (As she sits on the carpet. The rest of the students joined us and gathered around the red board.)

Yessenia: Our song is really good.

Teacher: Now, what is the problem that we need to talk about? Haley is there a problem?

(Haley remains silent.)

Yessenia: There was already a group of three to do the hook and Juan was stuck doing all the work by himself.

Grace: Haley wouldn’t help Juan.

Teacher: How were the groups decided? Was it in a fair way?

Yessenia: Yeah, we voted.

Jose: Yeah

Juan: Everyone wanted to be on that side so I just decided to be on the other.

Teacher: Okay, that’s what I figured. Juan, first, thank you. It’s hard to work in a group and it’s hard to split up work. Haley, I understand that the way that the groups were decided wasn’t fair. I hear that. Let’s talk about a more fair way to select groups in the future. (The conversation continues as the

teacher names multiple strategies students can use.) Why is that a more fair way than everyone yelling at each other?

Haley: Because everyone gets a turn. (Video Transcription, Week 5)

During this conversation, I asked for ideas about ways to determine group roles more fairly. I also modeled a process where each role is written on a piece of paper and then roles are randomly selected. Arguments or disagreements were a frequent occurrence in groups. Students needed help and training on how to communicate their thinking with one another and work out disagreements.

While working together students would frequently clarify thinking or group directions by asking one another questions or by giving feedback to their peers. This became an important part of the learning process in the classroom. During Week 3, students were researching renewable and nonrenewable energy sources. One student from each table was assigned a particular source; their job was to become an expert on their energy source and then teach their tablemates about it later in the week. Students were asked to meet with the other students in the class studying their topic. All of the students researching nuclear energy gathered at the front of the classroom to share important facts. They organized their facts into a T-chart for benefits and drawbacks. In Week 4's field notes I observed an interaction with the nuclear group.

Yessenia: Did you know that it takes thousands of year for nuclear to—

A Student: —to what?

Aaron: No, to put it somewhere secure so it won't hurt people.

Phyu: Where does it go?

Aaron: It's a drawback dude if it gets out.

A Student: What did she say again?

Natalie: Isn't that positive?

Aaron: Yeah, but it takes thousands of years.

Yessenia: Put it in drawbacks because it's my idea and if it's my idea—it takes thousands of years to make it safe.

Aaron: Nuclear does not dirty the air— that's a benefit.

A Student: This is good. (Phyu starts to talk over the group.)

A Student: Let's not play around. It cleans the air.

Aaron: Really, it does.

Haley: Wait, I don't know what Phyu or Yessenia said.

Aaron: Clean the air.

Phyu: NOOOO, it's clean.

Yessenia: NO, he said nuclear is clean. It doesn't pollute. (Field note, Week 4)

This sharing of ideas demonstrated how students asked clarifying questions to help understand each other's ideas. In this example, an idea was shared and students worked together to determine if this was a benefit or a drawback. In addition, with Phyu's idea students worked together to clarify what *clean* meant. It took Yessenia to clarify that *clean* meant that it did not pollute the air, not that clean meant nuclear was not dirty. Students worked together using questions and feedback to understand and learn from one another.

Through the difficult process of working together, students transferred learning to each other. This transfer of information was often simple. When asked about what role other students played in her learning Aileen explained, "They [the other students] play like—sometimes they ask me what does this mean and I tell them what it means" (Student interview, Week 4). Answering the same question Yessenia stated, "I'm learning

from them because when Nicole said that you could recycle trays I didn't know that and then I started to do that" (Student interview, Week 7). This suggested that students learned from their peers and then applied that information in their own learning.

As students worked together through a series of *shared practices* they created meaning and understanding of the new content (Rogoff et al., 1995). During their group work they clarified one another's thinking and expanded on each other's ideas. Revisiting the first lesson of the unit, a group of students stood around a picture of a refrigerator with the door opened. They were asked to make observations of the picture and ask questions about it. As discussed above, all of the pictures were a hint to the topic of our Project-Based Learning unit. At first the students' ideas were general and not related to the topic of study. One student said, "I notice an icemaker." Another said, "I notice there is soda." At this point I stepped in and asked why they thought I might have chosen this particular picture.

A student: I notice that the door is open.

Dylan: I notice that they are wasting food because they have way more food than they need in there.

A student: They are also wasting electricity because the door is open. (Audio recording, Week 1)

Notice that the moment the first student mentions the detail about the opened door, the dialogue and discussion become richer. By the end of the exchange, students were discussing the waste of food and the waste of energy. This was an important observation because the driving question of the unit asked, "How can students reduce waste at Wilson Elementary?" Students worked together to make observations of the refrigerator. They

added on and expanded on each other's ideas thus making the new learning more meaningful.

In another lesson, students worked in pairs to categorize a list of ideas. The class brainstormed a list of negative waste behaviors that happened on the campus. Ideas included things like leaving the lights on, throwing juice boxes in the trashcan, and not turning off computers. Students worked with partners to look at all of their brainstormed ideas and group them with similar ideas. Once they had grouped ideas together, they assigned each group a label. Haley and Zola worked together:

Haley: I'll put—I'll put computers and smart board like we did at the front.

Zola: Did Ms. Lund say *charger*?

Haley: Tablets, computer and—

Zola: —computers, chargers, and tablets.

Zola: They're all energy sources.

Haley: They're all technology.

Zola: They're all stuff our classroom uses. (The girls circled the items they discussed and labeled it as technology in the class.)

Haley: I'll put projector—look I'm putting projector and printer together because they are both connected to the computer.

Zola: (Makes a noise)

Hailey: Yes—because if you print, it comes from the computer.

Zola: Yeah, I guess they both come from the computer.

Haley: Both from computer. (She says out loud as she writes the label down.)

Zola: Yeah, they're connected to the computer. (Audio recording, Week 5)

Zola and Haley expanded on one another's ideas and negotiated meaning together. Where Zola noticed they were energy sources, Haley relabeled this as technology, and Zola

extended her thinking by noting that they were all in the classroom. This suggested that students constructed meaning together through the process of working together and expanding on each other's ideas. Though working together is difficult, the students struggled with constructing ideas as a team. This was an essential component of their learning process.

Although teams were most often successful in their endeavors, there were instances where teams were not able to work together to construct new meaning. The table randomly selected to be video recorded often struggled with coming together to share and generate ideas. During the fifth week of the research, students were brainstorming problems they had observed around campus in order to generate problem statements to guide the unit. One student would say an idea and then write it on a sticky note and place it in the middle of the table. Students at the recorded table engaged in the following conversation:

Antonio: What are you going to write?

Yessenia: Throwing away ripped books.

Another student: I'm doing that.

Jose: I know, I can hear you.

Yessenia: Stop, I said it first.

Juan: What—

Jose: She's bossy. She wants . . . (Extended field notes, Week 5)

In this example, students were clearly frustrated with one another. They were allowing their personal feelings to interfere with the new learning. Instead of listening to one another, they were busy insulting or interrupting one another. Although examples like

this were in the minority, it is important to recognize that not all goal-oriented group work resulted in a sharing or a construction of new learning.

The Teacher's Role in Constructing Knowledge

In this Project-Based Learning environment, I, as the teacher, played an essential role in enabling students to construct meaning. I worked to create a community of learners (Rogoff et al., 2003). I structured learning for students through partner work and group work using a number of different structures and learning strategies to help students work together and share ideas. These learning structures were represented in the following themes: "Teacher structures learning time" and "Students work together as a team." These structures created a foundation for student thinking to develop. The learning process was difficult, and as mentioned above, students struggled to work together and grasp new concepts. The student thinking being evident throughout group work formed the theme "Student thinking." It was my role, as the teacher, to address these concerns. In order to enable students to be successful, I modeled procedures and new learning skills. This modeling was labeled as "Teacher models thinking." During the learning time, I addressed misunderstandings or confusions with questions and clarifying statements, which formed the theme "Teacher role." Together these themes helped me better understand the role of the teacher in a Project-Based Learning Environment. As the teacher, I created the structures that enabled students to co-construct new learning and guided student thinking throughout the unit.

When a student would struggle, I would either ask that student a guiding question intended to help that student pull out important information or I would make a statement to clarify his or her thinking. During the first lesson of the unit, where students were

making observations about pictures around the room, one group of students surrounded a picture of wind turbines. The picture was chosen because it featured wind power energy. After a couple other students had shared, I overheard Diana saying, “I notice it is raining.” I stepped in and asked Diana if she thought that was the reason I chose the picture. I asked her, “Why do you think I chose this picture?” and “What do you think might be the most important part of the picture?” Diana replied, “The most important thing is most likely the white windmills” and after a couple seconds “I wondered if they ever turn off” (Audio recording, Week 1). Notice that one guiding question pushed Diana towards a deeper observation of the picture.

In another lesson, students were meeting with their energy source groups. All of the students studying solar energy were seated together on the carpet and were trying to decide which fact that they had shared was the most important fact. They would each bring this fact back to their table group. I walked up as Kevin was saying, “I think power plants is to the sun because it makes energy.” He was trying to explain that energy from solar goes to a power plant, where it is then transferred to homes. His idea was unclear and really did not help us understand solar power better. I waited for other students to respond and they did not. After a moment I stepped in:

Teacher: I disagree—boys and girls, you should not wait for me to say things. It doesn’t make sense. I agree that there are power plants . . . but ALL of the sources have energy that goes to power plants. (I draw a diagram on my paper to show where the power plant is in our chain—similar to our note-taking sheet). What makes solar special? What makes it different?

Daniela: It needs materials to work. It can’t just have the sun. It needs solar panels to make the electricity.

Teacher: I agree. Okay now discuss that idea. (Audio recording, Week 3)

In this example, I clarified the purpose for the group meeting together and then asked questions to guide students towards a more accurate response. This example and the previous example indicated that students constructed meaning often with the support of the teacher. Through clarifying statements and questions, I guided students towards a deeper understanding of the new learning.

Aileen summed up this finding well. When asked what role the teacher played in her learning, she said, “You ask us questions and we give you the answers and sometimes we get the answers when we answer the question” (Student interview, Week 2). This suggested that students often constructed their own meaning just by answering a teacher’s question.

In addition to asking questions and making clarifying statements, I structured the learning environment in a way that fostered student thinking and group interaction. The last two weeks of the Project-Based Learning unit, things were structured differently. Students worked in committees to reduce waste on campus. Each committee had a different objective and would regularly meet with me to set goals. In this form of *guided participation*, students needed to communicate and organize their actions together (Rogoff, 2008).

For example, one group was called the Green Team. This team decided they would write a recycling pledge, create posters, and design a presentation to teach students on campus how to recycle their breakfast waste. The Green Team was working on their second goal: design posters that teach students what can and cannot be recycled. They decided to split into two groups to design these posters. Aaron reflected on the experience:

[Making posters] was the first time we started working in groups of two and then we came up with the idea that sometimes we could work in groups of two so you could share ideas and like share ideas with new people and stuff like that. (Student interview, Week 7).

This group continued to divide future goals in this way. Students would work with different partners for each goal. This demonstrated how I, as the teacher, would set up a structure and then students would navigate that system together to create meaning.

Another reducing waste committee wrote a play about reducing energy use. They used super hero characters to teach students how to save energy at school. In an interview, Aileen was asked what was difficult about the unit:

Aileen: What's kind of difficult is when we work as a team because we kind of disagree and we have to decide whose job goes first and who's getting the job.

Teacher: How do you decide who gets what job?

Aileen: Well, Zola always says let's vote who wants to be the good guys and the bad guys and then if that didn't work she usually tested us to see who could get the most answers right.

Teacher: What is it, learning, like in this unit?

Aileen: It's like working as a team to try to figure out how to get kids to reduce and like waste less energy. (Student interview, Week 7)

Aileen reflected on how roles were assigned in her group. Students had to work together to determine who would do what to accomplish the goal. When she reflected on the learning experience as a whole, it was the group work that she pulled out. This suggested that group work played an essential role in the learning process.

As the teacher, I created these structures and discussed the importance of roles within a group. Daily I used group structures to better enable students to interact together. For example, we used Jot Thought whenever we needed to brainstorm ideas. In the Jot

Thought activity, a question is asked and students say their responses out loud, write them on a sticky notes, and then place the notes in the middle of the table. Each student shared their thoughts and added to the group brainstorming. During one lesson, I explained how I wanted students to use Jot Thought to brainstorm places on campus we would go to observe on the next day:

Tomorrow we are going to go around campus and look for examples of students conserving and examples of students wasting resources and energy at our school. I want you to think about this question: ‘Where will we need to observe in order to observe these things?’ You will start with the table captain. They will say their idea. Then they will—(students chorally say “write it” with the teacher). Then the next person at your table will go. (Audio recording, Week 4)

This sample demonstrated how I set up learning structures that fostered students sharing and hearing one another’s ideas. Students were able to think of more places to observe after hearing one another’s ideas.

In addition to structuring group work-time, I often structured partner interactions to promote higher-level thinking and foster student understanding. During a previous lesson, students had used Jot Thought as a team to brainstorm ways they saw people on campus wasting energy and resources. The day before students had made observations about positive and negative conservation behaviors around campus; each pair of students had been assigned a couple of classrooms or locations. After students used Jot Thought to brainstorm ways people were wasting energy and resources, I wanted them to organize their examples into a Venn diagram. Students were asked to sort their ideas into examples that were teacher-controlled, student-controlled, or controlled by both the teacher and student. This sorting helped us as we developed solutions to the problems we had witnessed. To explain I related the following to the students:

Okay, boys and girls, you are going to be categorizing the problems that you brainstormed into who has control over them. I modeled with juice boxes. I wrote it in the middle of the Venn diagram and explained, "It goes under both because even though students all drink the juice boxes I have control over the systems that my kids use and whether or not I ask them to recycle." I then pulled another sticky note from a table's Jot Thought. It said "document camera." I modeled putting it under teacher. "This is only the teacher because students are usually not allowed to touch the document camera." (Audio recording, Week 5)

This example demonstrated how I modeled the type of thinking and the structure that I wanted students to be using. This suggested that part of the role of the teacher is to set students up for success by modeling both the thought processes and the physical processes students are expected to use. This gave students the foundation they needed to successfully construct learning together and apply their new learning to our school.

Structure and teacher feedback played an important role in developing student thinking. However, in the nature of full disclosure, not all structures and teacher-to-student interactions resulted in shared learning or meaning making. During the second week of the research, students were beginning to research recycling. Students worked in pairs to read a text about the recycling process. Together their job was to pull out information that would answer a list of "I wonder statements" the class had generated earlier in the week. In one example, two students, Leticia and another student, were working together. Leticia had just finished reading a chunk of text:

Teacher: So what do we know? (The second student remains silent.)

Leticia: I know that we can recycle.

Teacher: That is not what the author said. They said that earlier in the text. It is okay to go back and reread something to better understand it. (We reread the text together out loud.)

Teacher: Leticia what did you learn?

Leticia: I learned that some bottles are the color of brown and green.

Teacher: But why is that important? We are learning about the process of recycling. Your new learning should be about the process. What do they do?

Leticia: Sort it.

Teacher: What do they sort?

Leticia: Brown—

Teacher: They sort glass. . . . That's the important part.

In this example I attempted multiple times to redirect Leticia through questioning.

However, even after rereading the text she still struggled with understanding the meaning in the research. In the end, I did the thinking for her. Although teacher questioning and group work were often helpful in the learning process, it was not always enough to help students learn difficult content.

Applying Learning Beyond the Daily Lessons

Students in a Project-Based Learning environment constructed new information during their daily learning block. The students then applied this learning outside of the designated learning time, often in their home or school. This data formed the theme “Beyond the classroom.” Table 4 further explores the theme-related components used to understand this theme. This application of new learning beyond the classroom demonstrated a motivation to use the new learning in their daily life. It also indicated that students understood that their learning was about the real world around them and was significant.

Students began to make connections between what they were learning during the one-hour Project-Based Learning block and their classroom, school, and home. Grace made the first major connection. When we were closing out our learning for the day, suddenly Grace flung her hand in the air:

Grace: I have a question. . . . Diana is eating a yogurt. Do you think it's recyclable? (Diana sits right in front of Grace and had just stood up to throw her plastic yogurt cup in the trashcan. The yogurt was in her hand.)

Teacher: Great question. We never went over this but there is often a number at the bottom of plastic that helps you decide if it can be recycled. Diana, let's look at it. (I took the yogurt from her hand and showed her the number 2 at the bottom with the symbol around it). Wow, Grace, yes it can!

Teacher: Wait a minute our yogurt cups can be—

Class: —recycled.

Teacher: Okay so we have been throwing them away but we cannot do that any more. . . . Should I put it in the recycle bin like this? [The yogurt cup was still full of left over yogurt with the thin aluminum cover.] What should Diana do so we can recycle it?

Dylan: Wash it.

Teacher: Wow, Grace, you have never said that to us before. What changed your thinking?

Grace: Because when you were talking about recycling I was looking at Diana and thinking if it could be recycled.

Teacher: Did Grace start the process of becoming an expert?

Students: Yes.

Teacher: When you know things it changes your behavior. This is where we are. This is where we are going (I moved my arms to demonstrate that we still have a lot of work to do). (Audio recording, Week 3)

Grace made a connection for herself and the other students that recycling was not just a topic we were learning; it was a real task they could apply in their own lives. After Grace's question and the discussion of the recycling symbol, recycling became a regular occurrence in our classroom. Within a couple of weeks, students were recycling at breakfast and lunch.

One afternoon I left the classroom to pick the students up from lunch, and I walked out to an army of recyclers. My line was full of black vegetable containers, milk cartons, trays, and a random applesauce container. Student after

student asked if they could go rinse their containers out. Juan—Grace—Diana—Earnest—Leticia—Daniela—Nicole—Antonio—more than usual. Some students like Earnest and Juan had collected recycling too. I had not seen these students do so before. Yessenia has a Styrofoam bowl in her hand: “Ms. Lund, this one doesn’t have the recycle symbol on it, but I think we can recycle it because it’s made of the same material as this” (she points to the tray). The tray has a recycle symbol with a number six in it on the bottom. I told her that it was really Styrofoam and if it didn’t have a symbol we probably couldn’t recycle it. We walked for a bit. . . . I spoke to a couple more students. . . . Yessenia got my attention again. “Ms. Lund, well I could always bring it home to my dog and reuse it as a hat for him.” I told her that is an excellent example of reuse. (Audio recording, Week 5)

The examples above demonstrated that students wanted to apply their new learning to the world around them. Grace’s questions led to a class discovery of the recycling symbol and its role in determining what can and cannot be recycled. Yessenia’s dialogue demonstrated the thinking students were going through. When Yessenia accepted that although the Styrofoam bowl looked like other recyclables it could not be recycled, she immediately started thinking of ways to reuse it. Yessenia believed that reducing waste was more than just a topic of learning in the classroom. It was important to her life.

Students applied the same concepts at home:

Eamont brought in a paper box from his home and asked if he could recycle it. He’s started bringing things from the lunchroom every day and each time he shows me he is always smiling. Today, I told his group that he was a recycling king and he smiled and blushed. Before he left today, he told me he had three more things at home that could be recycled and he was wondering if it was okay to bring them in. (Field notes, Week 7)

Eamont’s reaction to being called a recycling king and his eagerness to bring recycling from home demonstrated his pride and enjoyment in his new learning.

In an interview, one student, Valentina, was discussing the two bins outside her home. One bin was for recycling and one bin was for trash. When asked about her experience in the Project-Based Learning unit she replied that they were “like learning

about how much trash can be recycled.” When asked if she thought this was important she replied that “yeah, sometimes it gets mixed up and you don’t know where to put it but now when my mom tells me to take it outside I know where it goes” (Student interview, Week 4). These at-home examples suggested that students felt motivated by their learning. They wanted to and were able to apply their new learning in their homes.

In addition to making change, students began to form strong beliefs and ideas. They believed reducing waste was significant. In her journal, Samantha responded to the questions that asked, “Do you understand the three R’s better? What have we done in class to that has helped you understand them better?”

I do think it has helped me understand more. I never used to recycle because I didn’t know how important it is to recycle. Now I know that recycling helps make the world a better place and it helps make less waste. (Student journal, Week 2)

Later in her journal Samantha was asked, “*What do you hope we do more of?*” She wrote, “I hope we can push people to stop doing or making waste. Also I hope we can show people how to recycle the correct way and I want to show little kids what can and cannot be recycled” (Student journal, Week 4). These journal entries demonstrated that Samantha believed recycling was important and the work she was a part of was important.

In an additional example, students were reflecting about the changes we had made in class. We had started recycling all breakfast waste that could be recycled and had begun to reduce the use of bowls at breakfast by either using no bowls at all or by reusing ones that were not dirty. Two students discussed the results:

Lisania: You know how we didn't recycle, our trash bag was like (she extends her arms out to show that the bag was very large).

Phyu: Like so big.

Lisania: But now it's so much smaller (she moves her arms inward to indicate a smaller size).

Phyu: Ooo, we're reducing waste.

Teacher: Okay, like you said, we are an example of what we are trying to do.
(Video Transcriptions, Week 4)

Lisania and Phyu made connections from our Project-Based Learning goal of reducing waste on campus to the other actions being taken in our classroom. They understood the difference they were making and the impact their actions had on our campus. This valuable learning indicated that Project-Based Learning was the type of learning that is applied beyond the classroom. It is motivating enough to students that they want to use the information they have learned outside of the designated learning time. In addition, they believed what they were doing was important and was making a difference.

Most students owned their new learning and applied it beyond the lesson or in their own homes. These recycling behaviors increased throughout the unit. In one of my final extended field notes, I reflected on the army of recyclers that would bring recycling from the lunchroom on a daily basis. It came to my attention that although most students were committed to what had become our classroom mission, there were some students who resisted the change:

Later at lunch: Antonio had a plastic yogurt container in his hand. . . . “Look, Ms. Lund, it’s recyclable.” I asked who realized it? Diana was like, “Well I think it was Leticia first. . . About 10 students had yogurt or applesauce containers in their hand in the line next to us. Ms. S’s students all had the trays.” It is interesting that the same kids are recycling and discovering new items each day. There are a couple of resisters. I wonder if Earnest, Ashley, or Jacob will start recycling at lunch? I wonder why they have not bought into the group thinking? (Extended field notes, Week 6)

This was an interesting observation because although the majority of students in the study were applying their new learning, some students did not experience a need to do so.

Summary

In summary, data collected in this research suggested that a Project-Based Learning environment did have an impact on student engagement and student motivation over time. Instead of negative or no interactions, students interacted with their teacher and their peers in a meaningful way in order to co-construct learning. Students participated more actively and competently in the unit as they developed a deeper understanding of the content. Students developed this deeper understanding through a series of group and partner experiences designed by the teacher. Though group and partner interactions were often difficult, most student learning occurred during this time. Together students struggled to understand new concepts, but more importantly to make that new understanding their own by applying it in their homes and school community. They clarified each other's thinking, expanded on one another's ideas, and shared their new learning. These shared experiences helped students construct new knowledge and understanding together. Moreover, their new learning was motivating. Their motivation was demonstrated in their confidence to share the learning with other students and adults on campus, as well as implement their new learning in their home lives.

Discussion

This chapter provides a brief summary of the findings in this action research study, organized by research questions. I discuss my study's contribution to existing theory, lessons learned, limitations, and implications for practice.

Summary

This qualitative action research project explored how a Project-Based Learning environment influenced student engagement and motivation in a third-grade classroom.

Data were collected over a span of seven weeks through student interviews, video observations, extended field notes, student artifacts, and a researcher journal. I summarized my findings through the lens of the following research questions used to guide this study:

1. In what ways does Project-Based Learning facilitate the development of student engagement?
2. How does Project-Based Learning change student motivation over time?
3. How do students (in a third-grade classroom) interact with their teacher and their peers in a Project-Based Learning environment?
4. Within the Project-Based Learning community, what practices do students employ to construct learning?

Student Engagement

For the purpose of this study, engagement is defined as active participation through behaviors such as being on-task or taking part in activities and group work (Ainley, 2012). Throughout this study, I was most impressed by the increase in behavioral and cognitive engagement. In regards to behavioral engagement, there was a noticeable increase in student participation throughout the seven-week innovation. This increase in participation was noted both within single lessons and over the span of the seven weeks. Often at the beginning of lessons or in the first couple weeks of the unit, students were hesitant to share their thinking. Over time, as their confidence and competence increased, so did their level of engagement. Students were more likely to raise their hand, volunteer their ideas, and take risks. Furthermore, their cognitive engagement increased. Students became personally invested in their new learning, which

became evident when they began to apply their new learning outside of the structured learning block. Students began to recycle at lunch, remind me daily to turn off lights and computers, and give advice to other staff members. A Project-Based Learning environment provides a structure that fosters students' physical and mental engagement in new learning.

Motivation

Motivation is what leads a student to show the physical behaviors associated with engagement discussed above (Skinner & Pitzer, 2012). Although there are multiple types of motivation, intrinsic motivation is the most important to this study. Intrinsic motivation, an internal motivation, energizes and creates action in the student. This type of authentic motivation is associated with interest, excitement, and confidence (Ryan & Deci, 2000b). My research suggested that a Project-Based Learning environment fosters and promotes intrinsic motivation in students. Autonomy is one component that fosters student intrinsic motivation. In the Project-Based Learning environment, students were in control of their own learning. I structured learning through research stations, committees, and group work. Each classroom element gave students control over which topics they studied, which resources they used to do their research, and which solution path they wanted to support. Student participation and excitement increased in these environments. My research suggested that students enjoyed learning in these autonomy-supportive structures.

In the later weeks of the study, students applied their new learning in their home and school lives. As students made connections to their lives, they brought in recycling from their homes and tried to persuade their parents to recycle. Taking recycling to the

homes demonstrated how students were motivated to respond to their new learning. Furthermore, at school, students demonstrated their competence in their new learning by advising teachers around campus on how they could reduce waste. These examples highlighted the students as experts. Students were motivated to apply their new learning beyond the time structured for their daily lessons.

Student-to-Student and Student-to-Researcher Interactions

Unlike *assembly-line instruction* (Rogoff et al., 2003), where the teacher is the all-knowing source who imparts information to students, Project-Based Learning fostered an environment where students learned from and with one another. As the teacher, I did not play the role of the information holder; instead I worked with students to create a learning environment that fostered the development of *cultural practices*. These practices allowed students to build learning through goal-oriented group and partner activities. In essence, *cultural practices* helped foster student learning (Nasir & Hand, 2006). Each lesson I organized involved structured group-work and a goal aligned to our bigger purpose of reducing waste on our campus. Examples of these structures included think-pair-share where students answered higher level questions with their partners and expanded their thinking using phrases like “I heard you say . . .” or “I agree/disagree with you because . . .” In addition, students attended group-research stations where they worked in table groups to research topics they identified as important to our class purpose. Later in the unit, students were reorganized based on interest into solution-committees. The committees worked daily to accomplish individualized group goals that I developed with the group. In addition to establishing structure, I interacted with students through dialogue that consisted of questions and clarifications. My research

suggested that one of the teacher's main roles in a Project-Based Learning environment was to utilize questions and clarifying statements to address misconceptions and encourage higher level thinking. This form of *guided participation*, led to students co-constructing meaning that is discussed in the next section (Rogoff, 2008).

Students interacted with one another within the context of the group-work structured by the teacher. My research suggested that students all played an active role in these interactions. Together they used *cultural tools* and *artifacts* to navigate the new learning (Nasir & Hand, 2006). The tools and artifacts took the form of language, symbols, and physical objects. Students discussed energy conservation and reduction of waste using academic vocabulary related to the topic. Furthermore they used symbols such as the recycling symbol or the three Rs to discuss and explain their new learning to others. They taught one another how to recycle and what can be recycled through the physical objects in our classroom and from their homes.

Co-construction of Meaning

As addressed in the previous section, students took part in *cultural practices* developed in conjunction with the teacher. My research found that students co-constructed meaning through these shared practices. Within these goal-oriented groups, students learned from one another. As such, students formed a *community of learners* (Rogoff et al., 2003). Together they learned new information and took the time to clarify their understanding. Students repeated one another's ideas; and when they were unclear or confused, they worked together to clarify meaning. When an idea was particularly difficult, the teacher clarified and questioned group members until all group members understood the new ideas.

Students built on their new learning each day, drawing connections between new and old ideas. Most significantly they worked together to create new ideas. Often students would draw conclusions that I, as the teacher, had not considered. Students co-constructed meaning through a process of sharing, refining, and extending. Once new ideas had been developed, they applied these ideas in their school and home lives. As a class, students determined what reducing waste really meant. Through shared experiences and shared conversations, students came to their own consensus on what Wilson Elementary needed to do to become a cleaner campus. Through this application they expanded on their understanding of the topics being studied.

Once one student would apply the learning, other students would follow. The first time a student recycled at lunch, it was just her and her friend. The next day a couple more students participated. A week later, everyone did. Students went through a process of *participatory appropriation*, or the act of becoming (Rogoff, 2008). As they participated in the group interactions and the application of reducing and recycling, they became leaders and experts. It was no longer a series of isolated facts but instead a movement towards something more real, a cleaner campus.

Contribution to Theory

There were two theories that guided this study: Rogoff's interpretation of socio-cultural theory and Ryan and Deci's self-determination theory. Socio-cultural theory finds that learning and development take place when students are interacting with one another in *communities of learners* (Rogoff, 2008). Self-determination theory (SDT) focuses on motivation, what motivates people to be engaged in the world around them. SDT states that intrinsic motivation, or internal drive, can be fostered by increasing one's

competence, autonomy, and relatedness (Deci & Ryan, 2000a). My research demonstrated how these two theories can be used in tandem to better foster student learning and development. The learning environment and motivation are linked. A learning environment can either ignite or diminish an individual's motivation. I found that an autonomy-supportive classroom that structured all learning through student-to-student interactions did, in fact, foster student intrinsic motivation. Goal-oriented group work developed and fostered student engagement and motivation. A Project-Based Learning environment is a tool to create this environment. It provides students with a meaningful purpose that is interesting and engaging. It encourages group work and student-to-student interactions. Supportively, it clearly defines the teacher's role as a facilitator and clarifier.

Lessons Learned

I learned a number of important lessons throughout this research process. First and foremost I learned more about the role I played in my student's learning. As teachers, we often envision ourselves as instructors who impart knowledge onto our students. We utilize state standards and district pacing guides to generate lists of objectives we want our students to master. We model the learning, we check for understanding, we reteach, and we move on to the next objective. I learned that my role as a teacher is so much more than that.

After reviewing my research, it is clear that my role as a teacher is largely to foster new learning through questions and clarifications. Looking at my codebook through HyperRESEARCH, it is interesting to note that, whereas 29 data points were coded as modeling, nearly 300 data points were coded as "teacher clarify" or "teacher

question.” Students developed understanding with the assistance of guiding questions at various levels of complexity and statements intended to clarify thinking or correct misunderstandings. Many of the opportunities for questions and clarifications happened while students were working in groups together. The questions were addressed to a group of students and the clarifying statements were used to address group misconceptions. My questions and clarifications played an essential role in these groups constructing knowledge.

Another lesson I learned in this research process is that qualitative research methods are powerful sources of information, most notably extended field notes and video observations. The depth of knowledge I was able to collect is something that would be difficult to replicate through testing or other qualitative sources, particularly with such young students. Extensive transcripts allowed me to truly look at student learning and student-to-student interactions. At first glance, a Project-Based Learning environment feels messy and overwhelming. Students are often working on different goals or at different learning stations. The classroom is loud and student conversations can be confusing or seem off-task. However after close examination, this environment was fostering a depth of student learning. Students worked together to figure out what difficult vocabulary meant and to understand complex ideas like reducing energy use. Throughout lessons and over time their ideas began to clarify and strengthen. This stronger understanding led to deeper connections and application. These patterns would have been difficult to assess without in-depth transcripts and field notes from the qualitative methods used in this study.

Limitations

As with any research, there are limitations to this educational case study. The main limitations are the brevity of the data collection portion of the study and the potential for personal bias. Data were collected over the span of seven weeks. The Project-Based Learning unit continued for an additional two weeks; data were not collected during this portion. The final two weeks of the Project-Based Learning unit involved the students taking their final projects out into the school community and teaching others about what they had learned. This was an important time and might have provided a deeper understanding of student engagement and change in motivation. Additionally, Project-Based Learning is a unit of study. Students participated in an additional Project-Based Learning unit during their spring semester. Following student interaction over an extended amount of time, for example an entire year, would provide more evidence to better understand changes in student thinking and development. Moreover, the more opportunities students have to experience Project-Based Learning, the more students' thinking and development may shift over time. This particular limitation was addressed through rich descriptions and a diverse array of qualitative data collection methods that included observation, as well as interviews and artifacts. The short duration of data collection required and allowed for more extensive data collection methods. This is in part why both video observations and extended field notes were used.

It is inevitable that some personal bias played a role in the analysis of my study. As their teacher, I wanted my students to succeed and feel more engaged in the classroom and the setting that I provided them. In order to minimize the impact of personal bias, I used rich, thick descriptions from field notes and interviews to show and support results

found in the study. Furthermore, I relied on multiple methods of data collection. These complimentary methods were used in conjunction with finding themes and drawing assertions in order to ensure the validity of the conclusions drawn.

Implications for Practice

Through the implementation of a Project-Based Learning unit in my classroom I learned a number of important ideas to improve practice. First and foremost, it is essential that students have the opportunity and time to work together to develop new thinking. This study suggested that students learn from repeating, expanding on, clarifying, and responding to one another's thoughts and ideas. This can only take place if students are given the time to interact within lessons. The results of this study show that students need time to learn how to interact with one another. Evidence collected demonstrated how students often struggled to work together initially but learned and implemented new group strategies over time. This indicated that incorporating group work throughout daily lessons would be beneficial.

Furthermore, this research suggested that the teacher must structure group work-time in order to ensure on-task student participation. Students often referred to roles and responsibilities as well as group goals when discussing their work together. By assigning specific roles or assigning structures that students can use while engaging in tasks together, students were able to spend more time on the thinking tasks needed to be successful.

Finally, through this study I learned the importance of providing students with learning that could be immediately applied to their lives and the world around them. The most memorable findings of this research were the classroom-to-school and classroom-

to-home applications. The Project-Based Learning environment provided students with a real-world problem that was affecting their lives at school. Together they developed solutions that they immediately implemented into their community. This form of real-world learning positively impacted their engagement and motivation, which implies that students are engaged and interested in real-world topics.

Significance

This seven-week Project Based Learning Unit left a lasting impression on my classroom. By altering one hour of instruction per day to be more student-centered and allowing students to guide instruction, engagement and motivation increased. Students learned how to work together as a team, share ideas, and make plans. Together students created a shared understanding. They used this shared understanding to make their school a better place. Over time students gained confidence in their thinking. Regardless of academic level, students were able to demonstrate their understanding and play the role of expert. The role of an expert demonstrated the importance of incorporating group work into the classroom and asking students real-world questions. Additionally, this study found that teachers should step back and allow students to do the thinking. Teachers can ask questions and use clarifying statements to support thinking. Finally this study further explored the connection between socio-cultural theory and student motivation. The study supported the idea that a learning environment can foster student motivation. Project-Based Learning provided an environment that fostered positive results in student thinking and student interactions.

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APPENDIX A
INTERVIEW PROTOCOL

Introductory Script: Thank you for being willing to help me learn more about your experiences in our Reducing Waste Unit. I am going to ask you a couple questions about the Reducing Waste Unit and I want you to be honest about your thoughts. There are no right or wrong answers. Your answers will not affect your grade. I am only interested in learning more about what students think about this unit.

Are you okay if I record this?

General Questions/ Experience:

What has it been like participating in the Reducing Waste Unit?

What do you enjoy most about it?

What do you enjoy least about it?

What is learning like in the Reducing Waste Unit?

What role has your teacher played in your learning during the Reducing Waste Unit?

What role have the other students played in your learning during the Reducing Waste Unit?

If you could use three words to describe your experiences in the Reducing Waste Unit what would they be?

APPENDIX B
INTERVIEW QUESTIONS

Sequence	Data Collection
Week 1 October 19, 2015- October 23, 2015 PBL Unit Starts	Video Lesson 1 Extended Field Notes 1-2 Artifact 1
Week 2 October 26, 2015- October 30, 2015	Interview 1- 3 students will be interviewed for the first time Video Lesson 2 Extended Field Notes 3-4 Artifact 2
Week 3 November 2, 2015- November 6, 2015	Video Lesson 3 Extended Field Notes 5-6 Artifact 3
Week 4 November 9, 2015- November 13, 2015	Video Lesson 4 Extended Field Notes 7-8 Artifact 4
Week 5 November 16, 2015- November 20, 2015	Video Lesson 5 Extended Field Notes 9
Week 6 November 23, 2015- November 24, 2015	Extended Field Notes 10
Week 7 December 30 th - December 4 th	Interview 3- the same 3 students will be interviewed for the third and final time. Additional students selected to be interviewed. Video Lesson 6 Extended Field Notes 11 Artifact 5 Artifact Books collected from all students participating in the study

APPENDIX C
INTRODUCTORY SCRIPT

Introductory Script: Thank you for being willing to help me learn more about your experiences in our Reducing Waste Unit. I am going to ask you a couple questions about the Reducing Waste Unit and I want you to be honest about your thoughts. There are no right or wrong answers. Your answers will not affect your grade. I am only interested in learning more about what students think about this unit.

Are you okay if I record this?

General Questions/ Experience:

What has it been like participating in the Reducing Waste Unit?

What do you enjoy most about it?

What do you enjoy least about it?

What is learning like in the Reducing Waste Unit?

Do you consider yourself an expert?

What role has your teacher played in your learning during the Reducing Waste Unit?

What role have the other students played in your learning during the Reducing Waste Unit?

If you could use three words to describe your experiences in the Reducing Waste Unit what would they be?

APPENDIX D
CODEBOOK

<i>Student Codes</i>
Apply new learning Connection to home Feeling of significance Inference or connection Learn from outside resources Off task On task Participation Reference new learning Struggle with new learning Student as expert Student confidence Student Enjoyment Student repeat ideas
<i>Student-to-Student Codes</i>
Argue of disagree Clarify or negotiate meaning Expand on each other's ideas General reference to teamwork Learn from one another Question one another Struggle with working as a team Student as teacher/leader Student-to-student feedback Student assigns roles Students compromise Students don't help one another Students share ideas Use team strategies
<i>Teacher-to-Student Codes</i>
Learn from the teacher Teacher addresses purpose Teacher as learner Teacher clarify Teacher model new thinking Teacher praise Teacher provides choice Teacher refocus through questioning Teacher structures group work Teaching strategy