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# Analyzing School-Wide, Project-Based Learning in a Middle School: From a Cultural Historical Activity Theory Perspective

Laura Venegas

University of Texas at El Paso, [lavenegas2@miners.utep.edu](mailto:lavenegas2@miners.utep.edu)

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ANALYZING SCHOOL-WIDE, PROJECT-BASED LEARNING IN A MIDDLE  
SCHOOL: FROM A CULTURAL HISTORICAL ACTIVITY THEORY  
PERSPECTIVE

LAURA ANN VENEGAS

Doctoral Program in Teaching, Learning and Culture

APPROVED:

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Pei-Ling Hsu, Ph.D., Chair

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Angus Mungal, Ph.D.

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Song An, Ph.D.

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Charles Ambler, Ph.D.  
Dean of the Graduate School

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## **Dedication**

This dissertation is dedicated to my husband, Tony Venegas who encouraged me to begin and complete the program. His unwavering belief and support made the time dedicated to my studies possible. I would also like to acknowledge my two sons, Antonio and Steven to show them that perseverance can make dreams come true. Lastly, to encourage all underrepresented populations to pursue their goals in higher education. Si, se puede!

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by

LAURA ANN VENEGAS, M.Ed.

DISSERTATION

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The University of Texas at El Paso  
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of the Requirements  
for the Degree of

DOCTOR OF PHILOSOPHY

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## **Abstract**

Recognizing the importance of preparing students for the 21st century along with meeting the accountability measures, educators must continually seek those educational practices that will support both endeavors. Through the literature and during this research, project-based learning has emerged as a promising curriculum tool that answers these objectives. To implement 21st century educational experiences, project-based learning has been attempted in various capacities of specific contents, grade levels and individual teachers; however, there has been limited application of a school-wide practice. While there is potential of project-based learning as a transformative curriculum tool in education, challenges of implementation still exist. Given this information, this study is interested in exploring those challenges or tensions that impede application of project-based learning in a school-wide environment.

Cultural-Historical Activity Theory (CHAT) was used to explore the five activity systems of whole school, administration, teachers, students and parents that comprise Border Leadership Academy as they engaged in the school-wide practice of project-based learning. The study presents a cultural-historical context of the development of 21st century skills through project-based learning over time. This research focuses and analyzes the contradictions encountered by each of the five activity systems and presents the negotiation and transformation process as the activity systems strive towards resolution of the challenges associated with project-based learning. CHAT exposed the specificity of the contradictions in the activity systems facilitating a targeted perspective of where growth and change occurred. An in-depth look at the whole-school application of project-based learning through the participating activity systems revealed how implementation and sustainability is possible in a middle school.



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## **Chapter 1: Overview of Research**

### **INTRODUCTION**

Education and what it means to be educated is in a constant state of renewal and revision (Ravitch, 2010). In today's current testing and accountability climate being educated is equated to high performance on standardized tests (Hurley, 2011). The higher the score the more educated the student is deemed. Students are tested on national standards such as Common Core (Common Core State Standards Initiative, 2010) and state standards such as the Texas Essential Knowledge and Skills (Texas Education Agency, 2017). These assessments are considered a bellwether of educational proficiency of the student body within. In addition, determining the status and quality of education extends beyond the borders of the United States to include comparisons with other countries on the effectiveness and overall education of the citizens of the country. The Trends in International Mathematics and Science Study or TIMSS measures the achievement levels of fourth and eighth grade students against students in 38 other participant countries (National Center for Education Statistics, 2015). According to the 2015, TIMSS report, the United States ranks 11th and 9th in fourth and eighth grade mathematics respectively and ranks 8th in science in both fourth and eighth grade in comparison (National Center for Education Statistics, 2015) with other participant countries. Competition continues between districts, states and countries to demonstrate the educational attainment of their students through the reflection of measurement statistics on assessments.

Even in this current climate of testing and accountability, an alternative and expansive perspective of what it means to be educated is emerging. In a keynote address to the Midwestern Research Conference, Hurley (2011) elaborated upon the six virtues of understanding, imagination, strong character, courage, humility and generosity as characteristics of an educated

person. He ascertained that a virtue should be useful and inspiring in context of education and it is through the development and combination of virtues that education is achieved (Hurley, 2011). Including virtues into the education schema presents a more humanistic view of what it means to be educated and is a goal of reformers (Ravitch, 2010; Hurley, 2011); in part because it expands the definition of being educated beyond a test score to skill sets and characteristics of an educated person.

Educational researchers such as the National Research Council (2012) and policy makers at the national level such as the U.S. Department of Education (2015) believed more needed to be done in the development of educating a child in preparation for the future. In 2002, the National Education Association (2017) in conjunction with other educational organizations developed the Framework for 21st Century Learning (National Education Association, 2017). The framework was designed to prepare students and empower educators in moving forward in educational reform. Critical thinking skills, problem solving, communication, collaboration, and creativity (National Education Association, 2017; Bell, 2010; U.S. Department of Education, 2015) are all considered demonstrative tenets of being educated in preparation for the 21st century. In addition, President Obama's Race to the Top initiative calls for an increase in "establishing high, challenging learning standards aligned with readiness for college and careers, and transforming instructional practices to enable students to meet the more challenging expectations" (U.S. Department of Education, 2015, p. 7) supported these transformation efforts.

Teachers, administrators and community members also play a vital role in educating a child. Administrators develop the environment through support and systems that build teacher capacity in making the changes possible. The establishment of a direct relationship

between leadership and capacity building has been attributed to successful school initiatives (Crowther, 2011). Too often schools may falter in implementing change due to lack of organizational leadership and climate (Berman & McLaughlin, 1978). Therefore the urgency for administrators to provide guidance and build capacity in reformulating the idea of what it means to educate is needed (Browder, 2014).

Community members also provide a role in the support system of educational reform. When the Framework for 21st Century Learning was being developed partnerships were established with national and international companies such as Ford Motor Company, The Walt Disney Company, and Qatar Foundational International (NEA, 2017). These companies provided input as to the type of skills needed for the 21st century workforce who included collaboration, problem solving and creativity as skill sets that enable students to think through projects that have yet to be imagined.

Teachers are on the forefront of initiating change. The current literature supports the critical role that teachers play in the success and motivation of their students. Leikin and Levav-Waynberg (2007) explored teacher knowledge and educational beliefs towards acceptance or reluctance of implementing new pedagogy. The results showed a gap between theory and practice. Teachers may believe in the theoretical aspects of teaching and learning but implementation was lacking due to limitations in teacher's content knowledge. What this study implies is teachers will be reluctant to implement innovative pedagogy, such as 21st century skills if their understanding is limited. Therefore in order to overcome this challenge teachers will need to have extensive training and support to apply creativity, collaboration, communication and critical thinking into the educational landscape of the classroom. With the urgency for implementation of 21st century skills in the classroom, educators have sought



out pathways of application in context of the content. Project-based learning has shown promise in achieving this objective (Buck Institute for Education, 2002).

Preparing students with the skills needed for the careers and jobs in the 21st century is one of the goals of implementation of project-based learning. Project-based learning has been touted as an exemplary teaching method in developing problem solving ability in students as they engage in their learning (Holm, 2011). Multi-disciplinary applications of reading, mathematics, science, technology and social studies engagement is a key construct associated with project-based learning. Students work in groups to address the goal of a project incorporating skills and applying analytic thinking to the resolution and or presentation of the project. An example might be investigating the way in which alternative fuels are utilized within a community. Learning and constructing of ideas does not exist in an isolated bubble but rather in context of a community filled with challenges to solve. Project-based learning provides opportunities for students to interact within the world around them through a combination of relevant topics that “encourage active learning and the construction of ideas” (Tal, Krajcik & Blumenfeld, 2006, p.723). Implementation of project-based learning facilitates the practice and implementation of 21st century skills, which incorporate collaboration to solve real world problems (Bell, 2010). Students need to be able to develop the skill to work together and use tools to refine and reach a resolution.

#### **STATEMENT OF THE PROBLEM**

While there is promise of project-based learning as a transformative curriculum tool in education, challenges of implementation still exist. In the midst of accountability, teachers struggle with teaching for mastery of the standards and balancing the demands of today’s education environment of developing 21st century learners (Browder, 2014). Raising the level

of rigor and student scores, meeting global demands and implementation of curriculum design has become the focus for educators (Texas Education Agency, 2010a). As a result, teachers and administrators realize this is not a solitary task but rather a systemic effort in which all members, artifacts and activity work in conjunction with one another to meet the challenge. Understanding how the challenges can be overcome has the potential to improve student learning (Lee, 2011). New knowledge and resources are acquired through discourse and interactions within the system and can be used as tools to address the challenge of student learning. Knowledge and new ways of being are mediated through interactions within a collective system that is working together towards a common goal (Engeström, 1987). To elaborate further, learning is not an independent endeavor but rather socially constructed through mediated actions of the collective (Vygotsky, 1978). In ideological terms, working within a system to address the challenges of project-based learning appears viable. Therefore, utilizing a collaborative process to address concerns and challenges supports the learning process

Expectations placed on teachers contend that every child achieves according to the expected passing standards regardless of background or language (Texas Education Agency, 2016) while at the same time implementing innovative practices. Within the teaching community there are contradictory views on this expectation. Some teachers view these demands as oppositional in nature; however others feel they are more reflective of a symbiotic relationship. In a study conducted by Rosenfeld and Rosenfeld (2006), teacher's individual learning differences were investigated towards their preference of using project-based learning or more traditional methods of instruction. The results indicated that once teachers became aware of their own epistemological frame they were more open and receptive to new ways of

knowing (Shulman, 1986). This revelation provided a perspective as to why some teachers prefer one way of teaching over another and provide a possible entry point towards facilitating change in pedagogy. In addition, research has shown that in this “climate of accountability that prioritizes the acquisition of factual knowledge, teachers tend to emphasize managerial aspects of their practice, concentrate on getting through the content” (Bencze & Hodson, 1999, p. 523). Addressing teachers’ epistemological understanding towards new ways of knowing along with meeting the student academic achievement expectations is a conundrum encountered by educational institutions (Fullan, 2007).

The implementation and application of school-wide project-based learning in context of the educational landscape is viewed as a challenge. Project-based learning is defined as “systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks” (BIE, 2002, p. 4). If a teacher operates from a traditional way of teaching and learning, this requires a pedagogical shift from teacher-centered to student-centered. In a study conducted by Harris (2014), five challenges towards implementation of project-based learning were identified: time to implement, meeting accountability requirements, school schedule, teaching the standards and designing the project. Mediating these concerns through a learning community provides a positive construct of negotiating meaning through a collaborative culture for project-based learning (Wenger, 1998).

The problem encountered by educators is how to meet the expectations of accountability while at the same time developing 21st century learners through the application of school-wide project based learning. This problem is worthy of investigation as education transforms towards the demands and expectations of the 21st century. The focus of the proposed research study will

examine how challenges of school-wide practice of project-based learning are overcome within and between the stakeholders and practitioners of a middle school.

## **PURPOSE**

The purpose of the study is to investigate how challenges of school-wide practice of project-based learning are overcome within and between the stakeholders and practitioners of a middle school to make implementation possible. Given that project-based learning, as demonstrated through the literature is shown as a promising practice for application of 21st century skills, understanding how a school-wide, project-based learning community supports this initiative is creditable. Previous research has focused on partial implementation of project-based learning within a specific content with limited research available on whole school implementation. In a recent study a collaborative model between middle school science teachers and content experts was developed to support the design and implementation of project-based learning in the middle school science classroom was explored (Krajcik, Blumenfeld, Marx & Soloway, 1994). The focus was on middle school science teachers and the support systems developed for implementation within the science classrooms. In another study, the researchers investigated how seventh graders in a suburban school in the United States and sixth graders in an urban school in Taiwan developed argumentation skills and science knowledge in a science project-based learning environment that incorporated a graph-oriented, computer-assisted application (Hsu, Van Dyke, Chen, & Smith, 2016). The research was concentrated on the development of argumentation skills in the science classrooms.

Other studies of project based learning have focused on student learning of the content and the development of interest. Mioduser and Betzer (2007) conducted a study to

determine the effect of project-based learning on high achieving students' academic performance, skills acquisition and attitudes toward technology, in comparison to students in technologically-focused schools. The results show a higher academic achievement, particularly with girls in the project-based learning group compared to the technology focused school (Mioduser & Betzer, 2007). Another study focused on student learning outcomes of a fifth grade social class that utilized project-based learning as the primary mode of instruction (Gültekin, 2005). Gains were reported in higher order thinking and research skills in students in comparison to students who were taught with a more traditional form of instruction (Gültekin, 2005).

In review of the literature multiple, studies were found in regard to content specific implementation to project-based learning, student learning and teacher perspectives. The overall research demonstrates positive results in regard to the application of project-based learning for students but hurdles of implementation were encountered through the application process. To expand upon this thought if project-based learning has demonstrated success, why hasn't more school programs adopted project-based learning within the curriculum? In examining the research on project-based learning, a gap in the literature appeared in the absence of studies related to how school communities are utilized in the development of school-wide implementation of project-based learning. Capraro et al. (2016) also identified this gap by concluding that more research needs to be done to investigate how innovative practices such as project-based learning can become generalizable across school contexts through a school-wide initiative. Speculation of targeted professional development, project-based learning conceptualization and the development of communities of practice may hold the key to successful implementation (Capraro et al., 2016). The purpose of this study is to

explore how school-wide practice of project-based learning is conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible.

### **RESEARCH QUESTION**

The driving question that will guide the research is “How is the school-wide practice of project-based learning conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible?” The question is situated within a school community in which school-wide, project-based has been implemented in the anticipation of garnering insight as to the conceptualization of project-based learning as a common understanding amongst its members. The question will be used to guide the analysis of the results to illuminate practices, tools and activities that are conducive to resolving conflicts of implementation of project-based learning. The results derived from utilizing this question will assist in providing a model for the development of school-wide, project-based learning practice in middle schools.

### **SIGNIFICANCE OF THE STUDY**

Given the importance of preparing students for the 21st century along with meeting the accountability measures, educators must continually seek those educational practices that will support both endeavors. By conducting a case study investigating how a school community supports project-based learning, insight could be gleaned as to how the network of support was developed to make school-wide project-based learning possible. This study investigates a viable educational practice that could result in a development model of implementation for project-based learning.

The previous research shows that project-based learning is a promising practice to improve student learning and the development of 21st century skills (BIE, 2002; Bell, 2010; Holm, 2011). In addition, the culture and cognition of the learning community is mediated through interactions (Lecusay, Rossen & Cole, 2008) which provide an environment through which a community can develop and construct universal meanings and understandings as they engage in a common practice (Wenger, 1998). In this case study, the common practice or activity is the school-wide application of project-based learning. Now, no other studies have investigated the constructs that communities provide to support project-based learning to include the negotiation of tensions within the system to make implementation possible.

This study has the potential of wide-spread implications of increasing the number of schools and communities that engage in school-wide project-based learning by providing a model of implementation. Early research has elaborated upon the multiple challenges of implementation of project-based learning such as the seemingly incompatibility of meeting the testing accountability requirements and the application of a rigorous curriculum with connections to the real world (Harris, 2014; Welsh, 2006). Other research has shown that application of project-based learning is beneficial; however most of the concentration of project-based learning has been grade or content specific such as science with limited application as a school-wide practice. In addition, providing a vehicle of resolution in which educators and community members address challenges associated with project-based learning presents a possible sustainable model for reform. This research could be utilized as a guide to increase school-wide application of project-based learning to meet the challenges and goals of the 21st century.

## **THEORETICAL FRAMEWORK**

In this study, cultural historical activity theory will be used as theoretical framework of analysis. Cultural historical activity theory interprets human activity as situated within the environment and knowledge as intertwined and multilevel, occurring within culture, history, and material contexts (Engeström, 1987; Chinn, 2009). In addition, the activity within a system can be described as a consistent, long-term endeavor directed toward a common goal (Farrar 2016; Leont'ev, 1978; Hsu, van Eijck, Roth, 2010). Attention is drawn to the idea that learning does not occur in isolation and purely through receptive input but rather rethinking learning and meaning making as a process that is mediated through interactions within the activity system (Rybacki, 2009). "Focusing on the practices of meaning making can reveal detailed understandings of how interaction and collaboration are produced and how knowledge construction and meaning making are negotiated within the discourse of participants" (Timmis, 2014, p. 9). Cultural historical activity theory has roots in Vygotsky's (1978) social-cultural theory in which individuals construct meaning through a social or cultural context. Project-based learning is considered a variation of situated learning as students construct meaning through participation in a project with real-world context (Krajcik & Shin, 2014).

In this research, how the school wide practice of project-based learning is conceptualized between the stakeholders to make implementation and sustainability will be investigated. Social interactions that are situated within a cultural context provide the foundation for the activity system. In this study, social interactions not only occur with members who belong within the school facility but are extended to the greater community in which the school is situated. The purpose and motive of social interactions are central to the understanding and learning embedded within the project; thus, viewing how understandings are negotiated through the system provides a unit of analysis. Negotiations occur between the constructs that constitute the system and



Engeström (1987) refers to these negotiated tensions as contradictions. Contradictions that challenge existing paradigms are beneficial as they offer opportunities for learning as members mediate their collective understanding of the phenomenon (Amory, 2010). Cultural historical activity theory or CHAT includes contradictions as an essential tool in understanding the socially constructed meaning and motive of the activity.

CHAT incorporates many tools that make the study feasible. Grounded in a socio-cultural perspective that is attuned to the culture, collective and socially distributed activity; situates the study within context of the environment (Timmis, 2014). This situated context supports the use of CHAT as it provides a venue through which to “explain real, every day, situated activity in its concrete, material detail” (Roth, 2006, p. 22). Utilizing the CHAT structural framework of constructs or moments (Roth, Lee, & Hsu, 2009) facilitates the visualization of the system making the learning and negotiated meaning visible through analysis of the contradictions (Hsu et al., 2010). In addition, CHAT can be a valuable tool in the analysis of the motives, goals and needs of the stakeholders as they negotiate through the activity system of teaching and learning for project-based learning (Lazarou, 2011). Therefore, using CHAT to answer the guiding question of ‘How is the school-wide practice of project-based learning conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible?’ is a viable and productive theoretical framework for the research.

## **SUMMARY OF METHODS**

The purpose of this qualitative case study is to investigate how the school-wide practice of project-based learning is conceptualized within and between stakeholders to make implementation and sustainability possible. A case-study method was selected because of the unique insight of the school-wide application of project-based learning the identified school

provides. Conducting a case study facilitates the gathering and analyzing of a detailed and rich description of the school site (Lichtman, 2013). The research site is a public, all girls, middle school leadership academy along the southern border of the United States. Participants include teachers, students, administrators and parents who are actively engaged in the practice of project-based learning. Data will be collected through observations, interviews and document analysis and coded for trends, particularly how they are related to situate learning in the development of practice for project-based learning. Observations will be conducted in the classrooms and during active participation in components of project-based learning which would include planning, implementation and presentations. Interviews will be conducted with purposefully selected members who are representatives of their community. Documents of the school will also be analyzed to understand the foundations of implementation along with providing an opportunity to triangulate the observations, interviews and documents in the research. Further discussion of the methods employed in the study will be elaborated upon in Chapter 3.

## **LIMITATIONS**

A case study is described as a focused, comprehensive description and analysis of a phenomenon or social unit that can be concentrated into a unit of study (Merriam, 1998). A limitation present in this case study is the participation of a singular school, that I will refer to as Border Leadership Academy, that is implementing a school-wide practice to support the implementation of project-based learning. This school was purposefully selected for several reasons. The first reason for selection of the school is the school-wide, active practice of project-based learning with all members of the community. In review of the literature, partial implementation of project-based learning along grade level or content boundaries is the norm

rather than the exception (Holm, 2011). Therefore, the school-wide implementation of project-based learning is uncommon making the selected site of Border Leadership Academy valuable in context of the research. The second reason is access to the school, students and personnel within the building. In education, access to students within a school can be a challenge as safeguards are put in place and followed according to the International Review Board (IRB) protocol protecting participants from undue risk or harm. In addition, the school administrator can be a gatekeeper to access; however, a professional relationship had been developed with the researcher prior to beginning the study. In part because professional courtesy and trust had already been established the principal willingly granted access to the school following approval of the International Review Board. The last reason is proximity of the school which is in the same city as the researcher making multiple observations and interviews possible. Even though the case study is limited to a singular site, the selection of the school was purposeful to garner valuable information for the research.

Another limitation of the study was the selection of the participants. Participants were selected through purposeful sampling who might or might not be accurate representatives of the membership within the school. Participants were purposefully selected based upon the criteria of inclusion within the school community, active participants in the development and process of project-based learning and willingness demonstrated through permission to participate in interviews and observations (Lichtman, 2013). Currently there are 125, 6th grade students, 98, 7th grade students, and 95, 8th grade students from the student population three girls from each grade level along with their parents will be purposefully selected as possible candidates for participation in the interviews and observations. More representatives from the student participants will not be selected due to the scope and time limit of the study.

In addition, the current administration plus selected teachers were included in the study. A more comprehensive view of the participants is included in Chapter 3 Methods.

The time allotment for the study is identified as another limitation. This is the second year of application of school-wide project-based learning and the second foundational year of the school opening. Therefore, it is crucial that first and second year experiences are captured within the scope of the research to garner information as to the development of the program. In addition, the school calendar may limit access to participants during the summer recess.

The last limitation associated with the study is the term and conceptualization of project-based learning. Project-based learning is defined as “systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks” (Buck Institute for Education, 2002, p. 4). In schools, sometimes activities can be interpreted as project-based learning. Activities such as building spaghetti bridges or collecting specimens from outside are sometimes viewed as project-based learning (Krajcik et al., 1994). However, in order to have a true project authentic to the enterprise of project-based learning adherence must be to the definition above. Long term sustained inquiry, centered on a complex challenge or question that produces a product or tasks are the hallmarks of project-based learning.

#### **SUMMARY FOR ORGANIZATION OF DISSERTATION**

Chapter One establishes the need for investigating how the school-wide practice of project-based learning is conceptualized by within and between the stakeholders to make implementation and sustainability possible. Chapter Two presents a review of the literature on project-based learning to include historical context along with the benefits and challenges of

implementation. In addition, explanation and application of cultural historical activity theory is included to provide a background and justification for its use. Chapter Three delineates the methods employed in the study, the research question, the design and the instrumentation that will be used in the data collection and the processes of final analysis. Chapter Four will present findings and analysis of the data organized around the cultural historical activity theory framework. Chapter Five will summarize important findings from the study and present conclusions and possible implications for educators, practioners and researchers.

## Chapter 2: Literature Review

### INTRODUCTION

With the promotion of project-based learning as a promising instructional tool to meet the demands of the 21st century, educational reform researchers have begun to investigate the benefits, effectiveness and challenges associated with this innovative teaching model. The preliminary research indicates that active participation in project-based learning has many benefits for students to include increased interest in science education and report a higher engagement and self-efficacy in learning (Gültekin, 2005), however, challenges have been associated with its implementation for teachers. The purpose for the study draws upon the promise and the gaps associated with project-based learning, particularly the school-wide practice of implementation. My driving question inquiries, “*How is the school-wide practice of project-based learning conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible?*” and will be used as a guide for the research.

In review of the literature several challenges and potential gaps surfaced regarding teachers and project-based learning. According to Rosenfeld and Rosenfeld (2006), the literature is dearth in investigating teachers’ epistemological beliefs and preferred teaching environments during implementation of a constructivist teaching model. Another challenge visible upon review is the reporting of teachers valuing the idea of project-based learning however; factors such as time constraints and a curriculum restrict application. Lessons developed with strict adherence to state and national standards limit the flexibility needed for full implementation within the classroom environment (Capraro et al., 2016). In addition, some teachers allude to feeling uncomfortable with the premise of project-based learning in utilizing an inquiry-based approach to instruction (van Uum, Martina, Verhoeff, & Peters, 2016) in part

due to the student-centered rather than teacher driven form of instruction.

Barriers, such as pedagogical content knowledge are not a new phenomenon specific to project-based learning (Welsh, 2006). Challenges associated with educational reform have become visible and through efforts of educators and researchers who have discovered ways to address these inhibitors to student learning. Regarding implementation of project-based learning, one of the challenges associated with project-based learning is the development of school-wide application from all stakeholders within the school community (Thomas, 2000). School-wide communities offer a collaborative activity environment in which members may share ideas and find innovative solutions to challenges that may be encountered within the teaching and learning environment (Wenger, 1998). Utilizing the promise of an activity system to investigate how challenges associated with project-based are addressed and overcome has yet to be investigated (Thomas, 2000). The proposed research study will address the gap of investigating how school-wide practice of project-based learning is conceptualized and negotiated within a middle school to make implementation and sustainability possible.

## **HISTORY OF PROJECT-BASED LEARNING**

Project-based history is based upon a long history of education “as a means to make schooling more useful and readily applied to the world, and became popular in the early part of the century within the United States” (Barron et al., 1998, p. 272). The early philosophy of educators was the belief that students learned by doing and projects afforded this opportunity. Projects consisted of wide range of learning experiences to include creating a garden, making a dress to watching the World Series, with the common thread of learning through experiences. John Dewey (1959) built upon the early ideas of projects as a means of learning and introduced the philosophy of learning as a process of active learning. Dewey believed that

students would engage in the learning process if the content were meaningful and relevant to real- world situations (Krajcik & Shin, 2014). Building upon this premise early adopters sought ways to develop a holistic approach to learning that extended beyond rote memorization of facts to application of knowledge in context of real-world situations. Vygotsky (1978) extended Dewey's (1959) thinking by proposing the idea that learning occurs because of social and cultural interaction within context of the environment and not in isolation. He believed that through social interaction students come to make meaning of the learning and is constructed through an active process.

Engeström (1987) extended this idea and is credited with the development of the third generation of cultural- historical activity theory framework, which concurs that learning does not occur in seclusion but rather situated in the context of the learning environment. Growth occurs through the mediated interactions making the learning meaningful to the participant (Engeström, 2015). Situated learning grew out of Vygotsky's (1978) social-cultural theory in which individuals make meaning through "social, cultural, educational and historical context" (Postholm, 2015, p. 45). The importance of actively learning in a situated context has now been included as an initiative in the Next Generation Science Standards (NGSS Lead States, 2013a) and The Race to the Top Initiative (U.S. Department of Education, 2015). Hence, the implementation of project-based learning in which learning is situated in context of the environment is based upon research and initiatives from government agencies to provide a robust learning environment for students. Further development of project-based learning is explained in the following section.

#### **OVERVIEW OF PROJECT-BASED LEARNING**

Project-based learning is built upon a constructivist's approach in which students are given the opportunity to interact with the content in a context that allows them to make meaning of



the learning through a personal and relevant application (Hsu et al., 2016). Project-based learning approach is a method that “combines relevant topics, innovative teaching approaches that encourage active learning and the construction of ideas” (Tal et al., 2006, p. 723). This student-driven and teacher-facilitated approach to teaching and learning engages students in a real-world context often associated with science or a social issue of the community (Bell, 2010). Educational researchers conclude that the “most effective learning occurs when the learning is situated in an authentic, real-world context” (Krajcik & Shin, 2014, p. 277). According to the Buck Institute for Education (2016a) “project-based learning is a teaching method in which students gain knowledge and skills by working for an extended period to investigate and respond to an authentic, engaging and complex question, problem, or challenge” (p. 1).

Key elements are associated with the gold standard of project-based instruction. The gold standard is about full implementation of project-based learning with defined criteria recognizing the authenticity to instruction and learning. Essential elements of project-based learning design (Buck Institute for Education, 2016a; Bell 2010; Krajcik & Shin, 2014) include: (1) Content knowledge and application of 21st Century skills, (2) challenging open- ended project or question, (3) inquiry, (4) authenticity, (5) student-centered, (6) reflective, (7) revision and (8) final presentation. When implementing authentic project-based learning instruction, the gold standard is referred to as the desired instructional and learning design and when accomplished all components of the standard are present in the learning environment. Further descriptions of the components are elaborated upon in the following paragraphs.

Content knowledge and application of 21st century skills incorporate student-learning goals to include standards-based content with the opportunity to think critically and collaborate with others to address the outcome of the project. Content knowledge provides a foundational

baseline through which the project can be implemented, with focus being drawn to application the 21st century skills that opportunities to collaborate with other students, teachers and community organizations and think critically to examine the project from a variety of angles. The project is not restricted to standards-based knowledge of a specific grade level but rather viewed as springboard that the project may expand upon. For example, an 8th grade Texas Science Standard (Texas Education Agency, 2010a) asks students to describe and analyze human impact on the environment. With this as the foundational content in project-based learning emphasis will be on the incorporation of critical thinking in the analysis of human impact to include causational factors along with potential solutions.

A challenging open-ended project or question that is developmentally appropriate provides a meaningful challenge for participants encouraging them to expand beyond their current base of knowledge. Challenging open-ended projects encompass topics that are relevant and meaningful to the learner and facilitate opportunities for students to explore topics related to the project to analyze and synthesize information. Student inquiry is the driving force in the construction of knowledge building the connections between academic and natural world. These connections provide the link through which the information is personalized facilitating critical thinking in relation to their home and school environment (Rivera Maulucci, Brown, Grey, & Sullivan, 2014). The open-ended project must be broad enough to be inclusive and allow for variance of interpretations and resolutions while at the same time provide parameters through which the students must negotiate while in acquisition of the information. Building upon the previous topic of analyzing human impact on the environment; students would be given the opportunity to resolve with the following example, ‘How does human activity impact the environment, economy and resources within a region? Provide specific examples and potential resolutions (if needed).’ This challenge of marrying a learning standard with real

world application can be visualized through the students' abilities and engagement with the content in meaningful ways.

During active inquiry students are vigorously involved in the process of inquiry by asking questions and searching for solutions to their project. Inquiry, specifically long-term inquiry provides opportunity for students to engage in “a rigorous extended process of asking questions, finding resources, and applying information” (Buck Institute for Education, 2016a, p. 1) and is a critical component of project-based learning. Students asking questions that lead to discovery is reflective of inquiry application. When students “create their own investigation designed to answer a question that they helped to frame and is important to them and their community, they see how the science can be applied” (Krajcik & Shin, 2014, p. 278). Finding resources either through digital resources or making personal connections with the community allows for an extension beyond the classroom, encouraging the inquiry process. An example of inquiry could also be applied to analyzing human impact on the environment by interacting with various community resources and in-field investigations that would aid in the inquiry process. Application of information to the project develops connectedness between prior knowledge and new learning to develop a comprehensive conceptual understanding (Shulman, 1986).

Authenticity provides for real-world connections that make the learning meaningful and relevant to the learner (Hsu et al., 2016). Authenticity speaks to the real- world context of students' concerns and interest while implementing tasks and utilizing tools that are reflective of the tools used in research such as new technology to assist the students in the creation of authentic artifacts that represent student understanding (Buxton, 2006). When seen within the context of student's lives authenticity becomes meaningful and personal to the learner (Rahm, Miller, Hartley, & Moore, 2003). Authenticity and inquiry work in conjunction with one another

to support the students' efforts in the application and resolution of the project (Martineau, Traphagen, & Sparkes, 2013). Through project-based learning, students have the opportunity to engage in the learning in an authentic context strengthening the link between application and 21st century learning.

Project-based learning is also characterized by being student-centered. Students are the primary investigators and decision makers of the project and the teacher acts as a facilitator and guide for the students' learning (Bell, 2010). In project-based learning students get to be the primary decision makers such that they get to decide what they are going to pursue in terms of the research, how they would like to investigate the information and what the final project will look like. This allows for freedom of choice rather than a pre-determined outcome. This student-centered approach fosters an environment of collaboration with others, which resembles an authentic working environment and develops 21st century skills of collaboration and problem solving. Student voice and choice are considered foundational components of the gold standard of project-based learning (Buck Institute for Education, 2016a).

Reflection affords students and teachers the opportunity to actively practice meta-cognition by reflecting on the quality of their work and addressing ways to overcome challenges. "Meta-cognition occurs when a learner retrospectively considers a learning event and evaluates how effective it was, and engages in forward thinking transfer" (Winne & Azevedo, 2014, p. 63) to decide how to proceed with the emerging results. Did the initial inquiry answer the driving question or support the overall goal of the project? As part of the reflection process students also reexamine how they worked with others while seeking information. If barriers were encountered how were they overcome? Including this component in project-based learning supports teaching and learning by developing intrinsic as opposed to extrinsic motivation in

students and teachers preparing them for future learning.

During the revision process students give and receive critiques to other projects and use feedback to revise their product. Building upon the reflective process, students are given the opportunity to revise their project based upon their own intrinsic understanding along with feedback and critique from others. Being able to reflect upon your own learning in addition to critiquing and providing feedback to others creates an environment through which conceptual change and understanding can flourish. Conceptual change is not simply the acquisition of new information but rather it the building of “new ideas in context of old ones; hence the emphasis on change rather than on simple accumulation” (diSessa, 2014, p. 88). With this new information, students can revise and build upon their information to continue to make progress towards the completion and presentation of the project to reflect their learning.

Lastly, in project-based learning students must explain, display and present their project to others. Conducting a final presentation offers an opportunity for students to present their projects to their class and others beyond the classroom. In this step students are given the choice on how to share their information and outcome of the project with others. Students may elect to present their findings through a project board, PowerPoint or by other means of the student’s choice. Culmination of student learning is manifested through the final presentation and artifacts presented to the public. This provides evidence of understanding, application of information and conceptual development in students. Allowing flexibility in the presentation of the project supports the idea of student choice within project-based learning model.

#### **BENEFITS OF PROJECT-BASED LEARNING**

Project-based learning plays an important role in the transformative nature of educational change. The Next Generations Science Standards, (NGSS Lead States, 2013a) and the National

Research Council (2000) include objectives and goals that are reflective of project-based learning. These include the application of a rigorous curriculum embedded with 21st century skills, which will prepare students to become active contributors to the community. Application of crosscutting curricular content is a foundational principle of NGSS Lead States that is readily applied through project-based learning creating contextual relevancy within the education system (NGSS Lead States, 2013b). Relevancy in context of real-world experiences is a key construct associated with authentic learning environments (Braund & Reiss, 2006). Project-based learning has a strong connection to STEM education and provide a venue for authentic experiences through the application of science, technology, engineering and mathematics. In addition, STEM project-based learning provides opportunities for students to collaborate on projects that reflect students' real world experiences (Han, Capraro, & Capraro, 2015, p. 1092) providing an anchor for making meaning of the learning.

According to the research there are many benefits for students and communities associated with project-based learning such as the alignment and support of project-based learning with the national educational reform initiative associated with Race to the Top (U.S. Department of Education, 2015) whose goal is to educate all students and provide them with a 21st century skill set preparing them to become active contributors to the community. The new skill set requires students to become critical thinkers and work collaboratively with others to solve problems and work on projects that are beneficial to society (Rotherham & Willingham, 2010). In studies students report being engaged in the learning process as project-based learning provides relevance to their world allowing a pathway for meaning between school and the community. Furthermore, students' interest, self-confidence, and self-efficacy were increased because of project-based learning as they work with others and engage in the active learning

process of project-based learning (Bell, 2010). In addition, students can incorporate the use of technology as a contextual tool to facilitate a resolution to the project. As a result of actively participating in the project-based learning process students are developing skills exemplifying career and college readiness. Further elaboration on the benefits of project-based learning will be discussed in the following sections.

### **Authentic Context**

One of the many reasons proponents encourage the use of project-based learning is its strong relationship to authenticity which is considered a key construct and benefit of project-based learning (Buck Institute for Education, 2016b). Authentic activities involve the transformation of complex and ambiguous content, thinking skills, and resources that support investigations (Lee, & Butler, 2003). Authentic experiences are defined as genuine in nature therefore authentic content must be sincere to the praxis of application. However, authenticity has experienced a transformation of interpretations as a reflection of the educational system transitioning from a canonical approach, which focused on knowledge and skill philosophy to one of adding rigor and depth to the content (Buxton, 2006). Authenticity of practice is not a static object that can be identified solely by name but rather through characteristics of interaction between students, teachers, scientists and content working in conjunction with one another to clarify the meaning and understanding of authentic instruction.

Genuine interactions within the community foster the development of authenticity for individuals interacting within the system Student driven inquiry which allows students opportunities to develop their own investigation and conduct research was proposed as a marker of authenticity (Martineau et al., 2013; Roth, 2008). This idea is supported by other researchers who believe that authentic experiences should include opportunities for students to

engage in “finding evidence-based answers to questions and problem in natural contexts with no pre-determined solutions” (Houseal, Abd-El-Khalick & Destefano, 2014, p. 85) as an inclusive descriptor of authenticity. In a study conducted by Boaler (1998) differences in the quality of student learning between a traditional and an authentic project-based context were examined. Boaler (1998) was specifically looking for mathematical aptitude and used the results on the state standardized exam as a unit of comparison along with interviews. The students in the authentic project-based classrooms outperformed those in the traditional setting and attributed their success to authentic, contextual relevancy of the math they were taught in project-based learning.

Authentic instruction provides students opportunities to apply cognitive processes and develop complex reasoning within context of investigations (Buxton, 2006). Authentic practices cultivate learning by increasing interest in the content by making connections to the real world in context which assists in developing and improving the students’ affective domain regarding learning.

Promoting student inquiry in authentic practices is a supported tenet of the Next Generation Science Standards (NGSS Lead States, 2013a), National Research Council (2000) and National Science Teachers Association (2013) in part because of the many benefits attributed to its implementation. Authentic experiences provide students opportunities to apply cognitive processes and develop complex reasoning within context of investigations (Buxton, 2006). Authentic s practices cultivate learning by increasing interest in learning by making connections to the real world in context, thus improving the students’ affective domain regarding learning along with providing opportunities for career investigations.



## **Connections to STEM**

Project-based learning has a close association to Science, Technology, Engineering and Math (STEM) education based upon overlapping constructs associated to both. “STEM project-based learning is grounded in the theoretical background of constructivism where students are engaged in the diverse components of problem solving, interdisciplinary curriculum, open-ended questions, hands-on activities, group work, and interactive group activities” (Han et al., 2015, p. 1093). In parallel, project-based learning is based upon similar principles; however it is not restricted to STEM education but rather can be focused on additional issues related to the real world such as border policy or immigration. Both STEM and project-based learning are guided by a challenging problem or question to guide the inquiry. Authenticity is a key construct in both creating relevancy and conceptual development of concepts that surpass the classroom to include challenges associated to the community and world. In addition, projects are student-centered focusing not on a specific outcome but the inclusion of students’ voice in the process of working the project and the final presentation or resolution. Many at the local, state and national level support STEM project-based learning. Promoting student inquiry through STEM project-based learning is a supported tenet of the Next Generation Science Standards (NGSS Lead States, 2013b), National Research Council (2012) and National Science Teachers Association (2013) in part because its ability to facilitate the development of skills that students will need to be prepared for 21st century careers.

To support the STEM and project-based learning connection, Han et al., (2015) conducted a three- year study in which project-based learning unit was implemented every six weeks into three high school mathematics classrooms. A linear, three-year growth model was applied using the state standardized assessment. The results of the study revealed a significant

growth in learning for all students but showed significant growth in mathematics for low performing students (Han et al., 2015). Hence, utilizing a STEM project-based learning teaching and learning structure for mathematics instruction benefits low performing students to a greater degree and has been shown to be effective in decreasing the achievement gap.

STEM projects incorporated the skills of science, technology, engineering and math an example might be the development of project or an idea to conserve water in the southwest region of the United States. To address this project, students would need to develop and understand the sources of water and how to mediate its loss. Technology could be included as a component to address the project or by gathering information through research of authentic companies or devices to develop students' decision-making process. Engineering is included in the actual development of the device; while mathematics depending upon the project provides a venue for application. The real-world context supports the premise of an authentic STEM project because of its connection to the community and the inclusion of all components attributed to STEM education.

With the promotion of project-based learning in conjunction with STEM, the goal of science education has shifted from mastery of scientific facts to application of science content within scientific argumentation and discourse. The Next Generation Science Standards (NGSS Lead States, 2013a) also support this premise by encouraging opportunities for students to engage in argument based upon evidence as an essential component in the development of science education. Allowing students to defend or refine their thinking in regards to phenomenon provides constructive opportunities of conceptual development in students (Shulman, 1986). When the gold standard is applied to project-based learning environments, students consistently revise critique and defend their positions in relation to application of

content making STEM education a viable and strong foundational component of project-based learning.

### **Development of 21st Century Skills**

According to the National Education Association (NEA, 2017) preparing students for a 21st century global society should include collaboration, communication, critical thinking and curiosity. Education of students should be comprehensive to expand beyond the four core subjects of English Language Arts, Science, Mathematics and Social Studies to include preparation for the 21st century. Business leaders from IBM and Bayer Corporation state “the availability of a creative and highly skilled workforce across America’s cities, regions and states stimulates innovation and results in economic prosperity” (NGSS Lead States, 2013b, p. 2). Although there are slight variances 21st century skills are identified in Table 2.1.

Table 2.1  
*21st Century Skills*

21st Century Skills
<ul style="list-style-type: none"><li>• Critical thinking and problem solving</li><li>• Collaboration and leadership</li><li>• Agility and adaptability</li><li>• Initiative and entrepreneurialism</li><li>• Effective oral and written communication</li><li>• Accessing and analyzing information</li><li>• Curiosity and imagination.</li></ul>

(Saavedra, & Opfer, 2012, p. 8)

Problem solving, critical thinking and collaboration are tenets of project-based learning and provide an opportunity to marry education and industry towards a common goal of creating an innovative and educated adult capable of contributing to the betterment of society (NEA,

2017). In this context, project-based learning affords the potential to build success skills for college, career, and life. In the 21st century workplace success requires more than basic knowledge and skills but rather the application of a skill set that is adaptable to the upcoming challenges of tomorrow. In a project, “students learn how to take initiative and responsibility, build their confidence, solve problems, work in teams, communicate ideas, and manage themselves more effectively” (Buck Institute for Education, 2016a, p. 1).

To elaborate further on 21st century learning, in 2002 the National Education Association or NEA in collaboration with other educational organizations began to develop a 21st century framework that could be used as a guide educators (NEA, 2017). In the beginning the framework proved to be cumbersome and as a result a revision and focus emerged identifying four key elements indicative of 21st century teaching and learning. These foundational constructs are critical thinking, communication, collaboration and creativity otherwise known as the Four C’s (NEA, 2017; Bell, 2010). If today’s students want to compete in this global society they must become effective practioners of 21st century skills in context of their educational and professional careers.

“Critical thinking has long been a valued skill in society. Today, every student—not just the academically advanced— needs it. While critical thinking and problem solving used to be the domain of gifted students, now it’s a critical domain for every student” (NEA, 2017, p. 8). Critical thinking must be applied in context of the academic content as students engage in the resolution of problems and challenges presented in that domain (Rotherham & Willingham, 2010). It is essential that teachers afford the opportunity for all students to employ critical thinking by developing learning experiences that facilitate this process such as project-based learning. In the future, students must be able to think inductively and deductively, which are key process associated with critical thinking to formulate solutions in the work environment.

Expressing thoughts and ideas clearly in verbal or written form have long been valued as an essential skill in communicating with others (Rotherham & Willingham, 2010). In the 21st century, these skills have been transformed as technology has expanded the way we communicate with one another. “The power of modern media and the ubiquity of communication technologies in all aspects of life make teaching strong communication skills even more important” (NEA, 2017, p. 13). Due to these new technologies, students now have a multitude of options to employ as they communicate their ideas through digital collaborative communication platforms and physical personal communication with others. Project-based learning capitalizes on communication opportunities in an authentic and organic enterprise by providing the context which necessitates the conveying of thoughts and ideas of the participants. Thus, project-based learning serves as a catalyst for the incorporation of 21st century skills.

Collaboration is considered an integral skill in education and in the workforce. The ability to work effectively by listening, valuing other’s contributions and compromise to accomplish a common goal or task (NEA, 2017) are essential constructs of collaboration. These collaborative skills are now considered vital in the global economy as much of the work today is accomplished in teams of individuals rather than individual efforts. “The ability to collaborate with others is an important 21st century skill and an important condition for optimal learning” (Saavedra & Opfer, 2012, p. 11). Project-based learning promotes collaboration as students learn from each other and work together to develop a solution. Developing 21st skills is not limited to students but expands to teachers as well. Teaching within context and using the technology to collaborate and problem solve is not just good teaching but a necessity to meet the demands of globalization. According to Saavedra & Opfer (2012) “The interconnectedness of

our global economy, ecosystem, and political networks require that students learn to communicate, collaborate, and problem solve with people worldwide” (p. 8).

Creativity is esteemed in educational, economic and universal circles as it ignites innovations that can create new industries, find resolutions and motivate social development (Rotherham & Willingham, 2010). Creativity is not an internal, predetermined characteristic but rather a skill that can be taught and formulated in a learning environment that is conducive to its application such as project-based learning. It is critical to foster creativity in schools for “if students leave school without knowing how to continuously create and innovate, they will be underprepared for the challenges of society and the workforce” (NEA, 2017, p. 24). Developing creativity and innovation are not without structure; rather guidance and intentionality is needed from teachers to create context through the academic disciplines (Saavedra & Opfer, 2012). This contextual relevancy serves as motivation for students to develop their creative capacity.

To further support the symbiotic relationship between 21st century skills and project based learning, the Buck Institute for Education (2016b) espouses project based learning provides a scaffold for learning which includes strategies that are critical for success in the 21st century (Bell, 2010). Active construction, situated learning and social interaction are conducive for the application of 21st century skills and are also key components associated with project-based learning (Hsu et al., 2016). Active construction allows students a venue for deep conceptual knowledge and development as students interact with the content creating an environment in which learning becomes a rational process through which students interact and refine ideas and beliefs based upon the evidence (Posner, Strike, Hewson, & Gertzog, 1982). As a result, students who participate in project-based learning have more experiences with the application of 21st century skills preparing them for the future.

## **Increase Student Learning**

Active participation in project-based learning has also been attributed to improving student learning in comparison with traditional instruction. Duncan and Tseng (2010) conducted a mixed-method study to document the implementation of utilizing project-based learning pedagogy for a Biology unit, which reported gains in student learning. In another study, the application of quality project-based pedagogy demonstrated a stronger student performance when compared to traditional instruction (Tal et al., 2006). Gender also plays a role in the improvement of overall learning. In a study quantitative study developed by Harris, et al. (2015) a difference of gender was noted in regards to student learning, in their study “girls generally performing better than boys on the physical science unit ( $ES=0.10$ ,  $z=2.03$ ,  $p<0.05$ ) and the Earth science unit ( $ES=0.15$ ,  $z=2.85$ ,  $p<0.01$ )” (p. 1378) when project-based learning curriculum was utilized for instruction These studies support the premise that project-based instruction improves student learning as a result of engaging more deeply in the content; therefore being able to remember and apply the information in new situations (Buck Institute for Education, 2016a).

Increase in student learning can be attributed to several components within the gold standard pedagogical framework. The opportunity for students to engage in rigorous long-term inquiry provides conditions that enable students to delve deeper into the content, making connections and synthesizing information in a contextual environment. To support this claim, in a study conducted by Mioduser and Betzer (2007) reported higher gains in academic achievement and skills in technology in the project-based learning group compared to students who were part of the tradition instruction cohort. Girls showed gains and the researchers attributed these results to greater engagement in the subject matter. Students could interact

with the content beyond superficial memorization and apply new information within the parameters of the project. In addition, the authenticity of the project perpetuates the learning cycle allowing the students to make meaning of the content through a personal perspective. Lastly, collaboration and working with others supports the ideals championed by Vygotsky (1978) that learning is a social constructed process. Through interaction with peers students come to make meaning of the learning and internalize the information for a deeper contextual understanding; therefore, causing an increase in student learning.

### **Increase in Self-Efficacy**

Project-based learning has been associated with increasing student's self-efficacy. In a study conducted by Cheng, Lam, and Chan (2008) quality of collaborative work as experienced in a project-based learning environment was a predictor of increasing or decreasing self-efficacy for both high and low achieving students. The opportunity for students to work together and negotiate an understanding through a collaborative process helps to promote self-efficacy in students. In another study in which project-based learning was utilized to determine the effects of the affective domain, the results indicated an increase in self-confidence in their ability to plan, develop ideas through problem-solving tools of negotiation (Alcapinar, 2008). According to the Buck Institute for Education (2016b) students who participate in the project-based learning process build confidence by working in teams and communicating ideas in turn preparing them by developing 21st century skills. Skills that are considered an inclusive norm within project-based learning lend to the development of a positive self-efficacy frame because of the culture of success that permeates through the environment. Working with others to seek out a common understanding makes the learning enjoyable and fosters an intrinsic motivation to learn and interact with the content (Gültekin, 2005). The project-based learning approach



“combines relevant topics, innovative teaching approaches that encourage active learning, and the construction of ideas” (Tal et al., 2006, p.723) all designed to motivate learners to promote student self-efficacy in the learning process. In multiple studies, “students reported enjoying the active, hands-on approach to content, as well as improved perceptions of the subject matter” (Holm, 2011, p. 9).

### **CHALLENGES OF PROJECT-BASED LEARNING**

There are many benefits associated with project-based learning as elaborated in the previous portions of the paper. However as with most pedagogical approaches challenges are encountered with its implementation. In review of the research several limitations were noted within the community of researchers regarding the implementation of project-based learning as an integral part of the teaching and learning structure.

One of the first barriers to implementation was buy-in from the teachers to implement project-based learning to its full fidelity (van Uum et al., 2016). Alignment with state mandated curriculum standards were also noted as a concern for its reduced application within the classroom. In part because of the state mandated curriculum teachers believed that they didn’t have time to incorporate project-based learning and was viewed as beneficial but not attributable to improving test scores (Capraro et al., 2016). Their concerns are not without merit, as there have been some studies that report an increase in state standardized scores; however, the focus of project-based learning is not necessarily to improve test score but rather preparing students with a 21st century skill set allowing them to be successful in the future. Unfortunately, skills such as collaboration, rigorous thinking and application of technology are not necessarily measured on a standardized assessment but rather realized once students enter college.

Another critique levied against project-based learning is the claim that constructivist's learning pedagogy is ineffective due to students' limited knowledge base associated with the content (Kirschner, Sweller & Clark, 2006). Although this assertion is in contrast with the premise that learning is developed through inquiry in authentic context, which is a key construct of project-based learning, it does warrant further exploration and investigation. Particularly in light of addressing how guided and unguided instruction is applied in a classroom learning environment. Therefore, I will further elaborate on these challenges presented against project-based learning in the following paragraphs.

### **Teacher Learning**

The reluctance of teachers to utilize project-based learning manifests in many ways. Teachers who have been trained with pedagogical techniques of teacher-led rather than student-directed curriculum have expressed hesitation with implementation; in part because they are unfamiliar with the project-based learning pedagogy and prefer to use “methods and materials whereby pupils primarily follow instructions” (van Uum et al., 2016, p. 451). “Across a number of studies, teachers expressed reservations about putting project-based instruction into place because of the changes it required in the way they taught, the materials and resources they offered, and in the way they prepared and planned for instruction” (Holm, 2011, p. 9). With teachers being the primary guide and facilitator their epistemological beliefs surrounding instruction could potentially influence the implementation (Rosenfeld & Rosenfeld, 2006) of project-based learning pedagogy. Professional development has been conducted to address this issue; however without follow through a one and done training is limited in its success (Chang & Lee, 2010).

Recently, in a study conducted by Lam, Cheng, and Choy (2010) teacher's motivation

and willingness to participate in project-based learning was investigated. The results indicated that if teachers perceived a stronger collegiality and teacher competence then they displayed much more motivation in pursuing project-based learning. In essence, “project-based learning will have a better chance to bring about the desired benefits for students if teachers have a strong motivation to experiment with, and improve it in the classroom” (Lam et al., 2010, p. 488). Teachers need to feel confident in their ability to implement project-based learning and believe that their concerns are validated in the process. Investigating how teachers address these contradictions is part of the proposed research for “without adequate attention to the difficulties teachers face and ways to support them as they cope with these difficulties, project-based instruction will not be widely accepted” (Krajcik et al., 1994, p. 489). Therefore teacher learning and motivation presents a gap in the research. In the proposed study, understanding how motivation for project-based learning makes implementation and sustainability possible will be investigated in context of the school environment.

### **Tension between Standards and Project-based Learning**

Another concern regarding implementation is the interpretation that project-based learning conflicts with state accountability standards. Teachers who are more content/achievement driven as opposed to 21st century skills focus believe that implementation of project-based learning will not be measurable on traditional measures of student achievement indicators (Capraro et al., 2016) therefore; not a viable form of instruction given the time constraints and adherence to the state mandated curriculum. Teachers have expressed hesitation towards implementation of project-based learning because of the personal accountability of teaching the standards-based curriculum to prepare students for end of year exams and standardized tests (Capraro et al., 2016). To add to this scenario, in Texas teachers will now be evaluated

according to their students' results on the state mandated assessment on the new T-TESS evaluation system (Texas Education Agency, 2016). However, if the project-based learning model is followed with fidelity, the adherence to designing the project with a content and standards-based focus allows for the development of content knowledge for students and the application of information in a new and novel format develops the learning rather than restricting the process.

Krajick, McNeill and Reiser (2008) addressed the tensions by designing a model that trained teachers on how to design lessons according to the standards along with the incorporation of project-based learning pedagogy. Prior to development of the model three overall tensions were unpacked. The first is the conflict between content choices dictated by the context versus the standards. Tension between depth of coverage for true project-based learning while still addressing a full year's curriculum standards, represents the second conflict. The third conflict was identified as the contextualized nature of project-based learning versus the standards (Krajick et al., 2008). In response to these tensions a curriculum model, *Investigating and Questioning our World through Science and Technology (IQWST)* was designed that explicitly taught teachers how to blend standards and pedagogy (Krajick et al., 2008) and assessed students to determine the effectiveness of the program.

The results indicated a challenge due to the complexity in the development of the curriculum. Student growth was measured according to the standards and adjustments were made with an iterative process. The study was conducted over a three-year time span which supported the learning process. However, the challenges encountered by Krajick et al. (2008) and the teachers, reveals the complexity of the tensions that exist between the standards and project-based learning pedagogy. How teachers overcome and mediate these challenges for

school-wide implementation of project-based learning warrants further investigation that will be conducted in the proposed research.

### **Multiple Interpretations of Project-Based Learning**

Multiple interpretations of what constitutes project-based learning leads to another challenge. A disconnect of understanding occurs between the stakeholders, of what project-based learning is and what it looks like and sounds like within a school environment. As outlined in the previous sections project-based learning is a student-centered model of instruction that is diverse in nature allowing for the inclusiveness rather than exclusiveness of learners and analytic thought. The project should be comprehensive to include concepts from the four core contents plus the application and synthesis of information utilizing technology tools and 21st century skill set to complete the project. To further elaborate, project-based learning encompasses “relevant topics, innovative teaching approaches that encourage active learning and the construction of ideas” (Tal et al., 2006, p. 723). Project-based learning has also been mislabeled to mean an action such as building a spaghetti bridge, to what constitutes project-based learning. However, true project-based learning encompasses more than an activity but rather an engaging thought continuum, which supports the development of student thinking.

Even if project-based learning is understood among the participants, reliance on skills rather than the total project becomes the norm. In a study conducted in four Israeli schools, teachers experienced difficulty in orchestrating project-based learning principles such as critical thinking and curriculum integration (Rosenfeld, Scherz, Breiner, & Carmeli, 1998). Because of their uncertainty skill development was emphasized over curriculum content, which led to the superficial development of projects (Rosenfeld et al., 1998; Thomas, 2000).

Therefore, how project-based curriculum is designed to reflect a rigorous project true to the tenets of project-based learning is worthy of further investigation. In the proposed research, how projects are developed to meet the demands of project-based learning will be investigated.

### **Limited Time**

Limited time is another barrier to implementation. In a project-based study conducted by Hertzog (2007) in a first-grade classroom, teachers felt constrained to implement project-based learning because of time factors and testing associated with district and school policies. In this instance, teacher's viewed project-based learning as a peripheral to learning rather than a central component of instruction. In addition, project-based learning is time consuming. It was discovered that project-based learning often takes longer than anticipated as questions and challenges arise through the implementation process (Marx, Blumenfeld, Krajcik, & Soloway, 1997). Time is constrained by outside influences; however it is also flexible enough in the hands of teachers. Teachers can control how much time they should provide the foundation for academic content by determining how important a construct is and allowing for time for implementation to include time for students to learn the content through engagement in project-based learning (Tal et al., 2006). In sum, limited time can be a challenge in implementation however if managed wisely, the goals of the project can be met.

### **Ineffectiveness of Inquiry for Learning**

A challenge was brought forth "that minimal guidance during instruction is significantly less effective and efficient than guidance specifically designed to support the cognitive processing necessary for learning" (Kirschner et al., 2006, p. 76). Examples about limited cognitive load and long-term memory were presented to support the premise, that inquiry alone

is not enough to place new learning into long-term memory. Long-term learning is influenced by everything we experience and is therefore considered the dominant structure of cognition (Kirschner et al., 2006). DeGroot's (1965) research on chess expertise and the impact of long-term memory was the foundational research cited for the linkage between cognition and long-term memory. The results indicated that problem solvers drew upon their long-term memory to apply the best procedure to solve problems. Critics against project-based learning ascertain that inquiry does not provide enough structured practice and guidance to allow students to build their cognitive understanding of the concepts and place their learning into long-term memory (Sweller, 2003).

Although I do not dispute the findings of the research, I question the validity and the application of these findings, fifty-three years later. To become a chess master, participants must play often and address new challenges as they present themselves. This is also the case with project-based learning. Students must be able to construct and apply their new knowledge in meaningful context often as new projects are implemented (Posner et al., 1982). One cannot expect a one-time or limited player of chess to become a chess master and the same principle can be applied to project-based learning. Inquiry in project-based learning is not a singular event but rather an ongoing cycle in which inquiry, guidance and learning are interwoven within project-based learning (Bell, 2010). Thus, providing an environment in which meaningful learning and problem-solving capabilities can become affixed into long-term memory.

In sum, the focus of the study will investigate how school-wide practice of project-based learning is conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible. In order to accomplish this task a situated

perspective within the context of a school-wide, project-based learning environment of a middle school is necessitated. Investigating how teachers, students, administration and the parents address and negotiate the challenges of project-based learning requires a systemic approach of viewing the activity system. For these reasons, cultural historical activity theory was chosen as the theoretical frame for it provides the structure and analytic tools needed in this study.

### **THEORETICAL OVERVIEW**

The proposed research is approached through the application of a constructivist's paradigm in which the ontology is centered on the construction of knowledge through lived experiences of interaction with other members of the community (Lincoln, Lynham & Guba, 2011). A constructivist's lens enables the researcher to understand and interpret the phenomenon as the knowledge is being constructed and meaning making is developed through intersections with others. Social constructivism expands upon the view of constructivism as it posits the development of knowledge as a process that is mediated through social interaction (Vygotsky, 1978; Nathan & Sawyer, 2014). In this study, the intent is to understand how a school-wide practice of project-based learning is manifested within and between the members of the community. Therefore understanding the interactive constructs and processes that occur within the activity system which help formulate this understanding and realization of project-based learning is essential. Cultural historical activity theory (CHAT) provides a method and a theoretical perspective (Engeström, 1987) to analyze project-based learning development and representation among the practioners of the middle school in the study. These theoretical underpinnings will be used as an influence and a guide to the research, overall design and analysis of the study.



## ACTIVITY

According to the principles of activity theory, activity can be described as a consistent, continuing endeavor directed toward a common object or goal that is socially, culturally and historically situated within the environmental context (Farrar 2016; Leont'ev, 1978; Hsu et al., 2010). Building upon this definition, the term activity can also be further elaborated as “a collective, systemic formation that has a complex mediational structure” (Rybacki, 2009, p. 291-292) of collective human agency (Roth & Lee, 2007b). Leont'ev (1978), who is considered the founder of activity theory clarifies that “activity is not a reaction and not a totality of reactions but a system that has structure, its own internal transitions and transformations, its own development” (p. 50). In other words, activity should be thought of as a long-term systemic enterprise that is goal driven and situated in a social, cultural environment.

In context of activity theory, activity should not be considered as a singular action, such as walking a dog but rather a collective or a measureable unit of the systemic whole which constitute the activity. Differentiating between an action and an activity is at the very center of understanding activity. “Activities are realized by means of actions, and actions make sense when they are understood within the activities in which they emerge” (Engeström, 2015, p. xxviii). To illustrate further, an example of activity is demonstrated through the application of Huckleberry Finn's life activity in which the moments of his life are exemplified by the delineation of activity as a whole unit (Engeström, 2015). Huck and Jim floating down the river would be considered an action within the larger context of Huckleberry Finn's life activity. To further elucidate activity within an activity system and differentiate it from actions, Engeström (2015) bounds activity with the following parameters:

*First*, activity must be pictured in its simplest, genetically original structural form, as the smallest unit that still preserves the essential unity and quality behind any complex activity.

*Second*, activity must be analyzable in its dynamics and transformations, in its evolution and historical change.

*Third*, activity must be analyzable as a contextual or ecological phenomenon. The models will have to concentrate on systemic relations between the individual and the outside world.

*Fourth*, specifically human activity must be analyzable as a culturally mediated phenomenon  
(p. 32).

These parameters provide the prerequisites for constitution of activity within the activity system. Together they form a cohesive structure from which analysis can occur through the visualization of the mediation process, which is a foundational feature of activity theory (Engeström, 2015).

Within the context of CHAT, the mediated activity is conducted over a significant period to allow for the emergence of collective goal based upon the situated context. Therefore, examining activity within a system, over an extended period of time allows the researcher to view the development of the mediated human agency within context of the situated environment.

To assist in the visualization of human activity, Leont'ev (1978) includes a three-part hierarchal structure of activity, actions and operations as fundamental units of analysis for activity theory. In context of this unit of analysis, activity is collectively developed and primarily motivated through social interaction. Actions are individual and goal driven that can best be “understood as conscious, goal-oriented processes that move towards the fulfillment of the object” (Rybacki, 2009, p. 292). Operations can be described as unconscious acts that occur within the context of the activity. For example, within the context of playing a team sport such as football; the activity can be described as the collaborative group of players working together towards the common goal of winning the game. As a whole a common understanding of what the team must do to accomplish this task is negotiated through the mediated actions of the players. Therefore the actions describe what the individual players must do in order to accomplish the task of winning the game. Operations such as running and jumping are done unconsciously in

response to the activity. Thus, understanding the activity system as the sum of its parts, allows the researcher to draw upon the individual units for further analysis in context of the situated activity (Cole & Engeström, 1993; Hsu et al. 2010).

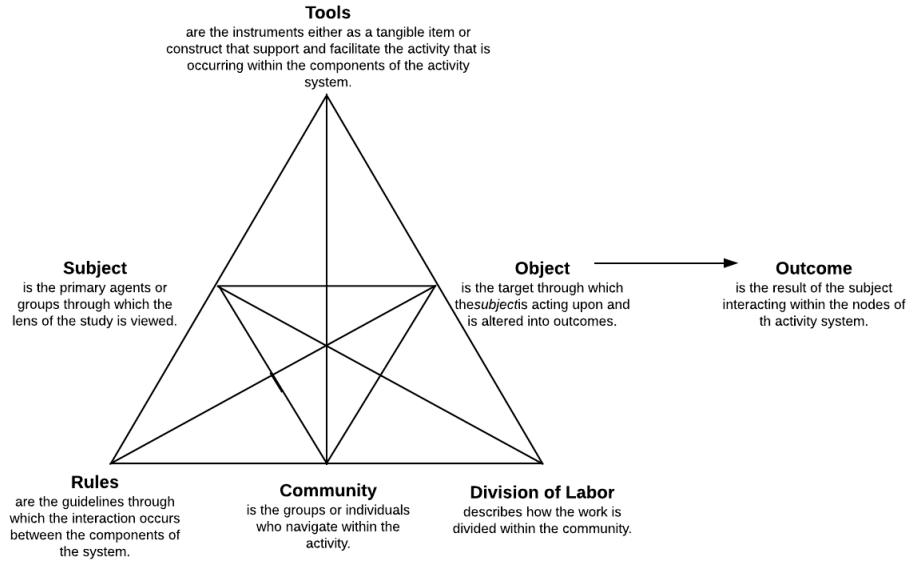
### **CULTURAL HISTORICAL ACTIVITY THEORY**

Cultural Historical Activity Theory (CHAT) was developed upon the foundation of Vygotsky's (1978) socio-cultural theory in which individuals make meaning through "social, cultural, educational and historical context" (Postholm, 2015, p. 45). Lev Vygotsky (1978) is often credited for the first generation of CHAT which established a base from which predecessors built upon. Vygotsky proposed the theoretical perspective that artifacts mediate all human action and everyday artifacts such as a phone impact how we interact with one another and within our community. The overarching idea emphasized the role of the social context of the artifacts within the interpretive nature of meaning making in the content. Even though Vygotsky's activity theory (1978) was considered groundbreaking, Leont'ev expanded its theoretical aptitude by describing activity as shared meaning amongst its members whereby roles are negotiated within the system (Leont'ev, 1978).

Alexei Leont'ev (1978) is associated with the second generation of CHAT, and he addressed this limitation by asserting "that many human actions make sense only when seen in the context of collective activity, wherein different people take on different roles according to a division of labor mediated by rules" (Beatty & Feldman, 2012, p. 285). An example of collective activity could include a production of a play, participation in a team sport such as football, working on a group project or family interaction. The final goal is the same but the roles of the individual members differ. To elucidate further, an individual's response to a stimulus is dependent upon their role and interaction with the stimulus within the activity system (Leont'ev, 1978). An

example of Leont'ev proposal can be demonstrated when an individual changes roles within a system such as a football player transitioning to team captain or a student changing roles from technology developer to team leader. Even though the participants are still working within the same collective community their roles within the activity have changed which affords them a different perspective through which to interact with the other participants and artifacts.

Yrjö Engeström's (2001) is often credited for the formulation of the third-generation of activity theory to include development of dual or multi-systems interpretation of the activity system (Beatty & Feldman, 2012) such that all components or moments contribute to the outcome. The third generation activity theory builds upon the conceptual tools to understand the dialogue through multiple perspectives instead of a singular focus through the interaction of two systems to facilitate the third space learning environment (Engeström's, 2001). In addition, CHAT "views human activity as situated and knowledge as dispersed and multilevel, occurring within culture, history, and material contexts" (Chinn, 2009, p 645). Currently CHAT is comprised of a matrix system through which collaborators and variables interact to make meaning of the context around them. Knowledge is constructed through discourse and interaction between the elements and is a primary focus of CHAT (Timmis, 2014). Engeström (1987) describes the mediated action of discourse within and between the nodes as contradictions which offer opportunities of change and growth for the participants (Farrar, 2016; Amory, 2010). The Cultural Historical Activity Theory triangle is represented in (Figure 2.1) and illustrates the structure of the activity system and the tool of analysis that will be used within the study.



*Figure 2.1.* Cultural-Historical Activity Theory model representing human activity (Engeström, 1987).

There are seven key moments identified as key constructs within the system of interaction: subject, object, tools, rules, community, division of labor and outcome. By analyzing the interaction between and within these moments the epistemological understanding of participants is revealed for it is through these mediated intersections when learning occurs in context of the situated learning environment. The motive of the activity is discovered by examining the moments of the activity system as a whole to include the anticipated outcome (Roth et al., 2009). This study employs the use of CHAT because of its ability to parse the data into a cluster for analysis- an activity system, and expose the relationship among the moments within the activity system (Farrar, 2016). The key moments in CHAT are described in the following paragraphs.

The *subject* refers to one of the primary agents or groups through which the lens of the study is viewed (Hsu et al., 2010). For example this could mean individuals, students, groups or

organizations through which their perspective is analyzed with and against other variables within the cultural historical activity theory framework. In my dissertation study the subjects could include the teachers, students, parents, administration or the middle school campus as a whole depending upon the analysis and results of the study. In addition, subjects have the ability to employ agency depending upon their social position within the situated cultural and historical context (Ogawa, Crain, Loomis, & Ball, 2008). This enables the subjects to be active participants in different contextual roles in multiple activity systems. An example is exemplified through parents who can be the primary subject within the analytical frame of analysis for parental involvement in project-based learning or belong to the community when students are situated as the subject. Utilizing multiple lenses through which the activity system of project-based learning is viewed enables the researcher to answer how school-wide practice of project-based learning is represented by stakeholders within the middle school activity system.

The *object* refers to the target through which the *subject* is acting upon and is altered into outcomes. Sometimes this can be considered the catalyst or the primary interactive agent through which the subject interacts with to make meaning of the situation. The object acts as a channel to guide individual actions and make connections through the collective activity (Ogawa et al., 2008). The subject and object are linked through the transitive interaction of the system; therefore enabling the object to change the inherent structure of the activity system (Hsu et al., 2010). An example of an object in a school setting could be considered a school course such as Biology or Drama. In this study the anticipated object will be project-based learning. For it is through the development and implementation of project-based learning that the subject's actions will be mediated to make meaning of the outcome.

*Community* refers to the groups or individuals who navigate within the space of the object and help to form the organization and definitions of actions within group while interacting between the object and subject. The community can be viewed in two ways, as a section of society with commonalities or as a community of practice with collectively developed norms, routines and interactions (Hsu et al., 2010). An example would be dynamics of individuals within a school system such as the principal, teachers, students and their roles of interaction within the system and as a community of practice such as the actively working group of teachers developing and planning project-based learning units for students. Community can play a vital role in the interaction within the activity system as the moments are situated within and with the context of the system; thereby providing a foundation through which the subject and object mediate the learning.

*Tools* provide the instruments either as a tangible item or construct that support and facilitate the activity that is occurring within the components of the activity system. Within the activity system the subjects have the opportunity to utilize the tools as they interact with the object of the system. In addition, tools can be organized into two categories that which “are learned and used in activity and as products of activity” (Ogawa et al., 2008, p. 86). Tools can be visualized as documents for planning, cooperative group tools for facilitation of ideas and dialogue or content specific tools such as science probes for testing water quality. The rules and the applications of the tool vary depending upon the perspective of the subject in the study. Investigating how and why tools are utilized provides an opportunity for analysis for the research.

*Rules* are the guidelines through which the interaction occurs between the components of the system establishing a normative behavior of activity between and within the groups. The

rules can be clearly defined such as the safety rules and ethics within the science lab or unwritten rules that modify behavior. In the school system, rules govern what is taught, how it is taught and when it is taught with prescriptive expectations of success and outcomes. However, in a project-based learning environment rules regulate the interaction between the *subject*, *object* and *community* and therefore play a role in the development of the *outcome*.

The *division of labor* refers to how the work is divided within the community and facilitates identification of roles, responsibilities and tasks and is consistently being negotiated based upon the positions of power within the community. Negotiating positions while interacting with the subject and object assists in formulating new activity systems through which meaning making and learning can occur (Engeström, 1987). Therefore the division of labor node plays a contributing role in the overall analysis of the activity system. The division of labor can be exemplified by observing the roles negotiated by the group to complete a project-based learning challenge.

The *outcome* reflects the results of the subject's interactions with the object, tools, community, rules and division of labor of the activity system (Hsu et al., 2010). The outcome is the resultant of interaction within the activity system. By examining and reflecting upon the outcome participants are able to shape or reshape the outcome to meet their collective goal (van Eijck & Roth, 2007). In the school system the outcome could be based upon a student's or school's success in regards to a goal as a result of interacting within the system.

## **Contradictions**

Contradictions play an important role with the CHAT framework as they provide the dissonance and space in which learning occurs. According to Engeström (2011), contradictions are “historically accumulating structural tensions within and between activity systems” (p. 609).



Within the activity system, contradictions can be characterized as areas of conflict between ways of knowing and understanding within multiple constructs of the system and are in a constant state of flux. As individuals work through and develop a conceptual understanding of the phenomenon new learning is occurring (Shulman, 1986). It is this new ways of knowing that can be examined and analyzed within the research. Amory (2010) supports purposeful inclusion of contradictions within a system as they “challenge existing paradigms and allow for disruption and therefore learning” (p. 76). Contradictions are valuable in the learning process because they assist in the overall transformation of the activity system (Farrar, 2016).

An activity system is not necessarily static but rather flexible and adaptable to the changing tensions and contradictions within and between its components. The system is a living and breathing machine with moving parts that allow contradictions to manifest themselves in conflict and creative solutions (Engeström, 2011; Farrar, 2016). Although the term contradictions and conflicts may appear unconstructive; “their resolution are the driving force of change and development within an activity system” (Kahveci, Gilmer, & Southerland, 2008, p 329). Contradictions do not happen by accident but rather are the principle motive for change and create new forms of activity as solutions emerge (Engeström, 2015). Hence understanding where and how contradictions occur is fundamental in understanding the overall complexity and dynamics of the systems.

One of the goals of learning is to address contradictions to further the development of the community and the activity system (Engeström, 1987; Farrar, 2016). Contradictions hold a pivotal position that enable researchers to compare and realize connections between systems; therefore utilizing the contradictions in CHAT to understand the perspectives of project-based learning from multiple stakeholders at the middle school supports the use of this theoretical

framework. Additionally, the function of contradictions is central to realizing the numerous and multifaceted connections that exist between and within the activity systems (Lazarou, 2011). Recognizing these contradictions assists in moving the subjects through the object towards the reform goal of the activity system (Engeström, 1987). Thus recognizing contradictions or gaps provides an opportunity for discourse and learning within the system. Engeström also contends that the identification of contradictions assists practioners to focus their efforts on the root cause of the gap (Engeström, 2000).

Engeström (1987) describes four types of contradictions that are experienced within an activity system as it transforms: within a node, between nodes, when a more advanced activity system is introduced into the existing activity system and between activity systems. Each contradiction offers an opportunity of transformation for the system as knowledge is gained or adapted through the mediation process of the activity system. Utilizing the contradictions as a tool for analysis brings clarity to the complex system and allows the researcher to visualize the gaps that may be present internally with the nodes or externally with other activity systems. Building upon the idea of contradictions, a recent study examined four activity systems that involved science teachers teaching with and without computers and students learning with and without computers (Lazarou, 2011). An analysis was done to discover areas of commonality and dissonance between the components of the activity systems. Utilizing CHAT as the theoretical framework, the researcher was able to uncover the gaps and make recommendations towards the expected goals of reform.

The first type of contradiction is within a moment or node of the activity system (Engeström, 1987). To elucidate further, a contradiction could appear within the subject such that various perspectives are present within the member. Using Huck Finn as an example, Huck

(subject) struggled between a free vagabond lifestyle vs. a school boy. He was conflicted as to how he wanted or others wanted him to be (Engeström, 2015). How he negotiated this conundrum represents a contradiction that was present within the subject. In this case, exploring how and why this differentiation occurs offer an opportunity for learning. In examining the research, not only is it important to uncover the gaps but to also comprehend if and how the contradictions are resolved. How resolutions are resolved leads to another question “How did the transformation of learning occur?” The answer to this question is at the very core of the research process utilizing CHAT.

The second type of contradiction is the development of tensions between the moments or nodes of the system (Engeström, 1987). This contradiction is clarified through analysis of the mediation between the components of the system. This contradiction manifests as subjects interact within the activity system causing new artifacts and tools to form as part of the learning and growing transformation activity (Farrar, 2016). Resolutions of the contradiction in the activity system are an integral part of the transformation process and motivate the change to achieve the goal of the system. Using the previous example of Huck Finn’s life activity, the secondary contradiction can be realized between Huck’s vagabondism (subject) and the instruments (tools) he chose to employ that allowed him to survive (Engeström, 2015). The subject’s understanding (Huck) of the tool (wit) was being continuously mediated as problems were encountered within his life activity. This tension between the subject and tool represent a gap or contradiction in the learning. How Huck was able to adapt and develop his wit in order to survive his adventure, provided a measurable unit of analysis visible through the presence of the contradiction between subject and tools (Engeström, 2015).

Discourse between the activity participants and the newly advanced system/culture for achieving the object (Engeström, 1987; Farrar, 2016) describes the tertiary or third contradiction. The tertiary contradiction “appears when representatives of culture (e.g., teachers) introduce the object and motive of a culturally more advanced form of the central activity into the dominant form of the central activity” (Engeström, 2015, p. 70). What this contradiction exemplifies is the representation of old vs. new culturally advanced activities. Revisiting the story of Huck Finn, the conflict between the activity of vagabondism and schooling provides an example of the third contradiction. Formal schooling (advanced activity system) was interjected into Huck’s vagabond activity presenting a conflict or contradiction between the object and or motives of the two systems (Engeström, 2015). How Huck resolved this tension presented a unit of analysis according to the cultural historical activity framework. Applying this tertiary contradiction to the study presents an opportunity to investigate the present system of instruction against the infusion of project-based learning to further understand how the meaning and application are mediated amongst the participants.

The fourth type of contradiction exists “between the central activity and its neighbor activity” (Engeström, 2015, p. 71). This type of contradiction enables the researcher to compare the different activity systems within the study. Engeström (2015) refers to the fourth or quaternary contradiction as “neighboring activities linked within the central activity that is the original object of our study” (p. 71). Within the two systems an embedded object and outcome provide a basis of similarity and comparison between the two neighboring activity systems. “Conflicts and resistances appearing in the course of the implementation of the outcomes of the central activity in the system of the object activity are a case in point” (Engeström, 2015, p. 72) of the contradictions present between the two systems. Comparisons may be made between the

nodes of the activity system such as subject to subject or the system in its entirety as long as the objects overlap. An example returns us back to the story of Huck Finn and the representation of two neighboring activity systems; that of Huck Finn and the other his aunt's activity system. The object (learning) remains the same in both systems but the outcome differs because of the interplay between the moments within each activity system. How these neighboring activity systems produce a different outcome presents the unit of analysis for research. Another example of the fourth contradiction would be the comparison between the project-based learning teacher's activity systems to the student's. This contradiction may become visible if during the course of the research the teacher's perception of the learning while using project-based learning differs from students. Utilizing this fourth contradiction becomes an area of growth and learning for the participants in the study.

In sum, contradictions can be a source of conflict as the subject negotiates through the activity system. However, this tension is a necessary part of growth and can provide the motive for change (Engeström, 1987). In order for transformation to occur the contradiction must be recognized and attended to otherwise the system remains the stagnant. According to Engeström (1994) change cannot occur unless the contradiction is reflected and acted upon. This idea of reflection was also supported by Leont'ev (1978) who viewed reflection as the core to learning in which it provided a motive for the purposeful change within the activity system. In order for new learning or conceptual change to occur the old paradigm must be challenged (Shulman, 1986) to provide a pathway for new ways of learning and restructuring of the activity system. Employing CHAT and its components provides a venue through which to investigate activity systems for research.

## **CHAT in Research**

Cultural Historical Activity Theory has roots in Vygotsky's social cultural theory in which meaning is socially constructed through actions by the subject (Vygotsky, 1978). As a result of the socio-cultural influence and contextual relevancy, researchers have utilized CHAT as a framework for analysis. The hierarchical structure of collective, individual and routine human activity within the framework assist in making visible the invisible through the interactive constructs is one of the many reasons researchers choose this theoretical framework (Hsu et al., 2010). Understanding and transforming human actions within a social context is a primary focus of CHAT (Roth et al., 2009) making the theory valuable in a socio-cultural context. Advocates of CHAT contend that flexibility within context of the situation enable this theoretical framework to rapidly adapt to the introduction of new innovations (Lee, 2011). In light of this context, many other researchers have employed CHAT as an analytic tool for the following reason:

CHAT is broad enough to accommodate a great variety of contexts with different approaches and instruments, In addition to analysis of activities; it can be adjusted to clarify educational issues. Not only can CHAT explain situations in terms of dynamic relationships but also reveal social resources as they influence changes in human endeavors and educational practice (Nussbaumer, 2012, p. 46)

Building upon this reasoning, CHAT has been employed in a variety of studies. One study utilized CHAT as a theoretical framework to study the emergence of professional creativity as a result of professional development in England. Teachers reflected upon their current practices in contrast to their historical practices in context of neighboring activity systems. Analyzing the contradictions between the two activity systems of present and past, which represents the fourth contradiction, the author identified areas of creativity and growth through the intersections of professional development and practice contained within each activity system (Ellis, 2011).

CHAT not only provided the theoretical lens but also the analytic frame and structure for analysis.

In another study, Roth and Lee (2007a) used the second generation of activity theory to investigate the connected systems of community, students and scientists which affected a community effort of developing scientific literacy in students. Understanding the relationship within the system proved to be fruitful in uncovering the contradictions within the moments of the system developing a pathway for transformational learning (Engeström, 1987). CHAT also can be implemented with a broad spectrum of age groups and has been used as a tool for exploring how cultural factors influence preschool teachers' science activities (Sundberg et al., 2016) to understanding how technology is used in an undergraduate chemistry classroom (Kahveci, Gilmer, & Southerland, 2008). The versatility in application is considered one of the strengths of CHAT (Lee, 2011; Roth et al., 2009).

The usefulness of CHAT is not limited to education but can be expanded to include other collectives of human agency. In a recent study the framework, was employed by museum directors to develop resources that would maximize the learning and affective experience from their patrons (DeWitt & Osborne, 2007). The framework was intentionally chosen as a tool of analysis through which to view the interactive experience of visitors. Employing the constructs within the framework served as a focus through which to examine contradictions for the sole purpose of developing new artifacts or tools within the museum. CHAT has also been used in industry but for the sake of this research the focus will remain on the educational spectrum.

### **Benefits of CHAT**

Proponents of CHAT ascertain the usefulness and benefits of this theory as a change agent in educational research (Lee, 2011; Roth, et al., 2009). This belief is supported by the

significant increase of CHAT over the last twenty seven years. In 1990, activity theory was experiencing a dearth in citations, by 2005 the number had risen to over 200 (Roth & Lee, 2007b) and in 2016 over 6800 citations have been attributed to activity theory (Web of Science, 2016). Versatility to a wide range of studies plus its potential to “sublate traditional dichotomies in everyday teaching-learning situations including individual/collective, body/mind, intra-/inter-psychological, cognitive/emotive and psychological/sociological” (Roth et al., 2009, p. 131) have contributed to the rise and justification of its use. In addition, Lee (2011) contends

CHAT-based research can address five areas where educational change research experiences weaknesses and shortcomings: (1) the failure to fully analyze the context; (2) a tendency towards reductionism rather than embracing complexity; (3) low sensitivity to the effects of power and politics; (4) lack of concern with emotions and identity; and (5) the rapidity at which new innovations are often introduced (p. 403).

Social researchers advocate for the inclusion of contextual relevancy when conducting a study; in particular ones with ethnographic methods (Engeström, 2015). Ethnography affords the historical and contextual experience while CHAT situates the activity. According to CHAT, understanding of human activities can only be understood in context of the situation (Rybacki, 2009).

CHAT also has the ability to uncover and work within the contextual layers that encompass human activity, thus revealing the linkages of social and historical context within and between activity systems (Ogawa et al., 2008). CHAT embraces complexity through the visualization of the individual and collective activity, while attending to other nodes or moments of rules, tools and community that influence the outcome of the system (Orland-Barak & Becher, 2011). Deciphering human activity is not a linear process but rather a complex network of understanding the confluence of intricacies that wane and fluctuate within the activity system. Therefore CHAT does not reduce human behavior to a simple cause and effect relationship but



rather examines the complex nature of human activity within its situated context making CHAT a valuable tool in educational research.

Being attuned to the power and politics manifested through the contradictions present within the system is a strength of CHAT. Contradictions are a key construct that if “overcome, are the catalyst for learning and change” (Lee, 2011, p. 411). Tension between the moments offers reflexivity among the subjects as transformation of the system creates new tools and ways of being. Therefore, tensions and contradictions are not considered a weakness of CHAT but rather crucial components in uncovering the connected pathways in which change can occur (Lazarou, 2011). Understanding the root cause and the origination of power within the activity system creates a unit of analysis ripe for transformation. Contradictions enable the researcher to recognize and address the effects of power and politics within an activity system because of their ability to reveal tensions that were previously hidden.

Lack of concern for emotions and identity has been viewed as a shortcoming in educational change research (Lee, 2011). To address this area of need, CHAT offers the situated context which includes the emotions and identity enveloped within the system. Including emotions and identity is purposeful as it helps researchers better understand the motives and underlying tension for the activity. A drawback of excluding emotions in research can lead to a “cool” interpretation of the data based strictly on technical merit bereft of feelings for the participants. Therefore CHAT includes emotions and identity to help formulate an elucidated portrayal of the phenomenon. Supporters of CHAT assert that identity goes beyond recognition of self and in order “to understand identity, we must consider the tools, object, community, rules and division of labor associated with the primary activity system” (Roth et al., 2004, p. 68). Thus a benefit of CHAT is its attention to the whole individual to include emotions and identity that

help situate the individual within the system. Without the inclusion of emotions and identity only a partial and almost robotic portrayal of the individual is represented within the human activity.

Innovations are consistently being introduced within the educational realm. Fresh tools of technology, pedagogical tools and insight as to how people learn have been developed through application of research. As these new tools are being introduced their effectiveness must also be examined within context. Another benefit of CHAT is its ability to incorporate new information and tools within the activity system (Lee, 2011). There is no need to wait for a test score to prove effectiveness but rather can be incorporated within the system and interpreted through the tensions or contractions that may result as a consequence of its inclusion.

In sum, there are many benefits that have been attributed towards the use of CHAT in educational research. The theory encapsulates a systemic view of socially constructed activity enabling a broad and diverse application. Complex systems can be analyzed through the structure of moments and contradictions that can fluctuate and reflect the learning that occurs through the transformation process (Engeström, 1987). Contradictions provide a unit of analysis and act as change agents in the conversion and resolution process. Emotions and identity are included within the constructs of the framework to present a more comprehensive representation of the phenomenon. Last but not least, CHAT is responsive to new innovations through its ability to incorporate and analyze change within the activity. Even though there are many benefits to utilizing CHAT, as with any theoretical framework limitations occur.

### **Limitations of CHAT**

Critics of CHAT bring forth concerns regarding vagueness of the constructs within the theoretical frame which can become the primary point of contention if not defined clearly and can lead to misunderstanding or distortion of the term. Bakhurst's (1991) criticism of the term

activity provides an example of this misinterpretation. He equates the action of writing a paper with the activity of educating, referring to both as a type of activity. Bakhurst (1991) argues that writing a paper has no exploratory value for activity and cannot be applied to the framework (Engeström, 2015); therefore, minimizing the application of CHAT for research. However, he is misinformed on what constitutes activity and is applying the term with a broad brush to actions which are inclusive within the activity but are not recognizable as activity within the framework. This argument implies that Bakhurst is not interpreting the term activity correctly or applying the term to the appropriate context.

Another example of vagueness is demonstrated through the critique presented by Chinn (2009) of what constitutes knowledge. Chinn (2009) calls into question the ethnocentric view of knowledge presented by the researchers in regard to indigenous knowledge and science (van Eijck & Roth, 2009). She asks caution be exercised on equating indigenous science knowledge as having less worth than other forms of knowing. She argues unwillingness or a narrow interpretation of the object has the potential to reify a privileged position and presents barriers of understanding as new problems and applications emerge (Chinn, 2009). In research, it is important to qualify and clarify key constructs within a theory and consideration must be taken on potential bias and limitations within the definition. This example represents a challenge point of interpretation for CHAT. Therefore, providing clarity of the constructs presented in the activity system minimizes the limitations that may be present with its use.

Another limitation of CHAT is its double-edged sword of complexity. On one side, the multi-faceted nature of CHAT enables the researcher to interpret multiple layers as the subject mediates their behavior through the system. The opposite side presents a complex view of the activity making analysis a challenge (Yamagata-Lynch, 2007). Compounding the dilemma are

rich data sets that produce multiple and overlapping tensions, particularly when situated in a network of activity. This potentially could result in various interpretations; therefore the researcher must be clear and concise during the analysis of the activity. Although the theory allows for flexibility in interpretation; how the results are justified makes the researcher vulnerable for challenge. Thus, supporting the results and drawing conclusions must be done with utmost care to support the validity of the study. Although limitations are present within CHAT, addressing those challenges while negotiating through the research process can conclude in a positive result for the researcher and educational community.

### **Summary of CHAT**

In conclusion, CHAT provides a venue for connecting the subject and object related to the activity within the system. In addition, it provides a framework and unit of analysis through which to garner insight into the collective actions of the community and provide evidence of learning through contradictions, “situating the activity within the greater social, historical and cultural context” (Farrar, 2016, p. 11). CHAT through its organization and structure provides a method to answer the following guiding question by examining not only the individual participants as they engage in project-based learning but takes into consideration the situated context. How this question will be answered is discussed further in methods.

#### **Driving Question:**

*How is the school-wide practice of project-based learning conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible?*

### **GAPS IN THE RESEARCH**

Research has been done on various components related to project-based learning. For example, Duncan and Tseng (2010) conducted a study to document the implementation of a project-based learning unit of Biology and improvements in learning for students. The research

recorded a positive result for student learning on the implementation of project-based learning on one unit in Biology. Many other studies report similar results of increased student learning as a result of actively engaging in project-based learning (Duncan & Tseng, 2010; Gültekin, 2005; Mergendoller & Maxwell, 2006; Tal, et al., 2006). Other research has focused on project-based learning practices that foster inquiry and encourage urban students learning of challenging subject matter (Tal, et al., 2006). The results indicate that teacher's planning and having a high degree of investment in student success were attributed to the success of project-based learning. Kanter (2010) conducted "systematic experiments to test which instructional supports matter for learning and how much" in the project-based learning environment.

Even though there have been studies investigating some components of project-based learning, more needs to be done. In review of the literature gaps surfaced regarding project-based learning through absent or limited research on a subject of study related to project-based learning. Missing in the literature is the investigation of the relationship between teachers' epistemological beliefs regarding project-based learning, and preferred teaching environments (Rosenfeld & Rosenfeld, 2006). Understanding what happens in the teaching and learning environment when teachers are operating from a different epistemological paradigm then what is being required in the classroom, such as project-based learning is worthy of investigation. Determining teacher needs and adjusting the level of support could result in professional growth for the teacher and in return academic success for the student. It is suggested using additional "tools, which offer different perspectives and may hold promise in predicting or explaining different teacher responses to constructivist learning environments" (Rosenfeld & Rosenfeld, 2006, p. 398). It is possible that this mismatch in teaching and learning paradigm could account for teacher hesitation in the implementation of project-based learning. Attention to this

misalignment could be “particularly relevant when the innovative measures are very much different from the existing practices” (Lam et al., 2010, p. 494).

Another noted gap was the limited research available on the impact of project-based learning professional development on teacher knowledge and practices and student outcomes (Capraro et al., 2016). Attention to professional development training regarding to project-based learning has the potential to adjust teacher’s epistemological frame towards the complexity and interdisciplinary nature of project-based learning. Understanding teachers’ epistemology regarding instruction could provide insight as to why some teachers readily embrace change and while others resist it (Rosenfeld & Rosenfeld, 2006). To provide additional support Chang and Lee (2010) suggest that not only project-based learning pedagogy be included in professional development but also provide training in the use of the tools of technology commonly used to implement project-based learning successfully in the classroom. Providing justification for implementing project-based learning along with specific tools which facilitate implementation removes barriers to application in the classroom. In theory, this sounds plausible; however, limited research has been done on investigating teacher professional development of project-based learning and the impact on implementation and student learning.

Even though, components of project-based learning have been explored to include teacher and student learning there is limited research on whole campus implementation of project-based learning according to the gold standard (Buck Institute for Education, 2015). Investigating how school communities can be utilized to support project-based learning warrants further inquiry. Particularly, how school activity systems which include multiple structures to support all stakeholders in the active practice of project-based learning (Thomas,

2000). Understanding the factors that are conducive and necessary for support of project-based learning implementation leads to a greater likelihood of realization. Research has been done on teacher barriers to include pedagogical knowledge and personal paradigms, student barriers to learning through project-based learning such as time allocation and fidelity of implementation; however investigating a campus in which project-based learning has been successfully implemented as a primary form of instruction has yet to be investigated. The purpose of my research is to investigate how the school-wide practice of project-based learning is conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible. .

## **NEED OF RESEARCH**

Educational reform has garnered a significant amount of time and attention as a result; project-based learning has risen to the forefront as a valuable tool in the movement to prepare students for the challenges of the 21st century. However, a wide variance of implementation and understanding of project-based learning has been noted in the research, with little information on what full project-based learning implementation looks like and sounds like in the educational system within a school-wide community of practice. In a study conducted by Han et al. (2015) student growth and achievement were measured in a long-term study conducted with high school math and science teachers who took part in a three-year professional development series of STEM project-based learning. The research demonstrated an increase in student interest and academic ability, especially with at risk-populations. Again, the focus was on student outcomes in high school math and science classes but not how the school community was developed to make this growth possible.

To address this mutually agreed upon understanding of the gold standard of project-

based learning a clearly defined target and model of project-based learning must be examined and analyzed. It is only through reaching a common understanding of truly effective project-based learning as a normative structure in the school community that others may have a potential guide to follow. There is little debate as to the efficacy of utilizing project-based learning as a progressive tool in the educational reform movement. However if project-based learning is to become systemized as a norm within the educational system further research is needed to clearly define the components that support the implementation of project-based learning and investigate how challenges that have been uncovered through the contradictions are negotiated through the system. Developing a clearer understanding assists educators in designing curriculum and organizing structure within a school that is conducive to project-based learning. In addition, investigating the epistemological frame of teacher's who are actively practicing project-based instruction will guide professional development in developing and supporting emerging practioners of educational reform. Lastly, students who are the ultimate consumers and benefactors of the implementation of project-based learning need to be examined to determine factors that contribute to their success in applying 21st century skills to the content.

## **PROPOSED RESEARCH**

My proposed research addresses the gap of understanding how the challenges associated with school-wide implementation of project-based are negotiated and manifest themselves into conditions that allow for a thriving and successful implementation of project-based learning initiative within a school-wide school community (Thomas, 2000). In this study, school-wide is inclusive of all contents to include science, math, social studies, language arts and fine arts teachers, administration, students and parents. Examining a highly functioning project-based



learning school culture from various perspectives to include leadership, teachers, students and parents to investigate how school communities support the implementation of the project-based learning model is the focus of my research. By doing this I will be addressing the need of further research regarding project-based learning by providing a model of constructs that are necessary within a school community to guide educators toward the implementation of school-wide project-based learning and answering my research question of “*How is the school-wide practice of project-based learning conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible?*”

## CONCLUSION

In conclusion, project-based learning is a student-centered, multi-disciplinary approach to instruction that provides students with the tools that enable them to be prepared for the college, career and the challenges of the 21st century. While there has been significant research regarding project-based learning as an effective tool to promote student learning, more can be done. With our diverse student and teaching population, meeting the needs of all can be a challenge. Before the barriers of implementation can be addressed it behooves us to reinvestigate the current research and build upon what is already understood regarding project-based learning and work to fill the gaps to benefit society as a whole as we embrace the challenges of educational reform and prepare students to meet them.

## **Chapter 3: Methods**

In this section I will provide an overview of the problem and justify the need for the study. Building upon the need or gap, I will describe the methodology of my research to include exploratory question to guide the study. In addition I will provide an overview of the theoretical framework and validation for its application for data collection and analysis. Research procedures will be described in detail providing a blueprint for fellow researchers.

### **METHODS**

The purpose of this qualitative case study was to examine how the school-wide practice of project-based learning is conceptualized and negotiated within and between stakeholders of a middle school to make implementation and sustainability possible. The gap in the literature revealed limited research on constructs that support school-wide application of project-based learning (Thomas, 2000); therefore conducting this study addresses a need in educational research. The site of this research was conducted with a public middle school, all girls leadership academy which has implemented the school-wide practice of project-based learning embedded within the curriculum. For confidentiality purposes the school will be referred to as Border Leadership Academy. The school is open to the public, with two screening criteria of an interview and an assessment for acceptance due to the accelerated curriculum (Young Women's Preparatory Network, 2002). Currently, all students entering 6th, 7th or 8th grade are eligible for taking the entrance exam to ensure the strength of their foundational skills in preparation for the rigor needed to succeed in college prep courses. The academy's curriculum is centered on developing the girls' 21st century skills to facilitate and support college preparation; thus, the inclusion of project-based learning was purposeful. In addition, the interview explores the students' dedication and willingness to participate in the rigor and structures of the school.

Project-based learning is defined as “student-centered instruction that occurs over an extended time-period, during which students select, plan, investigate and produce a product, presentation or performance that answers a real-world question or responds to an authentic challenge” (Holm, 2011, p. 1). Authenticity is a key construct of 21st century as it provides relevancy and rigor within the learning environment (National Research Council, 2012; NGSS Lead States, 2013a; Texas Education Agency, 2010b). In addition, authentic experiences become meaningful to participants if situated within their own lives (Rahm, et al., 2003). Project-based learning in conjunction with authentic tasks “highlights the complex and multifaceted nature of interactions between learner, task and environment” (Buxton, 2006, p. 700). The intertwining nature of the interactions supports the use of a case study as the activity is situated within the school environment.

#### **EXPLORATORY QUESTION**

*How is the school-wide practice of project-based learning conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible?*

The question was created in response to a gap in the research. Embedded within the question are key subjects that will be explored and defined more clearly within the study. The phrase *school-wide practice* refers to those practices which are pervasive throughout the system. School-wide practice indicates a systemic application of the activity under review in contrast with only partial implementation of a population sub-group or specific content. In a study conducted by Olenchak & Renzulli (1989), a school-wide application of an enrichment program was applied to all students and not restricted to the identified gifted and talented students. The results indicate an enhancement of student learning across all populations and an increase in teachers’ attitude towards the adoption of a new program. In review of the literature school-wide

practice is not the norm but rather the exception in research related to project-based learning. In the beginning of this research, over 48 project-based learning articles were examined for content and structural analysis and only one of them included a school-wide application (Holm, 2011; Welsh, 2006). Considering, the school-wide application of project-based learning is worthy of exploration to address the gap in the research.

Another underlying principle within the question is project-based learning. Project-based learning can best be described by the following paragraph.

Project-based learning has a number of key features: active construction, situated learning and social interaction. In project-based learning, situated learning occurs when students engage in real-world, meaningful problems that are similar to the activities that adult professionals such as scientists engage in. Project-based learning allows students to gain a deeper understanding of materials when they actively construct their understanding by working with and using ideas (i.e., using active construction). Social interaction is another important feature that allows students to work with others such as peers and teachers to construct shared knowledge (Hsu et al., 2016, p. 55).

The complexity of project-based learning is evident in the description provided; hence providing fertile ground for confusion about the application and meaning making process. Terms like active construction, situated learning and social interaction can operate on a continuum for the participants if not mediated through the activity system. An example of this misunderstanding can be elucidated with the term active construction. Active construction can mean one individual working independently on a task such as resolving a math problem to construct meaning. In contrast, it can also mean a collaborative group generating unique ideas and resolutions to task to mediate their meaning making as a collective. Therefore, the study affords an opportunity to investigate where on the continuum meaning making of project-based learning occurs for the participants. As a researcher, utilizing the philosophical lens of constructivism, allows for multiple truths as perceived by the participants and the researcher through interaction within the context (Lichtman, 2013). Hence, investigating how project-based learning is manifested by the

members of the community contributes to the overall understanding and truths regarding implementation.

## **RESEARCH PROCEDURES**

A constructivist epistemology was applied to the study. Epistemology is the process of thinking and is built upon the relationship between what we know and what we seek (Lincoln et al., 2011). Applying a constructivist's view implies the belief that people construct their own understanding of reality based upon the interactions with the contextual environment (Lincoln et al., 2011). Operating from a constructivist's position, I acknowledge the link between myself as a participant observer and the participants as part of the contextual milieu. From a constructivist's standpoint who we are and how we understand the world is central to how knowledge is represented in the study. Included in the research question is the conceptualization of project-based learning from the identified stakeholders within the community; therefore understanding how those realities of project-based learning were constructed to form different perspectives is essential. Hence in the research, I immersed myself in the culture of the school to include daily observations of classes, faculty meetings, planning sessions, parent/teacher meetings and community presentations. The purpose of the diverse observations was to formulate an understanding of how meaning was developed and constructed in various environments within the school community.

Cultural historical activity theory or CHAT was used as the theoretical guide and provided a framework from which the data was organized and analyzed. CHAT is situated in a cultural, historical and material context of the environment and provided a unit of analysis to interpret human activity within the activity system (Chinn, 2009). In addition, CHAT was used to analyze the central activity system of teaching and learning for project-based instruction

providing a structure for the case study. According to Yin (2003) using a theoretical orientation within a case study, guides the analysis and draws attention to relevant data within the research. Therefore utilizing both CHAT and case study methodology provided a contextual, multi-faceted view of the activity of project-based learning in the study. The framework and unit of analysis in CHAT along with the tools of a case study was used to answer the primary guiding question of the research. “How is the school-wide practice of project-based learning conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible? I utilized the nodes or moments within CHAT, as an organizational tool, which assisted in the visualization of the contradictions between and within the constructs of the school system. An example, of the first type of contradiction manifested within the object between the teachers and students, regarding projects. Expectations of the project offered opportunities of growth for students and clarification for teachers. Further elaboration of this finding will be discussed in Chapter Four.

A descriptive case study was used to examine how school-wide practice of project-based learning was manifested by identified participants in Border Leadership Academy. The primary goal of a case study is the specific description of a case (Flick, 2009). Merriam (1998) elaborates upon the definition of a descriptive case study as “one that presents a detailed account of the phenomenon under study” (p. 38). The primary purpose of this study was to examine closely how project-based learning was conceptualized among participants to make implementation and sustainability possible therefore; utilizing a descriptive case provided the proper vehicle for an in-depth study in its natural setting (Creswell, 2003; Merriam, 1998). The goal was to examine the case to uncover interactions, events and cause-and effect connections that support the implementation of project-based learning (Hays, 2004). Uncovering the meaning

of interactions assisted in revealing the reality constructed by the participants as they interacted within their social worlds (Merriam, 1998). In addition, using a case study methodology allowed space for multiple interpretations of reality as the members made sense of their experiences in the world (Yazan, 2015; Merriam, 1998).

Within a case study three aspects must be included as part of the methodology (Merriam, 1998). The first is the researcher must focus on one specific phenomenon and bound the context (Merriam, 1998). This is important as a school-wide case study has the potential to introduce variables that are not necessarily the focus of the study and draw the researcher away from the specificity of the project-based learning activity being observed. For example, within a school setting if the researcher started to concentrate on high absenteeism rates among students and investigate why they were occurring instead of the focused activity of project-based learning this would be considered a distraction. A distraction extends beyond the bounded system of the case under study, weakening the overall analysis (Merriam, 1998; Yazan, 2015). Therefore diligence to adhere to the focus of project-based learning was essential. In light of this recommendation, I focused on those elements which made implementation possible or acted as a hindrance to fruition of project-based learning. These elements included curriculum development, scheduling, expectations, and understanding of 21st century skills, alignment and buy-in from stakeholders.

The second feature of a case study is the inclusion of observations to include participant observations. Observations must be captured through thick descriptions that provide a rich elaboration of the phenomenon with as many details as possible. “Rich data reveals participants’ views, feelings, intentions, and actions as well as the contexts and structures of their lives” (Charmaz, 2006, p. 23) providing a thick description (Geertz, 1973) of the events and individuals

intertwined within the case. Thick descriptions include detailed field notes of observations, documents and interviews that help to reveal meaning beyond the beyond the surface of the phenomenon (Geertz, 1973). An example of a thick description included within the study is the interaction between students, parents, teachers and administration on the parent/teacher night. A sample is included below:

On parent night, students are guiding their parents on a 7 minute rotation of their schedule. All the girls are wearing green shirts that say “Keep Calm and Transform”. Within each classroom there are approximately 12 students, 8 of the 12 students have two parents present the remaining four have a single parent. In each of the classrooms a 4ft. x 8ft. section of the wall is dedicated to a specific college to include costs, specialty, location and traditions. Each hallway includes college information as well, there are at least two in each hallway of the school. As the parents are transitioning from class to class the principal is very visible and stops and talks to parents along the way calling each girl by name. One of the interactions that transpired was the principal saying to a parent, “Kendal is off to a great start.” The parent responded with “Thank you, I love to hear that.” (Venegas, 2017, Parent/Teacher Night).

This thick description created a visualization of the event with evidence of the pervasive theme of college readiness apparent within the school environment.

The third aspect is the research should expand upon the researcher’s experiences, validate what is already believed to be true or reveal a new discovery about the subject (Merriam, 1998). In a recent case study involving project-based learning in charter schools, it was discovered through the research that educating parents on project-based learning and instruction was an important component in the implementation process (Welsh, 2006). This was a significant finding for Welsh realizing the significance of parental support for the school and the successful implementation of new programs as well. In context of this study, I examined closely how project-based learning was manifested or modified within the school setting to make application possible. Using case study methods, I built upon the understanding of the content and use of my background knowledge as a conduit for further investigation of the case. Utilizing a case study



methodology supported the overall goal of investigating how a school-wide practice of project-based learning was conceptualized by the stakeholders of a middle school to make implementation and sustainability possible. To further support this goal a description of the case study site and participants will be discussed in the following paragraphs.

### **Study Participants**

A case study researcher works to create an in-depth picture and understanding of the case through multiple data points presenting a comprehensive representation of the phenomenon (Merriam, 1998). Case studies that are conducted within a natural setting provide opportunities for specific examination of focus populations to gain more concrete and contextual data for analysis (Hays, 2004; Merriam, 1998). The selection of the case study school site was purposeful. The participating school Border Leadership Academy (pseudonym), in the study is a public, middle school located in a Southwest city along the Mexican and United States border. The school has two affiliations the local school district and membership in the Young Women's Preparatory Network®. The Young Women's Preparatory Network (YWPN) is a nonprofit organization that partners with public school districts to operate the largest network of all-girls', public, college preparatory schools in the nation (Young Women's Preparatory Network, 2002). A Science, Technology, Engineering, Arts and Math or STEAM focused curriculum is featured in all participating schools along with core values of college readiness, leadership and wellness life skills. The school was opened in the 2016-2017 with 125, sixth grade and 98, seventh grade girls, with planned expansion every year until the school is fully operational with 6th-12th grade students. In the 2017-2018 academic school year, the grade levels expanded to include eighth grade as well. The school demographics are comprised of 88% Hispanic, 5% African American, 5% White and 2% other and reflect the demographic makeup of the city. All girls living within

the city entering 6<sup>th</sup>, 7<sup>th</sup> or 8<sup>th</sup> are eligible to apply; however must take an entrance exam prior to acceptance. The intent of the exam is to ensure the students have enough foundational knowledge to be successful with the advanced curriculum.

The Young Women's Preparatory Network (2002) mission statement emphasizes the goal of preparing students with academic and leadership skills needed for the 21<sup>st</sup> century.

Our mission is to support single-gender, college-preparatory, public education in Texas and beyond, giving young women the academic and leadership skills to achieve success in college and in life. (YWPN, 2002, Mission Statement).

In order to support the mission of preparing students with academic and leadership skills Border Leadership Academy has embraced project-based learning as a curriculum and learning structure to conceptualize and meet the goal of college and life preparation for their students. For this reason, the school was selected as the research site.

Even though this is an all-girl school, the intent of the study is not to focus on gender research; however it was included as a limitation within the documentation. The school-wide application of project-based learning was the primary justification for selection of the school. Border Leadership Academy, through its systemic application of project-based learning offered me the opportunity to investigate how school-wide practice of project-based learning was conceptualized by the stakeholders of a middle school to make implementation and sustainability possible. Particularly, how the identified members negotiated the meaning of project-based learning to make school-wide implementation possible.

The study site of Border Leadership Academy adhered to the gold standard of project-based learning, which was a primary reason for its selection. The gold standard of project-based learning is inclusive of the following design guidelines in Table 3.1.

Table 3.1

*Gold Standard of Project-based Learning*

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Gold Standard of Project-based Learning

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- Challenging problem or question
  - Sustained inquiry
  - Authenticity
  - Student voice and choice
  - Reflection
  - Critique and revision
  - Public product
- 

(Buck Institute for Education, 2015, p.1)

The projects were constructed by first creating a challenging problem or question such as “In our border community what would be the best way to allocate water resources for both countries?” This task provided authenticity as it connected to the community and provided opportunity for sustained inquiry. The collaborative structure of the project facilitated student voice and choice enabling multiple viewpoints in the solution. Reflection was demonstrated through journal writing. Critique and revision was an ongoing process that occurs with the teachers and classmates as the project progresses. Culmination of the project was demonstrated through a public product that was shown to community members, peers or parents. Authenticity to the gold standard of project-based learning contributed to the selection criteria of the school site for my research study.

Other schools and programs have embraced project-based learning as a partial structure within their organizations but what makes the study school unique is the school-wide embrace of project-based learning for all stakeholders within the organization. The study participants were purposefully sampled (Lichtman, 2013; Flick 2009) because of their affiliation and participation with project-based learning at the school. To represent a comprehensive view of the

conceptualization and manifestation of project-based learning amongst stakeholders, participants were purposefully sampled to represent different lenses of the activity. Teachers, administrators, students and parents comprised the purposefully sampled participants. Table 3.2 provides an overview of the participants.

Table 3.2

*Overview of Participants*

<b>Participant Population</b>	<b>Total #</b>	<b>Specificity</b>
Teachers	6	Math Science Social Studies English Language Arts STEM Theatre
Students	9	3 - 6 <sup>th</sup> Grade Students 3 – 7 <sup>th</sup> Grade Students 3 – 8 <sup>th</sup> Grade Students
Parents	9	3 – 6 <sup>th</sup> Grade Parents 3 – 7 <sup>th</sup> Grade Parents 3 – 8 <sup>th</sup> Grade Parents
Administration	3	Principal Assistant Principal Curriculum Coach

In part because of the school-wide, cross-curricular development of project-based learning, six teachers that represented a variety of academic disciplines were recruited for interviews and observations. Math, science, English language arts, social studies, STEM and theatre teachers were invited to participate in the study. Nine students and their parents, three from 6th, 7th and 8th grade were recruited via an invitation presentation during a Parent, Teacher, Student Organization (PTSO) meeting. Each participant was purposefully selected as

representatives for their respective grade level for interviews and observations. The inclusion of parents and or guardians was based upon the research of Welsh (2006) who uncovered the pivotal role that parents play in the support of project-based learning. Three administrators from the school were also selected to be part of the study. In total, 27 participants to include teachers, students, parents and administrators volunteered to be part of the research to represent multiple viewpoints of project-based learning.

All confidentiality rules and regulations regarding participants were followed according to IRB approval to ensure privacy and protections under the study. All participants in this study were given the opportunity to either accept or deny participation in the research and to remain anonymous (Lichtman, 2013). Pseudonyms were used to protect each participant's identity. Data was gathered, coded and evaluated through member checking, with individual identifiers removed to protect the participants upon publication. Member checking was conducted by me and the individual participant in the study. Data collection notes, interviews and documents were stored at my home in locked computers and cabinets. Written permission was received prior to any observations, interviews or data collected for the study (Lichtman, 2013; Flick, 2009; Babbie, 2014).

### **Data Collection and Instrumentation**

This study used observations, interviews and document analysis as the primary tools to gather information on how a school-wide practice of project-based learning was conceptualized by the stakeholders of a middle school to make implementation and sustainability possible. Observations were conducted in a variety of settings to include the classroom, planning sessions, presentations and community meetings. Interviews were also completed with each of purposefully sampled participants to include six teachers, nine students, three administrators and

nine parents to elucidate the perspectives of project-based learning community of practice members. In addition, documents such as minutes from meetings, planning forms, school organizational structures and student projects were collected and analyzed. Utilization of multiple forms of data was essential in developing trustworthiness for triangulation for analysis (Lichtman, 2013; Flick, 2009; Babbie, 2014). Table 3.3 provides an overview of the participants and data collection.

Triangulation refers to a checking of data, methods and investigators to demonstrate an alignment or congruence of the phenomenon being observed (Lincoln & Guba, 1985). In qualitative research, particularly in a case study, multiple data sources are utilized to represent the data (Hays, 2004). Multiple sources include observations, interviews, documents and other sources to assist in the development of clear illumination of the phenomenon under study. Yin (1994) supports the use of triangulation in case studies and elaborates further by stating “multiple sources of data are a major strength of case studies” (p. 228). The use of triangulation to establish credibility is promoted as an established norm in qualitative research (Loh, 2013; Lincoln & Guba, 1985; Creswell & Miller, 2000; Merriam, 2009; Yin, 2011); therefore creating a foundational framework from which to promote trustworthiness.

## **Interviews**

Conducting interviews is a key element in case study research (Lichtman, 2013). It provides a way for participants to share their stories or perspectives that might not be evident through observations. One of the primary purposes of interviewing is “to hear what the participant has to say in his or her own words, in his or her own voice, with his or her own language and narrative” (Lichtman, 2013, p. 195). Qualitative researchers often view interviewees as conversational partners who can share their experiences in a more personal way

Table 3.3  
*Overview of Data Sources*

Data Source	Description	Teachers	Students	Admin.	Parents
Interview	Semi-structured that will occur in the middle of the study.	6 teachers	9 students	3 administrators	9 parents
Classroom observation non-project-based learning	Observation of teachers and students in non- project-based learning environment.	12 classes @ 2 for each teacher	18 classes @ 2 for each student.	0	0
Classroom observations of project-based learning	Observation of students and teachers in the classroom while engaging in project-based learning	24 classes @ 4 for each teacher	36 classes @4 for each student	0	0
Teacher planning session observation of project-based learning.	Observation of teachers planning for project-based learning.	4sessions @ one per month	0	0	0
Community observation	Observation of teachers, students, administration and parents as they interact with the community on project-based learning activity.	3 presentations, field research & community outreach	3 presentations, field research & community outreach	3 presentations, field research & community outreach	3 presentations, field research & community outreach
Instructional artifacts	Includes lesson handouts, Power Point slides, laboratory exercises, equipment, articles, diagrams, graphs, notes written on the board.	12 @ 2 artifacts per teacher	0	0	0
Foundational artifacts	Includes administrative documentation, funding, mission statement, strategic yearly plan.	0	0	6 @ 2 artifacts per administrator	0
Student work artifacts	Includes completed worksheets, project-based learning planning and working documents, student projects,	0	18 @ 2 artifacts per student	0	0

with the researcher (Lichtman, 2013) and assists in understanding “experiences in which you did not participate” (Rubin & Rubin, 2005, p. 3). Vygotsky (1987) believed “every word that people

use in telling their stories is a microcosm of their consciousness” (pp. 236-237). Therefore, it is important to listen to the voices of the participants through the interview process.

The purpose for interviewing in this study is two-fold. The first is “understanding the lived experience of other people and the meaning they make of the experience” (Seidman, 2013, p. 9). To understand the interviewer must develop questions and a structure and then listen to participants as they share their thoughts, feelings and perceptions (Lichtman, 2013). In project-based learning “there is a need to examine what kind of support must be used and whether the built-in support in the application” (Hsu et al., 2016, p. 72) of project-based learning achieves the desired outcome of school-wide implementation. Support could include time, organizational structure, administrative flexibility, scheduling flexibility and resources. Therefore interviewing the active participating members of project-based learning provides insight into the type of support that is present in the Border Leadership Academy.

There are many types of interview structures that range from tightly structured survey interviews with a preset range of answer selections to open-ended conversations (Seidman, 2013). In this study, I utilized a semi-structured interview format which applied standardized open-ended interview questions which allowed for elaboration questions of the interviewee (Seidman, 2013). In a semi-structured interview, there are primarily three types of questions used for gathering information descriptive questions, structural question and contrast questions (Flick, 2009).

Descriptive questions clarify the event from the perspective of the participant which reinforced the trustworthiness of the field notes taken during observations (Lichtman, 2013). An example of a descriptive question that was asked of teachers during the interview was ‘How would you describe the students when they are actively involved in project-based learning?’



Structural questions demonstrate how participants “organize their knowledge about the issue” (Flick, 2009, p. 170). In the case of this study, structural questions provided information on how project-based learning was conceptualized within and between the participants. One of the structural questions asked of teachers during the interview was ‘At your school project-based learning is part of the curriculum, can you please tell me the process that you and or your colleagues use to plan and implement the project?’ Lastly, contrast questions provide information about the differentiated meaning of project-based learning from the participant’s perspective (Flick, 2009). A contrast question presented to parents was, ‘Is there a difference between how your child works on projects compared to their content (math, science, etc.) courses? If so, how?’ In this study, contrast questions helped clarify the meaning of project-based learning from the viewpoint of each participant community of students, teachers, administrators and parents. These three questioning structures were applied in the development of the questions to align with the nodes associated with the CHAT activity triangle (Engeström, 1987).

The formation of these questions were guided by the components of an activity triangle (Figure 2.1) which assisted in identifying the motive of actions within the central activity as well as representation of the central activity being observed (Engeström, 1987). Constructs of the activity system were intentionally used as an organizational structure of the questions to facilitate the analysis of the moments and contradictions within and between the systems. Utilizing the CHAT theoretical framework as a guide for the questions allowed the researcher to see the connections and visualize the system as a whole unit (Engeström, 2015). Participant questions teachers, students, administration and parents can be found in (Appendix, A).

Interviews were conducted with purposefully sampled representative members of the school community. The principal, assistant principal and curriculum coach were interviewed as members of the administrative team on campus. Six teachers, from various academic expertise of math, science, social studies, English, STEM and theatre were interviewed. The school in this study adheres to the practice of developing and implementing cross-disciplinary project-based learning; therefore it was imperative that a cross-section of teachers were included within the data. Nine students, three from each grade level, along with their parents were also interviewed as participants in the study. Each interviewee was audio taped and assigned a pseudonym to insure privacy. Interviews were conducted by myself and transcribed. The interviews were kept confidential and adhered to the guidelines set forth by the Institutional Review Board.

### **Observations**

Observations are considered a fundamental component of qualitative research (Merriam, 1998). One of the primary purposes of observations is viewing “humans in a natural setting to assist us in our understanding of the complexity of human behavior and the interrelationships among groups” (Lichtman, 2013, p. 224). Observations allow us to gather insight into the culture of the community. Culture is defined as “a system of shared beliefs, values and customs, and behaviors that individuals use to cope with their world and with each other” (Lichtman, 2013, p. 224). When conducting a case-study culture is particularly important as it formulates and reveals the community and subsequent environment through which the participants interact to develop their norms and rules within the project-based learning activity system. Descriptive field notes using thick descriptions as opposed to thin descriptions were created during the observations which allowed the researcher to capture behaviors and events that were present in

the culture and served as a basis for analysis. Thick descriptions aid the researcher in formulating a view of the culture and are considered a valuable tool in research (Geertz, 1973).

To elaborate further on the difference between a thick and thin description Geertz (1973) presented an example on winking. A thin description of winking could materialize as “rapidly contracting his right eyelids” (Geertz, 1973, p. 7). In contrast a thick description would describe in detail the context, motives and elaboration of the situation and was demonstrated through the following example on winking “practicing a burlesque of a friend faking a wink to deceive an innocent into thinking a conspiracy is in motion” (Geertz, 1973, p. 7). Both examples describe winking; however the context of a thick description provides a much more visual context of the environment.

In the study, observations were conducted in multiple venues within the community. Observations sessions occurred within the six participant teacher’s classrooms. Two observational sessions per teacher were conducted during her or his academic specialty. To garner insight into differentiated instruction, an additional two observations were conducted as teachers and students worked and interacted within the project-based learning curriculum. One of the unique features of the school was dedicated time given to project-based teaching and learning. The teaching week was altered to allow a full-day of instruction and implementation of project-based learning within the school day. Therefore, multiple observations were conducted during those days in which application of project-based learning is occurring, allowing me to view the interaction in a natural setting.

Observations were also conducted during the teacher planning sessions for the development of lessons. Focus was drawn to the interactions particularly how conflicts or contradictions were negotiated within the group of teachers and administrators. At this school,

project-based learning is not a single subject endeavor but rather a collaborative practice that is multi-disciplinary in nature, rigorous, authentic and provides a real-world context to the surrounding community and beyond. The utilization of the gold standard of project-based learning (Buck Institute for Education, 2015) as explained in the literature review, along with the tenets of the Young Women's Preparatory Network (2002) help to form the developmental frame of the projects.

In addition, observations were also conducted with the students as they interacted with the community both inside and outside of the school. Community interactions included, but were not limited to building positive relationships with the surrounding neighborhood and welcoming in guest speakers. Three community interaction events were observed throughout the study. The school incorporates the community as an extension of the learning for project-based learning and provides opportunities for connections through research and culminating presentations of their projects. Connections to the community are varied and range from field trips to outdoor learning environments such as the area wetlands or presentations to the city council on an issue that is related to their research. Therefore, in my study, the community outside of the school building is included as part of the research. The community consists of businesses and organizations that provide support through access to resources, information and community outreach providing the real-world context for application of the projects. Therefore, observing and acting as a participant observer enables me the ability to view the interactions as they occur which is an important component in the fieldwork data collection (Yazan, 2015).

Observations are a key component of case study (Merriam, 1998). They offer insight into the culture of the community revealing how norms and rules are formed. Observations reveal how meaning making is made through the negotiation process that occurs in tensions between

the participants and components of the activity system. The use of observations support the purpose of the study which is to investigate how the school-wide practice of project-based learning is conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible.

### **Artifact Collection**

To investigate further how project-based learning is conceptualized artifacts were gathered and analyzed to investigate contradictions that may be present within the activity system. It is essential throughout data collection to encapsulate two essential elements of an activity system to get a sense of knowing in and from project-based learning to include representations that result from and used during the activity (Engeström, 2015; Farrar, 2016). Further, Merriam (1998) indicates that artifact analysis is a valuable tool in qualitative research as artifacts such as documents are usually free, accessible and represent unbiased data.

In order to conduct document analysis for the study school improvement plans, meeting notes, curriculum planning documents, school schedules, meeting schedules, mission statements, guiding tenets and school budget were gathered. Samples of student work were also collected as artifacts and documentation of student effort and progress. “Written material created by the participants captures the thoughts, ideas and meanings of the participants” (Lichtman, 2013, p. 231). In this study, document analysis was an important component of investigating how project-based learning was developed and established as the study occurred during the second year of inception for the school. Hence the documents provided a foundation and a historical record of the school-wide practice for project-based learning. Furthermore, utilizing the documents allowed a triangulation or confirmation with field observations and interviews for the data collection and analysis (Yazan, 2015).

## **Data Analysis**

The data collection methods of observations, interviews and document analysis were used to address the study's purpose of investigating how the school-wide practice of project-based learning is conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible. In qualitative research the investigator often encounters an overwhelming amount of data making the task of analysis difficult (Merriam, 1998). Qualitative researchers recommend using an inductive strategy to "examine the whole, in a natural setting, to get the ideas and feelings of those being interviewed or observed" (Lichtman, 2013, p. 244). Data analysis is often thought of as an active process in which analysis and interpretation is open to the application of your chosen theoretical frame (Lichtman, 2013). With this in mind, cultural historical activity theory was used as a framework for data analysis.

In order to address the driving question data gathered from the observations, interviews and artifacts were coded in categories aligned to the nodes in the CHAT activity triangle. Engeström (2015) refers to this gathering and delineation of the data as the first step towards understanding "the nature of its discourse and problems as experienced by those involved in the activity" (p. 253). Applying this first step to the analysis of the study provided me an insight to the contradictions and problems experienced by the participants of the activity. Thus providing a starting point from which to examine the learning activity as it transitions from one reality to another is an essential step in the analysis of the activity system.

The second step was the rigorous analysis of the activity system, particularly in regards to the object of the activity (Engeström, 2015). The object of the activity primarily determines the identity of the activity (Engeström, 2015; Leont'ev, 1978). Therefore, the analysis is drawn to the transformation of the object within the activity system and provides the pivot point,

demonstrating the connectedness of activity system both within and to other activity systems.

Engeström (2015) clarifies this process by stating:

This procedure, moving “from within” the central activity out to the object activity and back into the central activity, is essential if the researcher is to preserve his or her grasp of the self-movement, the self-organizational dynamics of the activity under investigation (p. 254).

In the study, interpreting the dynamics of the movement between the nodes within activity system provided insight into how the contradictions encountered within the activity system were negotiated and resolved by the participants. Contradictions are not just a feature of the activity system but rather are the principle of its self-movement (Engeström, 2015). Contradictions are the catalyst for change as they provide motive of new learning to occur. Recognizing this new learning made visible the emergence of fresh solutions to the contradictions present in the activity. In my research analysis was drawn from the contradictions present within the activity system as they provided visualization and conceptualization of how participants addressed and mediated challenges in project-based learning.

## **Coding**

In order to address the driving question the interviews, observations and artifacts were coded for each component of the activity theory model. Each category represented a node or construct from the activity triangle (i.e. subject, object, artifact, etc. in Table 3.4). All interviews and observations were transcribed and coded following the CHAT framework. A constant comparative method of coding was applied as was recommended for empirical data (Strauss & Corbin, 1990; Creswell, 2003). This provided a consistency through which analysis of the data occurred. In addition, coding within this case study presented a detailed accounting and delineation of the activity (Merriam, 1998).

Table 3.4

*Nodes of Analysis*

Code	Activity Theory Node	Description
S	Subject	The primary agents or groups through which the lens of the study is viewed.
O	Object	The target through which the <i>subject</i> is acting upon and is altered into outcomes.
A/T	Artifact/Tool	The instruments either as a tangible item or construct that support and facilitate the activity that is occurring within the components of the activity system.
C	Community	The groups or individuals who navigate within the space of the object and help to form the organization and definitions of actions within group while interacting between the object and subject.
DoL	Division of Labor	How the work is divided within the community and facilitates identification of roles, responsibilities and tasks and is consistently being negotiated based upon the positions of power within the community.
R	Rules	The guidelines through which the interaction occurs between the components of the system establishing a normative behavior of activity between and within the groups.
OC	Outcome	The results of the subject's interactions with the object, tools, community, rules and division of labor of the activity system
1C	First type of contradiction	The first type of contradiction is within a moment or node of the activity system
2C	Second type of contradiction	The second type of contradiction is the development of tensions between the moments or nodes of the system.
3C	Third type of contradiction	The third type of contradiction appears when a more advanced form of activity is introduced into the present dominant activity.
4C	Fourth type of contradiction	The fourth type of contradiction exists "between the central activity and its neighbor activity" (Engeström, 2015, p. 71).

Coding the data was done manually. Manual coding allowed me the opportunity to see nuances within the field notes and interviews that might not have been visible if utilizing coding software in which words are the primary sorting tool. Gathering and coding data manually allowed for an in-depth representation of the data for analysis revealing patterns of interactions



and words (Lichtman, 2013). Lichtman (2013) reminds us that analysis is not one time event but rather “an ongoing process throughout the life of a project (p. 247). Therefore the analysis was pervasive throughout the study as preliminary thoughts and conjectures were captured in field notes, followed by coding and organization of the data through the CHAT framework which culminated in analysis of the contradictions present in the data.

### **TRUSTWORTHINESS**

In quantitative research validity and reliability are measured and analyzed through statistical analysis proving or disproving variables within the study. Validity is established through the measurement tool and is evaluated based upon its application and effectiveness to measure what it is supposed to measure (Rudestam & Newton, 2007). Reliability is demonstrated through the consistency of the results. There is an absoluteness and final resolution to the quantitative research based upon statistical analysis. In contrast, qualitative research is dynamic and is driven through interactions of participants and is subject to variations within the population. Due to the nature of qualitative research from a constructivist’s stance, understanding and meaning are developed through interaction of the participants therefore beckoning alternative measures of analysis compared to the quantitative measure of reliability and validity. As a result, in qualitative research the quality index is established through trustworthiness.

Trustworthiness provides a platform and means through which the research is validated based upon the qualitative evidence. Trustworthiness is established through verisimilitude, or believability of truth in which participants experience congruence with the analogous situation (Blumenfeld-Jones, 1995; Loh, 2013). In order to support the claim of trustworthiness, the study must resonate a sense of plausibility to the consumers of the study. Utilizing a constructivist’s ontology Guba and Lincoln (1989) established parallel or foundational criteria on which to judge

the quality of trustworthiness in comparison to conventional quantitative paradigms of reliability and validity. Four trustworthiness criteria of credibility, transferability, dependability and confirmability were foundationally established and linked by Guba and Lincoln (1989) to support the veracity of qualitative research. Therefore, in the study I have included the four trustworthiness components within the study to support the research. Further elaboration and justification of the criteria to affirm trustworthiness is discussed in the following sections.

### **Credibility**

Credibility can be described as a measure of internal validity for qualitative research (Lincoln & Guba, 1985) and is a key construct in establishing trustworthiness. Credibility is formulated through prolonged and persistent engagement with the participants and triangulated through data (Flick, 2009). Within the credibility criteria, seven qualitative techniques have been described to verify credibility within the research. Prolonged engagement, persistent observations, triangulation, peer debriefing and member checks are considered strong indices in demonstrating credibility (Lincoln & Guba, 1985). Further elaboration of the description and implementation of the credibility criteria are discussed further in the following paragraphs.

Prolonged engagement facilitates the establishment of trust relationships between the researcher and participant. Meaning making is constructed through interactions; therefore prolonged engagement offers opportunities for clarification or congruence on the details of the interview or observations assists in developing trust in the research (Creswell & Miller, 2000). Throughout the period of this study, prolonged engagement occurred over the course of six months. Engagement was not limited to observations but included conversations, emails, interactions with families and working alongside the faculty which facilitated the development of relationships with all participants. By implementing prolonged engagement a foundation of trust

and credibility was established between myself and the community. Therefore, supporting the overarching goal of trustworthiness within the study.

Persistent observations offer a baseline of consistency or inconsistency in the activity being observed. Norms can then be established along with making contradictions (Engeström, 2015) or anomalies visible within the observations. Persistent observations were conducted throughout the study. Observations of the classrooms occurred at various times of the day and different times within the lesson cycle over the course of six months. In addition, observations were conducted in non-classroom environments such as in community events. With the application of persistent observations within the research, several benefits materialized. The first was the establishment of behavior norms from the participants within the different environments. Teachers, students and parents adjusted their behavior depending upon the context of the environment. Establishing these norms presented a second benefit as they created an opportunity for triangulation between observations, interviews and documents. Lastly, the persistent observations helped make visible the contradictions that were present within the school community. Contradictions occurred between and within the participants as they interacted with each other throughout the day. By applying the practice of persistent observations credibility was supported along with providing evidence to facilitate triangulation opportunities within the research.

Triangulation refers to a checking of data, methods and investigators to demonstrate an alignment or congruence of the phenomenon being observed (Lincoln & Guba, 1985). In qualitative research, particularly in a case study, multiple data sources are utilized to represent the data (Hays, 2004). Yin (1994) supports the use of triangulation in case studies and elaborates further by stating “multiple sources of data are a major strength of case studies” (p. 228).

Multiple sources include observations, interviews, documents and other sources to assist in the development of clear illumination of the phenomenon were utilized in the research. To apply triangulation to the study observations, interviews and documents were checked for alignment of key constructs associated with project-based learning. An example of triangulation occurred within the understanding and development of project-based learning. Observations of the active practice of project-based learning, interviews and questions regarding project-based learning and documents to include lesson plans were analyzed using triangulation to check for congruency. If a positive triangulation occurred, meaning the observations, interviews and documents were aligned in representation of the data, no further of analysis of the data was needed for that specific data point. However, if an inconsistency occurred the anomaly was viewed as a contradiction, or opportunity for growth which was a key focus for this research. These contradictions will be discussed further in the results. Therefore utilizing triangulation was beneficial two-fold. First, it provided a schema through which to reveal contradictions in addition it provided credibility to the study. The use of triangulation to establish credibility is promoted as an established norm in qualitative research (Loh, 2013; Lincoln & Guba, 1985; Creswell & Miller, 2000; Merriam, 2009; Yin, 2011); therefore triangulation supported a foundational framework from which to promote trustworthiness.

Another opportunity to establish credibility was the application of peer debriefing which offered me an opportunity to conduct extensive discussions about the methods, modes of inquiry, findings and progression of an investigation with a non-partisan peer (Spall, 1998). The exchange of ideas between researchers supports credibility of the research in establishing trustworthiness (Lincoln & Guba, 1985). Spall (1998) contends “peer debriefing contributes to confirming that the findings and the interpretations are worthy, honest and believable” (p. 280).

Prior to the beginning of the research, a peer group of fellow doctoral students to include myself was established to create a doctoral learning community to exchange ideas and check for understanding as we journeyed towards the completion of the doctoral process. In this community, checks and balances were established to create norms. Building upon this community of expertise, feedback and critiques were given regarding direction and analysis of the research. Voicing thoughts and ideas with peers allowed for an unbiased assessment of the research and provided a sounding board through which to “work out” or address multiple components; hence supporting the credibility of the study.

Building upon the premise of honesty and transparency to establish credibility and ultimately trustworthiness, member checking of the participants was employed in the research. Member checking is described as the process through which participants are given transcripts or partial narratives from interviews to verify accuracy (Carlson, 2010). Member checking is an ascribed practice in qualitative research to establish credibility (Lincoln & Guba, 1985; Yin, 2011; Merriam, 2009, Creswell & Miller, 2000, Carlson, 2010). Lincoln and Guba (1985) describe member checks as “the most crucial technique for establishing credibility” (p. 314) in a study. Member checking provides a critical opportunity to increase or decrease rapport and trust within the interview portion of the research. As a result, member checking can become a pivotal point in the developmental stages of relationship building in establishing trust (Carlson, 2010). In addition, plausibility is substantiated through member checking to establish trustworthiness in the research (Loh, 2013). Therefore, member checking was included as a vital component to assist in establishing credibility for the study. Prior to engaging with the interview, participants were offered the opportunity to participate in member checking after the interviews had been transcribed which facilitated a climate of trust within the interaction. Out of the 27 participants,

seven participants engaged in member checking which included reading through the transcription of the interview and brief follow-up interview. No changes or challenges were made regarding the veracity of transcript; therefore supporting the credibility of the interviews.

Using a constructivist's frame, I approached the study with the understanding that meaning making is co-constructed and therefore can be used to validate interpretations (Birt, Scott, Cavers, Campbell & Walter, 2016). Validation occurs when the researcher meets with the participant after the transcription to check for accuracy and meaning, allowing the interviewee to add or delete data. The constructivist's stance of member checking increases the credibility of the research by offering another checkpoint of the data and refinement opportunities to clarify critical understandings of the phenomenon. With the comprehension that member checking would occur preplanning for the type of transcription was reviewed and taken into consideration.

Transcriptions can be conducted verbatim with all of the ah's and um's that are characteristic of natural speech, cleaned up versions or narratives. Rarely do individuals talk in complete grammatically correct sentences but rather a string of phrases that connect the thoughts and ideas of the participants (Carlson, 2010). In my study I chose to utilize cleaned-up transcripts. Cleaned-up transcriptions removed the fillers and corrected the necessary grammar to the extent that the original context was not changed but rather translated into more grammatically accurate representation of speech. Utilizing a cleaned-up transcript facilitated a higher readability while maintaining as much of the authentic conversation as possible.

Member checking provides a valuable tool in establishing credibility in the research. Employing member checking ensures the representation of the participant's own meanings; therefore minimizing researcher bias that may be interjected into the research (Birt et al., 2016). By implementing the recommended member checking processes credibility was established as a

fundamental construct of establishing trustworthiness. Even though credibility was proven through the constructs described above Lincoln and Guba (1989) also suggest the construct of transferability to institute trustworthiness.

### **Transferability**

Transferability implies the transference or application of the data in similar situations or events (Lincoln & Guba, 1985). Qualitative social research differs from quantitative research in its observations of phenomenon or events that occur at a singular point in time and therefore cannot be duplicated. The researcher may look for trends or patterns in the phenomenon that may become visible through repeated observations. To capture events as they are occurring, thick descriptions are utilized as a tool to establish trustworthiness. Thick descriptions are a detailed account of the event or phenomenon in context of the culture (Lichtman, 2013). A thick description as opposed to a thin description goes beyond the surface level of the phenomenon and records the cultural context of the event to include motives and gestures (Geertz, 1973). Thus, the detailed thick description provides a pathway of transference as details may become recognizable in other situations of the school culture. During the classroom, project enrichment and community events thick descriptions were employed to capture the culture of the school community in a variety of settings. This variability of settings facilitated the visualization of transferability. Thick descriptions allow the researcher to see transferability of the event to new venues and situations; hence supporting the trustworthiness of the research.

### **Dependability**

Dependability refers to the structure and veracity of the data gathering. Guba and Lincoln (1989) aligned dependability with the quantitative criterion of reliability such that the stability of the data is of utmost importance. It is not to say that the data is stagnant but rather the

dependability lies in the process and the extent the data has been established, tracked and documented (Guba & Lincoln, 1989). The technique for documenting the dependability of the process is referred to as a dependability audit. A dependability audit checks the authenticity of the data and examines how the data was gathered and kept. In my study a dependability audit was established and checked through peer debriefing. Through peer debriefing sessions, the data was vetted for veracity with multiple peers to determine progress through the appropriate documentation. Establishment of how data was gathered and documented was screened by the doctoral peer review committee. Authenticity was validated through peer review and member checking. One of the primary purposes of demonstrating dependability was to create a climate of trust. By establishing dependability of the gathering and authenticity of the data; trustworthiness of the study was supported through member checking and peer review (Loh, 2013).

### **Confirmability**

Confirmability is equated with objectivity (Lincoln & Guba, 1985) and can be established through an inquiry audit or other means of checkpoints within the research. The audit entails an examination of the final research to determine if the findings, interpretations and recommendations are supported by the data (Lincoln & Guba, 1985; Loh, 2013). There were many opportunities for determining confirmability within my research which included member checking, peer debriefing and triangulation. During member checking, confirmability occurred through the interaction and feedback established in the interview and follow-up meeting. Peer debriefing was an ongoing endeavor which provided analysis throughout the research process. Triangulation through data and methods provided another safeguard in solidifying the confirmability of the results. In order for the study to attain confirmability it must demonstrate



congruence to an objective observer. By establishing confirmability, I provided another piece of the foundation for trustworthiness in the research.

## **SUMMARY**

This chapter described the research methods that were utilized in this qualitative case study, including a description of the research design, rationale, data collection instruments and evaluation of the methods. The research design supported the purpose of the study which was to examine how school-wide practice of project-based learning was conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible. Data collection occurred through interviews, observations and documents which allowed myself insight into the development and application of project-based learning in a natural setting (Lichtman, 2013).

## Chapter 4: Findings

### OVERVIEW

In this chapter, qualitative findings from five CHAT based activity systems are presented. The purpose of this research was to investigate how the school-wide practice of project-based learning was conceptualized by the stakeholder of a middle school to make implementation and sustainability possible. The study utilized CHAT to view the contradictions that are present within and between the five activity systems of whole school, administration, teachers, students and parents. Each activity system was analyzed for definitive description of the nodes that comprise each system along with the transactions that were mediated through the system that resulted in either a positive outcome or the negotiation of contradictions that manifest themselves through the activity. Engeström (2015) describes the negotiation process as structural tensions which assist the researcher in visualizing the manifestation of contradictions. By utilizing the CHAT framework as a unit of analysis, I addressed the overall guiding question of *“How is the school-wide practice of project-based learning conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible?”*

The first section of findings includes a further elaboration upon the structure of CHAT, specifically how contradictions can be further defined and delineated to be used in the analysis. Parsing out contradictions in CHAT provided a more in-depth analysis for the types and degrees of contradiction that were present within each activity systems. In the second section, the five activity systems of Border Leadership Academy were described as evidenced by the interviews, observations and documents. Due to the multiple activity systems, I decided to delineate the layers of analysis according to the differentiated populations, within the study. The layers

consist of the following: whole school community, administration, teachers, students and parents. The construction and analysis of five activity systems represents a multi-dimensional view that is supported by the following quote.

Activity system as a unit of analysis calls for complementarity of the system view and the subject's view. The analyst constructs the activity system as if looking at it from above. At the same time, the analyst must select a subject, a member (or better yet, multiple different members) of the local activity, through whose eyes and interpretations the activity is constructed. This dialectic between the systemic and subjective-partisan views brings the researcher into a dialogical relationship with the local activity under investigation. The study of an activity system becomes a collective, multi-voiced construction of its past, present, and future zones of proximal development. (Engeström & Miettinen, 1999, p. 10)

By representing the five activity systems I demonstrated a multi-faceted view of the activity present within the system to include a holistic view and a complimentary subject view. This enabled me the opportunity to examine multiple systems to analyze how they were developed and also to visualize and apply any if not all the four levels of contradictions that may be present within or between the activity systems. Engeström (2015) promotes collective activity as opposed to individual activity as the unit of analysis for activity theory. The process of transformation in context of the environment must be taken into consideration when analyzing social practice (Foot, 2014). In addition, multiple voices in intersecting activity systems provide sources of conflict or tensions that lead to innovations and negotiations (Daniels & Cole, 2002). Therefore applying an integrated analysis of the systems is conducive to revealing the contradictions that may be present in the research.

Each activity system was presented through the reflection of the activity system through which it was operating, exploring beliefs and understandings according to the participant's epistemology. Contradictions for each activity system were elaborated upon following the initial evaluation of the system. Contradictions, though present in each system were not omnipresent

but rather selective in their manifestations representing areas of growth for each activity system. The only deviation from this pattern was the expansion of administrative activity system to include analysis for answering the second question regarding the development of a school activity system that is conducive to 21st century learning.

### **KEY CONSTRUCTS OF ACTIVITY**

The data will be analyzed according to key constructs associated with CHAT. Of primary importance is the clear understanding and definition of activity. In part, due to the multiple meanings of the term activity it is essential to differentiate and clarify this term in context of cultural historical activity theory. “Activities are realized by means of actions, and actions make sense when they are understood within the activities in which they emerge” (Engeström, 2015, p. xxviii). Activity in context of CHAT is not viewed as a singular event but rather has systemic structure that encompasses multiple factors to apply to the whole activity system. According to Foot (2014) “activity is not “behavior” in the sense of the focus of the study of Western psychology. Activity is a process-as-a-whole, rather than a linear sequence of discrete actions” (p. 333). In my literature review I clarified activity with the application of Leont’ev (1978) three-part hierarchal structure of activity, actions and operations as fundamental units of analysis for activity theory by applying a football analogy. In context of a football game, the activity can be described as a collaborative group of players working together towards the common goal of winning the game. Actions are applied and mediated by the individual players on the team to accomplish the task while operations are the unconscious acts of running and jumping in response to a goal. Thus, understanding activity as an activity system and is the sum of its parts, allows me to draw upon the individual units for further analysis in context of the situated activity (Cole & Engeström, 1993; Hsu et al. 2010).

The activity framework is formed by the constructs of cultural historical activity theory. These include subject, object, tools, division of labor, rules, community and outcome. The *subject* refers to one of the primary agents or groups through which the lens of the study is viewed (Hsu et al., 2010). The *object* denotes the target through which the *subject* is acting upon and is altered into outcomes. *Tools* provide the instruments either as a tangible item or construct that support and facilitate the activity that is occurring within the components of the activity system. *Community* comprises the groups or individuals who navigate within the space of the object and help to form the organization and definitions of actions within group while interacting between the object and subject. *Rules* are the guidelines through which the interaction occurs between the components of the system establishing a normative behavior of activity between and within the groups. The *division of labor* refers to how the work is divided within the community and facilitates identification of roles, responsibilities and tasks and is consistently being negotiated based upon the positions of power within the community. The *outcome* reflects the results of the subject's interactions with the object, tools, community, rules and division of labor of the activity system (Hsu et al., 2010). By categorizing the data into these constructs, tensions or contradictions will manifest themselves within the nodes and between the activity systems.

#### **DELINEATION OF CONTRADICTIONS**

Contradictions can be described as structural tensions that exist within and between activity systems (Engeström, 2015). Within the activity system, contradictions can be characterized as areas of conflict between ways of knowing and understanding within multiple constructs of the system and are in a constant state of flux. Contradictions will remain unnoticed most of the time but when exposed can reveal new facets and dynamics that will aid in the transformation of the activity (Foot, 2014). Contradictions are valuable in the learning process

because they assist in the overall transformation of the activity system (Farrar, 2016). Contradictions should not be viewed as a negative but rather as an opportunity for negotiation that enables the development of new tools and learning.

In social research, difficulties in analysis arise in part due to the ambiguity and application of terms, such is the case with the term contradiction. In order to address this vagueness, I will further clarify what the term contradiction means in context of cultural historical activity theory. According to Engeström, 2001 “Contradictions are not the same as problems or conflicts” (p.137). A problem is not always evident but arises from “problematic situations which are puzzling, troubling or uncertain” (Engeström, 2015, p. 72). Problems are larger than contradictions which materialize as a result of the activity and can require a more integrated approach of outside influences to resolve or understand. Contradictions can be considered as sources of change and development towards a resolution that is mediated by factors within and between the activity systems. Therefore it is incorrect to view and use the term problem in parallel to a contradiction.

A clear delineation point between contradictions and problems is that “contradictions cannot be observed directly; they can only be identified through their manifestations” (Engeström & Sannino, 2011, p. 369). In addition, a contradiction is a “foundational philosophical concept that should not be equated with paradox, tension, inconsistency, conflict, dilemma or double bind” (Engeström & Sannino, 2011, p. 370) but rather must be tracked through its historical development. A tension can be defined as a balance between opposing forces or elements (Webster, 2018). Therefore when a contradiction is described as “historically accumulating structural tensions within and between activity systems” (Engeström, 2001, p. 137), the tension represents a part of the contradiction and is not synonymous with the term

contradiction. A tension assists in the manifestation of the contradiction and aids in the visualization and analysis of the activity system.

To further clarify the term contradiction, Engeström & Sannino (2011) characterized four important types of discursive manifestation of contradictions namely: dilemmas, conflicts, critical conflicts, and double binds. A dilemma is represented by our everyday thinking and behavior and is created from the development and mediation of shared beliefs which arise from independent thinking and discourse (Engeström & Sannino, 2011). Through discourse a dilemma may reproduce as a result of denial or be resolved through reformulation. Conflicts often take the form of resistance, disagreement, argument and criticism and are manifested through terms such as “no” or “I disagree” (Engeström & Sannino, 2011). Conflicts usually can be resolved through a compromise or submitting to authority or the majority. However, “critical conflicts manifest into a more serious situation in which people face inner doubts that paralyze them in front of contradictory motives unsolvable by the subject alone” (Engeström & Sannino, 2011, p. 374). Critical conflicts are usually laden with emotion and feelings as the conflict is personal to the individuals involved and often include narratives which are rich in metaphorical representation. An example of a narrative might be, “I now realize I was basing my assumptions on incorrect information”. Resolution of a critical conflict will take the form on negotiating new meaning making for the old situation (Engeström & Sannino, 2011). Lastly, a double bind is represented by participants who believe the alternatives are unacceptable and can reach a crisis level with unpredictable consequences (Engeström & Sannino, 2011). In most cases a double bind cannot be resolved by the individual alone but rather resolution is achieved through transformative collective action with a shift from the individual “I” to “we” in the transition. Table 4.1 synthesizes the four discursive manifestations of contradictions.

Table 4.1

*Types of Discursive Manifestations of Contradictions*

Manifestation	Features	Linguistic Cues
Double bind	Facing pressing and equally unacceptable alternatives in an activity system Resolution: practical transformation (going beyond words)	“we”, “us”, “we must”, “we have to” pressing rhetorical questions, expressions of helplessness “let us do that”, “we will make it”
Critical conflict	Facing contradictory motives in social interaction, feeling violated or guilty Resolution: finding new personal sense and negotiating a new meaning	Personal, emotional, moral accounts narrative structure, vivid metaphors “I now realize that[...]”
Conflict	Arguing, criticizing Resolution: finding a compromise, submitting to authority or majority	“no”, “I disagree”, “this is not true” “yes”, “this I can accept”
Dilemma	Expression or exchange of incompatible evaluations Resolution: denial, reformulation	“on the one hand[...] on the other hand”; “yes, but” “I didn’t mean that”, “I actually meant”

(Engeström &amp; Sannino, 2011, p. 375)

To summarize, contradictions are a philosophical and historical developmental tensions that can only be identified by manifestations (Engeström & Sannino, 2011). A contradiction is not be confused with a problem but can be differentiated through its context within the activity system. With contradictions being realized, in terms of types of manifestations, they can be further explored in their locations within and between the activity systems.

Contradictions are considered a valuable tool in the transformational process of the activity system (Farrar, 2016). Understanding the types of manifestations aids in the analysis of the study when cross referenced with the types of contradictions in relation to the interconnecting systems; therefore, presenting a depth and complexity to the activity. To further elucidate, Engeström (2015) identified four types of contradictions:



- Primary within the components of the old activity system
- Secondary between the components of the old activity
- Tertiary between the old and the given new activity/motive (between the only understood and the effective motive)
- Quaternary between the new activity and the neighbor activities.

These four contradictions were elaborated upon in Chapter Two; therefore further discussion is not warranted at this time. Investigating and analyzing these four types of contradictions within the study presented an opportunity to reveal the areas of growth and negotiation that was occurring within the activity system.

By applying both the manifestations of the contradictions along with the types of contradictions, I developed a Contradiction Analysis Matrix to assist me in distinguishing between the many forms of contradictions that manifested within the five activity systems. The establishment of the matrix was important as it helped to clarify and provide structure to sixteen possible variances of contradictions that may be present when utilizing the CHAT framework. The Contradiction Analysis Matrix was particularly helpful in the study as I was working with multiple activity systems necessitating organizational structures that tracked contradictions through their historical development (Engeström & Sannino, 2011). In addition, the delineation of the contradictions further clarified the location and the degree of the contradictions within and between the activity systems to include the constructs that formulated the node. The Contradictions Analysis Matrix is presented in Table 4.2. In addition, each category description of the matrix is included to elucidate the description and provide examples of application.

Table 4.2

*Contradictions Analysis Matrix*

	Primary within the components of the old activity system	Secondary between the components of the old activity	Tertiary between the old and the given new activity/motive (between the only understood and the effective motive)	Quaternary between the new activity and the neighbor activities
Double Bind Double bind facing pressing and equally unacceptable alternatives in an activity system	Double Bind/ Primary	Double Bind/ Secondary	Double Bind/ Tertiary	Double Bind/ Quaternary
Critical Conflict Facing contradictory motives in social interaction, feeling violated or guilty	Critical Conflict/ Primary	Critical Conflict/ Secondary	Critical Conflict/ Tertiary	Critical Conflict/ Quaternary
Conflict Arguing, criticizing	Conflict/ Primary	Conflict/ Secondary	Conflict/ Tertiary	Conflict/ Quaternary
Dilemma Expression or exchange of incompatible evaluations	Dilemma/ Primary	Dilemma/ Secondary	Dilemma/ Tertiary	Dilemma/ Quaternary

*Double Bind/Primary (DBP)* - A double bind primary contradiction would consists of unacceptable alternatives that is occurring within the node of or moment of the activity system. An example would be a contradiction that could occur within the subject of the activity system between the student and the parent such that the alternatives would be unacceptable to both parties.

*Double Bind/Secondary (DBS)* – A double bind secondary contradiction would manifest itself as an unacceptable alternative between two nodes of the activity system. An example would be a

contradiction between the subject and tools such that the tool or use of the tool is unacceptable to the subject.

*Double Bind/Tertiary (DBT)* – A double bind tertiary contradiction would reflect an unacceptable alternative from the new activity system that is being introduced into the old activity system. An example would be the introduction of new rules such as dress code into the subjects, in this case it is the student's original activity system. Some students could truly dislike the idea of a strict dress code which presents a contradiction into their own way of negotiating within their own activity system.

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*Double Bind/Tertiary (DBT)* – A double bind tertiary contradiction would reflect an unacceptable alternative from the new activity system that is being introduced into the old activity system. An example would be the introduction of new rules such as dress code into the subjects, in this case it is the student's original activity system. Some students could truly dislike the idea of a strict dress code which presents a contradiction into their own way of negotiating within their own activity system.

*Double Bind/Quaternary (DBQ)* – A double bind quaternary contradiction represents an unacceptable alternative between two activity systems. An example could be between the parent's activity system conflicts with the teacher's activity system in regard to tools (homework) that is expected.

*Critical Conflict/Primary (CCP)* – A critical conflict primary contradiction would be visible within a node of an activity and would reflect a motive of guilt within a social interaction. An example could be within the subject a parent/student or teacher/administration relationship such that a new meaning or realization occurs that is personal to the individual involved in the contradiction.

*Critical Conflict/Secondary (CCS)* – A critical conflict secondary contradiction would manifest between the nodes of the activity system and would reflect a feeling of regret with an interaction. This could occur between the subject/tools or subject/community with a moral contradiction that transitions to a new understanding or feelings based upon the paradigm shift.

*Critical Conflict/Tertiary (CCT)* – A critical conflict tertiary contradiction represents the infusion of a new model or tool into the existing activity system that involves feelings of guilt. This could be visualized if the teacher (subject) is working with a tool and a new tool or instrument is introduced. A first reaction could be resistance and or violation of trust, later the contradiction could reach a resolution such that the teacher now understands the new tool and no longer feels the tool is a violation but rather is a useful tool of instruction.

*Critical Conflict/Quaternary (CCQ)* – A critical conflict quaternary contradiction would reflect a moral or personal narrative between two neighboring systems such as between the school and the parent activity system. This could occur if the parent or school are engaged in a contradiction

that one feels a sense of violation occurred such as around trust. This can only be resolved if the trust is once again established and a new understanding occurs between the parties.

*Conflict/Primary (CP)* – A conflict primary contradiction represents a conflict within the node the activity system such that there is a disagreement in which one party feels that the activity is not true. Often, you will words such as “no” or “I disagree” a resolution is achieved when one party submits to the authority of the other or a mutual compromise is achieved.

*Conflict/Secondary (CS)* – A conflict secondary contradiction occurs between the nodes of the activity system and there is arguing or criticizing between the nodes. An example would be a conflict between the subject and community and is resolved through a compromise between the nodes.

*Conflict/Tertiary (CT)* – A conflict tertiary would manifest when something new is being introduced into the present activity system and arguing or criticisms occur. A resolution can be reached through a compromise or one party submits to the authority of the other.

*Conflict/Quaternary (CQ)* – A conflict quaternary contradiction would occur if one activity system is in conflict with another activity system such as between the administration and the student’s activity system. There is not necessarily arguing but rather criticism of one activity system over the other. A resolution could be reached either through compromise or submission of authority.

*Dilemma/Primary (DP)* – A dilemma primary contradiction would manifest within the nodes or moments of the activity system. For example a DP can manifest through an exchange of incompatible evaluations in the community and can only be resolved through denial or reformulation of the activity.

*Dilemma/Secondary (DQ)* – A dilemma secondary contradiction could occur between the moments of the activity system such that expressions of incompatible views are presented to the other. This DQ dilemma is characterized by words such as “yes, but” or “I didn’t mean that”. This contradiction can reach a resolution through denial or reformulation of the activity.

*Dilemma/Tertiary (DT)* – A dilemma tertiary contradiction develops when a new idea or tool is introduced into the existing activity system that results in exchange of incompatible expressions. An example could be introduction of a new tool or a new object into the current activity system. A resolution can be achieved either through reformulation or denial of the new item into the present system.

*Dilemma/Quaternary (DQ)* – A dilemma quaternary contradiction is represented when a neighboring activity system is involved in an exchange of incompatible evaluations with another activity system. An example could be between the parent and student’s activity systems such that one system is incompatible with the other. This can only be resulted through denial or rejection or reformulation of the contradiction.

Focusing on the contradictions for the analysis has been used in other research. Postholm, (2015) recommends the application and analysis of the contradictions to provide focus to the research and answer guiding question. Farrar (2016) utilized contradictions to identify the knowledge gaps that were present in teachers’ instructional goals for science practice. Drawing upon the framework, she demonstrated a secondary conflict between a teacher’s and student’s perception of the object. This was demonstrated through an example along with creating a pictorial representation of the contradiction. Four additional conflicts were found and were elaborated upon within the analysis. In another study conducted by Ryder and Yamagata-Lynch (2014) the primary goal was to understand tensions between activity systems of a transpacific

collaboration. In the research five primary and secondary contradictions were discovered and analyzed. Pacheco (2012) also utilized contradictions but approached the study with a slight variation and specifically applied the double bind (Engeström, 2015) as “an analytic tool to emphasize how dilemmas, contradictions, and conflicts can potentially rouse productive problem solving practices and actions driven by individuals' interest in collectively enhancing their life circumstances” (Pacheco, 2012, p. 122). Lastly, Yamagata-Lynch (2007) utilized CHAT and particularly contradictions to understand the complex interactions of individuals as new technology was being introduced into a school setting. She examined five activity systems to include the overarching central office, school and individual teacher as new technology was being introduced within the system. As a result of this preliminary research I believe contradictions provide a strong unit of analysis through which to identify change and growth findings for the study.

### **WHOLE SCHOOL ACTIVITY SYSTEM**

The Border Leadership Academy activity system is centered on the anticipated *outcome* which includes college readiness, student independence and transformer. In examining the data focus is drawn to the anticipated outcomes. The interviews and documents reveal that the administrators, teachers, students and parents are the *subjects* who negotiate through the activity system to reach the desired outcome of college readiness, student independence and transformer. An administrator reflected this belief “I mean, our goal is for them to expand out to college, every single one of them, get scholarships, so it's a big drive for us for them to do that.” (ABTCC, interview). This common ideal and goal is also reflected in the campus Mission Statement:

The Young Women's Leadership Academy is dedicated to promoting a nurturing environment that challenges students by offering an advanced placement college

preparatory and STEAM (Science, Technology, Engineering, Arts and Math) curriculum, exemplifying a healthy and well balanced lifestyle empowering girls to lead, persevere and transform (Young Women's Leadership Academy, 2017, Mission Statement).

Teachers also reflected the goal to develop the whole child to be academically and emotionally prepared to address challenges and meet their individual goals. This sentiment was reflected in an interview with one of the teachers.

It's been an amazing experience being here at this school. And I think that we could easily be a powerful, rigorous-- an academic rigor school every single day, and it is drill and kill and nose to the grindstone. And we could have some success in whatever ways that you want to term that. But I think what we're doing here is we're not building machines. This isn't a college mill. We're building human beings for the future. And human beings that will be self-reliant and really take care of themselves (TPB8SS, interview).

This quote reflects the teacher's overall sense that the mission of the school is facilitate the development of students to be strong independent thinkers. This belief is a driving force throughout the teaching and learning cycle within the whole and is reflected through the actions and statements by all stakeholders within the school community.

Students convey a college bound mentality through their statements as well, "I always had A's but they're 97's, 98s. And that's really important to me because I want to get into Yale when I get older so I've just kind of been working for that my whole life" (SJM6, interview). This individual student can connect the work that is required in the school as a pathway to achieve her overall goal. She is not viewing the effort as a contradiction to her success but rather views it as a building block towards achieving her goal of attending Yale.

Parents also support the mission of the school by promoting the development of independence, which is viewed as a necessary structural support for college.

Honestly, as a parent [inaudible] my cultural bias, I think about that often. What if she wants to go out of town? And I think, "Okay, I got to show her-- she's got to be ready physically [laughter], and I have to take to classes for self-defense." But I mean,



wherever I guess she wants to go. I know she has shown an interest in nursing. Every time we ask her so far, she's talked about nursing but she might change her mind. But we support, by all means-- I mean college is what our expectation is whatever college it turns out to be. Well, that will be up to her (PEL7PL, interview).

Parents conveyed that preparing their daughters for college was one of the reasons the decision was made to send their child to the school. The subjects within the whole school activity system are all working towards the same outcome, which is developing an independent, college bound individual that is capable of transformation to meet her individual goals. How the outcome is achieved is determined through the mediation of the subjects as they interact through the nodes within the whole school activity system. The Border Leadership Academy activity system is displayed in Figure 4.1. The *subjects* engaged in the school activity to reach the desired

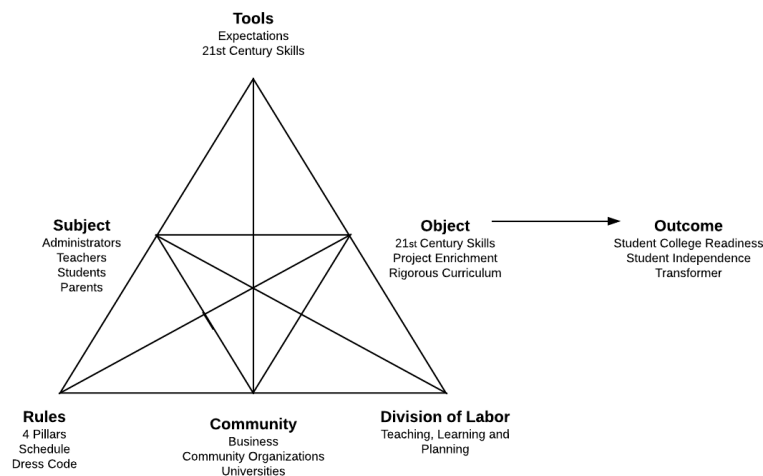


Figure 4.1. Border Leadership Academy activity system.

outcome. The *object* denotes the focus through which the *subject* are interacting with to achieve the intended outcomes. In this whole school activity system, rigorous curriculum, project enrichment and project-based learning are the objects through which the *subjects* are acting upon. Rigorous curriculum which is identified as college preparatory curriculum in the form of

SpringBoard (2018) is utilized to prepare students for college in mathematics and reading. The other core subjects of science and social studies along with the additional course employ project-based learning or project enrichment to increase the level of rigor within the curriculum.

The *tools* are comprised of high expectations and the application of 21st century skills. High expectations are exemplified through the demands of academic achievement and reinforced through a common belief system. In her interview, one of the administrative team stated, “There is an expectation and it's the expectation of full-blown success” (AMVP, interview). Students not only understand that the school is rigorous but understand and interpret the expectations as caring as demonstrated in one of the student interviews “They just expect a lot more and they expect you to be able to do these things. So I think it's just they care because they want us to succeed. So I don't mind it, to be honest.” (SJM6, interview). Embedded into the curriculum is 21st century skills which are a norm within the school environment. These skills consist of but are not limited to problem solving, critical thinking, collaboration, adaptability, initiative, effective oral and written communication, analyzing information and curiosity (Saavedra, & Opfer, 2012). An example of applying 21st century learning, project-based learning and rigorous content was demonstrated in a science classroom observation and corroborated through student interview. The project consisted of students working in groups to design a package for a third world country that would produce an endothermic or exothermic reaction. Students created a prototype and a company that would market the product. Research was done to understand the scientific principles, explore feasibility, cost, and potential impact on the community. Students needed to work collaboratively in groups and present their findings to the class. Several students mentioned this project-based learning experience in their interview; however I chose to include one excerpt below.

Recently, we did a project in science that was to create an exothermic or endothermic reaction using certain chemicals, like citric acid, vinegar, water, there was another--magnate sulfate. Doing that stuff. And we had to create a little pack for it to be used in a third-world country. So there we had to think of ways how to use it. If we were to sell it, how would we market it, keep it safe, and yeah (SAL8, interview).

What was curious about this response that the student did not view the project as a project-based learning experience but rather as a normative learning situation that occurs within the science classroom. This indicates that the application of 21st century skills and high expectations is not necessarily an anomaly but rather a consist occurrence within the school environment.

*Rules* were also an important structure which served as motivation for movement within the activity system. The four pillars, schedule and dress code reside within the *rules* node. Development of the enrichment days are based upon the four pillars of STEM, leadership, college and career readiness and wellness (AMVP, interview). Teachers worked in committees to develop these experiences which included a field trip to the zoo to investigate structure and function of organisms along with careers in zoology, biology and environmental science. The school is unique such that it operates on 4 schedules of A-Day, B-Day, C-Day and E-Day that are mapped out at the beginning of the year. A and B days are block schedule curriculum days in which two core subjects of 90 minutes long are conducted along with leadership, AVID and electives. C-days usually occur on Wednesdays and allow the core teachers time to plan in the morning with an abbreviated core rotation in the afternoon. E-days are referred to as enrichment days and can involve guest speakers, field trips, projects or community events all centered on addressing one of the four pillars. A copy of the schedules is located in Appendix B. The schedule is considered a tool because it is conducive to the development and support of a rigorous curriculum and 21st century learning that is imbedded into project-based learning and project enrichment.

Lastly is the inclusion of dress code as a *rule*. Students referred to the dress code on multiple occasions as something that must be followed with comments such as “The main rule is dress code” (SEC7, interview) and “Just the dress code thing.... They're really strict with it (SMB7, interview). By their statements students viewed this rule as highly important construct within the activity system of the school. Emphasis was placed on it by the administration and teachers of strict adherence to the code depending upon the day. Further discussion of dress code will be elaborated upon in the administration activity system as it manifested itself as a contradiction.

Within the whole school activity system, *community* was infused within the system through partnerships developed with businesses, community organizations and universities. A construction firm with an all-female engineering department partnered with the school to provide interviews and presentations. Community organizations such as The Junior Women’s League of El Paso provided funding for field trips to universities and museums in addition to sponsoring special projects such as get to know your neighbor and Christmas caroling. In addition, the National Junior Honor Society partnered with Special Olympics to provide weekly support and present plays as fund raisers for the cause. The community provided an extension of the school expanding learning beyond the structure of the building.

*Division of Labor* was exemplified through multiple venues. In the planning portion teachers actively collaborated in groups to develop enrichment days focused on the 4 pillars of STEM, leadership, career and college readiness and wellness. Each teacher was assigned to a group that actively collaborated across the curriculum to develop experiences for the girls that would be categorized in one of the pillars. One of the teachers explained the process in her interview.

So we have the pillars that build our school. So that would be STEM, college and career, leadership, and wellness. So those are the pillars that we kind of base ourselves on. And so each of the teachers is assigned to one of the pillars. So within your committee, you kind of develop what activities you want to do throughout the year on your enrichment days. So that's kind of how it's planned out. So as a committee-- let's say I'm part of STEM committee. We kind of target, "Okay. What can we do that's based around STEM that would give the girls an interactive experience?" Maybe something they've never done or could never do. And then from there, that's how it's built into the schedule. So we plan it. We send the girls. And I've seen a huge, I don't know how to say it, but some of the girls have never done those things before. So to them, it is just a huge open door for them. So I think it's a great thing (TJY8S, Interview).

Teaching and planning for the enrichment days is divided into committees with the ultimate goal of developing an enriching experience for girls that will support the object and desired outcome of the whole school activity system.

As an activity system, the school is functioning in a manner that is conducive to support the overall goals of the system and is in the formation and refinement process of creating their dynamic activity system. Prolonged engagement between myself and the participants that extended beyond six months assisted in establishing credibility in the findings (Lincoln & Guba, 1985). In part due to the inception of the school being less than two years, it was necessary to triangulate the data through observations, interviews and foundational documents to capture the historical record of growth and transition as the activity system was in formation from one year to the next. Adjustments or mediate actions have already occurred from the first to the second year, the principal referred to this phenomenon as “building while flying” (AMVP, interview), in context of this study I will identify it as an area of change or contradiction.

### **Whole School Activity System Contradictions**

Two major contradictions were identified within the whole school activity system. Frequency of project-based learning was the first negotiated meaning from year one to two. No longer was project-based learning concentrated on a monthly or bi-weekly schedule but rather

became embedded within the curriculum and tied into enrichment days. The second mediated meaning that occurred within the activity system was transformation of project-based learning to also include project enrichment under the classification of project-based learning. Due to the findings of two contradictions within the whole school activity system I will discuss each individually in the context of the study.

The first contradiction of frequency of can be categorized as a critical conflict/secondary in part due to the emotional aspect that surrounded these adjustments. A critical conflict/secondary contradiction is characterized by a contradiction between the nodes of an activity system including an emotional response that results in new meaning (Engeström & Sannino, 2011). As was the case with this contradiction, teachers and students (*subjects*) were working from an emotional aspect to apply project-based learning (*object*) to the frequency

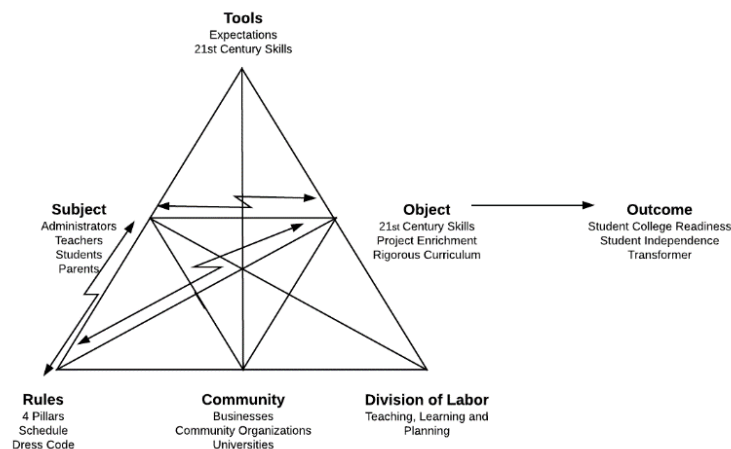


Figure 4.2. Critical conflict/secondary contradiction present in whole school activity.

(*rules*) and depth that it required Figure 4.2 depicts the contradiction. However application and manifestation of project-based learning resulted in exhaustion and frustration. This sentiment

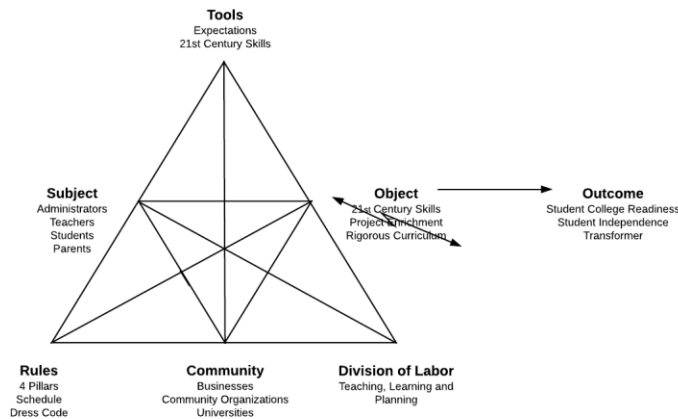
was conveyed in a teacher's response regarding the first-year application of project-based learning.

Last year, it was once a month. Or was it once a month? Once every other week or something like that. It was a lot. And we found out through trial and error that that was too much. It was exhausting us putting on-- it takes a lot of energy. And the girls were tired too because it's in the middle of the week. So I think now we're having one every month? Something like that (TJY8S, interview).

With the manifestation of the critical conflict contradiction in regards to scheduled frequency a new schedule and format was developed. This adjustment is reflected in the allocation of days for enrichment on the 2017-2018 Master Calendar. Furthermore, project-based learning would no longer only be conducted on enrichment days but rather flexibility was given to the teachers to embed project-based learning into the curriculum to create more enriched learning opportunities for the students. As a result, even though the number of designated project-based learning days were reduced the frequency of the application of 21st century skills through enrichment were increased.

As a result of the shift in frequency, along with flexibility of embedding project-based learning into the classrooms, teachers (*subject*) mediated a new meaning for project-based learning to include the term project enrichment to reflect a modified version of project-based learning. Thus, a second contradiction manifested within the *object* in regards to the meaning of project-based learning. Due to manifestation of the contradiction within the *object* of an incompatible expression of project-based learning this contradiction can be categorized as dilemma/primary contradiction and is depicted in Figure 4.3.

Previously, project-based learning encapsulated a whole day experience assigned to designated days on the school Master Calendar. However, when teachers were given the flexibility to incorporate project-based learning into the context of the classroom curriculum, a modification of the meaning of project-based learning occurred. This modification



*Figure 4.3.* Dilemma/primary contradiction present in whole school activity.

or interpretation of project-based learning came to be understood as project enrichment from the subjects within the activity system. Project enrichment is differentiated from project-based learning by the exclusion of reflection and possibly authenticity in context of the projects. Thus, some of the projects implemented by the teachers reflected more project enrichment characteristics rather than project-based learning experiences. This was evidenced through observations conducted in the classroom. One such example was displayed by students working in a science classroom to create a superhero out of an element. There was an open-ended challenge which allowed students the opportunity to apply content knowledge, 21st century skills and inquiry. The project was student-centered and chances were given for revision prior to the final presentation. However, what was missing was the authenticity and reflective component characteristic of project-based learning. The project did provide a significant amount of project



enrichment even though it did not include all the indicators of a project-based learning experience.

Thus, the campus mediated the meaning of project-based learning to also include project enrichment under the umbrella of project-based learning. An administrator validated this shift by saying, “teachers I think do see the benefit in the enrichment projects because they all lead right back to the content areas, and to the standards, and to all these enriched opportunities for girls” (ALBDI, Interview). What this statement reflects is the embracing of project enrichment and project-based learning within the *object* of the whole school activity system. Therefore, this contradiction resulted in new meaning of project-based learning indicating an area of growth and change for the campus.

#### ADMINISTRATION ACTIVITY SYSTEM

The administrative activity system operates similarly to the whole school activity system since it is the guidance and direction of the administration that created the school. However there are some differences that are specific to the leadership of the campus. The administrative activity system is elucidated in Figure 4.4. The *subject* in the administrator’s activity system are

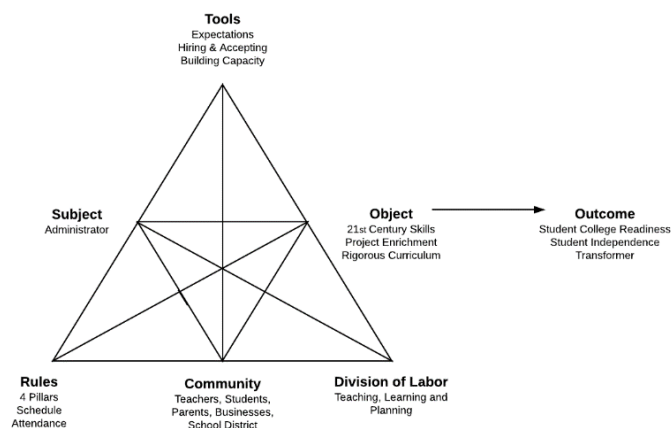


Figure 4.4. Administrators’ Activity System represented in the school.

the administrators. It is through their lens of activity that formulates the nodes within the activity system. The *object* remains the same as the whole school activity system as the administrators were the creators of the school hence the *object* of 21st century skills, project enrichment and rigorous curriculum is still being acted upon by the administration. Evidence of the interactions between the administrator (*subject*) and the *object* was conveyed by an administrator in an interview with the following quote:

But I want to be assured that whatever we're putting in front of girls sixth, seventh, and eighth grade in STEM, which I consider enrichment for sure, that those skills at some point in high school can be transferred to really finding a problem or connecting with something in our community. Is that water? Is that air? What is that thing? That they can take those learned skills from what was very-- it had been tried and true. We knew it could happen to a space where we don't know if it can happen. Not that we don't believe there's solutions to any problem but are there viable solutions that can be sustainable and really have the impact of what we're looking for?" ... So I've planted that seed for some deeper reflection around-- this is right now and I consider this very foundational. Very foundational, it has a place. It has a purpose. It has an investment. It has a level of critical thinking we can't measure yet, but what I am interested in knowing is in a year, two years, three years, college, how did this enriched learning over here in the foundation allow girls to stretch themselves in the possibilities (AMVP, interview).

This administrator conveyed the central focus of enrichment, project-based learning and 21st century skills to reach the desired outcomes. Particularly, critical thinking and the application of 21st century skills in various context was of central importance. These 21st skills revolve around the ability to think critically, collaborate, adapt, demonstrate initiative, communicate, analyze information and foster imagination (Saavedra & Opfer, 2012). With these key tenets in mind the administrators of Border Leadership academy have developed an activity system that is conducive towards the application of 21st century skills not only for the students but for the rest of the community that actively participates within the whole school system.

Finding solutions to problems that are beginning to emerge in the border community or for that matter any the community is an underlying norm that allows the school to connect and interact with the community around them. One such connection occurred during an observation of the judging of the school science fair. In this scenario, the judges were from a local engineering and construction firm. The student who was being judged designed a new grate system to manage water runoff and had created several prototypes to use during the investigation. This investigation impressed the judges so much, they offered her an internship even though she was only in the 8<sup>th</sup> grade. At the regional, state and national fairs this is not an uncommon occurrence with high school students; however this student was still in the 8<sup>th</sup> grade making the offer rare.

The *community* in the administrator's activity system consists of community members, who support the school in various context. These include judging science fair, conducting presentations, providing financial and resource support plus offering opportunities to visit worksites to foster first-hand knowledge of companies and careers. Furthermore, the administrators situate the community as contributing members of the activity system rather than extensions and actively seek alliances of integration of the community into the school activity making the learning authentic and meaningful. An administrator elaborated upon this exchange in an interview.

Well, I have to say, this year we've been very lucky. We had one business call us, and they're having a grand opening in November. And they called us seeking and asking us, "Do you want to be part of our grand opening? Do you have some groups that can go and be a part of that and do entertainment?" So we're doing that. Then the same week, we had the engineer women from Fort Bliss that are building-- they call it a campus, but the new hospital. They contacted us, and we had a meeting with them. And they're going to bring in all women engineers, 9 to 15 of them, on October 13th, and we're going to have a STEM dating time where the girls can visit different ones and see the different levels of engineers that there are. What I appreciated about that was they're all women, they're young and hip - they're not like us older people [laughter] at school - and they're all from

different ethnicities. There was one girl that came to visit us, and she's coming from Juárez. And she grew up there, and now she works there as an engineer (ABTCC, Interview).

Offering experiences that spur curiosity and communication between the school and the community demonstrates the active practice of 21st century learning within the school activity system.

Students and parents are also included within the community. After the *object*, students which constitute a part of the *community* are perceived as the primary filter through which the administrative team remains focused upon. Decisions are made based upon the welfare of the students in order to achieve the goals of the activity system. An administrator elaborated upon this decision making process, “We can create a rat race, or we can create a race that we can all run in a pace, in a rhythm, in a heartbeat, and still do what we need to do. But that takes mindfulness, that takes creativity, that takes real conversation about how to do that” (AMVP, interview). Decisions are not made quickly but rather thoughtfully and with attention to the final outcome. Parents are also very much considered part of the school community, as their role and support facilitate the system and the overall success and achievement of their child. One administrator conveyed this sentiment in an interview.

But I think the parents here realize what a nice little goose egg this is and they really want their girls to do well. And they try to support in every manner. I mean, it's not that it's always 100% wonderful glossy. I mean, we do have those tough conversations with parents when girls are struggling. But the more we can give the girls, the more accepting they are, I think, and the more they want for them, and the more they're willing to do to help us out (ABTCC, interview).

Administrators actively work to facilitate relationships amongst the community members of the activity system. This is done through daily interaction with the students, community outreach or communication via face to face, conferences or in the interview and screening process.

In the administrators' activity system the screening process of interviews of the parents and students resides in the *tools* node of the system. This screening process acts as a tool or filter for acceptance into the school. In the interview, the administrator is seeking openness to working hard and taking on challenges. She is looking for effort and determination of both the student and parent and accepting students that are operating from a growth mindset facilitate the collaborative nature and willingness to innovate which are characteristic of 21st century learning. Applying the administrators' activity system, tools such as high expectations set the standard through which all must negotiate. There is also an academic assessment that the students must take as well. However according to one administrator "over 300 interview and the top 135 are selected no matter what they scored on the assessment" (ABTCC, interview). Another administrator described what type of student she was looking for in being admitted to the school.

And to me, it's not about how smart you are. It's about your work ethic. How much drive do you have in you? When the going gets tough, what do you do? Do you sit down and cry, or do you say, "I'm going to find a solution to this thing"? That's about gumption. That's about go-get-it-ness (AMVP, interview).

By using work ethic as a primary screener tool for students, provides a foundational structure to the school in which girls who are admitted are already inclined to strive towards the outcome of the activity system. The girls are willing to work for those high expectations set forth by the administration.

The creation of Border Leadership Academy was facilitated by administrators; thus they had the opportunity to hire the faculty. Teachers were hired and selected based upon their willingness to go above and beyond to ensure success for students, to be innovative, open to new ideas and contribute to the overall mission of the school. An administrator emphasized the need for innovation "because now we are asking for people to redevelop and redesign something

they've never had to do" (AMVP, interview). By hiring for innovation, the administrator is addressing one of the barriers of project-based learning implementation, that of teacher reluctance. To revisit the study by Lam, Cheng, and Choy (2010) in which they discovered a teacher's willingness and motivation to engage in project-based learning was greatly increased if strong collegiality and competence was developed. By creating a culture of learners and innovators, the administrators have minimized resistance to implementation of an enriched curriculum by using the tools of purposefully hiring faculty that support the outcome of the activity system.

Another tool utilized by the principal is that of building capacity within the faculty and students. For teachers, building capacity is realized by teacher autonomy within the design of their lessons in addition to the development of project enrichment. An administrator reflected upon the idea of teacher innovation and autonomy in an interview.

Try something new. Do something out of the norm, but you have to have a safe environment to do that without criticism or, "How did that happen?" Or, "Why didn't you think of that?" So there's a huge paradigm shift for me about traditional and really being innovative. And we're raised traditional, it is difficult to be innovative (AMVP).

This statement conveys the goals and direction set forth by the administration; however she is expressing the paradigm shift or growth she is experiencing as a leader. Creating a school culture that fosters innovative learning and teaching is purposeful and powerful in supporting the overall outcome of the school.

For students, the administrations' idea of building capacity is centered on the idea of taking risks. This could include the student trying out for a sport or taking the leadership role in a group project. For learner to believe in taking chances a physically and emotionally safe environment was created that minimizes fear and builds upon an "I can" rather than an "I can't" culture. One administrator conveyed her outlook of building capacity for the girls.

It could be about really working hard and tackling something that I'm not good at and getting better at that and that could be success. It could be trying out for the play and I would have never dreamed I would be trying out for a lead position in a play and I did it.... I think there's different measuring sticks to allowing girls to grow and try something. Try it out. Taste it. If you don't like it, well, we'll do something else. But you've got to create the opportunity for that, one, two is just seeing girls emotionally grow (AMVP, interview).

In the administrators' activity system the *tools* of setting forth high expectations, building capacity, hiring innovative teachers and accepting students with a strong work ethic are the primary tools in creating the culture of the school to meet the outcomes. These tools are evidenced by the statements in the interview, through the observations of the classroom and through the screening processes for students and teachers.

The *division of labor* within the administrators' activity system is organized around the teaching, learning and planning. In planning, teachers work in collaborative groups as does the administration when creating the Master Schedule. Teacher input is actively solicited for the overall success of the activity system. When designing the enrichment days according to the four pillars an administrator describes the process.

So we have four committees based on that, and what we did this year is - because it was placed on one committee, but it's a lot of work for just five people to do - we asked everybody to pick their-- we did a Google form, and pick what you would like to be a part of, and then we divvied up the teams. So we're actually planning days where the teams get to meet and plan on Mondays. We have Monday after-school meetings where they can plan. And each work is divided, so we come up with a skeleton of, "This is what we want to do this year" (ABTCC, interview).

Based upon this response to how the work was divided, the administrative team adjusted how the work was going to be divided amongst the entire faculty. In the previous year, this was not the case as all of the projects were created by five people which resulted in an extraordinary amount of work for a few people. Therefore with the reduction adjustment of project-based learning and project enrichment from the previous year a shift of the division of labor also

occurred. The overall tone of the school was that teachers and administrators all support one another in the teaching learning and planning cycle. An administrator commented, “You walk in and you feel it. And we all get tired, but I think that we kind of loop arms, and help each other up when we're tired, and remind each other” (ABTCC, interview). Building upon this sentiment, administrators conveyed that the work at the school was not an “I” and “them” mentality but rather an “us” based upon a collaborative effort by the entire campus. Administrators worked alongside teachers for enrichment days, meetings and in the classrooms based upon the observations. This all “hands on deck” mentality was displayed in the following response by an administrator, “I see myself on the same level as a teacher. I don't see myself on a level as an administrator. I think that it helps with me being a part of that because they see like, “She's willing to do the work, too, so I'm going to do the work also” (ABTCC, interview). Therefore understanding this sentiment, the division of labor is balanced within the administrative activity system.

*Rules* in the administrators’ activity system are anchored in the four pillars (STEM, leadership, college and career, and wellness), school schedule and dress code. As referenced early in the whole school activity system the four pillars provide a structure through which to build the project enrichment or project-based learning experiences. In addition, the four pillars facilitate the development of 21st century learning for they act as a construct through which to build and guide the activity system. Teachers are allowed a degree of freedom in developing the projects as long as they are aligned to one of the pillars. “The four pillars are strongly looked at and everything that we do, we're trying to make sure that we're in alignment” (ALBDI, interview). By aligning the enrichment curriculum and learning opportunities to the four pillars



ensures a continuation and a focus on the anticipated outcome of developing students who are career and college ready, independent and transformers of self and the world around them.

Another *rule* set forth by the administration was the creation of innovative and multiple schedules that make an altered learning environment possible. The A, B and C schedules are located in Appendix B. With the schedules, attention to timeliness and minimizing absenteeism is emphasized particularly with the students. The A/B schedule works on a block scheduling therefore if a student misses one day, she is actually missing two instructional class periods. Teachers also feel the need to be present as much as possible. One of the teachers in the school described this experience.

But when the girls are absent, that's where you also see it hard because they're basically missing. For example, if they miss Monday, they miss your class for 90 minutes which is two lessons basically. But you don't see them until Wednesday which is a C day, and we have them for 30 minutes. And it's not in their original classes. They're in leadership. So it's hard to catch them up—I've seen that here. I think that they weigh things in their head [laughter] and they figure if I'm gone, I'm going to have so much more to catch up than if I'm just here. So I think attendance is really good because of those reasons because I think they feel pressure. And teachers feel pressure too because if you're gone it's a 90-minute class and you don't see them until Thursday really to teach them (TJY8S, interview).

The schedule can be viewed from two points of view. From one viewpoint it allows for longer periods of instruction which are conducive to innovation and project-based learning and enrichment. On the other side is costliness of time if the teacher or student is absent, making it difficult to catch up with the necessary pacing of the curriculum.

The C schedule is designed such that teacher planning and student enrichment can occur within the modified schedule. On average C schedule days occur once a week, usually on Wednesdays depending upon the district schedule and holidays. This flexibility in scheduling facilitates targeted instruction and planning and serves as a positive conduit for implementing project enrichment. Furthermore, the flexibility of the schedule minimizes barriers to application,

in turn maximizes the development of learning experiences that apply 21st century learning in context of the content.

Another opportunity for project-based learning or enrichment is on an identified E day. On these designated days, which on average occur once a month, the entire day is dedicated to enrichment opportunities for students. These days can include a full day of project-based learning, field trips, guest speakers or a combination of all three experiences. The E days are purposefully planned at the beginning of the year and placed on the Master Calendar to ensure implementation. Administrators and teachers collectively develop these experiences focused on the four pillars.

The last *rule* that guides the school is dress code. Students are required to wear very specific attire on each day of the week. The dress code includes pants, shorts, shirts, sweaters, sweatshirts, socks, hair accessories and shoes. No deviation is allowed. The importance of this rule is displayed in the student interviews. One student said, “Our dress code's very strict, to make sure that we look very professional, especially in our leadership uniform because that's what we normally wear when we have guests over. So we want to just show how professional we are” (SAL8, interview). Another student stated, “The main rule is dress code” (SEC7, interview). The purpose of the dress code is create a sense of unity and sisterhood amongst the girls. In addition, dress code rules are in place to minimize competition with the girls’ attire. The administration believes that expressing individuality should occur in academics or in project enrichment rather than through expression of dress. Therefore, dress code is used a tool to bring focus toward the application of project-based learning and project enrichment instead of presenting a barrier towards implementation.

In order to promote trustworthiness within the findings, I employed the tools of credibility. Peer debriefing and member checking were the primary verification tools utilized within the administrators activity system. Administrators were offered and given a copy of their interview transcripts and then a second meeting was arranged for any corrections that might have been needed. No adjustments to the transcripts were suggested by the administrators ensuring accuracy of the quotes included from the administration. In addition, peer debriefing with another doctoral student, who is an assistant principal assisted in providing guidance and interpretation of the data from an administrator's point of view. As a result of the peer debriefing, a contradiction emerged in the administrator's activity system.

### **Administrators' Activity System Contradiction**

In the administrators' activity system a dilemma/secondary contradiction was visualized between the administrators (*subject*) and the *object*. A dilemma is characterized by expressions of incompatible views and represents a tension that exists in value or ideal. In this case, the dilemma is manifested through the administrators paradigm shift from traditional instruction towards the embracement of project enrichment and innovation as a norm within the school and administrative team. In addition the defining factors of a secondary contradiction is the tension must be between two nodes within the same activity system as in this example between the *subject* and *object*. The manifestation of the dilemma/secondary contradiction in the administrators' activity system is presented in (Figure 4.5).

An administrator expressed her willingness to implement project-based learning and project enrichment but was still unsure of the process and the ultimate outcome of her decision, which represents the dilemma. She expressed her thoughts in an interview "And it almost feels... It's like a petri dish experiment, in some ways because it's non-traditional. It's something

that, unless you grew up in that or you've experienced yourself, you're not sure of" (AMVP, interview). What this statement conveys is the mediation that is occurring between the

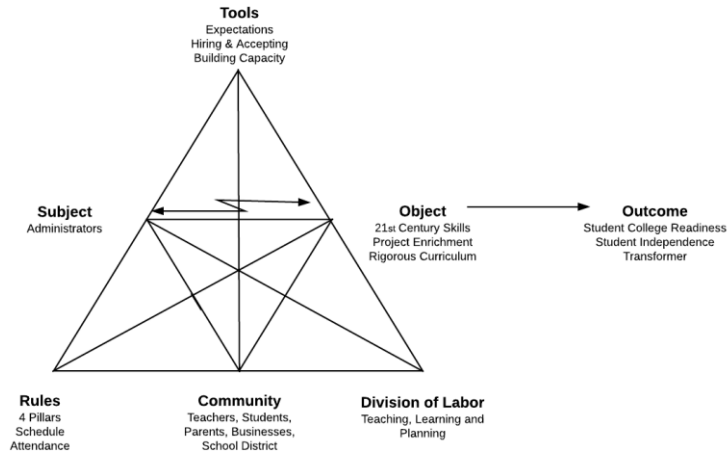


Figure 4.5. Dilemma/secondary contradiction present in administrators' activity system.

administrator (*subject*) and the *object* of project enrichment. The administrator was frank about her own reflection, "So there's a huge paradigm shift for me about traditional and really being innovative. And we're raised traditional, it is difficult to be innovative" (AMVP, interview). Her thoughts represent a dilemma of an incompatible view in the administrators' activity system. The tension between knowing that an innovative approach of project enrichment is the direction she would like to pursue but being uncertain if the results of the activity system will be successful in reaching the desired outcome of student college readiness, independence and transformation. This sentiment can best be summed with the following quote:

If I haven't traveled this road, I couldn't have connected this"? So that's what I think about the enrichment of today's journey-- some walk away with very different levels of the meaning. Very different levels of connection. Others, it doesn't have as great of an impact as some, but I think over time, what we do, we will have the greater impact (AMVP, Interview).

As a result of this administrator's dilemma, the contradiction has not been fully resolved. It is still in the process of negotiation as a resolution of denial or reformulation has not been achieved. Therefore, I consider this contradiction open or unresolved as it is still in the active processes of negotiating meaning between the administrators (*subject*) and project-based learning (*object*). The administrators' activity system continues to negotiate through the CHAT framework; therefore providing an opportunity for growth and reformulation. By understanding how the contradiction manifested within the administrators' activity system an insight was provided into how a school-wide practice of project learning is conceptualized and negotiated between the nodes.

### TEACHERS' ACTIVITY SYSTEM

The teachers' activity system is interconnected with the other activity systems and represents the pivot point or conduit through which information is filtered and applied. A CHAT representation of the teachers' activity system is located in Figure 4.6. The *subject* within this

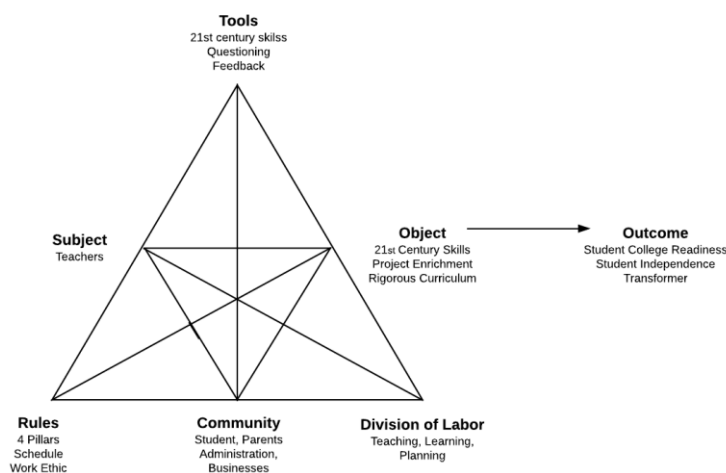


Figure 4.6. Teachers' activity system present in the school.

activity system would be considered the teachers. The primary *object* that the teachers (subject) are acting upon is project enrichment, project-based learning and rigorous curriculum. In comparison to other activity systems, teachers are the most centered on the *object* as it determines not only what they teach but how they teach. The remainder of the nodes act as agents of support for the relationship between the teachers and the object. An example of this is displayed in the following excerpt from an interview with a teacher.

But I see the enrichment activities creating more bonding opportunities that happen. Because face it, sometimes, in the class, it's, "Get down to work. Hey, we ought to buckle down and really get through some stuff." In the enrichment activities, it's a lot more opportunity to explore, to grow, to work together, maybe with different groups, maybe outside your comfort or friend zone. And so that works. So it's more real life, mimics what a future job or career [laughter] might be. You don't get to choose, necessarily, who you work with. So I do see that combining and creating sort of a different attitude. And I think it really started because we started with enrichment, before the school year even started last year, before any of these girls had one class. We started with the summer camp. And it was enrichment every day. It was team-building. It was doing projects. It was creating things, doing things in school. And so you saw this sort of collaborative - I'm trying to think - sort of a quality-based thing. Like, "Hey, we ought to make sure everybody's on the same page." And that extended into the academic year (TPB8SS, interview).

This teacher expresses at the very beginning and creation of the school, the campus started with project enrichment and project-based learning as the starting point for building relationships and incorporating 21st century skills. By doing so, they set the preparatory stage for the expectations of the school as innovative, collaborative and enriched.

This attitude transferred into the first school year with bi-weekly or monthly projects. Projects ranged from egg drops with minimal supplies to foster creativity, field trips to museums, and a community outreach. A teacher describes last year's experiences regarding project enrichment and project-based learning.

Well, I'll refer to last year because that's when we had the most things going on. So an example of an enrichment activity would be, for example, we went to the zoo as a field trip. Not just as a field trip, we went to learn about the different careers at the zoo. And we also went to White Sands and the space museums and learning about science in that way, learning about the features of White Sands and learning about astronomy. And then, what's another? Here on campus, we created a volunteer fair, where we wanted the students to be involved in the community, so we had different representatives from different organizations in El Paso come. And it's similar to a career fair where they have booths set up, except it was a volunteer fair where the students went around just getting information and planning on how they can get involved and volunteer among the community. We also had another project in which we created a story called Sharing Sam. And it taught elementary school students how to take care of pets. And we partnered with the Humane Society, and we created a storyboard with the actual story, and then we went to an elementary school, and the students were in the classroom teaching that story to the kids (TEVE7, interview).

Diversity in the project enrichment or project-based learning that broadens students' horizons was the primary catalyst for driving the enrichment experiences for the students.

Teachers used a variety of *tools* to enable their activity system which included feedback, questioning and 21st century skills. Teachers provided feedback to the students in regards to expectations. If a student turned in an assignment and was not successful, the student could come in for feedback and given the opportunity to redo the assignment. This open approach to learning encouraged students to seek feedback and view it as a helpful tool in learning. A student elaborated "Because when you ask for help you can improve your grades, you can improve your learning" (SPA6, interview). Constructive feedback provided a conduit to student success and risk taking. Students viewed feedback and as a beneficial tool in the learning process rather than an indication of being a poor student. Administrators also recognized feedback as a powerful tool utilized by the teachers for instruction "It's the whole feedback process before the grade is given. So there is opportunity for not only the feedback but for adjustment" (ALBDI, interview).

Questioning is also considered a *tool* utilized by teachers to scaffold the learning and provided a deeper understanding of the content in context of the lesson. In this study, the teachers applied Hess' Rigor Matrix (Hess, 2006) which provided a matrix of questioning and instructional lesson design to create an environment that is rigorous for students. On the y axis, resides Bloom's taxonomy (Bloom, 1956) which consists of six level of questioning which increase in complexity. Webb's Depth of Knowledge (Hess, 2006) which encompasses four levels of thinking required by the students resides on the x axis. When these structures of questioning and thinking are combined in a matrix the resultant is Hess' Rigor Matrix (Hess, 2006). Teachers apply this matrix to planning and questioning. In response to a question asked in the interview regarding tools in the classroom, she commented "And I think also, the level of questioning that you ask them. Is it just simple questions, yes or no, or is it actual deep thinking questions? So I think that's another thing that we have to actually really, in our planning, develop those questions" (TYR7M, interview).

The last *tool* utilized by teachers was the application of 21st century skills for the students in instruction. These skills include but are not limited to collaboration, critical thinking, initiative, communication, accessing and analyzing information and curiosity (Saavedra, & Opfer, 2012). In observations, teachers applied critical thinking through role play. An example of role play was conducted in a social studies classroom in which students were acting out and analyzing historical events from the United States civil war from altering perspectives. Using secondary documents, such as newspaper articles and pictures from the period, students were given the opportunity to reconstruct historical events related to the civil war. Girls collaborated in small groups to create a vignette of possible conversations that could have occurred based upon the evidence. This allowed students to apply many 21st century skills such as curiosity, innovation, oral and written communication.



Other classes incorporated 21st century skills around holidays or special events. In the border community, Dia de los Muertos or Day of the Dead is celebrated to honor loved ones who have passed away. The Spanish, theatre and English teacher partnered together to create a joint project in which the students would research a famous female scientist who had passed away, create an altar of artifacts of that person and write a monologue in first person. Students had to present their monologue to their classmates and to parents. One teacher described the project

Well, last year the way we did it is because the Spanish teacher was doing altars for the Dia de los Muertos. She was doing that. And so I told her, "Well I want to do something with you." And what I did is my theater girls, they did monologues for each of the altars. They had an altar and one girl would dress up as replica of the dead individual represented in the monologue. So we did that with a lot of the girls. But this year we're doing-- they want to do the altars by leadership...Enrichment that they get, they're going to see a play, they get to learn about different people in history with the altars, and they will be reading things. They won't be doing a monologue like last year, but they will be reading information about who that person was. And that's going to be the enrichment for that day (TVCTH, interview).

By applying 21st century skills students applied the content standards of English, Spanish, theater, science and social studies. In addition teachers collaborate across the disciplines to create a final project that was presented on an enrichment day. This examples describes how collaboration in creating the project by teachers facilitated the much broader application of 21st century skills in context of the standards.

A mathematics teacher also applied 21st century skills into their classroom. This was evidenced through observations and the interview. During the observation of the class, students were working in groups and resolving mathematical problems through role playing such that students would teach one another through and discover alternative ways of proving their answer. Each girl within the group would take on a role ensuring that everyone was accountable for the work. By situating the mathematics in a student centered environment students were able to collaborate, resolve problems, communicate and analyze information. In addition, the

mathematics described this process in the interview as an effective tool she uses within the mathematics classroom.

In my classroom right now, since we're reviewing as well, I have them take roles. Okay, you take the role of being the tutor, you take the role of solving, you take the role of reading. So I think having them being in charge of something gives them the-- what would it be called? Ah. It was here. It's here. I think they take over their learning more than anything. Once you give them that tool, they know the tools for that, I think they're able to do that.

In sum, teachers utilized questioning, feedback and the application of 21st century skills to support the overall outcome of the school which is to prepare students for the 21st century and transform themselves and their community.

*Rules* also guide the teacher's activity system towards the anticipated outcome and include the four pillars, schedule and work ethic. The four pillars of STEM, leadership, college and career readiness and wellness provide the framework for enrichment both inside and outside of the classroom. When planning for enrichment the teacher takes into account the schedule along with the four pillars. At the end of the year the summer and following year master calendar is sketched out allowing teachers plenty of opportunity for thinking and planning for those enrichment experiences that guide the school. One of the teacher's describes the experience below.

There was an E day committee. I was part of an E day committee that met to plan out the summer activities right at the end of the school year and at the beginning of the summer. And we planned what the summer activities were. And then since we were kind of already in the flow, we started sketching out for the rest of the year so we could really see what that looks like and really mesh it with testing and then with other days that we couldn't fiddle with. And so we started to get a rough framework. And then we brought that to the rest of the faculty and then the faculty chose an area of which their-- based on our four core pillars of health and wellness, STEM, college and career readiness, and responsible leadership. And the teachers decided which committee they wanted to be on and now they're fleshing out and giving more detail and more substance to those days themselves (TPB8SS, interview).

This demonstrates that both the schedule and the four pillars provide the foundation through which the school functions and applies enrichment. The Border Leadership Academy purposefully plans and makes space within the schedule to allow for enrichment. As stated previously, the school functions on four primary schedules of A/B block scheduling, C-days which are held weekly and E-days or Enrichment days which are scheduled throughout the year at the beginning of the year. A copy of the schedule can be viewed in Appendix B.

Another rule inferred by the expectations from the administration is work ethic. This work ethic applies to both the teachers and students. From the administration, when teachers are hired at the school the expectation is the teachers go beyond the basics and actively contribute to the well-being of the students and the school. Teachers are expected to have multiple preps, multiple contents and grade levels. In addition they are asked at the time of the interview,

So if you have these enrichment days, what things could you bring to the table?" Or we have clubs every Wednesday afternoon where the girls can do different clubs. We have a culinary club, we have an innovation club, we have a yoga club. "What kind of clubs could you bring to the school?" (ABTCC, interview).

Not only does this sentiment reflect a strong work ethic but also supports the enrichment focus of the school. Teachers are expected to not only teach their content but contribute their expertise to supporting enrichment on the campus. Furthermore, this work ethic is conveyed to the students as caring, because students believe that the teachers will do whatever it takes to help them succeed.

In turn, a strong work ethic is expected of the students both in the classroom and in the form of homework. Within the classroom collaboration to do the job well is emphasized. One teacher commented, "We do expect them to collaborate because we do want them to stretch out, and sort of stretch their limits and expand them. I mean, that's the name of our school, The Transformer, so we want to see that (TB8SS, interview). Another teacher challenges the students

with questioning “Also, when they ask me if it's right or wrong, I don't tell them if it's right or wrong. I just ask them, "What do you think?" or, "Explain it. Why do you do this? Why do you do that?" (TICTE, interview). This questioning allows students to reflect if the job is complete and well done, instead of the teacher or the last question determine the ending or the quality of the project.

In line with work ethic is homework. Homework at Border Leadership Academy is significant as the school is designed as a college preparatory school. Parents describe the homework as “the homework is kind of like a-- I mean, there's so much homework. It's kind of college kind of-- what do I want to say? Kind of like a college feel to it” (PES8LS, Interview). Teachers assign homework to help students develop and treat the assignments as a supplement to the curriculum. When students were asked about the homework, a range of responses were recorded from a little homework to four to five hours a night and weekends. One interesting comment came from a student who believed they had manageable homework but the amount of work depended upon your work ethic. The excerpt regarding this response is below.

So weekdays, our teachers normally give us homework. It's not normally a big thing where we'll spend hours and hours putting into it. It's mostly just a simple little here's some math problems, practice them. Other one's it's like, read this chapter and tell me what you think about it. For social studies, that's the one where I feel like we have a lot, but it feels like we have a lot of homework when we actually don't. It's just more of like, who puts in the more effort to make it show more information and not just do the bare minimum (SAL8, interview).

Another student had an opposite response, “I'll eat first [laughter]. So that I'll work on homework straight for-- I know it's a lot of hours, but five hours, four hours. It's pretty long...” (SLS8, interview). What was interesting observation was both of these girls were in 8<sup>th</sup> grade, therefore they had the same teachers. One perceived the homework as minimal if you only did the basics but was extensive if you wanted to show your effort and or work ethic. In other words she

differentiated between completing the homework with minimal effort or completing the homework well. The second student did not consider doing the minimum but rather rose to a higher level of effort to complete the task. These examples demonstrate the understanding and meeting of the work ethic expected of students by the rules of the school.

The *community* of the teacher's activity system is comprised of administration, parents, students and businesses. Fluidity between the teachers and the community is in constant interplay as interactions occur frequently amongst the participants. Teachers are in direct contact with students and structure their teaching such that students are the primary beneficiaries of their efforts. As a result, students feel supported, "I feel like the teachers really care like your parents do. They're like your second parents. They really want to make sure that you're doing the best that you could. And make sure that you're going in the right path. So, yeah" (SAL8). In addition, students describe the teachers as approachable and available for help before or after school, at lunchtime or online via Google Classroom should they have a question. Parents also express a similar sentiment that they believe the teachers really care about their child's welfare. A parent shared their thought regarding teacher support in an interview.

And I've noticed they're really good about encouraging, and fixing, and giving them room to grow, and I really appreciate that. And the teachers are so aware and they just write nice little letters. And I was like, "What? They're telling me my kid's great. Thank you." Nobody's ever said that (PJM6JM).

Parents notice and appreciate a positive relationship between their child and the teacher, building and fostering a sense of community. As a consequence, a teacher also expressed the belief that parents support him as well, "And going back to parent support, I think parent support is there 100%. It's almost becoming an expectation that we do these things, so. And that's good and pressure [laughter]" (TPB8SS, interview).

Administrators also encompass the *community*, as their role provides direction and guidance for the teachers' activity system. Administrators display their support of teachers by valuing their opinion and including them in the decision-making process. An example of affirmation in the teachers' ability is conveyed in the following statement by an administrator.

So teachers drive all enrichment activities. The non-negotiables I have in place are it has to fit the four pillars. So our vetting process has to be, whatever they brainstorm and feel that it is appropriate at each grade level, as long as it can fit into the four categories of STEM enrichment, health and wellness enrichment, college and career enrichment, and responsible leadership enrichment (AMVP, interview).

The administrators trust the teachers to design the enrichment activities centered on the four pillars. As a result teachers feel trusted and supported, "From the administration, I've had a lot of support" (TVCTH, interview). What these sentiments imply is the development of a community of trust built upon positive relationships.

Businesses and outside organizations are included within the *community* as they are actively solicited or volunteer to assist in various capacities at the school. Guest speakers will come and speak to the students about possible career choices. Recently, these have included the President of the local university, the president of the Texas chapter of 4-H and an all-female engineering group. In addition, partnerships have been developed with Special Olympics and The Women's Junior League. Since teachers are the primary developers of enrichment opportunities they are also the ones who contact outside community organizations. A teacher shared her experience, "And then, of course, the community. We've reached out to the community multiple times, and they've also been supportive, with them responding" (TEV7E, interview). This ongoing support of the community and the campus is ongoing and continues to build in its development.

Lastly, *division of labor* also comprises the teachers' activity system. This node determines how the work is divided amongst the teachers when acting upon the *object*, of project-based learning, project enrichment and rigorous curriculum. Through investigation of the school a collaborative team effort was evidenced through actions of the planning sessions, development of committees and the tone of a common goal and understanding in the interviews. Prior to the beginning of the school year a master calendar was established that set forth dedicated days for enrichment by a committee of teachers and administrators. The enrichment days were centered on the four pillars of STEM, leadership, college and career and wellness. Teachers then chose which committees they would be part of to develop the enrichment days. An administrator commented on the process.

So we have four committees based on that, and what we did this year is - because it was placed on one committee, but it's a lot of work for just five people to do - we asked everybody to pick their-- we did a Google form, and pick what you would like to be a part of, and then we divvied up the teams. So we're actually planning days where the teams get to meet and plan on Mondays. We have Monday after-school meetings where they can plan. And each work is divided, so we come up with a skeleton of, "This is what we want to do this year...So all of the teachers working together within their committees helps get that disseminated, because if it was on two people, it's a lot of work for two people to do. So everybody takes their part, and it's just an expectation here. And when we joined here, we knew that was an expectation [laughter] as far as being a part of that (ABTCC, interview).

As stated in the previous comment it is an expectation that the work is divided and teachers contribute to the enrichment process. This was a change from the inception year in which all of the enrichment days were developed by five people. Teachers also commented on the collaborative process in their interviews.

Yes. We have committees. And basically we are in charge of planning everything from-- all the details are up to us for everybody in the whole school, all personnel, all students, all faculty...Well, we have each other's support [laughter]. We lean on each other a lot, we rely on each other, and of course the admin, they're always open if we need to discuss

something. They've never said "Not right now." They have an open door (TEV7E, interview).

Another teacher added:

Well, admin backs us up completely. So we have an idea and they tell us, "Don't dream small, dream big. Go for it and we'll support you with whatever idea you have." Parents, they support it. And I think this year they're going to be more involved in helping us do what we need to do with those enrichment days. And the staff, we all come together. So even though the committee plans it, we have a meeting with the whole staff and kind of we unroll it to them. And everyone kind of takes on a role. Nobody sits on the sidelines. ... Everybody helps (TJY8S, interview).

These comments demonstrate a collaborative process in which the work is divided amongst teachers. In addition, teachers also have the autonomy to dream big and not limit educational enrichment to cookie cutter experiences but rather collaborate and develop ideas that are big and are aligned to the four pillars. One such experience was developed last year, in which a dance troupe from Namibia came to school to perform and work with the students for a day and a half.

Prior to the Namibian dance group visiting the school fundraising and logistics needed to be established. Teachers worked together to gather corporate funding along with the selling of chocolates and travel cups to make the dance troupe visit possible. Upon arrival the dancers conducted a performance in which community members, parents and students attended. The following day clinics were held at the school in which students learned how to play the instruments, participate in a dance and learn more about the cultural heritage of Namibia. It was extensive enrichment experience that crossed multiple contents and expanded the students' horizon beyond the local community to that of the world.

In summary, the teachers' activity system plays an integral role in the development of project-based learning and project enrichment. Because of the central role that teachers play, I utilized triangulation to verify the representation of the data (Lincoln & Guba, 1985). Interviews from all the participants within the five activity systems provided checkpoints of credibility,

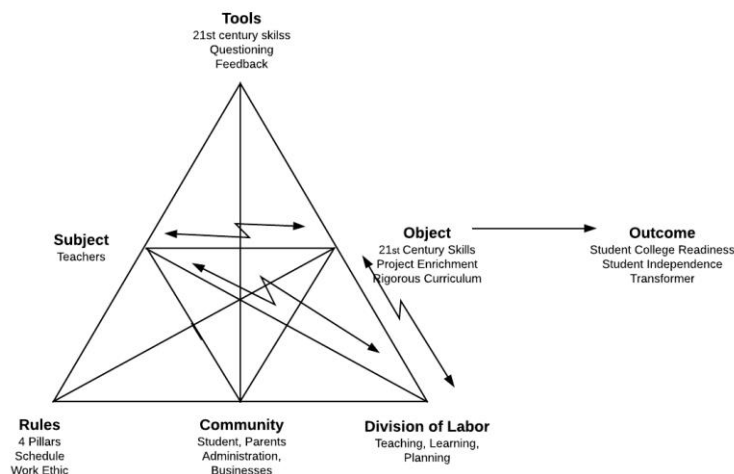


along with persistent observations and the inclusion of the schedule and lessons plans provided the framework for the triangulation. An example of this triangulation occurred with the description of the project-based learning experience of creating a product of an endothermic and exothermic reaction. Teachers and students referenced this project along with the detailed description in the lesson plans; therefore providing credibility to the research. All of the nodes of the system work in conjunction with one another towards a common goal of preparing students for college through academic readiness and the application of 21st century skills that will enable the students to be successful. By exploring how the teachers' activity system is constructed, I was able to understand how project-based learning was conceptualized within the teachers' activity system.

### **Contradiction in the Teachers' Activity System**

Although the teachers' activity system is structurally strong it did possess a contradiction that was connected to the implementation and sustainability of project-based learning. In light of this research, contradictions are not perceived as areas of weakness, rather they are viewed as areas of potential growth in which new meaning is formed as a result of the interactions (Engeström, 2015). Therefore, contradictions within the teachers' activity system represent areas of new meaning amongst the stakeholders and nodes of the system. One contradiction manifested within the teachers' activity system between the teachers (*subject*), project-based learning (*object*) and the planning and application (*division of labor*). In the teachers' activity system the amount of work needed to support project-based learning was unbalanced and incompatible for the system in the school's inaugural year, it required a few individuals to conduct a majority of the work. Emotion, to include the feelings of overwhelm and unfairness was observed and described by the teachers towards the application of project-based learning.

As a result, this contradiction can be characterized as a critical conflict/secondary contradiction and is demonstrated in Figure 4.7 within the teachers' activity system.



*Figure 4.7.* Critical conflict/secondary contradiction present in teachers' activity system.

As indicated early, the inaugural year of the school the project-based learning and project enrichment experiences were designed by five people of the campus primarily administration and a few teachers. Terms such as “exhausting” and “overwhelming” were shared by the individuals who constituted the inception year of the school with a project-based learning focus. Therefore, a mediated adjustment or new meaning was applied to who developed and constructed project enrichment experiences for the school, for this current school year. The division of labor was adjusted by the formulation of committees to accomplish the task of creating enrichment experiences for the students. An administrator described in an interview how the division of labor is now applied within the school.

So, initially, that committee got together and they decided the skeleton plan. Sixth graders would probably do these activities, seventh graders, and eight graders, to keep that fresh for each grade level. And that work now, because that small committee can't do it all, and plan it all, and have the agendas and all the nitty-gritty. So now, the teachers take a look at those skeleton plans. They take a look across those four pillars, the STEM,

everything and they connect themselves to one of those. So now they have a larger committee and a smaller focus with a lesser number of days to focus on and really get those final plans hammered out (ALBDI, interview).

What the division of labor now currently represents is the collaborative group effort of teachers to create and design experiences that are conducive to student growth and are concentrated on the four pillars of project enrichment.

Teachers also described how the mediated action of the division of labor is now occurring on the campus. “We have committees. And basically we are in charge of planning everything from-- all the details are up to us for everybody in the whole school, all personnel, all students, all faculty” (TEV7E, Interview). During the planning sessions, teachers are given a voice and the opportunity to contribute to build a cohesive plan for the implementation and sustainability of project-based learning.

Mediation is also occurring within the planning sessions as well. Teachers will bring forth ideas based upon the four pillars of the school. From there big ideas and questions are reformulated or mediated to produce a collaborative vision of the project-based learning. This negotiation process was described by a teacher in her interview.

In our meetings and actually even before the school started we had already planned our first unit as a whole team. And we questioned each other. Do you think this is a good question? What do you think? How can we tweak it? So I think that's where the teamwork goes back in. So a team we develop the-- I develop my question, I present it to them and to see if they have better options. But I think the majority is that one. Because once you get that, you can automatically see where is a misconception or where can I take it you know from here on. (TYR7M, Interview).

This statement reveals the present process that is part of the historical development of the culture of the school. Previously, the projects were designed by a few people making implementation difficult resulting in a critical conflict/secondary contradiction. However, as a result of mediated activity, project-based learning is developed by the entire faculty and a process through

which the projects are vetted is a norm within the teachers' activity system. Thus, the contradiction has been resolved by teachers discovering a new personal sense for the division of labor regarding the planning and implementation of project-based learning.

In sum, the contradiction present in the teachers' activity system represents an area of new meaning that has been created through the process of negotiation. The critical conflict/secondary contradiction between the nodes of teachers, objects and the division of labor has reached a resolution with the formation of committees to create the project-based learning or project enrichment experiences as opposed to five individuals. This resolution resulted in new meaning and understanding of the division of labor for the development, implementation and sustainability for project-based learning within the teachers' activity system.

### STUDENTS' ACTIVITY SYSTEM

The students' activity system was also examined in context of the research. In this case the students are considered the *subject* of the system and the activity is viewed from the lens of the students. A CHAT representation of the students' activity system is located in Figure 4.8.

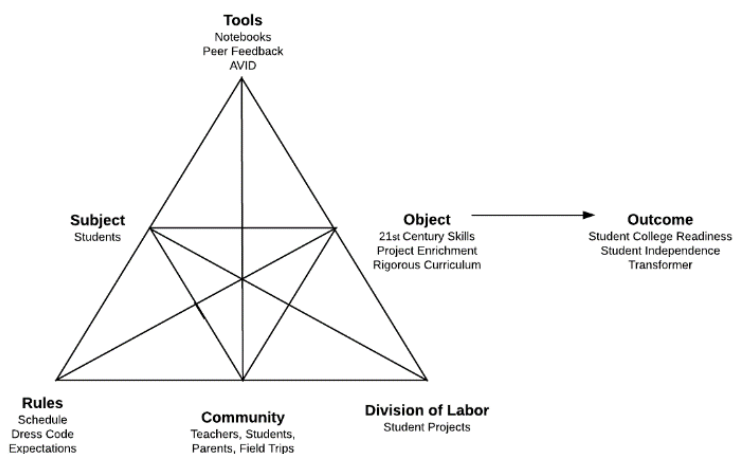


Figure 4.8. Students' activity system present in Border Leadership Academy.

Within the students' activity systems the *subject* is constituted by the students and who are acting upon the *object* of project-based learning, project enrichment and a rigorous curriculum. In comparison with the other activity systems in the study the students are the primary recipients of decisions and the mediations of contradictions in neighboring activity systems. Hence, understanding the central role students' play in the whole school activity system it was important to establish trust with the students through persistent observations and extended engagement in their activity system. This led to credibility of myself as a researcher and to students for the veracity of their experiences. In the study, students actively engaged in project enrichment and project-based learning experiences either in the classroom or on the identified E days. Students describe their experiences of interacting with the *object* of project enrichment or project-based learning.

Last year, one of my-- I guess an orchestra project was to compose a piece of music and then play it in front of the whole class. So that really got me thinking. How do I want to place it to show how my personality is and make it flow without sounding too repetitive or not all mixed up, so. Yeah, that was one of my favorite projects.... Yes. I was doing this weird thing where all the pieces that I did compose had a season name in it. So I believe it was Spring into Fall (SAL8, interview).

I like that they're hands-on and they're interesting. They make you think outside the box compared to just other schools when they just have you write an essay (SMB7, interview).

E days, I know we do mostly projects. Last year, we did a project called Sharing Sam, which was a story about how to take care of a pet properly and how pets can be treated and how taking an abused pet and nurturing it will probably make it a way better place and keeping them off the streets...They're not your typical projects. And what I mean by that is you're not just doing some project that another school will be doing for-- we sort of make them different. And then you do a lot of teamwork. They don't normally have individual projects. They try to show you that in the real world, you aren't always going to be by yourself so you need to learn how to work with other people (SAL8, interview).

These students describe how they interact with the object of the along with providing some samples of what they experience on a regular basis within the school environment. The

experiences are varied and provide a context through which their conceptual understanding of key concepts is being developed. The focus is not just completing the project but rather how is the project towards a broader understanding and connection with the world around them.

The students utilize a variety of *tools* to navigate through the activity system, these include interactive notebooks, peer feedback and AVID. Interactive notebooks are created by the students and used in context of the classroom and provide a venue through which the teacher and student can communicate. For students the interactive notebooks offer an opportunity for processing and sharing their understanding of a concept with the teacher. For teachers they provide an organizational structure through which to disseminate information and provide feedback for the students. They are structured with a table of contents, which assists in the organizational scaffolding of the content and an open page forum. The open page forum refers to the right and left side of notebook when opened. The right side is dedicated to teacher information and notes, the left side reveals the students processing or interaction with the content on the right side. This could include diagrams, content specific vocabulary or other pertinent notes related to the content. In observations students actively utilize notebooks and describe them as useful and helpful.

Another *tool* utilized by students is peer feedback. This is an instructional tool that was implemented by the teachers and is structured to allow peer feedback on assignments prior to the students turning them in to the teacher. Students elaborated that this structure is very helpful in helping them achieve the quality of work they are striving for. A student described the peer feedback, “Well, I like it because you get your opinion from other people and they try to boost you up” (SAL8, interview). Another student commented, “if we do summary, the students will give us feedback. It's peer feedback. I like it a lot more than the teachers” (SBM7, interview). By

utilizing peer feedback students are learning from their peers and participating in a higher level of reflection than if done in isolation. Students are able to recognize limitations in others' work and in the process become more cognizant of their own areas of need in the project. The administration also recognizes the value of peer feedback as a powerful tool in the students' activity system.

And they're able to then stand back and assess their work along with other students and with the teacher. And the teacher knows that this process is working when the teacher would give the same feedback that a peer would be giving to the student....It's the whole feedback process before the grade is given. So there is opportunity for not only the feedback but for adjustment (ALBDI, interview).

Peer feedback has shown to be an active tool for students as they solicit feedback from peers and are able to analyze others' work with a constructive and critical lens through which to improve their effort and level of understanding.

Another tool described by students is AVID. AVID stands for Advanced via Individual Determination and is an embedded program within the school that provides structures in place that actively teach students how to be good students. The program includes organization, notetaking, study skills and college exploration. A student describes her experience with AVID.

You get good grades, and you're really good in-- well, not really good always, because being successful isn't always about understanding everything because you need to ask questions too. And I think it's really good to ask questions, and to keep doing what you're doing, and never stop. Because when you ask for help you can improve your grades, you can improve your learning. And a subject that helps us a lot with that is AVID because— it teaches you those things (SPA6, interview).

AVID is sometimes referred to as the hidden curriculum. What is meant by this term is those skills that allow the students to be good students. Skills such as how to take notes in the classroom. In the case of the school students are taught to use a Cornell notes structure as they are taking notes in their classes. A student commented on the use of Cornell notes within the school.

Yes, Cornell notes. Yeah. I like the Cornell notes because they-- I used to think that taking notes by myself were really hard and since then taking notes has been really-- come easy to me since we've been learning about them. The first time I took them I was like, "Oh, I'm scared," but now that I've been more experienced with them. Actually, this morning we took Cornell notes by ourselves and it turned out really well. I thought that was really awesome... Yeah, I'm learning how to take notes for college and throughout middle school (SLH6, interview).

Therefore the use of Cornell notes which is taught within the AVID program has become a tool that students actively use throughout the day at Border Leadership Academy.

Within the students' activity system are *rules* such as schedule, dress code and high expectation that help to provide structure and guidance for the system. In part, due to the nature of the A/B schedule, attendance and organization is situated as a priority. A parent described the importance of the schedule in an interview.

I mean, a big push is just making sure that if she's even feeling a little bit under the weather, pop in those vitamins [laughter] because you cannot be absent because I know that their schedule is-- I mean, it'll be a good chunk of time. And Mrs. Villalobos has told us very well, "If she misses one day it's like missing two classes." So that's the extent of what we look at. And then she does take the bus most of the time. So grandma helps us with pickup, but I know that there's a couple of days where she might stay for tutoring, or she's in theater so she might stay for practice. Right now, they're doing the Christmas play. But it's a lot of calling afterwards making sure, "What does the schedule look like today? (PEL7PL, interview).

This parent comments reflect a focus on the schedule so much so that attendance, family functions and school support are all centered on the schedule. Students plan their day around the A/B schedule and even have separate backpacks to help them stay organized and be prepared.

As discussed previously in the findings, dress code plays a pivotal role in the *rules* of the students' activity system as well as the administrations' activity system. Specific attire is expected for each day of the week and students are expected to not deviate from the dress code. A student commented, "We do have the dress code and stuff" (SPL7, interview) in response to a rules. Another student expressed her frustration with dress code with her parent but she still



continues to comply with the dress code. A parent shared a portion of the exchange with his daughter in an interview, “And Audi doesn't understand that. She just goes, "Dad. What's important, learning or how I look?" I said, "Well they're both important." (PRL8AL2, interview). Previously in this chapter, dress code was identified as a contradiction as the significance is still being negotiated within the activity systems.

The last rule associated with the students’ activity system is that of high expectations. Students are expected to put forth their very best effort and take ownership of their learning. A student commented on her interpretation of rules, “And we have expectations. We don't really call them rules, but expectations” (SPA6, interview). These high expectations are reflected in project work, classroom assignments, homework and overall effort. A parent commented on his child’s expectation of herself, “So I think she's just got very high expectations, and she's not very forgiving of herself” (PRL8AL1, interview). Within the students’ activity system the rules provide the structure and guidance for the functioning of the activity system and act as conduits through which the system operates.

The *community* also provides a vital node of operation within the activity system. The community is comprised of the teachers, parents and community organizations that provide support for the students. Students have expressed they feel supported by the teachers of the school. This is demonstrated by the following comments.

I am supported by my teachers because they always tell us to ask questions. And each question we ask them, they answer. ... And then there's also tutoring, everyone welcome. And when I go to tutoring I don't feel embarrassed like at my old school because there, you're just there to get the work done (SPA6, interview).

Well, let's say I'm looking up research, and I don't understand some words. And if I look it up in the dictionary, it still doesn't make sense. I can ask them to simplify it for me (SLS8, interview).

If I'm having trouble with homework, they'll just ask me or go ask someone to try help me figure it out. With the teachers, if we can't figure it out at home we can just tell them

at Google Classroom or [inaudible], tell them we need help and they'll tell us, "Well, come to me during lunch or before or after school so that we can figure it out." (SAR8, interview).

No, I don't think so. I think if you're looking at what other schools are learning compared to ours, I think it'd be a lot different. But I just think, because the teachers talk us through everything, I don't think it's harder. I honestly think it's easier because you're not having to figure everything out....And it's also because the teachers, they kind of check up on you. They're like, "Hey. How are you doing? Are you okay?" And they're really tough on grades right about now because it's crunch time because the first semester's almost over. So they're kind of like, "Well, you did this, you can come back for a redo on this day." And they schedule redo dates and it's great (SJM6, interview).

Students consistently believed they were supported by the teachers. This belief was developed because the students encountered an openness by teachers to be available to assist them in helping them succeed. Teachers responded to questions promptly either face to face or via Google classroom. In addition, students were convinced that teachers were concerned with their well-being and had a personal interest in their success.

Parents also contributed to the *community* of support experienced by students. This support is demonstrated by assisting the student with their schedule along with providing academic and social emotional support when needed. A few comments from students and teachers regarding parent support are shared below.

Students:

Well, my parents, my teachers, sometimes even my classmates. I'll text them on the phone like, "Can you help me [laughter]?" Yeah. I'll just get help from them (SLS8, interview).

I fell more supported with my parents because sometimes they know that I'm stressed out. So sometimes they'll-- I don't know what they really-- they're just there to help out with homework. Or sometimes if I have a lot of homework for that week, they help me separate which day I should do what and then see what other time I have. If they know that I'm-- well usually they don't know if I struggle on something, so I have to tell them and they help out (SEC7, interview).

Teacher:

Parents are very supportive. Very supportive. They're very willing in helping with anything. Our volunteers are amazing. It's a different aspect. And I think it's because of how our administration developed that culture with us teachers and then with perspective to the students. I think that's transmitted often to the parents and to the community (TYR7M, interview).

Parents play a vital role in the students' activity system since the school is not considered a neighborhood school. In other words, students choose to come to the school and live in all parts of the city. Therefore it takes effort by the parents to make attendance possible since the majority of the students are not able to walk to the school but need transportation either through the parents or the school bus to attend. In addition, the rigorous expectations of the school impact the entire family as time is dedicated to attendance and academic support of the daughter to succeed at the school.

The last component of the *community* is other students. Students and parents will refer to this type of community peer support as a "sisterhood". This sisterhood ideal is developed at the beginning of the school year and continues throughout the year. Parents and students recognize the development of the peer support and sisterhood as evidenced by the following portions of interviews.

Parent:

I think I'm confident of that. I think that the connections that she's making are going to pay off. Not only here, but throughout her life. She's forming a sisterhood with the small group of girls, which I think is very powerful, and I'm very proud of that group of girls. I've just been on the whole very pleased.... And what we were really hoping is that she would grow as a person and come more confident. And then really also to form some lifelong friendships that would help her not only academically, but then perhaps socially and professionally have a network once they graduate from high school and into college, and then hopefully professionally after that. We just thought that those were going to be some very powerful connections for her to have socially, and again, academically. And you know what? I've been really pleased with you guys (PRL8AL2, interview).

Students:

Yeah, I have a lot of new friends. I actually have a friend, we call each other, and we just work for hours on homework and we just talk, like make small talk while we're working.

It's a lot of fun [laughter]....But if I have to choose my favorite thing, it'd probably be my friendships because I've gotten so close with my friends. I'm a lot closer with my friends that I've met, like what, 10 or 11 weeks ago, then I have met since I was 2 (SJM6, interview).

I feel totally comfortable here. Like if we have little school dances, I feel comfortable and confident enough to dance instead of standing in the corner looking at the guys dance and thinking, "If I dance, then they're not going to make fun of me." So it's comfortable knowing that everyone is a girl here and they understand how you feel (SLS8, interview).

The community of the students' activity system acts as an agent of support that facilitate the growth and well-being of the student. The student is offered support from teachers, parents and students offering a safety net conducive to student success.

The last node of the students' activity system is the *division of labor*, which is situated in student projects and collaborative work inside and outside of the classroom. As part of the application of 21st century skills, teachers design lessons that operate in a collaborative setting. Students work in groups to accomplish tasks and present their findings. When students were asked about the cooperative learning structure at Border Leadership Academy, the overall consensus was the understanding that everyone did their part. A representative sample of what was shared in the interviews is included below.

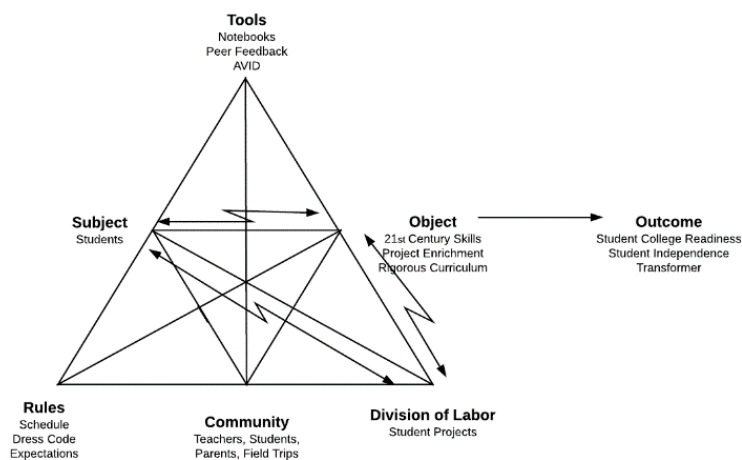
Most of the projects we do in class are group projects. Sometimes I'll have individual just so we know what you know and what you need to learn. And for group projects usually it depends in our group what you want to do. So let's say you want-- for the science one, let's say you wanted to do the chemical reaction. You would have one or two people doing that and you'd have one or two people making the prototype, one or two people doing the research on it, one or two people making the social things, social [crosstalk]-- ... Social media presentations and stuff. So I guess it's kind of what you want to do and then you work around what everyone else wants to do. So it's kind of like actually out getting a job because you have to see what your strengths are and play to it. Because our teachers, they don't tell us what to do. They let us decide so we know what we want to do and what we're better at when we work on just so we can figure it out but they don't tell us to do (SAR8, interview).

In the interview students were cautious and acted surprised about group work at the Border Leadership Academy. In fact, students commented that sometimes they prefer to work alone

because of past experiences related to cooperative learning. This revelation leads me to the contradiction present in the students' activity system.

### Contradiction in Students' Activity System

As alluded to previously, a critical conflict/tertiary contradiction manifested within the students' activity system to include the students (subject), project-based learning (object) and in work required (division of labor) to complete the project. A representation of the critical conflict/tertiary contradiction in the students' activity system is represented in Figure 4.9. Students described previous unpleasant experiences at other schools regarding cooperative learning and as a result did not accept readily cooperative learning structures at the Border Leadership Academy.



*Figure 4.9.* Critical conflict/tertiary contradiction operating in students' activity system.

What this contradiction represented was the infusion of a new motive in cooperative learning into their activity system, this qualifies it as a tertiary contradiction. A critical conflict contains an emotional connection in which students feel violated. In this case, students' previous experiences regarding cooperative learning was not cooperative at all and resulted in them doing

the majority of work; therefore they felt taken advantage of by the previous teachers. The administration described this experience in her interview.

Cooperative learning, I'm going to tell you, for some girls, is very difficult. Because they have been bitten by this ugly bug back in first or second or third grade, where the table group had a cooperative project happening, they ended up doing all of the work, but then something fell apart, it left a bad taste in their mouth. And so reteaching how to do cooperative learning, and teachers having the insight of knowing how to set up groups, how to set up roles within the group, and that each child, not only just on the final product, but is also having a rubric check on their portion and contribution (AMVP, interview).

Understanding the student past experience of division of labor assists in the development of creating new meaning for cooperative learning. Students also shared their experience and new understands that were emerging within their current activity system regarding cooperative learning.

Here I would say it's fair. Because at my old school when we do group projects, I usually be the one taking most of the work. But here's it's evenly spaced out because everybody does what they're supposed to do. It's not like one person's doing everything, the rest are just sitting there. Here, I like because it's not just you. When you work in a group, you're actually working in a group (SAR8, interview).

Yeah, but the groups here aren't as bad as they normally are... Well, it's just because everybody does their work. So it's not like you're taking up the work for everybody else (SJM6, interview).

The comments by the students represents the formulation of new meaning of what division of labor means in a cooperative group. Students are actively differentiating cooperative learning of the old and new activity system. Students are still hesitant and some prefer to work alone but as trust builds in the new activity system, students become more accepting of cooperative learning. In context of critical conflict/tertiary, a resolution is found when a new meaning is negotiated (Engeström, 2015). Students are in the process or have found new meaning for cooperative learning in the division of labor constituting a positive resolution for the students.

In conclusion, the students' activity system operates with tools such as interactive notebooks and AVID. Rules of schedule, dress code and expectations provide the structure. The community of parents, teachers and peers provides support and the division of labor is demonstrated through cooperative grouping. The students' activity systems acts upon the object of project-based learning, project enrichment and a rigorous curriculum to provide a positive outcome of academic achievement and student independence. In the next section of the research the parents' activity system will be unpacked.

### PARENTS' ACTIVITY SYSTEM

The parents' activity system provides the final component of representation of the activity systems present within the school. In the parents' activity system the parents are considered the *subject* and they collectively act upon the *object* of project-based learning, project enrichment and 21st skills. Parents provide an underlying support and inclusion of their activity system provides a different perception of the activity systems operating within the school. To provide clarity the parents' activity system is demonstrated in Figure 4.10.

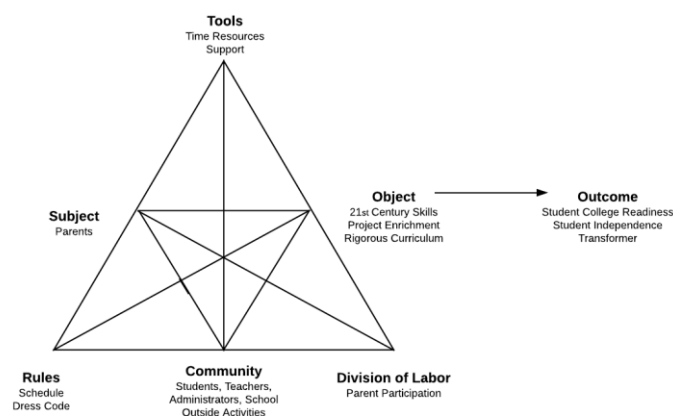


Figure 4.10. Parents' activity system present in Border Leadership Academy.

Within the activity system parents describe the *object* of project-based learning, project enrichment and rigorous curriculum as one of deciding factors in choosing to send their daughter to the school. A parent shared in the interview why they chose for their daughter to attend Border Leadership Academy.

I mean, when people ask me, "Oh, she goes to that school?" I just have to brag about it because exactly what you mentioned before as far as enrichment, the curriculum, the expectations. I couldn't agree more in terms of-- that's what all schools should look like. Because I, personally, am an educator. I'm a therapist. And so I work in the schools. And to see such a difference and variation and the quality of what is given to our students across the board, it's sad sometimes. And sometimes I even wonder-- being part of education, I think to myself, "Really? Is this what we're putting out there?" And lots of factors that come into play, but I really wish that everybody put as much effort that I see on this side from what I see in her school (PEL7PL, interview).

This explanation reveals some underlying values and expectations she was looking for in a school for her daughter. She was looking for a strong curriculum and enrichment opportunities that would allow her daughter to grow. As a whole, the parents are supportive of the school and believe in the mission of creating a nurturing environment that is challenging students in preparation for college and the world.

The *tools* present in the parents' activity system are time resources and support. Parents need to be purposeful in allocating time resources towards the success of their daughters. This includes transportation to and from the school, regular attendance and time provided for homework. Parents described these actions particularly time resources within context of the interviews. References were made regarding driving across town or coordinating pick-up or drop off duties in collaboration with their spouse or extended family such as grandparents. A parent describes her driving experience, "It's worth it though. I tell people it is very rewarding. I don't mind the driving. I mind the traffic a little and being late. Because that's what my problem is.



"Oh my God. We're going to be late." We're like an hour early but we're still late [laughter]" (PLA6PA, interview).

Parents also provide support as a tool that helps their daughter succeed. This is evident in the cognition that their child has homework and needs time to complete the assignment. A routine and location to do homework is designated to assist their daughter in completing the required assignments. Parents also provide resources, such as materials to complete projects such as science fair.

Lastly, parents provide support by encouraging their daughters to not only complete the assigned tasks but to strive to learn and grow.

She's 13 years old. I am concerned with having a very strong math foundation, English-- if you have the right tools, good things will come. My biggest concern is not what are you going to do, to be honest with you, two or three years from now? My biggest concern is do you have the tools so that you can make the choice of what you want to do? Because if she has the education she needs, she can-- you can do anything you want I believe that I don't care how good you are, there's always somebody out there that's better. Maybe we don't know who they are [laughter], but there's always somebody out there. So don't ever get too high on the horse that you think that you're the top of the heap because there's always somebody better. There's always somebody you have to report to. I don't care if you own your business, or what you do. There's always somebody you're going to report to. So you need to be humble. I mean, be proud and be glad with your results and what you do and stuff. But also realize there's always somebody better. So you've always got to keep striving (PGR8AR, Interview).

Parents utilize the tool of support to provide guidance and cheer on their daughter to make every effort to persevere and work through the activity system and apply 21st century learning to accomplish the outcome of student college readiness, student independence and transformer. A common theme that resonated through the parents was the support of shifting a student's attitude from only academics to a broader vision of an independence and development of the whole child.

And you can tell she's progressing and-- but these last couple of years has been more about like developing her instead of-- it's not just like, "How much do you know?" And she says, "Mom, I'm an average student over there," which we're not used to that. She's always been top of her class and I tell her, "But there's so much more." Like the full

package is good grades, good athlete, good character. So I remind her all the time, "You don't have to have all A's. It's all about the full package (PBM7BM, Interview).

One parent summed up his application of the tools within his activity system, "I like the feeling that I see in her that she feels that she can pretty accomplish anything" (PRL8AL2, Interview).

The *rules* in the parents' activity system are similar to the other activity systems such that they adhere to the schedule and following the dress code for their child. The four schedules of A/B, C and E day continue to dictate the routine and rituals of the school. Each schedule has its own set of rules in regard to expectations of work and dress code. Parents assist the student in following the rules by making sure they are on time and their child is prepared for the days expectations. In fact, students are keenly aware of being punctual and place pressure on the parents to make sure they are on time to school. A parent shared his experience in an interview.

In the morning is when-- if anything, in the morning is when I see her kind of stressed out [laughter]. She forgets things, and that's not typically Ana (pseudonym). We drive from the Northeast-- my wife drives her from the Northeast. And I don't know if the time-- because Ana's got to be-- she's like very responsible. So she just feels like, "If I'm a minute late— (PRL8AL1, interview).

In the observations, out of the 375 students at the school, tardiness was a rarity and causes were situations out of the parent's control such as the freeway being shut down or the unexpected illness of another child.

Parents ensure that their child is following dress code by providing the necessary clothing. For the most part, parents are supportive of the dress code but have expressed reservations regarding the strictness of application. A parent expressed this concern in an interview.

If there's anything that I'd like to change - and I'm just looking at it from Audie's perspective and sometimes even mine - is that sometimes I think there's-- rules are important but sometimes I think we need a little bit of flexibility. I think about, there are some things with the dress code that I'm just like, "Okay. That's a little much." (PRL8AL2, interview).

This dissonance in adherence to dress code was discussed as a contradiction in the administrators' activity system. Therefore no further discussion is warranted but rather the understanding that parents share the sentiments of their children regarding dress code.

The *community* within the parents' activity system is comprised of teachers, students, administration, Border Leadership Academy and outside activities. Parents interact with the children on a daily basis within their activity system. Teachers, administration and the school are in consistent contact with the parents either through notes, digital website or through a text messaging program called, *Remind Me*. The *Remind Me* app sends out messages to parents to notify them of upcoming events or assignments and is utilized by the school to communicate with parents.

While conducting this study, an extension of the community was revealed that extended beyond the walls of the school. This extension was the inclusion of outside sports, hobbies or areas of interest that the students chose to participate in beyond the school day. Other areas of interest and participation included: club volleyball, piano, ballet, 4-H, competitive horse riding, cooking, reading, painting and volunteering for organizations. This was a surprise because the school provides a significant amount of enrichment opportunities, yet families and students were seeking out additional enrichment. Parents had specifically allocated time to making these extension activities possible and were included as part of the community in the parents' activity system. A student describes her enjoyment of riding horses in an interview, "So yeah, I ride horses. Horses are my life when I'm not in school" (SJM6, interview). This sentiment reveals a passion that extends beyond the school and demonstrates that parents continue to support their child's outside interest and provide the ways and means to make it happen.

The *division of labor* also resides within the parents' activity system and is characterized by parent participation through volunteerism. Parents currently offer support to their children on a consistent and regular basis. Currently, parents have volunteered to be part of the PTSO which is the Parent, Teacher, and Student Organization at the school that provides support in different capacities such as field trips, fundraising or enrichment opportunities. Recently, parents provided support for students who wanted to design a haunted house for a school event. Some of the manual labor and the gathering of supplies was conducted by the parents; however the majority of the work was conducted by the students as they wanted ownership of the project. This example led to the revelation of a dilemma contradiction in the parents' activity system, that of parent assistance and student autonomy.

### Parents' Activity System Contradiction

The dilemma/secondary contradiction that manifested within the parents' activity system occurred between the two nodes of *subject* (parents) and *community* (students) classifying it as a secondary contradiction. The dilemma is represented by an exchange of incompatible

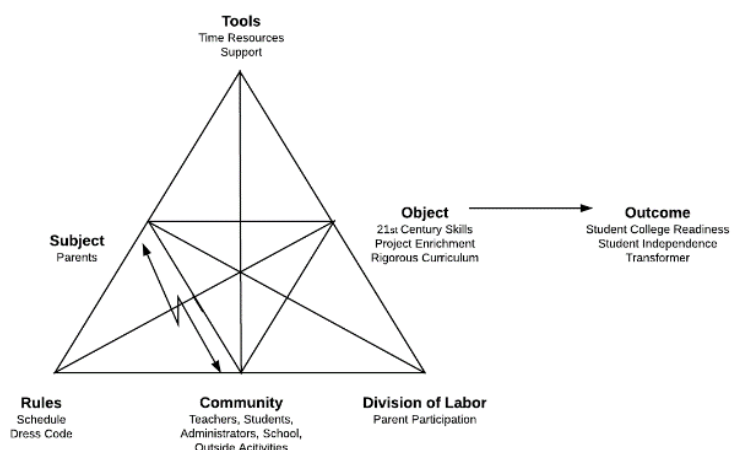


Figure 4.11. Dilemma/secondary contradiction operating in parents' activity system.

evaluations between the parents trying to offer balanced support and the development of their daughter's independence and autonomy and is represented in (Figure 4.11). Parents want to be supportive but also allow space for their child to grow and become independent. An example of this balanced support was shared by a parent in an interview in response to a question about support for his daughter.

Good question, because I'm changing my approach [laughter]. I gave a lot of input in her last science project, and she didn't do probably as well as she probably could've. So I learned I my lesson. I said, "I'm not in class. I'm not listening to the instructions of the teacher." So I told her, "This time, you're on your own. If you need something from me--" she's doing something with batteries this time. So I said, "Yeah, I'll get the batteries. We'll get the project board. We'll get everything for you, but I'm going to let you do this on your own this time." Because I think I steered her in the wrong direction last time. .... I'm hands off [laughter], but—supportive (PES8LS).

What this response reveals is the support as a tool is in the form of a gradual release. Such that the parent truly wants their child to become independent and finding the necessary balance of support and student independence is a dilemma. Parents describe their experience as they are witnessing their child's transformation from dependence to independence particularly when it comes to projects, "She's self-driven. And when I do give her ideas-- I don't know. She has better ideas. So I'll sit there and listen to her and maybe facilitate a little bit, but as far as giving her ideas, she's on her own" (PJM6JM, Interview). Another parent describes her experience

I just see Tina (pseudonym) way more independent. Before, I felt like we had to be helping her. The frustration levels with certain subjects were more visible. And [now?], I just see her-- it's almost like I have to remind myself to check, like, "Hey, how's it going?" But otherwise, I mean, she's pretty much self-sufficient. Some areas, by all means, we'll have to get extra tutoring, or let's do this, but I've just seen her really turn into a very independent student, which as a parent, what more could you ask for? (PEL7PL, Interview).

On one hand the student's new sense of independence is reassuring for parents as they witness their daughter navigating through their activity system, yet a challenge as they are still trying to find a balance of support. This reformulation of parent's thinking has come through personal

experience of too much support for their child impeding their growth, “So my experience with Lisa (pseudonym) is to let her be successful but not push her too much. Because then you can turn her off. Because that happened to me once when she was younger. I pushed her too much” (PGR8AR, Interview).

As a result of these experiences, parents have not fully reached a resolution to this dilemma/secondary of support and independence. As every child is different so is the context of the environment that is constitutive of multiple scenarios and participants. Therefore a full resolution can be difficult as constant mediation is occurring throughout the system.

Part of the intent of the research was to capture parent understanding and experiences in regards to project-based learning; therefore it was necessary to utilizing member checking to establish credibility with the parents and ultimately trustworthiness with the study. Parents were offered a copy of their transcript if they chose to review. Out of the nine parents, only three chose to receive a copy while the remaining parents declined. However, offering the option of member checking prior to the interview promoted a relationship of trust between myself and the parents. As a result, parents were forthcoming in their responses and understood that at any time they would be able to view their transcripts for verification.

## **SUMMARIZATION OF FINDINGS**

The purpose of this study was to investigate how the school-wide practice of project-based learning was conceptualized by the stakeholders of Border Leadership Academy to make implementation and sustainability possible. A comprehensive representation of the five activity systems was presented illuminating the cultural context and historical development of the activity systems that comprised Border Leadership Academy. The study utilized CHAT as the theoretical framework to view the manifestations of the contradictions. According to

Engeström (2015) manifestations can only be uncovered through the historical context and development of the activity. Focus was drawn to the contradictions in each activity system as they represented areas of growth and change. A compilation of the contradictions and their resolution status is displayed in (Table 4.4). By utilizing the CHAT framework as a unit of analysis, I was able to address the overall guiding question of “*How is the school-wide practice of project-based learning conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible?*” Further discussion of the implications of this research will be discussed in Chapter 5.

Table 4.4

*Compilation of the Identified Contradictions at Border Leadership Academy*

Activity System	Contradictions	Description	Resolution Status
Whole School- Border Leadership Academy's Activity System  (15/27) = 56% Participants shared in this contradiction.	Critical Conflict/ Secondary Contradiction Between Subject & Object & Rules	<b>Description</b> - The subjects found it difficult to implement project-based learning with bi-weekly frequency on designated days. <b>Example</b> - "It was a lot. And we found out through trial and error that that it was too much. It was exhausting us putting on-- it takes a lot of energy" (TJY8S, interview).	<b>Resolved</b> –Monthly designated days for project-based learning and flexibility for teachers to embed project-based learning into the curriculum. <b>Example</b> - There was a change in the Master Calendar from bi-weekly to monthly project-based learning and teachers' lesson plans reflect project-based learning within the context of the classroom.
Whole School- Border Leadership Academy's Activity System  (25/27) = 93% Participants shared in this contradiction.	Dilemma/Primary Contradiction Within the Object	<b>Description</b> - In the object, a common understanding of project-based learning was not established causing multiple interpretations and understandings. <b>Example</b> - "Teachers I think do you see the benefit in the enrichment projects" (ALBDI). "The problem-based or project-based learning the girls are doing right now in our STEM class" (AMVP). "We can do little projects like connector reading logs" (SLS8).	<b>Resolved</b> – A renegotiated meaning of project-based learning was established to include project enrichment and other variations of projects. <b>Example</b> –An administrator stated, "So the availability of doing enrichment is always open and available and it includes project-based learning and project enrichment. (AMVP).
Administrators' Activity System  (3/3) = 100% Administrators shared in this contradiction.	Dilemma/Secondary Contradiction Between Subject & Object	<b>Description</b> - Administration struggling with implementation of innovation to include project-based learning. <b>Example</b> - "So there's a huge paradigm shift for me about traditional and really being innovative. And we're raised traditional, it is difficult to be innovative" (AMVP)	<b>In Negotiation-</b> Administrators are still negotiating the application of innovation through project-based learning. <b>Example</b> "And it (innovation) almost feels it's like a petri dish experiment, in some ways because it's non-traditional. It's something that, unless you grew up in that or you've experienced yourself, you're not sure of (AMVP).



<p>Teachers' Activity System</p> <p>(12/12) = 100% Teachers &amp; Administrators shared in this contradiction.</p>	<p>Critical Conflict/Secondary Contradiction Between Subject &amp; Object &amp; Division of Labor</p>	<p><b>Description</b> - Project-based learning experiences were developed by a few individuals causing an imbalance in the workload amongst the teachers.</p> <p><b>Example</b> – "...because it was placed on one committee, but it's a lot of work for just five people to do" (ABTCC).</p>	<p><b>Resolved</b> – A new system has now been developed that allows a more collaborative effort in developing and sustaining project-based learning.</p> <p><b>Example</b> - "We have committees. And basically we are in charge of planning everything from-- all the details are up to us for everybody in the whole school, all personnel, all students, all faculty" (TEV7E).</p>
<p>Students' Activity System</p> <p>(7/9) = 78% Students shared in this contradiction.</p>	<p>Critical Conflict/Tertiary Contradiction Between Subject &amp; Object &amp; Division of Labor</p>	<p><b>Description</b> - Students had poor past experience of working collaboratively in groups; therefore struggled with expectations and participation in project-based learning.</p> <p><b>Example</b> – "Because at my old school when we do group projects, I usually be the one taking most of the work" (SAR8).</p>	<p><b>Resolved</b> – Students have negotiated new ways of being and meaning in context of collaborative work to support project enrichment.</p> <p><b>Example</b> – "Yeah, but the groups here aren't as bad as they normally are... Well, it's just because everybody does their work. So it's not like you're taking up the work for everybody else" (SJM6).</p>
<p>Parents' Activity System</p> <p>(4/9) = 45% Parents shared in this contradiction.</p>	<p>Dilemma/Secondary Contradiction Between Subject &amp; Community</p>	<p><b>Description</b> - Parents experienced tension with release of parental control to promote their daughter's ownership and independence in the learning process of project-based learning.</p> <p><b>Example</b> – "So my experience with Lisa (pseudonym) is to let her be successful but not push her too much. Because then you can turn her off. Because that happened to me once when she was younger. I pushed her too much" (PGR8AR).</p>	<p><b>In Negotiation-</b> Parents are still learning how and when to support their daughters to maximize independence while at the same time offering support.</p> <p><b>Example</b> – "Good question, because I'm changing my approach [laughter]. I gave a lot of input in her last science project, and she didn't do probably as well as she probably could've. So I've learned my lesson" (PES8LS).</p>

## **Chapter 5: Discussion**

This research addresses the barriers and challenges to school-wide implementation of project-based learning in a middle school. With recent attempts at the infusion of project-based learning into the school culture, school communities struggle with implementation and sustainability. Many middle schools lack the appropriate organizational structure and foundational constructs of project-based learning to gain the desired outcome and benefits of inclusion of project-based learning in the school. The findings from this study contribute to the current research on project-based learning (Krajcik et al., 2008) and the realized school-wide application of project-based learning to enable students with 21st century skills (Bell, 2010; National Education Association, 2017; National Research Council, 2012). Lastly, the findings also contribute to the theoretical perspective of CHAT-based research on examining contradictions as opportunities of growth and new meaning making within the activity systems (Engeström, 2015; Engeström, & Sannino, 2011; Yamagata-Lynch, 2007) of a school community.

As part of educational reform, schools are in the process of developing 21st century learners through application of project-based learning (NEA, 2017). However, participants who are attempting engagement in project-based learning find themselves with various levels of understanding and are negotiating meaning in context of the learning activity. These findings describe the interconnected activity systems within the school community and the constructs through which each activity system operates to support the development and sustainability of project-based learning. The research is situated within the historical development of each of the five learning activity systems of whole school, administration, teachers, students and parents making the manifestation of contradictions possible (Engeström & Sannino, 2011). Focus was

drawn to the contradictions as they speak to the tensions present in the systems and provide insight as to how new meanings are negotiated and resolved by the members of the school community.

Furthermore, these findings were framed within a CHAT framework and they offer insight of how to address the processes and challenges schools face when implementing a school-wide practice of project-based learning. Together, the school activity systems' findings and the contradictions present a wide and deep perspective of the transformation that must occur as middle schools embrace project-based learning as educational norm to prepare students for the 21st century. Thus, these findings provide guidance on how to achieve this goal and point to future research on project-based learning thru application of the CHAT framework. In this chapter, I will discuss the contradictions found within the study and elaborate how these findings can be used to resolve challenges encountered by project-based learning. In addition, I will elucidate upon the application of the CHAT framework and its potential to reveal areas of change in educational systems. Implications of the research will be discussed followed by proposals for future research.

#### **TIME AND SCHEDULE CONTRADICTION**

In the findings, a critical conflict secondary contradiction was discovered in the Border Leadership Academy's activity system indicating a tension between the subject, object and rules as the subjects found it difficult to implement project-based learning with bi-weekly frequency on designated days. This finding is congruent with recent research, in which teachers perceived "implementing the project within the school's schedule" (Harris, 2014, p. 75) as one of the top challenges in implementation. To compound this issue of time, Marx et al. (1997) discovered

that project-based learning often requires more time than anticipated as questions and challenges materialize through the implementation process.

The concept of time at first can appear nebulous as the specificity of how long or how much are not quantified, rather teachers express their understanding of time in general terms such as “more time” or “too much time” making it a challenge to address the impediments to implementation of project-based learning. Project-based learning studies often will recognize the need for more time (Capraro et al., 2016; Hertzog, 2007; Welsh, 2006); however there is limited research on how much time or in what form this might take. By applying the specificity of the contradiction of time allocation which constituted the subject, object and rules a targeted resolution was negotiated within the Border Leadership Academy. In the research, the participants encountered the critical conflict contradiction present in the whole school activity system and began the mediation process. The negotiation between the nodes of the system consisted of altering the school schedule of implementation from the first year, 2016-2017 school year to the 2017-2018 school year. Through mediation, the number of designated project-based learning days was reduced from twice a month to once a month; in turn facilitated the embedding of project-based learning into the context of the curriculum. As a result of negotiation between the participants a transformation of the whole school activity system towards sustainability of project-based learning occurred.

Recognition of the contradiction is essential, for without it a transformation of the activity does not occur. In a recent study, Farrar (2016) stressed the importance of consciousness of contradictions in an activity system as contradictions serve as a motivation to transform the activity system (Engeström & Sannino, 2011). Thus Border Leadership Academy recognized the tension within their system and negotiated a new meaning by restructuring the schedule to make

project-based learning possible. The identification of the contradiction, revealed a specificity of by which the Border Leadership Academy could act upon and address the challenge of time towards the implementation of project-based learning. If recognition and action had not occurred then the impediment of time allocation towards project-based would have still existed; hence increasing the likelihood of unsustainability.

### **TRUSTING INNOVATION CONTRADICTION**

One of the driving norms created by the administration was the development of a common purpose of creating a school that would enable girls to be prepared for a college and career of their choosing by application of 21st century skills that enabled independence and transformation. Utilizing project-based learning as a conduit for realization of this goal was infused into all five of the activity system, presented in Chapter 4. One of the administrative team referred to the development of this common belief as “drinking the Kool-Aid” (ABTCC, interview) in establishing a collective buy-in of the historical development of the beliefs and norms within the activity system (Lam et al., 2010). The community within the administrations’ activity system conveyed a unified understanding of the purpose and justification for the tools and rules applied to the object of project-based learning through the interviews, observations and documents applied in the course of this research.

Even though the administrators’ activity system demonstrated a strong cohesiveness, a dilemma secondary contradiction manifested between the administration and the object of an internal personal struggle with implementation of innovation to include project-based learning. The administrator revealed that even though the foundation had been established for innovation, the trusting of the process was still personally difficult because of the uncertainty of the outcome. Manifestation of this dilemma occurred in the interview, as the observations and documents

revealed a sense of determination towards implementation. In essence, even though actions had been established, mediation was still ongoing within the mindset of the administration as to how innovation would materialize and what would be the impact of the decision on the participants of the activity system. A constant sense of negotiation was and is occurring as data from examinations and observations were acting upon the administrators' system providing an individual learning opportunity and a potential source for change over time (Engeström, 2015; Pacheco, 2012). Hence this contradiction present in the administration activity system is still in negotiation as a final resolution to the effectiveness of innovation through project-based learning has not been affirmed.

The revelation of this contradiction is important as it reveals a decision point or moment in an activity system that influences the implementation and sustainability of project-based learning. Administrators even though the foundational constructs of project-based learning have been established, a constant reevaluation and mediation is occurring surrounding the effectiveness of innovation through project-based learning. In a recent study, Capraro et al. (2016) support this cyclical evaluative practice as they ascertain more research needs to be conducted with variations of innovation that are generalizable across different school context. Hence, the evaluative reflection employed by the administrator is in line with current recommended research practices involving innovation. In education, this is an important revelation as data driven decisions drive the curriculum and project-based learning is not necessarily measured on assessments but the effects of implementation are being viewed and interpreted based upon the results of student success of mastery of academic standards.

By employing this iterative method of utilizing data on standards-based assessment to guide instruction and determine effectiveness of project-based learning, addresses one of the

challenges to sustainability. Teachers operate under the assumption that 21st learning skills are not measureable and therefore minimized as to their importance in time allocation of teaching (Capraro et al., 2016). In other schools, teachers have expressed reluctance of implementation of project-based learning citing limits on time to teach the designated standards (Harris, 2014; Browder, 2014). However, by utilizing data this presents a counter argument as to the effectiveness of instruction by measuring not necessarily 21st century skills but the application of those skills through project-based learning that are reflected on standards-based assessment. Administrators and teachers in this study, employed data to determine the effectiveness of instruction and apply this decision point to sustain or alter project-based learning instruction based upon the results of standards-based assessments (Browder, 2014).

#### **DIVISION OF LABOR CONTRADICTION**

A critical conflict secondary contradiction manifested between the subject, object and division of labor within the teachers' activity system. This was as a result of the first year of project-based learning experiences being developed by a few individuals causing an imbalance in the workload amongst the teachers. Compounding this contradiction was the perceived limitations of time needed to implement project-based learning effectively. Even though all of the teachers applied project-based learning, not all of them developed the projects in the inaugural year of the school. Thus, the application of CHAT revealed the historical developing structural tensions situated within the teachers' activity system. As this contradiction was not present at the inception of the school but rather developed through interaction of the subjects on the object within the activity system.

By engaging in project-based learning teachers conveyed that planning, teaching and learning for project-based learning was considered time intensive. Previous research on project-

based learning shared a similar sentiment of time allotment and is considered a challenge towards implementation (Capraro et al., 2016; van Uum et al., 2016; Welsh, 2006). In another recent study, teachers were open to the enterprise of project-based learning but expressed concern on the limitations of time in context of planning organic and authentic projects for students (Welsh, 2006). Teachers at Border Leadership Academy, voiced parallel sentiments and were actively seeking ways to mediate this tension. In the process of implementing project-based learning with fidelity, the teachers at Border Leadership Academy conveyed they were exhausted trying to meet the demands of implementation. Thus, realization of this contradiction served as motivation to transform the teachers' activity system.

Browder (2014) in his study on understanding capacities to facilitate change to support project-based learning recommends establishing creative scheduling such that a block of time is allocated towards collaboration and communication. In another study, Chang and Lee (2010) suggested the application of a team-teaching approach to facilitate project-based learning to address the challenge of time and context within the content. In an effort to address the critical conflict contradiction the teachers at Border Leadership Academy employed both recommendations in the mediation process towards resolution.

This contradiction reached a resolution at the beginning of the second year, through adjustment of the calendar and the inclusion of all teachers and administrators as members of the development team for the planning and development of project enriched learning experiences. Planning for the implementation of project-based learning experiences now occurred at the beginning of the year and throughout the year on designated C-days, which established a block of time dedicated to collaboration. In addition, the labor of planning, teaching and implementing was now divided equally amongst the teachers supporting the continued sustainability of the



inclusion of project-based learning. Teachers were now involved in cross-curricular application of project-based learning facilitating a team teaching approach. Uncovering and recognizing the contradiction present in the teachers' activity in the division of labor particularly how the tension relates to time for planning, teaching and learning contributes to the research surrounding project-based learning. The negotiation of the teachers' contradiction in this study serves as an example to address the challenges to implementation, particularly how resolution was achieved through the specific components associated with the teachers' activity system.

Through mediated activity a new understanding was formulated; thus causing a transformation in the Border Leadership Academy and teachers' activity systems. By examining and applying the CHAT framework to the teachers' activity system, elucidation of where structural and emotional contradictions proved to be beneficial. Krajick et al. (1994) confirmed the importance of identifying contradictions as not only beneficial but also a necessity. Krajcik et al. (1994) stated "without adequate attention to the difficulties teachers face and ways to support them as they cope with these difficulties, project-based instruction will not be widely accepted" (p. 489). Thus identifying contradictions in the teachers' activity system provided insight as to where and how challenges to implementation of project-based learning may occur enabling planning of preventative measures to facilitate rather than impede application and sustainability.

#### **COLLABORATION CONTRADICTION**

A contradiction was also found in the students' activity system. Students play a critical role in the establishment of the activity systems and it is the outcome of their activity system which drives the actions of other activity systems that comprise the Border Leadership academy (see Figure 4.8). By applying CHAT to the students' activity system key understandings and epistemology from which students operate to engage in project-based learning was revealed.

Students understood inherently the tools employed by themselves and the teachers were conduits towards the desired outcome of independence to be prepared for career and college in order to transform themselves and the world around them. Hence, engaging the tools of 21st century learning was met with little resistance, with the exception of cooperative learning.

As a researcher, this was a surprise not only from the standpoint of the students' epistemology towards knowledge but also because it was in contradiction to the research surrounding girls in education. In a recent study involving 200 girls between the ages of eight through twelve in a series of Chemistry camps explored how girls learn science. It was discovered that girls enjoy working in small collaborative groups when they engage in hands-on and reflective practices (Tucker, Hanuscin & Bearnese, 2008). Another study by Boaler (1998) investigated how boys and girls prefer to learn. The results suggest that girls prefer environments that stress understanding through project-based learning which corroborates the findings by Tucker et al. (2008). In contrast, the findings of this current study revealed students resistant to collaboration, which is an integral component of project-based learning. This outcome was puzzling and warranted further inquiry. Additional investigation of the students' hesitation towards collaboration exposed the manifestation of a contradiction within the students' activity system.

A critical conflict tertiary contradiction was uncovered in the students' activity system and was revealed through the application of CHAT as an analysis tool. The manifestation of the contradiction between the students, division of labor and introduction of new ways of working within groups occurred through the historically developing tension between the old and new students' activity system. The research revealed students had poor past experience of working collaboratively in groups; therefore struggled with expectations and participation in project-

based learning. Previously, the girls conveyed that when working in groups at their old school they did most if not all of the work required. In addition, students reported they were placed in groups with students who were having difficulty completing tasks and were expected to assist those students. Consequentially, the girls enrolled at Border Leadership Academy had preconceived expectations of what cooperative learning entailed and were resistant to working in groups and preferred to work on individual projects.

Another consideration for this finding can be found in a study by Rosenfeld and Rosenfeld (1998) who investigated learning styles of students who perform well in traditional classrooms but perform unsatisfactory in project or group setting. According to two learning style inventories, the students who perform well in conventional classrooms were characterized as fact orientated and were driven by the need to know the answer and complete the task. In order to address this finding, the study suggests more opportunity for engagement in project-based learning to expand the educational experiences for students. The students enrolled at Border Leadership Academy also have a strong predisposition towards academics; therefore can be characterized as fact driven which could influence participation in collaborative groups.

Recognizing the existence of this contradiction enabled the teachers the opportunity to purposefully reteach and offer students a different understanding of what it means to work in cooperative groups. Thus introducing a new way of being or meaning for students, in the division of labor node regarding cooperative grouping. Students began to think of cooperative grouping as collaborative work in which everyone contributes, which is reflective of 21st century skills. What this contradiction contributes to the research on project-based learning is that collaborative grouping must be explicitly taught and organized. It is incorrect to assume that students understand how to inherently work in groups that are productive such that all members

contribute to the overall successful completion of the project (Rosenfeld & Rosenfeld, 1998). Rather, especially at the beginning of project-based learning roles must be assigned and checkpoints need to be developed that foster and support the collaborative thinking process that occurs within the project-based learning environment (Barron et al, 1998). Once established, a more open-ended approach can occur regarding collaborative work allowing students the opportunity to organize and design their groups based upon a mutual understanding and a culture of trust to complete the task.

#### **PARENTAL CONTROL VS. INDEPENDENCE CONTRADICTION**

Parents also played a role in supporting project-based learning. It was discovered that the parents' activity system is very much centered on developing an environment that is conducive to their daughters' success particularly in regards to the expected outcome of being prepared for college and career readiness. A dilemma secondary contradiction occurred between the subject and community, when parents experienced tension with release of parental control to promote their daughter's ownership and independence in the learning process of project-based instruction. As a whole, parents were highly interested and wanted to be involved in the facilitation of the learning process particularly in response projects. Understanding that one of the ultimate goals was independence for their daughter, letting their child actually be independent when it comes to learning was a challenge. Parents had to resist contributing their opinion or unwanted assistance as students were working collaboratively with others and promote ownership and empowerment of their daughter's learning.

In spirit, the parents had to create a new normal or a new way of being (Engeström, 2015), to support project-based learning experiences. Parents were and still are experiencing a paradigm shift of what the support looks like when trying to promote independence (Shulman,

1986). As a result, this dilemma is still in negotiation as parents are learning how and when to support their daughters to maximize independence while at the same time offering a foundation for project-based learning. In a study conducted by Welsh (2006) she investigated how two charter schools implemented project-based learning. In her findings, she shared as students and teachers need to be educated in the practices of project-based learning so do parents. Parents and community members are unfamiliar with the complicated structure of project-based learning and the independence and responsibility it entails on the part of the student. Educating parents on project-based learning facilitates cohesiveness in support and provides a means through which parents can contribute to their child's learning experience.

In sum, analysis of the five activity systems provided a broad and deep perspective of a school-wide application of project-based learning. The analysis of the research illuminated the conceptual understanding of project-based learning of the stakeholders within a middle school revealing not only a holistic representation of the activity but also the activity systems that comprise Border Leadership Academy. In addition, the contradictions reveal how these activity systems in this study addressed challenges to implementation and sustainability of project-based learning.

### **CONTRIBUTIONS TO CHAT-BASED RESEARCH**

Cultural historical activity theory offered a situated perspective of activity systems (Engeström, 1987) which allowed me the opportunity to investigate the multiple interactive activity systems that comprised the larger whole school system. Knowledge development is a contextual act that is situated in social context of the environment; therefore conducting the study within the school provided contextual relevancy of how knowledge of project-based learning was formulated. CHAT afforded a tool to connect actions and meaning making processes to the

intended objects of project-based learning and 21st century skills of the five activity systems. By examining the five activity systems of whole school, administrators, teachers, parents and students a broad and deep perspective of the activity systems was presented. The examination of the whole school community in conjunction with the individual level addresses Engeström's (1994) call that more studies are needed to compare the community and individual activity systems to illuminate the contradictions that manifest as the transformation of the community's central activity occurs.

As each activity system was viewed with a different subject lens; the same differentiated perspective was also applied to the contradictions. Contradictions offered a pivot point in which new meaning was created or new understandings were negotiated within the activity system (Engeström & Sannino, 2011). Upon the development of this research, contradictions presented themselves as critical tools to view the transformation of the activity systems (Engeström, 2015) in relation to the individuals who comprise it. Contradictions could be categorized according to their relationship within or between the activity systems of primary, secondary, tertiary or quaternary. In addition, contradictions could be further delineated and categorized through degrees of dilemma, conflict, critical conflict or double bind.

Due to the complexity of the study, identifying and analyzing contradictions with multiple activity systems was challenging. As a result, I formulated a Contradiction Analysis Matrix (Table 4.2) which applied the relationship with the degree contradictions to create a structured representation of sixteen different variances of contradictions. By utilizing the matrix in categorizing the contradictions that manifested in each of the activity systems, I was able to understand the mediated action that occurred within and between the nodes of each activity system as it interacted with the object of project-based learning. The matrix provided a systemic

structure through which contradictions could be identified and determine if they had been resolved or were in the process of resolution. Prior to this study no record of intentionally combining the relationship to the degree of contradictions was found; therefore the development of the matrix is a contribution to the application of CHAT based research.

In essence, applying the analytic tools of CHAT in conjunction with the matrix, captured a snapshot of the contradictions as they were occurring or had occurred within each activity system. This snapshot representation of contradictions is akin to capturing the “aha” moment of learning in which new meaning or the creation of a new paradigm is being formed (Engeström, 2015; Shulman, 1986). This analogy is compatible with the activity system and the constructs of CHAT as the activity system is in constant motion, evolving through collective learning interactions in response to contradictions (Foot, 2014). Engeström (2001) describes contradictions as a “historically accumulating structural tensions” (p. 137). The key words are historically accumulating meaning that contradictions are not simultaneous interactions of cause and effect but rather occur over an extended period of time and are in a constant state of flux as the nodes of the activity interact with one another (Engeström, 2015). By applying the tools in CHAT, I was able to answer my overall guiding questions of this research “*How is the school-wide practice of project-based learning conceptualized within and between the stakeholders of a middle school to make implementation and sustainability possible?*” Thus by utilizing CHAT as a unit of analysis I was able to manage the complex data sets of the five activity systems, to understand the human activity situated in a collective context (Engeström, 1987).

## **IMPLICATIONS**

The framework of *Preparing 21st Century Students for a Global Society* (NEA, 2017) specifically points to the need to prepare students for this new global society by teaching the core

content incorporating critical thinking, communication, collaboration and creativity. However, the gaps in the research indicate that many schools find it challenging to implement these 21st century skills in context of the curriculum (Barron et al., 1998; Farrar, 2016; Krajcik, 2008; Lam, 2010). The findings in this study support this conclusion and verify the existence of gaps in the application process, particularly when applied to a whole-school environment. In an attempt to prepare students for the 21st century, Border Leadership Academy chose to utilize project-based learning experiences to address this need. Even though structures were in place to facilitate this process, tensions still manifested as the participants involved in the school system negotiated meanings and understandings to make project-based learning possible (Ryder & Yamagata-Lynch, 2014). The use of CHAT was beneficial as it provided a means to view the specificity of the contradictions and indicate where areas of change did occur or where in the process of occurring. As a result, key findings were identified that made implementation and sustainability possible for project-based learning. Recommendations based upon these findings are discussed further in the following paragraphs.

First, the schools who choose to utilize project-based learning as a vehicle to embed 21st century skills into the curriculum must first develop the groundwork that is conducive to project-based learning. This groundwork would include establishing foundational goals through which a school community could aspire to building a collegiality of project-based learning (Lam et al., 2010). In addition, a schedule that creates space for planning and application of project-based learning must be intentional and applied to the Master Schedule.

Second, project-based learning must be inclusive and collaborative for all stakeholders within the community. All of the teachers and administrators work in partnership on the development of projects that are centered on core themes of the school and purposefully



including the four C's of critical thinking, communication, collaboration, and creativity (NEA, 2017). Furthermore, students must be explicitly taught how to apply 21st century skills in context of project-based learning.

Third, administrators must be supportive, innovative and open to the application of 21st learning through project-based learning. Support is demonstrated through scheduling, materials and resources and being responsive to the needs of the students and teachers. In addition, utilize data to determine if the program is being successful in preparing students for the 21st century, not only test scores but also qualitative data such as notebooks, observations and interviews to determine effectiveness. The gathering of data should be an iterative process by which innovation can be affirmed or negotiated.

Lastly, include parents and community members in the application of project-based learning. Parents provide the foundation for students; therefore educate them and the community on the process. In addition, the inclusion of the community presents a global picture and application of project-based learning; thus connecting to the community is essential.

## **FUTURE RESEARCH**

According to the research, project-based learning is experiencing a renaissance (Holm, 2011) as educators are seeking new ways to be innovative in order to adapt to our changing students and world in preparation for the 21st century (NEA, 2017). Collaboration, critical thinking, communication and creativity are considered foundational 21st century skills that students will need in the future. However, in this study, resistance towards collaboration was discovered in the students' activity system. This finding was a surprise as contradictory research demonstrated that students preferred to collaborate with others while engaged in project-based learning (Tucker et al., 2008). However, in this study, it was discovered that students were not

receptive to collaboration and had to be explicitly taught how to work with others such might be the case with other skills associated with 21st century learning such as critical thinking, communication and creativity (NEA, 2017). In light of this research, investigating how 21st century skills are incorporated within project-based learning, particularly how students respond beckons further research.

Another potential area for research was revealed in the administrators' activity system in conjunction with trusting the innovative practices associated with project-based learning. Administrators were open to the idea of innovation and established the foundation and yet were still apprehensive towards its effectiveness. In the study, the administrators used an iterative process to examine the data in relation to the standards to test and retest the findings to validate the application of project-based learning (Capraro et al., 2016). Even though this cyclical process of testing the effectiveness of project-based learning was utilized, administrators still expressed that trusting innovation was difficult. The issue of trust in innovation for administrators presented a dilemma that is still in the process of negotiation; thus development of trust in the effectiveness of project-based learning presents an opportunity for future research. Exploring how and why trust is established for innovative practices is worthy of investigation as educators seek new ways to meet the demands of the 21st century innovation. However more research needs to be done to determine what type of innovation is effective and how administrators and teachers can make informed decisions as to the effectiveness of its use.

In this study, parents were also included as part of the activity systems within the Border Leadership Academy and played a pivotal role in the support and development of their child. Parents conveyed that it was challenging to encourage independence of their daughter while at the same time providing support, particularly for project-based learning. This tension presents

an opportunity for growth as the contradiction was still in negotiation. Previous research revealed parents had limited understanding of project-based learning (Welsh, 2006). In this dissertation, parents also expressed an unfamiliarity with the practices of project-based learning and were seeking ways to promote support and independence in this endeavor. Exploring ways in which parents can become involved in project-based learning warrants further research.

In the course of this study, CHAT provided an organizational and analysis tool through which to view historical development of project-based learning in a sociocultural context of Border Leadership Academy (Engeström, 2015; Ryder & Yamagata-Lynch, 2014). In context of multiple activity systems examined in this research a representation of each activity system was explored enabling a whole-school and group view of the primary activity of project-based learning. Engeström (1994) recommended more studies be conducted to compare individual and community activity systems and I concur with this sentiment. Expanding upon this call, future research could specifically utilize contradictions as a way of pinpointing specific areas of growth and negotiation that occur in project-based learning activity systems. Hence, utilizing specific data to understand where tensions exist in a system and propose ways to negotiate their resolution.

## **CONCLUSION**

In sum, it is anticipated that the finding and conclusions demonstrated in this study have provided some additional insights in which a school-wide application of project-based learning can be implemented and sustained in a middle school. The evidence from the research revealed the systems and structures that were developed to support project-based learning, in conjunction with recognizing tensions that impede project-based learning. Literature presented on the challenges to project-based learning were similar to what other learning environments

experienced (Thomas, 2000). However, it is important to note that attention was drawn to the specific locations of the tensions or challenges and how these were resolved in the course of the activity system. For example, how time allocation for implementation and sustainability was negotiated to make project-based learning possible. Additionally, a representative sample of all members of the school community were included in the research, giving voice to participants of their project-based learning experiences. By incorporating the view points and experiences of many, a multi-dimensional view of whole-school project-based learning was presented reflecting a broad and deep representation of project-based learning in a middle school.

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## Glossary

*21st Century Skills* are the application of critical thinking, problem solving, communication and collaboration within the context of key knowledge instruction. (The Partnership for 21st Century Learning, 2015)

*Authentic* is the traditional or real practice of the culture to include artifacts and action through which meaning and purpose are socially constructed and mediated by members of the community (Feldman & Pirog, 2011).

*Case-study* is qualitative approach of an in-depth examination of a particular case or event. (Lichtman, 2013).

*Contradictions* are “historically accumulating structural tensions within and between activity systems” (Engeström, 2011, p. 609).

*Culture* is a “system of shared beliefs, values, customs, and behaviors that individuals use to cope with the world and each other” (Lichtman, 2013, p. 224)

*Third Generation Cultural Historical Activity Theory (CHAT)* represents “a developing conceptual tool to understand networks of interacting activity systems, dialogue, and multiple perspectives and voices” (Engeström, 2015, p. xv).

*Participation* is the process “of being active participants in the practices of social communities and constructing identities in relation to those communities” (Wenger, 1998, p. 4).

*Project-based Learning* is a “systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks” (Buck Institute for Education, 2002, p. 4).



*Situated Learning* is an exploration that situates the character of human understanding and communication in relation to the learning and social situation in which it occurs (Lave & Wenger, 1991).

## **Appendix A**

### **Interview Questions for Project-based Learning**

CHAT: Subject, object, tools, community, division of labor, rules, outcome

#### **Interview Questions for Teachers**

1. Can you tell me a little about yourself and how you came to work at the school?
2. Can you please describe for me what a typical day looks like and sounds like at the school?
3. How do you determine your effectiveness as a teacher? Can you give me an example?
4. How do you determine student success? Can you give me an example?
5. In your opinion, what are some of the best tools and or teaching strategies you have used to work with students? Can you give me an example?
6. At your school project-based learning is part of the curriculum, can you please tell me the process that you and or your colleagues use to plan and implement the project?
7. How is the work associated with the development and implementation of project-based learning supported amongst the faculty?
8. In your experience can you tell me of some of the benefits and or challenges associated with the implementation of project-based learning?
9. Is there a difference between how you plan for instruction for project-based learning and your content? If so, how?
10. How do students act in the content classroom compared to the project-based learning environment?
11. What kind of support, if any, are you given from the faculty to include teachers and administration for the implementation of project-based learning? Can you provide an example?
12. Can you please describe for me the role of the parents in the implementation of project-based learning?
13. Can you please describe for me the role of the community in the implementation of project-based learning?
14. What are your expectations of the student participants in the project-based learning process?
15. What do you believe will be the expected outcomes for students participating in project-based learning? In one year? In five years?
16. Is there anything else you would like to share with me regarding the school or the project-based learning curriculum?

#### **Interview Questions for Administrators**

1. Can you tell me a little about yourself and how you came to work at the school?
2. Can you please describe for me what a typical day looks like and sounds like at the school?

3. How do you determine your effectiveness as an administrator? Can you give me an example?
4. How do you determine student success? Can you give me an example?
5. In your opinion, what are some of the best tools and or teaching strategies you have seen teachers use when working with students? Can you give me an example?
6. At your school project-based learning is part of the curriculum, can you please tell me the process that you and or your colleagues use to plan and implement the project?
7. How is the work associated with the development and implementation of project-based learning supported amongst the faculty?
8. In your experience can you tell me of some of the benefits and or challenges associated with the implementation of project-based learning?
9. Is there a difference between how teachers plan for instruction for project-based learning compared to their content? If so, how?
10. How do students act in the content classroom compared to the project-based learning environment?
11. As an administrator what kind of support do you offer to the faculty towards the implementation of project-based learning? Can you provide an example?
12. Can you please describe for me the role of the parents in the implementation of project-based learning?
13. Can you please describe for me the role of the community in the implementation of project-based learning?
14. What are your expectations of the student participants and teachers in the PBL process?
15. What do you believe will be the expected outcomes for students participating in project-based learning? In one year? In five years?
16. Is there anything else you would like to share with me regarding the school or the project-based learning curriculum?

#### Interview Questions for Parents- English

1. Can you tell me a little about yourself and why you chose for your daughter to attend the Young Women's Leadership Academy?
2. Can you please describe for me what a typical day looks like and sounds like before and after school?
3. How do you know if your child is being successful?
4. In your opinion, what are some of the best tools or ways your child learns in school? Can you give me an example?
5. The Young Women's Leadership Academy uses project-based learning as part of the curriculum. If you could please share with me your experience or your child's experience with this program.
6. Is there a difference between how your child works on projects associated with project-based learning compared to their content (math, science, etc.)? If so, how?
7. As a parent do you have a role in the implementation of project-based learning? Why or why not?
8. What kind of community interaction does your child experience as a result of project-based learning?

9. When your child is working on a project, how is the work divided?
10. In your experience, how is your child supported at school with the project-based learning curriculum?
11. How does your daughter know if she has been successful in project-based learning? Are there any rules?
12. What do you believe will be the expected outcomes for your daughter as a result of her participating in project-based learning? In one year? In five years?
13. Is there anything else you would like to share with me regarding the school or the project-based learning curriculum?

#### Interview Questions for Parents- Spanish

1. Can you tell me a little about yourself and why you chose for your daughter to attend the Young Women's Leadership Academy?  
Diga algo de su persona que explica ¿porqué escogió *Young Women's Leadership Academy* como escuela para su hija?
2. Can you please describe for me what a typical day looks like and sounds like before and after school?  
Por favor describa el horario del día antes y después de escuela.
3. How do you know if your child is being successful?  
¿Cómo sabe si su hija tiene éxito en la escuela?
4. In your opinion, what are some of the best tools or ways your child learns in school? Can you give me an example?  
En su opinión, ¿cuales son algunos de los mejores métodos de aprendizaje en la escuela para su hija?
5. The Young Women's Leadership Academy uses project-based learning as part of the curriculum. If you could please share with me your experience or your child's experience with this program.  
La escuela *Young Women's Leadership Academy* utiliza aprendizaje basado en proyectos como parte del currículo. Comparta su experiencia o la experiencia de su hija sobre este programa.
6. As a parent do you have a role in the implementation of project-based learning? Why or why not?  
Como padre, ¿tiene Ud. una parte en la implementación del aprendizaje basado en proyectos? ¿Porqué si o porqué no?
7. What kind of community interaction does your child experience as a result of project-based learning?  
¿Qué tipo de interacciones tiene su hija con la comunidad como resultado del aprendizaje basado en proyectos?
8. When your child is working on a project, how is the work divided?  
¿Cómo se dividen el trabajo cuando su hija trabaja en un proyecto?
9. In your experience, how is your child supported at school with the project-based learning curriculum?  
Conforme a su experiencia, ¿cómo es que su hija recibe apoyo en la escuela con el curriculum de aprendizaje basado en proyectos?

10. How does your daughter know if she has been successful in project-based learning?  
Are there any rules?  
¿Cómo sabe su hija si ha obtenido éxito en su aprendizaje basado en proyectos?  
¿Hay algunas reglas?
11. What do you believe will be the expected outcomes for your daughter as a result of her participating in project-based learning? In one year? In five years?  
¿Que cree Ud. que serán los resultados para su hija al haber participado en el aprendizaje basado en proyectos? Dentro de un año? Dentro de cinco años?
12. Is there anything else you would like to share with me regarding the school or the project-based learning curriculum?  
¿Hay alguna otra cosa que le gustaría compartir acerca de la escuela o el aprendizaje basado en proyectos?

#### Interview Questions for Students

1. Can you tell me a little about yourself and why you chose to attend the Young Women's Leadership Academy?
2. Can you please describe for me what a typical day looks like and sounds like?
3. How do you know if you are being successful in school?
4. How do you like to learn in school? Can you give me an example?
5. The Young Women's Leadership Academy uses project-based learning as part of the curriculum. Can you share with me your experience in working with project-based learning?
6. Is there a difference between how you learn during project-based learning and your content? If so, how?
7. What is your role in project-based learning?
8. How do you interact with the community in project-based learning?
9. Are you supported during project-based learning? How?
10. How is the work divided during project-based learning?
11. How do you know if you have been successful in project-based learning? Are there any rules?
12. What are some things you like about project-based learning? Example?
13. Are there any things you dislike about project-based learning? Example?
14. As a result in participating in project-based learning what do you hope to gain at the end of the year? In one year? In five years?
15. Is there anything else you would like to share with me regarding the school or the project-based learning curriculum?

## Appendix B

### Border Leadership Academy

### 2017-2018 A/B Bell Schedule

Period	Time	Event
<b>1A, B</b>	7:45-8:30	1 - 90m Core (A or B) or 2 - 45m Elective (A & B)
2	8:33-9:18	
<b>3A, B</b>	9:21-10:06	1 - 90m Core (A or B) or 2 - 45m Elective (A & B)
4	10:09-10:54	
5	10:57-11:30	6 / ½ 7 Lunch ½ 7 / 8 Leadership
6	11:33-12:06	6 / ½ 7 Leadership ½ 7 / 8 Lunch
<b>7A, B</b>	12:09-12:54	1 - 90m Core (A or B) or 2 - 45m Elective (A & B)
8	12:57-1:42	
<b>9A, B</b>	1:45-2:37 (announcements)	1 - 90m Core (A or B) or 2 - 45m Elective (A & B)
10	2:40-3:25	

# Border Leadership Academy

## 2017-2018 Bell Schedule C Days

Period	Time	Event
<b>1</b>	7:45 – 8:15	Scheduled Elective or Enrichment Lab
<b>2</b>	8:16 – 8:46	Scheduled Elective or Enrichment Lab
<b>3</b>	8:47 – 9:17	Scheduled Elective or Enrichment Lab
<b>4</b>	9:18 – 9:48	Scheduled Elective or Enrichment Lab
<b>7</b>	9:49 – 10:19	Scheduled Elective or Enrichment Lab
<b>8</b>	10:20 – 10:50	Scheduled Elective or Enrichment Lab
<b>9</b>	10:51 – 11:21	Scheduled Elective or Enrichment Lab
<b>10</b>	11:22 – 11:52	Scheduled Elective or Enrichment Lab
<b>5 / 6</b>	11:53 – 3:25  Report at 11:53 Leave backpacks in Leadership during Lunch Rotation	Leadership Grouping (Core Rotation)  Lunch Times:      11:55 – 12:25    6 <sup>th</sup> Grade 12:15 – 12:45    7 <sup>th</sup> Grade 12:35 – 1:05      8 <sup>th</sup> Grade

## Vita

Laura Ann Venegas, Ph.D.

Laura Venegas earned her Bachelor of Fine Arts Degree in Education for Arizona State University in 1987. In 1996 she received her Master of Arts in Science Education from the University of Texas at El Paso. In 2013, she joined the Teaching, Learning and Culture program with a concentration in Math/Science/Tech. While pursuing her doctorate she worked with her chair Dr. Pei-Ling Hsu on the *Work with a Scientist Program* at the University of Texas at El Paso. Together they co-authored *High School Students' Science Learning in a University Internship: A Cultural-Historical Activity Theory Perspective* and presented at AERA at the 2016 conference.

Laura Venegas currently works for Ysleta Independent School District as a district instructional specialist in science education for middle schools. Her duties include mentoring teachers, writing curriculum and providing professional development. Furthermore, Laura has had the opportunity to share her expertise by conducting professional development in her local school district and presenting at the annual state science conference in Texas. In addition, she has presented at the national level with presentations at Association for Supervisors and Curriculum Development (ASCD) and American Educational Research Association (AERA).

Laura Venegas earned her Ph.D. in 2018 from the University of Texas at El Paso in Teaching, Learning and Culture with a concentration in Math/Science/Tech. The title of her dissertation was “Analyzing School-wide, Project-based Learning in a Middle School: From a Cultural Historical Activity Theory Perspective” and was supervised by Dr. Pei-Ling Hsu.

Permanent address: lavenegas2@miners.utep.edu

This dissertation was typed by Laura Ann Venegas.