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LEVERAGING PROJECT BASED LEARNING TO PROMOTE STUDENT ENGAGEMENT IN A MULTI-MODAL LEARNING ENVIRONMENT

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ABSTRACT

LEVERAGING PROJECT BASED LEARNING TO PROMOTE STUDENT ENGAGEMENT IN A MULTI-MODAL LEARNING ENVIRONMENT

Elizabeth Cole

The purpose of this study was to understand how teachers leveraged the components of Project Based Learning (PBL) in a hybrid, remote, or in-person classroom environment to promote cognitive, emotional, and behavioral engagement. A narrative inquiry was conducted examining three teachers' implementation of PBL with students in Grades 4, 5, and 8 in the Spring of 2021. Findings revealed students' needs prompted teachers to emphasize certain components, which positively influenced student engagement. Teacher 1 leveraged critique and revision and scaffolding resulting in behavioral engagement. Teacher 2 leveraged sustained inquiry and building the culture resulting in cognitive engagement. Teacher 3 leveraged voice and choice and design and plan, which resulted in emotional engagement. Takeaways resulted in the significance on the social and emotional well-being of both students and teachers to build a strong classroom culture to lay the foundation for all types of engagement to ensue.

DEDICATION

This dissertation is dedicated to my mother and biggest fan, Susan Warnick. Although she was only here to read Chapter 1, she was my guardian angel and guiding light always shining down on me over this last year. Thanks Mom, I did it!

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CHAPTER 1: INTRODUCTION

The emergence of the coronavirus pandemic in the year 2020 transformed the pedagogical paradigm in schools across the United States. The unfolding events of the past year forced a rapid change in the way educators interact with their students and caused schools to shift from in-person to virtual learning, resulting in the need for teachers to learn new teaching approaches and methods of increasing student engagement. This transition raised the question: How can educators keep students engaged in learning through a screen? Student engagement notably decreased and student attendance suffered as well according to survey results reported by Chalkbeat National (Barnum & Bryan, 2020). A decline in student achievement was also observed, matching the drop in engagement (Di Pietro et al., 2020). As the days of virtual learning turned into weeks and months, teachers came to the realization that school was not going to return to normal anytime soon. Teachers needed to develop engaging, interactive curricula that would motivate students to participate, consistently attend classes, and maintain an active role in their learning. This need became increasingly paramount as districts began to shift their learning models to offer multiple modalities of learning. Schools transitioned to a complex model of hybrid, remote, and in-person learning. Teachers presently working within this multimodal learning paradigm need access to instructional strategies that foster engagement with students across all three learning environments.

The Project-Based Learning (PBL) model is designed to engage students through meaningful, student-selected guiding questions that promote collaborative learning, self-paced student inquiry, and problem solving. Students collaborate with the support of the teacher as facilitator who leverages myriad interactive tools to help students navigate

their learning to foster critical thinking and independent growth. This model can be accessed by all students regardless of the learning platform. Students learning remotely can collaborate with those at school, and hybrid students do not miss an opportunity to collaborate as they have access to both educational paradigms. PBL has the potential to serve all students and promote increased engagement with support from the teacher. However, most educators have never used PBL in a multimodal learning environment and are facing unprecedented challenges. There are multiple approaches to PBL, all with varied interpretations of how to implement this learning model (Condliffe et al., 2017). Teachers are left to navigate these complexities without sufficient scaffolding and professional support and must learn how to incorporate the different PBL components into a remote or hybrid learning model. I designed the present study to ascertain what challenges educators were facing with their PBL implementation and how they were leveraging the components to support consistent student engagement. Through my personal experience in conducting this study during the COVID-19 pandemic, an unprecedented time in education, it is my belief that the PBL strategy must encompass the following components: a driving question, authenticity, sustained inquiry, voice and choice, reflection, critique and revision, and a public product or presentation to an audience of experts. Additionally, PBL must be supported by the infusion of the following teacher practices: build a culture, assess the learning, design and plan, and scaffold the learning; resulting in student attainment of behavioral, cognitive, and emotional engagement. Finally, it is incumbent on the teacher to leverage the PBL components and infuse the teacher practices based on both the academic need and social-

emotional well-being of students to reach all students' behavioral, cognitive, and emotional engagement potential.

Problem Statement

According to the 2019 *Nation's Report Card* (NAEP), students in Grade 12 have performed lower in reading in a 30-year downward trend since the first NAEP assessment in 1992 (National Center for Education Statistics, 2019). In addition to this disheartening trend, the shutdown of educational institutions during the early months of the COVID-19 pandemic shifted the traditional school setting into a virtual learning environment. The impact of this change on student achievement remains to be realized. Another area of concern is the effect on student motivation and engagement with online learning.

Learning in the 21st Century

Due to COVID-19 regulations, the notion of the "traditional classroom" has been reimagined. All across the United States, multiple learning environments are taking shape in accordance to the needs of the community. Some of these nontraditional settings include hybrid, remote, and in-person. A hybrid setting consists of live or synchronous instruction delivered to those students who are in class and those learning at home who are digitally connected and viewing the lesson on a platform such as Google Meet or Zoom. In-person learning is the traditional learning environment within a classroom in a school. In addition to this shift, some teachers are being asked to teach remotely, hybrid, and in-person simultaneously due to families' right to choose how they want to educate their children in conjunction with the limited personnel available to teach across multiple settings. As a result, each classroom varies in terms of the number of in-person, hybrid, and remote learners. Some teachers are fully remote, whereas others navigate all three

learning models. Due to the lack of uniformity within the classroom, many teachers are seeking alternative approaches to foster student engagement. The challenges of meeting the diverse learning needs of students, and subsequently supporting their active participation in a remote, hybrid, or in-person learning setting, can be ameliorated through the infusion of strategies supported by PBL, a 21st century learning strategy. According to Vander Ark (2019), 21st century learning encompasses the idea that "all students have an educational experience preparing them to be effective lifelong learners and contributors; further embracing key skills including critical thinking, communication, collaboration, and creativity that young people need to thrive in this complex rapidly changing world" (What is 21st Century Learning section, para. 1). PBL encompasses key aspects requisite for 21st century learning to foster collaborative learning through interactive and generative knowledge sharing approaches that are known as the 4Cs: communication, collaboration, critical thinking, and creating (Miller, 2014). According to Miller (2014), schools in which leaders and teachers have adopted the vision of forging 21st century learning have developed rigorous, student-centered classroom environments where the standards are embedded in authentic learning experiences. Regardless of the educational setting (i.e., remote, hybrid, or in-person learning), PBL has the potential to help students maintain engagement and develop the skills they need to be successful in the 21st century classroom and workplace.

Though PBL is not a new strategy, deficiencies in the extant literature include a lack of understanding around its implementation during the COVID-19 pandemic. Specifically, there is a lack of information surrounding implementing PBL in multiple concurrent settings (i.e., hybrid, remote, or in-person). In a 3-year study by Deutscher et

al. (2021) investigating how a science course designed with a PBL approach and performance-based assessments affected the engagement and academic achievement of middle school students, the PBL group displayed positive gains in both areas. As this study preceded COVID-19, it did not include the multimodal educational contexts of hybrid, remote, and in-person learning. The results of my study are written for K–8 teachers. The goal was to share teachers' successes and decision-making processes while implementing PBL within the multimodal learning context to improve student engagement in 21st century classrooms that have been transformed by the COVID-19 pandemic.

Purpose Statement

The purpose of this narrative study was to explore how teachers leverage the various components of PBL as a pedagogical tool to increase the engagement of students who are learning across varied settings (i.e., remote learning, in-person learning, or the hybrid learning environment). This study adds to the extant literature on PBL due to the impact COVID-19 has had on the implementation of instruction and the complexities of teaching that now exist in the classroom, specifically by examining how the setting of the learning environment is uncertain and can change weekly. For example, half of a teacher's student population may be learning from home and the other half may be learning in person. Additionally, if a school or classroom needs to shut down because of exposure of a positive case of COVID-19, then all students shift to learning from home virtually. These varied and ever-changing contexts complicate instructional delivery and potentially affect student learning, which is what compelled me to conduct this study.

Significance

The significance of this case study is that the implementation of PBL was occurring during a remote, hybrid, or in-person setting as a result of the COVID-19 pandemic. At a local level, this study was designed to provide insight into ways teachers can be supported in the advancement of their instructional practices to foster student engagement at the upper elementary and middle school levels. Students are overwhelmed by the myriad learning models and require consistency in their instruction. Observations of PBL through the multimodal learning contexts will elucidate how, if at all, PBL can provide this consistency and promote increased student engagement with learning.

Impact for Teachers

Empowering teachers and bringing their experiences, knowledge, and questions about PBL to the forefront of the research will provide a path to support a larger population of teachers throughout the district. Teachers sharing their successes with PBL methodologies that have the potential to improve student engagement in various learning settings has the potential to transform teacher practices while also positively affecting student motivation. Teacher participants in this study can serve as change agents for other educators who will be motivated to try PBL. Teachers value the opinions of their colleagues. Killion (2015) supported this idea in her study on the benefits of collaboration with teachers and students. A successful PBL implementation shared with a group of teachers will create the necessary buy-in for more teachers to try the strategy.

Impact for Students

Student engagement with learning has become a notable area for concern after schools transitioned to multimodal learning contexts (Barnum & Bryan, 2020). Students

are overwhelmed with the varied approaches to learning and need a consistent model to support engagement. The PBL model can address student engagement while simultaneously supporting the varied learning settings of remote, hybrid, and in-person instruction. Studies have shown students respond positively to PBL models of instruction, citing that students appreciate the elements of student choice, authenticity of topics, and the collaborative dialogue known to occur (Evans, 2019; Virtue & Hinnant-Crawford, 2019; Warr & West, 2020). Moreover, in a 2021 PBL study with middle school science students, the students reported "their classroom assignments were more interesting, challenging, worthwhile, and enjoyable as compared with reports from the comparison group" (Deutscher et al., 2021, p. 2). Students of participating teachers helped to shape the future of PBL for their peers by providing insight into engagement strategies that work and those that do not work within the present varied learning settings.

Context of the Study

The current study took place in a K–8 school district in the Mid-Atlantic region of the Northeastern United States with a population of 1,337 students. Due to COVID-19, the district moved to remote instruction on March 13, 2020, and continued through June 15, 2020. During this time, 73 out of 150 middle schoolers were in danger of failing or receiving an incomplete in one or more subjects during remote learning in the Spring of 2020. Reasons for this included students not handing in assignments, failing assessments, or not logging into class each day on their devices. In a parent survey created by the superintendent of schools in May of 2020, district parents reported the following information: 31.9% indicated they were concerned about their child's well-being and 47.5% indicated they were concerned about their child's level of motivation to complete

assignments with 5 weeks remaining in the school year. When asked how the district should improve, answers included the need for an increase in teacher feedback, live or synchronous instruction using Google Meet or Zoom, and project-based assignments.

Parental concerns during remote learning were not only a local problem but also a national problem. Chalkbeat National (2020) collected surveys from individual school districts across the country that revealed only 60% of students were regularly participating or engaged during distance learning. According to the surveys, "Two-thirds to three-quarters of teachers said their students were less engaged during remote instruction than before the pandemic, and that engagement declined even further over the course of the semester" (Barnum & Bryan, 2020, Student engagement section, para. 2). Another survey revealed teenagers were in contact with their teachers less than daily, and a quarter were in contact less than once a week (Barnum & Bryan, 2020). Teachers reported they needed strategies to maintain student engagement. Finally, parents reported their children needed to engage with motivating activities.

This qualitative narrative inquiry examining PBL implementation to support student engagement during remote, hybrid, or in-person learning was designed to add to the extant literature that exists on distance learning, PBL, and PBL implementation in a variety of learning environments. Results from this study can serve as a change agent for student engagement in an unsettled educational setting while still preparing all students with 21st century skills.

Conceptual Framework: Student Engagement and the PBL Method

Student engagement is an integral factor supporting academic success (Yilmaz & Banyard, 2020). Students who are engaged in their learning are more likely to retain what

they have learned and apply it to other aspects of their lives (Saavedra et al., 2021). There has been an increase in interest in learning ways to nurture student engagement within the current pedagogical paradigm transformed by COVID-19. Student engagement has faltered as students have had to navigate learning remotely, in hybrid settings, or in-person. These varied learning contexts have put a strain on teachers as they endeavor to motivate students to maintain consistent engagement with the instruction. PBL is one avenue used by educators who are seeking to keep students on task and motivated through inquiry and authentic learning experiences. PBL is a teaching strategy that encompasses student learning standards, a driving question, student inquiry, ongoing assessment, responsive instruction, and a public product presented to an audience. These characteristics of PBL are designed to appeal to the varied forms of engagement. According to Fredricks et al. (2004), student engagement is defined as a meta-construct that includes behavioral, emotional, and cognitive engagement.

Behavioral Engagement

Behavioral engagement is linked to participation in school activities that results in positive outcomes in school and the prevention of student dropout (Fredricks et al., 2004). Behavioral engagement often includes observable actions such as positive conduct, effort, and attending to a task (Appleton et al., 2008). Marks (2000) studied behavioral engagement in relation to the instructional activity of six classrooms (three in social studies, three in mathematics) of students in Grades 5, 8, and 10. Students responded to surveys pertaining to engagement and the instructional activity containing four measures: student effort, attentiveness, lack of boredom, and completing class

assignments. Results were statistically significant at .34, .40, and .42 ($p \leq .001$) respectively for elementary, middle school, and high school (Marks, 2000).

Emotional Engagement

Emotional engagement focuses on the positive or negative interactions with the different entities in school, such as the activities, academics, teachers, or students. Emotional engagement includes the following: interest, identification, belonging, and a positive attitude about learning (Appleton et al., 2008). Moreover, these interactions between the students and teachers, for example, are presumed to create ties to the school and willingness to do the work (Fredricks et al., 2004). In a study of fifth and sixth grade students, Reyes et al. (2012) found that "when a classroom climate is characterized by warm, respectful and emotionally supportive relationships, students perform better academically in part because they are more emotionally engaged in the learning process" (p. 11). Emotional engagement has moved to the forefront during COVID-19. School leaders have prioritized social and emotional learning (SEL) above academics in order to increase emotional engagement among students (DeArmond et al., 2021).

Cognitive Engagement

Cognitive engagement is rooted in the investment in learning (Fredricks et al., 2004). Moreover, it "incorporates thoughtfulness and willingness to exert the effort necessary to comprehend complex ideas to master difficult skills" (Wallace-Spurgin, 2020, pp 24-38). Marks (2000) investigated how authentic instructional work contributed to the engagement of elementary, middle, and high school students and found a positive effect size on each level respectively (.34, .40, .43). Additionally, Marks (2000) believed authentic academic work "involves students intellectually in a process of disciplined

inquiry to solve meaningful problems, problems with relevance in the world beyond the classroom and of interest to them personally" (p. 158). Cognitive engagement has been found to be prompted by questioning that sparks curiosity and inquiry (Caram & Davis, 2005). According to Walsh and Sattes (2017), questions "focus students on important content aligned with standards and goals; promote one or more carefully defined instructional purposes; facilitate thinking at an appropriate cognitive level; and are clearly and concisely worded so that students understand what is being asked" (p. 27).

Synthesis With PBL and Application to the Present Study

Engagement occurs through behavioral, emotional, and cognitive connections and the PBL components are tied to these three facets of engagement. Behavioral engagement is linked to participation in PBL activities, specifically in the student inquiry launch event, feedback by peers and the teacher, choice opportunities, and producing and presenting a product publicly. Emotional engagement is established and nurtured through the interactions that take place between both the students and the teacher and students during scaffolding and support sessions as well as ongoing feedback between the students and the teacher. Cognitive engagement is triggered through the incorporation of PBL's driving question, learning goals, higher-order thinking questions and tasks, reflection or synthesis of the learning, and the real-world connection that is embedded in the project. These types of engagement experiences have been hampered as the learning contexts have shifted in and out of remote, hybrid, and in-person learning as a result of COVID-19. This complexity raises the need for researchers to examine how teachers navigate the varied components of PBL to support the three types of student engagement within the concurrent model of in-person, hybrid, and remote learning.

Results of the current study reflect how teachers navigate the various components of PBL to leverage student engagement as a pedagogical tool within a complex learning environment composed of concurrent models of remote, in-person, and hybrid instruction. At this time in the year 2021, the traditional classroom has been replaced with students learning both in school and at home due to COVID-19. PBL is a strategy that promotes all types of engagement, which are now necessary during this unprecedented time in education. Research into PBL implementation during hybrid and remote instruction is not evident as these are new contexts for learning resulting from COVID-19.

Research Question

This qualitative study was designed to answer the following question through a narrative inquiry design: How do teachers leverage the PBL components to promote behavioral, cognitive, and emotional engagement within the complex model of remote, hybrid, and in-person learning?

Positionality

This study is personal to me as I have been an educator for 25 years. Through my experience as a general and special educator and learning disabilities consultant, I have gained a deep understanding of how learning occurs and how it is measured. Strategies that forge literacy and student engagement are critical components of sound teaching methodology. PBL has been an initiative in the middle school in the district where I work since the 2018–2019 school year. Teachers received professional development over the last 2 years from presenter Erin Murphy. I learned of the PBL strategy through collaboration with county directors of curriculum during my first summer in the role of

Assistant Superintendent of Instruction. I was eager to bring my background of special education into the general education realm in order to meet the needs of all students in the district and prepare them with the skills necessary to learn and work in the 21st century. PBL intrigued me because it is a culmination of multiple evidence-based strategies and an answer to a problem conveyed to me by middle school teachers regarding disengaged students. Our fourth through eighth grade teachers of ELA, science, and social studies have each developed and implemented at least one PBL over the past two school years. Beginning in October of 2020, Erin Murphy provided more training to our middle school teachers on how to implement PBL in a remote or hybrid learning environment.

Identity

As an administrator, I am focused on student achievement and social-emotional well-being. I believe the role of the teacher is to create a learning environment that is accepting of all students, their cultural backgrounds, and their learning needs. Furthermore, teachers need to have a clear understanding of the learning outcomes and the ability to craft learning experiences that entail clear and precise modeling, infuse evidence-based strategies, integrate technology, and promote student communication, collaboration, and creativity. These personal perceptions that define my beliefs drive my work and this study. This study, though small in scope, has the potential to affect a multitude of teachers. Teachers' perceptions regarding their PBL implementation to support student engagement represent their lived experience. The positives and negatives of the implementation of this study will be shared with district staff members during professional development days, professional learning communities, and other collaborative meetings. Through my position as Assistant Superintendent of Curriculum

and Instruction, I believe change is effectuated by teacher leadership. My hope was that my teacher participants would affirm their beliefs and perceptions about PBL having a positive impact on student engagement. These experiences will then be shared to empower other teachers to learn from their colleagues. Next, through my professional network, the results can affect students of neighboring districts in the county. As a researcher, I designed this study to build on the existing PBL research, but it differs due to the various learning environments that exist during the COVID-19 pandemic. Infusing PBL through a hybrid, remote, or in-person setting will support the depressed student engagement occurring at this time.

Exploring Bias

As an administrator in the district where I conducted this study, there were possible obstacles that I needed to overcome. For example, results may be viewed as biased by outside entities as teachers may have felt compelled to say what I wanted to hear, rather than providing their true opinions. Conducting a narrative study helped me overcome these challenges as "narrative designs can address a wide range of questions that ask why, what, and how of an issue and assist researchers to explore, explain, describe, evaluate, and theorize about complex issues in context" (Harrison et al., 2017, p. 11). Furthermore, a narrative study by nature was not perceived as evaluative from the teacher participants as all opinions and perceptions were accepted and deemed helpful and contributing to the study. A deep dive into PBL implementation through interviews set the stage for the collection of a multitude of information, which reduced the chance of bias skewing the data.

Method

I conducted this qualitative study through a narrative inquiry into the lived experiences of teachers' implementation of PBL to support their students' engagement during hybrid, remote, and in-person learning. I conducted teacher interviews and gathered PBL unit and lesson plans. Recorded transcripts captured teachers' perspectives throughout the PBL unit. I also used field notes and analytic memos to interpret and restory the experience through a collaborative and co-constructed narrative.

Audience and Stakeholders

The audience of this study is educators around the world. A focus on student engagement through the implementation of the PBL strategy in multiple settings drove the significance and relevance of this study. Moreover, the positive impact on student engagement will foster a learning environment conducive to deep learning, which is necessary in the acquisition of 21st century skills. The results will pave the way for improvements in instructional practices at the local level and then expand to a greater audience of stakeholders in the state and potentially to a national level. Opportunities to share with county curriculum directors, principals, and teachers will be available to me as an assistant superintendent. Additionally, I will present at in-state conferences in the hope of broadening the scope of the impact for students. Filling the void in the extant literature is the goal so future teachers can apply this research in various educational settings around the world. The potential impact is profound, making this a worthy study at this time.

Definition of Terms

PBL is a teaching method in which students learn by actively engaging in real-world and personally meaningful projects (Buck Institute for Education, n.d.-c). Rigor is a widely used term by educators to describe instruction, schoolwork, learning experiences, and educational expectations that are academically, intellectually, and personally challenging (Great Schools Partnership, 2014).

Conclusion

This study of the implementation of PBL to support student engagement is of great importance given the current state of education across local, national, and global contexts. The noted decline in student achievement indicated by the NAEP assessment may worsen due to the impact of the COVID-19 pandemic. Preparing students with 21st century skills to achieve success in post-high school education and the workplace has taken on a new dimension given the varied educational settings of hybrid and remote learning in schools around the world. Data gleaned from school district surveys indicate teachers are in need of strategies to maintain student engagement. Additionally, projected learning loss will further complicate the instructional practices of educators. A strategy with extensive potential to positively influence learners and foster consistent engagement is PBL.

The extant literature on PBL has revealed positive effects on student engagement in both the traditional and remote learning settings; however, distinct variables have also resulted in less than favorable results of the strategy. For example, a lack of a consistent PBL model has prevented researchers from obtaining measurable results. Furthermore, a lack of consistency of the implementation of the components skews results attributed to

achievement. In contrast, technology integration with PBL is a necessary component that has yielded positive effects. Technology is a critical component all educators have embraced in their teaching practices during the pandemic. Technology allows for student engagement and connectedness with their peers and teachers through applications like Google Meet and Zoom. This technology component is what sets PBL apart from other instructional methods as an appropriate student engagement tool for the current educational model of remote, hybrid, and in-person learning. PBL has the potential to meet all student needs, regardless of their learning environment, and bring students together in a collaborative forum to move them forward in their learning. The results of this study provide a road map for educators at the upper elementary and middle school levels to support learners in their classes and improve student engagement during an unprecedented time in history. The following outlines the forthcoming chapters of the study.

Chapter II consists of a historical account of PBL and highlights the most prevalent design features in the research. Next, the chapter moves to an examination of teacher perceptions of PBL implementation and how the different components of PBL are leveraged to affect student engagement in various settings. Finally, an exploration of the research on student engagement in both the traditional school setting and remote learning setting is provided to set the stage for the current narrative study. This review highlights the gaps in the literature and provides the rationale for the current study. Chapter III outlines the methods and procedures used to conduct this narrative inquiry to gain a deep understanding of teachers' perceptions of their implementation of PBL. Qualitative data were collected via teacher interviews during and after PBL implementation and were then

analyzed and triangulated for interpretation. Chapter IV presents the results of the qualitative analyses that are then integrated and used to answer the research question. Chapter V is a summary of the qualitative results along with the limitations and delimitations. Recommendations for future research and instructional practice are indicated.

CHAPTER 2: LITERATURE REVIEW

The following themes are explored to frame the focus of this qualitative study: pioneers of PBL through the Progressive movement; the free school movement; high-stakes testing equaled poor results; schoolwide reform and the development of PBL components; the confusion in PBL structure; PBL implementation with diverse learners; implementation of PBL through teacher perspectives; implementation of PBL through student perspectives; PBL and technology integration with diverse learners; PBL implementation in remote learning settings; student engagement in distanced learning settings; student engagement in traditional, hybrid, or remote settings; and student engagement in the hybrid or remote setting at the K–12 level.

Pioneers of PBL Through the Progressive Movement

The Progressive movement was founded on the idea that democracy involves active citizens who engage in all social, political, and economic decisions that will affect their lives. This means education must consist of "respect for diversity and the development of critical, socially engaged intelligence, which enables individuals to understand, participate, and collaborate effectively for the good of their community" (University of Vermont, 2002, para. 1). The term "progressive" arose from a period when public schooling in the United States was intended to achieve "cultural uniformity, not diversity, and to educate dutiful, not critical citizens" (University of Vermont, 2002, para. 1). John Dewey, a leader of the Progressive movement, believed education needed to emphasize the emotional, artistic, and creative aspects of human development.

John Dewey

Dewey was an educational scholar who believed learning takes place through experiences that help shape future decision making. “Progressivism rest(s) on respect for diversity and development of an engaged population that could effectively participate in community affairs” (Lynch, 2016, p. 2). Dewey embraced this idea and applied it to education as he believed in the importance of students being active participants in their communities. Additionally, Dewey believed in the importance of creating classrooms that reflect democratic values so children can learn to function in a democratic society of which they are expected to be a part (Holt, 2020). Moreover, Dewey believed that as an individual passes through different situations in their environment, their mind expands and contracts. Hence, the learning from one situation gives the individual the knowledge and skills needed for the continuation of learning (Holt, 2020). Finally, Dewey “believed that education should entice the natural interest of students via authentic real-life experiences that are relevant to the child’s life experiences” (Holt, 2020, p. 147). As a student of Dewey’s, William Kilpatrick was intrigued by the idea of student interest.

William Kilpatrick

William Kilpatrick, first a student and then a colleague of John Dewey, shared the belief that learning by doing was critical and the social development of the child was more important than cognitive development through mastery of content (Beineke, 1998). Furthermore, Kilpatrick believed that combining school and community activities with a focus on socially-minded development would equip students to become active participants in their community and become contributing members of a democratic society (Pecore, 2015). This led Kilpatrick to focus on the idea of implementing projects

in the classroom. Kilpatrick's project method reflected a child-centered approach to learning with a focus on four steps of purpose, plan, execute, and judge (Beineke, 1998). Kilpatrick believed the following:

> The key to the project method success is the skilled teacher guiding the student through the process such that the student takes as much ownership as possible over each step so as to provide a healthy level of stress but prevent discouragement from too great a level of difficulty. (Pecore, 2015, p. 159)

This component of scaffolding has withstood the test of time from Kilpatrick's project method to modern-day PBL. The Progressive movement, which was overcome by cultural conservatism in education, faded during the Cold War but became relevant again in the 1960s and 1970s with Montessori education and "concepts of open schools, experiential education, and schools without walls" (Lynch, 2016, p. 3).

Marie Montessori

The work of Marie Montessori has underpinnings in both social constructivism and self-determination theory. Montessori, most noted for her contributions to preschool and early elementary education, also wrote and spoke about the needs of the adolescent. After Montessori's death, one of her students developed the Erdkinder, a program for adolescents. The Montessori practices of this program are based on the idea that as "adolescents develop their own plan of study, projects, and role in the community, they begin to see their own capacity and ability to determine their own future" (Casquejo Johnston, 2019, p. 4). Moreover, student choice and contribution to the community are valued. The components of choice and authenticity in a student-centered environment

continued to reveal the hallmarks of current day PBL. The significance of the community continued in the free school movement and the practices and contributions of Ted Sizer.

The Free School Movement

The free school movement was ignited by a rejection of public schools and their defining characteristics, such as "large classes, teachers with absolute disciplinary and curricular power, rigid time-scheduling, required curriculum, concern with silence and control, discipline and obedience, and constant evaluation and motivation by competition, represented by grading, testing, prizes and honors, and ability tracking" (Graubard, 1972, p. 2). Free schools stem from the Progressive movement, the importance of the community, and the right to freedom. In the classroom, this translates to children who are naturally self-directed and motivated by their own interests (Graubard, 1972).

> In practice, this means respect for the autonomy of the individual students. Students have the freedom to decide on the type of work they want to do, whether it means participating in an on-going class project or whether they work on their own project. (Graubard, 1972, p. 3)

The idea of student choice echoed Montessori's philosophy and again foreshadowed current day PBL components. An outgrowth of the free school movement was Ted Sizer's Coalition of Essential Schools. Sizer's (n.d.) 10 principles that guided educator practices included learning to use one's mind well; less is more, depth over coverage; goals apply to all students; personalization; student as worker, teacher as coach; demonstration of mastery; a tone of decency and trust; commitment to the entire school; resources dedicated to teaching and learning; and democracy and equity. Central Park East Secondary School in East Harlem is a successful example of Sizer's Coalition of

Essential Schools. Started in 1985, the dropout rate was less than 5% and 90% of the graduates attended prestigious colleges. The high school, founded by Deborah Meier, built a structure where staff and students articulated the standards that were then evidenced in performance assessment. Students demonstrated their understanding through presentations and portfolios (Suiter, 2009). Real-world projects with an authentic audience laid the groundwork for another component of current PBL practices. The focus on high-stakes testing caused schools like East Secondary School to pivot away from student-centered learning to a school-wide focus on preparing for the state test. The following represents a detour from project learning and a focus on high-stakes testing in the 1990s.

High-Stakes Testing Equaled Poor Results

The age of high-stakes test preparation and No Child Left Behind (NCLB) changed the landscape of education in the early 2000s. NCLB increased the federal government's role in holding schools responsible for academic progress as the U.S. education system was no longer competitive in the world (Klein, 2015). "The so-called accountability agenda of the late 1990s, pressured many champions of the Coalition of Essential Schools' structures to compromise" (Wood, 2009, para. 6). Moreover, a positive school culture declined with the onset of standardized testing, as evidenced by the following: "When schools are only accountable for standardized test scores, too much else is shoved out the door-including the arts, project-based learning, portfolios, performance assessments, and dare we say it, the joy of teaching and learning" (Wood, 2009, para. 7). Fast forward through the early 21st century and achievement results revealed poor postsecondary outcomes of low-income high school students (M. J. Bailey

& Dynarski, 2011). According to T. Bailey et al. (2010), “Remediation in college is necessary because students arrive at the end of high school without adequate skills”(p.256). Though the increased focus on standardized testing in core subject areas loomed in American education, the global world called for students with 21st century skills. Zhao (2012) described how to prepare our students for the 21st century by: “Supporting diverse talents, encouraging children to be entrepreneurial, fostering global perspectives, and by providing personalized education that promotes diversity and creativity” (p. 7). As further technological advances and professions emerged, the need increased for schools to change and equip students with the necessary knowledge and skills to be successful contributors in society. Wagner (2012), the first Innovation Education Fellow at the Technology and Entrepreneurship at Harvard University, posited that students need to be “creative problem-solvers who will generate improvements in existing products, processes, and services, as well as invent new ones” (para. 3). Cultivating 21st century learners prompted the use of strategies like PBL, a pedagogical approach to promote creativity and critical thinking, in U.S. schools. Though the pendulum swung back to the experiential learning of Dewey and Kilpatrick, PBL was not clearly defined as of yet. Next, the PBL studies conducted by Thomas (2000) are summarized to demonstrate schoolwide reform.

Schoolwide Reform and the Development of PBL Components

The PBL strategy was implemented as a schoolwide reform in the 1990s–2000 in the United States in an effort to prepare students for work in a global economy. Thomas’s review of PBL in 2000 teased out prior studies distinguishing PBL from hands-on learning, discovery learning, and projects of the past. These techniques failed to

encompass both the student motivation and knowledge necessary to engage in cognitively challenging work (Blumenfeld et al., 1991). In an attempt to clearly define PBL, Thomas (2000) listed five criteria: centrality, driving question, constructive investigations, autonomy, and realism. These five components are hallmarks of PBL and were defined by Chowdhury (2016) as follows:

> Centrality refers to the notion that PBL projects are central to the curriculum in that concepts are learned through projects and not lecture-approach. A driving question is the focus on questions or problems that drive students to the central concepts and principles of the curriculum. Next, students engage in constructive investigations or inquiry that builds knowledge and perseverance. Finally, realism refers to the realistic nature of the projects so that it provides a feeling of authenticity to students. (p. 326)

The following PBL experimental studies involved a control group with traditional didactic teaching approaches compared to an experimental group or the PBL group. The PBL groups revealed gains in critical thinking, conceptual thinking, and content mastery (Boaler, 1998, Penuel & Means, 2000). The drawbacks of this research are believed to be an unclear design in the PBL structure used in the studies. Moreover, the terms Project-Based Learning (PjBL) and Problem-Based Learning (PrBL) were intertwined in Thomas's (2000) literature review of PBL, which contributed to the lack of clarity. These studies are presented to explicate the ambiguity surrounding PBL design features during this time period.

The Confusion in PBL Structure

Project-Based Learning (PjBL) and Problem-Based Learning (PrBL) have overlapping qualities and distinct differences. Furthermore, the evolution of PjBL cannot be explained without interjecting PrBL to gain a full picture of the PjBL journey. PjBL is distinguished from prior models of projects with the idea that projects are central to the curriculum rather than peripheral, focused on questions or problems that drive students to encounter, involve students in constructive investigation, are student-driven, and are realistic rather than school-like (Thomas, 2000). PrBL similarly placed value on the process of problem solving, but differed from PjBL in the emphasis on knowledge acquisition and the solution to the problem-solving process (Hanney & Savin-Baden, 2013). Furthermore, Barron and Darling-Hammond (2008) reported that PrBL studies appeared prevalent with medical students to improve their skills as interns to diagnose through working on ill-structured problems.

Researchers in the New American Schools Designs study examined Expeditionary Learning Outward Bound (ELOB) and Co-nect Schools as part of an extensive study of PjBL. Expeditionary Learning (EL) was an outgrowth of Outward Bound and involved fieldwork, service, teamwork, character building, reflection, and building a connection to the real world (Thomas, 2000). According to a report by the New American Schools Development Corporation (1997), nine out of 10 schools implemented EL and demonstrated significant improvements in students' test scores (Thomas, 2000). Similarly, after 2 years of EL implementation in three elementary schools in Dubuque, Iowa, scores on the Iowa Test of Basic Skills went from "well below average" to "well above average" (Thomas, 2000). Similar gains were reported in Co-

nect Schools during this time period. Co-nect is a whole-school reform placing an emphasis on PjBL, interdisciplinary studies, real-world applications, and technology (Becker et al., 1999). Though both EL and Co-nect were credited with improvements in test scores, the assessments at the time focused on basic skills in reading and math, which did not align with the goals of these reform efforts, thereby contributing to the lack of causal evidence of PjBL. Additionally, though student achievement was realized, the process of the implementation of PjBL was still unclear. What is clear is the component of real-world applications with EL and Co-nect Schools in the implementation of PjBL. Continuing on the PjBL journey, the 1990s brought "packaged" PjBL, not teacher-made, and a combination of PrBL.

The Cognition and Technology Group at Vanderbilt University (CTGV) fit in the PjBL category based on the project features of authenticity, independence, and performance measures to assess specific outcomes. Further, the CTGV studies combined PrBL and PjBL in a 5-week study of PjBL and PrBL on teaching students how basic principles of geometry relate to architecture and design (Thomas, 2000). Students had to design a playground as the PrBL component and design a playhouse that would be built for a community center as the PjBL component. Finally, students were charged with creating a two- to three-dimensional representation of the playhouse of their own design and presenting it to an audience of experts (Thomas, 2000). Although this was not an experimental study, of the 37 designs submitted, 84% were judged to be accurate enough to be built, a result the researchers regarded as a high rate of achievement (Thomas, 2000). This study points to several components of present-day PjBL design (i.e., presentation to an audience and demonstration of specific learning standards). The CTGV

studies also demonstrated projects that integrated both PjBL and PrBL. This was evident in Hanney and Savin-Baden's (2013) comment about the two as a "fit over time" (p. 12). PrBL was studied by Norman and Schmidt (1992), Albanese and Mitchell (1993), Vernon and Blake (1993), Berkson (1993), and Wolf (1993). The research from the aforementioned group indicated PrBL was effective in enhancing clinical knowledge, skills, and motivation (Albanese & Mitchell, 1993; Kalaian et al., 1999; Norman & Schmidt, 1992; Vernon & Blake, 1993), whereas others believed PrBL did not improve students' problem-solving ability (Norman & Schmidt, 1992). For the purpose of this literature review, Project-Based Learning and Problem-Based Learning are combined as one term: Project-Based Learning (PBL). The following sections contain a focus on the effects of PBL implementation on diverse learners and on teacher and student perceptions of PBL implementation. Diverse learners encompass struggling learners, English learners, and students with disabilities.

PBL Implementation With Diverse Learners

Up until the year 2000, the notable PBL components reported by Thomas (2000) were projects that encompass connectedness to the curriculum, not peripheral; focused questions or problems that drive students to encounter; involved students in constructive investigation; student-driven work; realistic not school-like activities; and a culminating presentation to an audience and demonstration of specific learning standards. The following studies illuminate missing PBL components or the need for additional components.

Shideler (2016) studied implementing iPads with PBL to enhance language acquisition among third-grade English language learners (ELLs). However, the study

lacked an assessment tool to understand the progress in skills along the way. Without a mechanism for assessing students during the PBL, acquisition of the learning standard was unclear.

Filippatou and Kaldi (2010) studied PBL implementation with students with learning difficulties. The 24 fourth-grade participants were identified as having learning difficulties based on two measures: a standardized teacher questionnaire for the identification of pupils with learning difficulties (A.M.D.E.; Padeliadu & Sideridis, 2008) and a standardized screening software for learning skills and weaknesses (L.A.M.D.A.; Protopapas & Skaloumbakas, 2008). Though the students with difficulties were engaged behaviorally through group acceptance, they were not engaged cognitively, which was evidenced by the use of more surface processing strategies like rehearsal and dictation provided by peers during the project experience (Filippatou & Kaldi, 2010). The ability for students with difficulties to "use more cognitive and metacognitive strategies through direct instruction by the teacher is required for the learning to take place" (Linnenbrink & Pintrich, 2003, p. 123). Though the students in Filippatou and Kaldi's (2010) study benefitted from the positive interaction and social component of PBL, there was an absence of the mini-lesson and infusion of strategies through direct instruction, as prescribed by Cooper and Murphy (2016).

Hernandez-Ramos and De La Paz's (2009) study fell short of a successful implementation as survey results revealed learning projects needed to have more meaning to the middle school students. This was noted as a limitation in the study as the driving question for the PBL was "framed strictly according to state standards with no input from students" (p. 168), which may have affected student responses on the posttest

questionnaire assessing the eighth graders' development of positive attitudes and beliefs about social studies and the study of history through technology-assisted PBL experiences.

Vaca Torres and Gómez-Rodriguez (2017) successfully incorporated a driving question in their study with 30 English foreign language (EFL) ninth graders who had basic English language skills. These students engaged in three projects connected to their personal lives. Project One-Discovering who their classmates are. Project Two-Is everything fine at school? Project Three-Getting involved in my neighborhood. Though the PBL encompassed inquiry and authenticity, it lacked the necessary scaffolding as most students were afraid of oral production in English. Perhaps the use of technology as a support would have bridged the gap in this study. All four examples point to the implementation process of PBL and missing important components, specifically an assessment tool, a driving question, and scaffolds to assist diverse learners.

Implementation of PBL Through Teacher Perspectives

PBL implementation has been shown to be successful and challenging as perceived by both teachers and students. Inconsistencies in implementation seem to lie in the PBL components. Additionally, a common theme is the difficulty of putting PBL theory into practice without the right professional development or training. Looking at the challenges and successes of PBL through the lens of teachers and students will shed light on the components of a successful PBL implementation.

Two studies involved student teacher perceptions about PBL during their third and fourth years of student teaching. Baysura et al. (2016) engaged 58 teacher candidates who enrolled in a Methods of Teaching II course at one of the state universities in

Istanbul, Turkey. The course consisted of 2 hours of theory and 2 hours of practice on teaching methods and techniques. Results from this qualitative study revealed a lack of understanding of the definition of PBL as evidenced by the following responses from teacher candidates to the question, What is PBL?:

> It is an approach which results in a product and for which the process is important and, during the process, the teacher has a guidance role . . . A project-based learning approach means making the learning process real by using projects . . . The teacher gives daily or weekly performance homework and pursues instructional process based on the is project. (Baysura et al., 2016, p. 23)

Further responses regarding using PBL in the future indicated both affirmations and rejections of the strategy as per these comments:

> Yes, I will apply. I think that the learning will be permanent if the students have an active role in a project . . . Now when I graduate, I do not think that I will apply this method as I do not know the details of this method completely . . . I do not plan on applying it because this method is too much work for both students and teachers. (Baysura et al., 2016, p. 23)

Mahasneh and Alwan (2018) conducted a quantitative study of degree of self-efficacy and achievement with 79 preservice teachers enrolled in a course titled, Using Computers in Education. Thirty-seven teacher candidates were taught using a PjBL approach in the control group and 42 were taught through traditional teaching methods. Results revealed statistically significant differences in the student teachers' self-efficacy posttest between the control and experimental groups in all strategies attributed to the PBL learning method in favor of the experimental group (Mahasneh & Alwan, 2018). In both studies,

student teachers' perceptions about PBL were captured. Mahasneh and Alwan's preservice teachers were confident in their ability to implement PBL, whereas Baysura et al.'s (2016) teachers appeared ill-prepared and not confident to implement PBL when they became teachers. The difference in these two studies lies in the training on PBL embedded in the college courses. The more effective approach was the one in Mahasneh and Alwan's (2018) study with the 37 teachers in the control group at Hashemite University of Jordan. The PBL design features were "introduction of the topic to students; organization of groups; project planning; project application; planning the presentation; presentation of the project; and project evaluation" (Mahasneh & Alwan, 2018, p. 516). On the contrary, Baysura et al.'s (2016) preservice teachers did not have a strong hold on the PBL components as evidenced by their responses, and the components of PBL were not indicated in this study. Meaningful training in PBL where teachers can apply the components appears to positively influence implementation, achievement, and teacher buy-in of the value of the PBL teaching strategy.

In-depth professional development surrounding PBL has been shown to have a positive impact on teachers' perspectives of its implementation as demonstrated by the previous two studies. Dole et al. (2016) expounded on this idea by investigating how a field experience for in-service teachers could affect their perceptions of experiential learning. This case study involved coursework for teachers working toward a license in gifted education. This included online courses and one in-person course. One was called Creative Thinking and Problem-Solving and there was a 1-week field experience called Rocket to Creativity (RTC). Three courses were centered around both PjBL and PBL in which essential questions accompanied each model, such as "What are PrBL and PjBL?

How do we implement PrBL and PjBL? How do we evaluate PrBL and PjBL?" (Dole et al., 2016, p. 21). Results of the case study revealed the following themes: teachers were able to apply theory to practice as they learned about the overall process of implementing PrBL and PjBL, teachers understood the logistics of PrBL and PjBL, and teachers understood the role of the teacher as a facilitator (Dole et al., 2016). The following specific comments from the teacher participants point to the most critical components in successful PjBL and PrBL:

> The processes such as generating and brainstorming ideas, promoting critical and creative thinking, creating timelines and rubrics were put to use immediately . . . I now know how to create problems for my student inquiry . . . I learned how to assess student comprehension of an objective or unit of study . . . You start with the curriculum standards, add application, mix in relevance and authenticity and add in open endedness . . . I learned that I need to let my students take more leadership in demonstrating their own learning . . . I saw the benefits of allowing more student choice in projects. (Dole et al., 2016, p. 28)

Teachers' positive perceptions confirmed that certain PjBL components were implemented consistently in the following areas: promote inquiry by posing a problem or question, assess the standards and objectives that are embedded, and provide choice in how to demonstrate students' learning.

Evans (2019) conducted a case study of a high school chemistry teacher named Sheila who designed a PBL unit after PBL 101 training. Sheila, a 25-year veteran, created a high quality PBL (HQPBL) unit on the transfer of energy. She implemented the unit over the course of a few weeks to two sections of high school chemistry students in the

beginning of the 2019 school year. The key findings of this study began with the teacher's perceptions of the PBL she created. On the exit survey, Sheila reported the "PBL 101 training was really helpful in terms of understanding how to design engaging and collaborative projects" (Evans, 2019, p. 7). The HQPBL had built in components, unlike the previous studies mentioned, that included key knowledge understanding and success, challenging problem or question, sustained inquiry, authenticity, student voice and choice, reflection, critique and revision, and a public product (Evans, 2019). The HQPBL also included seven teacher practices that were evaluated as part of the implementation of the PBL unit: design and plan, align to standards, build the culture, manage activities, scaffold the learning, assess student learning, and engage and coach (Evans, 2019). The resources used to evaluate the fidelity of Sheila's unit on the transfer of energy encompassed both the criteria for the project and teacher practices. This type of structure lends itself to consistency of implementation.

Evans's (2019) HQPBL and Dole et al.'s (2016) case studies emphasize the importance of applying theory to practice with quality training. Furthermore, Mahasneh and Alwan's (2018) study highlighted positive results in terms of teacher efficacy in the implementation of PBL after experiencing their coursework in a PBL framework. All three studies share the commonality of the importance of PBL training and coaching. Finally, the consistency of implementation was clear in the final study by Evans, driving home the importance of PBL design features and their relationship to teacher perspectives and training. The significance of these studies prompted me to duplicate Evans's structure using the Gold Standard Project Design Elements of the following: a driving question, authenticity, voice and choice, sustained inquiry, reflection, critique and

revision, and public product/presentation. Furthermore, the teacher must incorporate the teacher practices, namely build a culture, design and plan, assess the learning, and scaffold the learning. Finally, implementation of both the PBL components and teacher practices outline the tools for the teacher to leverage to promote student behavioral, cognitive, and emotional engagement.

Implementation of PBL Through Student Perspectives

Student perspectives on PBL show overall positive beliefs and opinions about the strategy and how it influences their learning. Virtue and Hinnant-Crawford (2019) conducted a phenomenological study using the perspectives of high school students engaged in PBL across disciplines (e.g., history and English, math and science, etc.). Five New Tech Network schools were chosen for the study in which 28 students were placed in four focus groups with seven students each. Students were asked: "What does PBL look like across the disciplines, and how do students perceive the impact of PBL?" (Virtue & Hinnant-Crawford, 2019, Methods section). The results revealed the following student comments:

> The way you tackle problems, the way you have to collaborate . . . it's not something you can emulate through a textbook or reading about it or watching videos; . . . We had a discussion about gun control in one of the classes, an open discussion and there was no fighting. There was no animosity. We're so much more tolerant and accepting of other people's ideas; . . . The only thing that bugs me is that when we are doing projects, we spend a few weeks to do it and you talk to the regular chemistry classes and they are so far ahead . . . I feel like in New

> Tech we don't get to learn everything we could be learning in a whole year. (Virtue & Hinnant-Crawford, 2019, Perceptions of Productivity section)

The significance of these comments is that they revealed high levels of student engagement and motivation due to the collaboration required and the real-world aspect of the projects (Virtue & Hinnant-Crawford, 2019).

Warr and West (2020) studied the perspectives of students who participated in a studio design structure at a small private college in which faculty members from different departments planned projects to promote creativity, innovation, and design. The following student responses were captured regarding the design studio experience:

> The freedom that you are given as a student in the class to make it your own and decide what you want to work on makes the class particularly valuable . . . Most classes focus on schedules and tests and books to teach various principles . . . this class allows students to feel what it's like to have to make deadlines or else the client loses trust in the organization . . . The world needs to see this and what it can do. (Warr & West, 2020, Customizing the Learning Experience Section)

Similar to Virtue and Hinnant-Crawford's New Tech high school students, Warr and West's results captured student motivation due to authenticity, choice, and collaboration. In Evans's (2019) case study of high school chemistry students' perspectives after participating in a PBL transfer of energy unit, results revealed 83% of the students demonstrated proficient or above scores in self-direction and 71% in collaboration based on the student reflections and teacher observation. Capturing student perspectives of successfully implemented PBLs solidifies the need to implement real-world project designs, give students a voice and choice, provide feedback, and sustain inquiry. The next

section focuses on PBL implementation with technology integration that effectively supports diverse students.

PBL and Technology Integration With Diverse Students

Technology integration has been noted as a critical and underlying component in the PBL design principles (Cooper & Murphy, 2016; Darling-Hammond et al., 2008; Grant, 2002; Krajcik & Shin, 2014). In Hernandez-Ramos and De La Paz's (2009) study on historical thinking development through a multimedia mini-documentary, results showed students' positive views about collaboration and the need for the "integration of technology in ways to promote disciplinary thinking" (p. 167). Similarly, Marwan's (2015) study on coupling information communication technology with PBL showed increased English acquisition among ELLs. Moreover, Marwan's study involved implementing three projects that required research, communicating through email, and creating a video and a brochure during three PBL units. Shideler (2016) studied iPad integration for ELL elementary students. Students created eBooks that integrated multimedia and used text and apps like Educreation to increase test scores in point of view, inferences, main idea, and identifying supporting evidence. Pitura and Berlinska-Kopec (2017) studied Project-Based Language Learning and technology integration to explore language acquisition in upper secondary students at the University of Cracow. These studies highlight the positive results of coupling PBL with technology. Technology integration forges creativity, which breaks down such barriers as language and learning disabilities that prevent students from reaching their academic potential.

Integrating technology into instruction has never been more critical than during the Spring of 2020 and the 2020–2021 school year as school districts are operating on a

hybrid, remote learning, or in-person model to educate students in response to COVID-19 restrictions. In this qualitative study, teachers leveraged the PBL components to promote student engagement in a multimodal learning environment. This took place in a hybrid, remote, or in-person learning setting, as the uncertainty of the coronavirus was a continued factor during the time of data collection. Regardless of the setting, students need to learn and maintain engagement. This study adds to the extant literature through exploring how teachers leverage PBL components to support the diverse learners in their classes and to positively influence student engagement in multiple learning settings.

PBL Implementation in Remote Learning Settings

Few PBL studies have been conducted during the outbreak of COVID-19. However, one study involved 11 high school teachers from four schools across three states of the United States. All four schools adopted a PBL approach to teaching prior to the pandemic and implemented a PBL unit in the Spring of 2020 from May 11 to June 15, 2020, while on remote instruction. The study was designed to explore the PBL strategy used during remote instruction as a "candidate for social distance learning (remote learning) when considering students' motivation to learn in online experiences" (Hira & Anderson, 2021, p. 98). Teachers' perspectives were captured under four lenses relating to student motivation: personal meaning and relevance, autonomy and agency, connections with others, and competence development (Hira & Anderson, 2021). The following teacher perspectives are significant in how their relationships with their students corresponded to the degree of student engagement.

When schools moved to remote learning, one teacher needed to redesign her traditional in-person projects to include household supplies students could find at home to

make implementation relevant and feasible. Melissa (a second teacher) employed one-to-one mentoring during the quarantine. She reported, “One-on-one actually helps . . . you’re [the student] the person doing the work, I’m the person just giving feedback . . . and I think what I love is to translate that when we go back next year the same way” (Hira & Anderson, 2021, p. 100). Another teacher hoped to help students develop a productive relationship with technology as they would learn about professional communication and etiquette. He stated, “I hope, [the students learn] how to not be afraid of technology, sometimes. I think that’s one. It’s not because the program is difficult to use, it’s because of their attitudes towards technology sometimes” (Hira & Anderson, 2021, p. 104).

Hira and Anderson (2021) also reported the negative impressions that emerged from teachers in the PBL remote learning experiences:

> Teachers share that in addition to the rift of not being in the physical vicinity of each other, they are also observing an emotional separation as they cannot make themselves available in their students’ lives as caring adults in the same way as being in person in the classroom. (p. 101)

Another of their teacher participants reported, “Our school struggle with a lot of things, what we don’t struggle in is relationship-building. Kids like coming to school . . . I feel like I’ve lost that joy” (p. 101). One teacher shared similar sentiments, stating “There’s a legit distance between you and the students, not only, obviously, spatial. It feels like, emotionally, there is a distance there. It’s really hard” (Hira & Anderson, 2021, p. 101). Finally, yet anohter teacher missed working one-on-one with students and reported, “I feel like everything online seems a lot colder and a lot . . . harsher when you’re just

typing an answer to a question" (Hira & Anderson, 2021, p. 102). Similarities to Hira and Anderson's (2021) study were echoed in the students' perspectives in a 2020 PBL study of 285 undergraduates enrolled in an online course entitled Mechanical Systems Laboratory out of University of California, Irvine (Wu et al., 2020).

As leaders of many educational institutions scrambled before the onset of the COVID-19 shutdown in the Spring of 2020, leaders at UC Irvine were no different with their Mechanical Systems Laboratory course. A traditional in-person course transitioned to a full online course in which educators assembled 285 experimental kits in an attempt to replicate the hands-on course remotely using the PBL strategy. This experimental study was designed to compare both student achievement and motivation with the previous year's in-person implementation of PBL. Results revealed comparable achievement results during the remote learning course in 2020 to the 2019 in-person course. However, there was a decline in self-reported motivation (10%) and only 15% of the students endorsed offering the online course in the future (Wu et al., 2020). The following reflects the student engagement data from the study.

Wu et al. (2020) compared cognitive and affective outcomes between the 2020 remote course and the 2019 in-person course. The affective outcome was based on a questionnaire item asking students about the "advantages of remote learning." Results indicated an answer of "none" to that question as the second-most frequent entry. Further, the students rated the remote course as more difficult compared to the 2019 course (59% more challenging vs. 49% in 2019). Digging deeper into the why revealed "reduced communication and interaction to be at 43% (Wu et al., 2020, p. 6). Finally, students had the same contact duration with instructors during lectures, labs, and office hours, though

they indicated “mediating these interactions through videoconferencing was dissatisfying” (Wu et al., 2020, p. 7).

Student Engagement in Distanced Learning Settings

Student engagement has been a hot topic because of its connection with the dropout rate (Chen et al., 2008). Chickering and Gamson’s (1987) Seven Principles of Good Practice was used as an instrument to examine science teachers’ perceptions of their teaching practices at colleges and universities between 1987 and 1991 (Ugras & Asiltürk, 2018). The instrument was applied to student engagement in the following study of distance learning by Yilmaz and Banyard (2020). Yilmaz and Banyard (2020) investigated student engagement in 154 distance education settings. Chickering and Gamson’s (1987) original seven principles for good practice in undergraduate education were as follows: student–faculty interaction, student collaboration, active learning, prompt feedback, time on task, high expectations, and respect for diverse talents and ways of learning (Yilmaz & Banyard, 2020). Yilmaz and Banyard (2020) added six more principles that were influenced by the literature, experiences of the researchers, and two expert opinions. These six additional variables were media properties, student characteristics, teaching method, course/content design, innovative techniques, and instructor competencies. (Yilmaz & Banyard, 2020). Next, student engagement at both the college and K-12 levels is explored in the remote or hybrid learning setting using the 13 principles reported by Yilmaz and Banyard (2020) as a framework.

Student Engagement in Traditional, Hybrid, or Remote Settings

Three studies involved investigating engagement with college students learning in the traditional, remote, or hybrid setting. The common theme within all three studies was

the role of the teacher crafting instruction in an artful manner. In a study of 456 college students in South Korea, Kim et al. (2020) explored how the academic use of mobile technology influenced active engagement in courses, higher-order thinking skills, and learning effort, as well as how active engagement affects student higher-order thinking skills and learning effort. Results indicated mobile technology can facilitate engagement among college students but did not show statistically significant results in promoting learning effort and higher-order thinking skills (Kim et al., 2020). Kim et al.'s (2020) study fell short in the characteristics of innovative techniques, instructor competencies, and course content design as per Yilmaz and Banyard (2020). Hsiao et al. (2017) highlighted the component of course/content design in two business courses at a Midwestern university where students benefited from the resources modeling real-world interview scenarios in their coursework. The multimedia design of the modules positively engaged the students; however, the results indicated learners who need more support would need extra guidance like instructor notes to better understand the concept (Hsiao et al., 2017). Finally, Chadha (2019) explored peer deliberative discussions on a website developed for student collaboration in an online setting across college campuses on political science topics. Results revealed statistical significance in four areas: students responded with academic deliberation across universities; students personalized and identified with each other; and students extended questions furthering reflective questions, and this occurred across any question or theoretical or controversial topic (Chadha, 2019). Furthermore, student comments reflected learning how to discuss controversial topics, such as gay marriage or free speech versus the right to privacy, in a respectful manner (Chadha, 2019).

These three studies reveal the importance of resources, course design, and teacher expertise in the integration of multimedia and technology with students learning remotely at the college level (Chadha, 2019; Hsiao et al., 2017; Kim et al., 2020). The significance of these studies is to recognize how technology integration and teacher expertise affect student engagement in a remote or hybrid learning environment and combine these characteristics with PBL components. Finally, the 13 principles of Yilmaz and Banyard (2020) combined with the critical features of PBL provided a framework for the methodology of the current study. The following continues the investigation of student engagement in the remote or hybrid setting, but the focus is on younger students and what critical components of Yilmaz and Banyard's (2020) 13 principles are most prevalent.

Student Engagement in the Hybrid or Remote Setting at the K–12 Level

Student engagement in the remote or hybrid setting with students in the K–12 age range appears to differ from that of undergraduate college students. A student characteristic of being self-directed seems to influence engagement. Barbour's (2015) case study of synchronous instruction with high school students who participated in distance learning in a rural school in Newfoundland and Labrador showed students displayed similar off-task behaviors as those in traditional school. This was evidenced by 10–15 minutes of student conversation during the 60-minute period. It is not clear whether the students were on topic; however, this may be an indicator of a lack of teacher innovation or expertise in planning (Kim et al., 2020). Barbour's study also highlighted that students preferred the chat feature over speaking orally using their microphones. The chat feature is a digital conversation that allows participants online to talk through typing. Barbour's study revealed positive gains in engagement by students who were at the

Beaches All Grades School. The class sizes were small, as there were only five to six students per class. Students developed a "friendly, close-knit, family," which contributed to the sense of community among the learners (Barbour, 2015). Louwrens and Harnett (2015) conducted a case study of the engagement of middle school students who attended Te Kura, a distance education provider to primary and secondary students in New Zealand. Unlike the previous study, this program integrated core curriculum (i.e., English, social studies, science, and mathematics) using the *Desire2Learn Learning Management System* (Louwrens & Harnett, 2015). This study exemplified Yilmaz and Banyard's (2020) principles of innovative techniques, instructor competencies, and course/content design. Teachers reported an increase in their students' engagement due to the Web 2.0 resources that afforded student autonomy and choice of demonstrating their learning (Louwrens & Harnett, 2015). Similar to Barbour's (2015) study, students reported they became familiar with their classmates online through teacher planned activities. This forged student-to-student feedback, which was regarded as very important in online learning (Louwrens & Harnett, 2015). Careful lesson design by instructors with innovative tools, regardless of student age, appears to be paramount in remote learning (Yilmaz & Banyard, 2020).

Research Implications

PBL promotes student engagement in the traditional classroom setting when teachers are afforded training that helps them put theory into practice (Dole et al., 2016; Evans, 2019; Mahasneh & Alwan, 2018). Additionally, the PBL features that result in student engagement are consistent with the Buck Institute of Education's High-Quality Project-Based Learning and are as follows: key knowledge understanding and successes,

challenging problem or question, sustained inquiry, authenticity, student voice and choice, reflection, critique and revision, and public product (Evans, 2019). Next, the research on student engagement in a distance learning setting exemplified the significance of resources, course design, teacher expertise, integration of multimedia and technology, student-to-student feedback, and developing a community of learners (Chadha, 2019; Hsiao et al., 2017; Barbour, 2015; Kim et al., 2020; Louwrens & Harnett, 2015). The current study was designed to gain an understanding of these characteristics while exploring how teachers leverage their PBL implementation to support their diverse students and their students' engagement in a hybrid, remote, or in-person learning environment.

Summary

Students become engaged when they are involved in the way the learning takes place. When the high school students from New Tech Network were learning history/English and math/science through PBL, they enjoyed the collaboration with their peers, the authentic real-world connection of the projects, and the rich discussions in a tolerant environment (Virtue & Hinnant-Crawford, 2019). Both college and high school students experienced similar outcomes when designing their learning experience in Warr and West's (2020) design studio experience and Evans's (2019) case study on high school juniors learning about the transfer of energy through PBL. When students receive feedback from instructors and peers, have voice and choice, and are connected to the real world in their learning, then engagement ensues.

Engaging students in an in-person or remote learning setting is a critical component to this literature review because of the current educational landscape during

the COVID-19 outbreak. Yilmaz and Banyard's (2020) study on online learning shed light on the paramount features needed to be present to ensure positive student engagement: authenticity of the learning, meaningful topics, infusion of mobile technology, use of the chat feature, a close-knit family classroom atmosphere, and having a choice (Barbour, 2015; Chadha, 2019; Kim et al., 2020; Louwrens & Harnett, 2015).

This body of research informs future research to explore the implementation of PBL in the remote, hybrid, or in-person environment and its impact on supporting student engagement in the wake of the COVID-19 pandemic of 2020. A focus on teachers leveraging PBL components, specifically the scaffolding component, will be paramount.

CHAPTER 3: RESEARCH DESIGN

The purpose of this qualitative study was to answer the following research question: How do teachers leverage the PBL components to promote behavioral, cognitive, and emotional engagement within the complex model of remote, hybrid, and in-person learning?

Qualitative Research Approach

A qualitative approach was chosen to conduct the current study. Qualitative research involves "emerging questions and procedures, data typically collected in a participant's setting, data analysis inductively building from particulars to general themes, and the researcher making interpretations of the meaning of the data" (Creswell, 2014, p. 4). I chose this approach as most suitable as the data collection process involved interviewing teachers on multiple occasions, writing analytic memos, and creating a story structure to jointly retell the teachers' stories through narrative inquiry.

I used narrative inquiry to uncover the factors that contributed to student engagement in a remote, hybrid, or in-person learning environment using the PBL method. Information gleaned from the data collection may not be generalizable, as narrative inquiry relies on criteria other than validity and reliability. However, "apparency, verisimilitude, and transferability" were possible forms of criteria that appropriately framed this study due to the anticipated varied experiences teachers endured while instructing during the COVID-19 pandemic (Connelly & Clandinin, 1990, p. 7).

Social Constructivist Paradigm

I designed this study through the lens of social constructivism. According to Creswell (2014), social constructivists believe individuals seek understanding in the world in which they live and work. Constructivists' beliefs are as follows. Ontology is characterized as relativism. Relativism, transnationalism, and subjectivism are synonymous and rely on the understandings and experiences of the people involved in the situation. Last, the methodology is hermeneutical and dialectical (Guba & Lincoln, 1994). Hermeneutic and dialectical is the interpretive process. Through conversation, any conflicts in beliefs are discovered and explored. Specifically in this study, teachers brought to their classrooms their beliefs, which were formed through their educational backgrounds and their practical classroom experiences. Also, as the researcher, I brought my own experiences, which may or may not have been similar to the participants' beliefs.

I applied these pieces through a narrative inquiry design in which I was able to tell the story of PBL implementation in a multimodal setting through both the lived experiences of the teachers and the incorporation of my own knowledge of the topic. I relied on the participants' views by asking broad, general, and open-ended questions to construct meaning for the topic being studied (Creswell, 2014). Through interviews with the teachers, I gleaned evidence about decisions made when implementing the PBL. Then, I asked questions in an attempt to mediate any conflicts in instructional methods that may have arisen through the interview process. The findings in the research presented a synthesis of the process. Crotty (2015) stated that the composition of meaning is always social and research is an inductive process based on the data collected in the field.

Social Constructivism and its Application to the Study

The following assumptions and beliefs are supported by the tenets of constructivism. Teachers in the study constructed meaning through the lived experience of implementing PBL in their classrooms. I arranged the investigation into an interpretivist research study by interviewing teachers and gleaning their lived experiences in their implementation of PBL and its impact on student engagement in a multimodal setting of hybrid, remote, or in-person learning. I conducted interviews during the beginning, middle, and end of the PBL and used field notes and analytic memos to record teachers' experiences throughout the process, noting any nonverbal cues made by the participants. The teachers shared their perceptions with me through open-ended questions, which promoted a dialectical process rooted in constructivism (Guba & Lincoln, 1994). Additionally, I collected data in the natural setting, examined documents, and interviewed participants to support the qualitative approach to research (Creswell, 2014). Finally, I analyzed multiple perspectives gleaned from the interviews to paint a holistic picture of the PBL implementation process and student engagement.

Research Design

I designed this qualitative study to use narrative inquiry to answer the question: How do teachers leverage PBL components to promote behavioral, cognitive, and emotional engagement within the complex model of remote, hybrid, and in-person learning? Narrative inquiry "involves the gathering of narratives-written, oral, visual-focusing on the meanings that people ascribe to their experiences seeking to provide insight that befits the complexity of human lives" (Josselson, 2006, p. 4). My role involved more than recounting the teachers' sharing of chronological events, as I

attempted to capture the feelings, hunches, and conversations in the hallway (Trahar, 2009). Within this context, myself as the researcher and the participants were co-constructing a personal narrative, but then another level emerged as I needed to move beyond the telling of the lived story to tell the research story (Trahar, 2009). In this study, my voice regarding the inquiry of PBL implementation and its impact on student engagement was woven into the narrative as a second voice. Peshkin (1985) called this the "dual I" in explaining the various voices of the researcher and participant in the collaborative process of narrative inquiry. This team approach in constructing the narrative requires transparency when we share a similar experience (Trahar, 2009). In addition, researchers must beware of the "illusion of causality" (Crites, 1986, p. 168) where a sequence of events looked at backwards links events to the past, and looking forward, forecasts the future. This oversimplification due to the chronological notes can minimize the meaning trying to be conveyed. Instead, Polkinghorne (1988) suggested narratives are derived from the whole, and not explained by cause and effect. These potential pitfalls made it incumbent upon me as the researcher to continually ask, as recommended by Clandinin (2018), So, who am I in this? Why am I here? Why do I want to know about student engagement using PBL in remote, hybrid and in-person settings?

Research Site

The study site was a K–8 public school district in a suburban town in central New Jersey. During the 2020–2021 school year, the student enrollment consisted of 1,337 students in Grades Pre-K–8. The district was composed of three schools: K–2, 3–5, and 6–8. Each school qualified for Title I services and 9.5% of the population participated in the free and reduced lunch program. The demographics of the students in the district

reflected 77% White, 16.5% Hispanic, 10% Black, 7.2% Asian, and 5% two or more races. English learners (ELs) represent 3% of the district's students and 22% of the district's students receive special education services. During the 2020–2021 school year, 3.5% students received protections through Section 504.

To protect the privacy of the participants and the school district, I use the pseudonym Mountain Way School District throughout the study. I refer to the Grade 3–5 school as Rock Spring School and the Grade 6–8 school as Cameron Middle School. I chose this school district because of my role as an administrator in the district. This site selection allowed me to schedule meetings and interviews with the participants on campus at convenient times. The district's superintendent approved the study in March of 2021 as part of the district policy.

Participants

The participants in this study were purposefully selected, which involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest (Creswell & Plano-Clark, 2018). PBL professional development was provided to English language arts, social studies, science, technology, and gifted and talented educators who taught in Grades 4 through 8 beginning in the 2018–2019 year. PBL training continued for teachers in the aforementioned subject areas in Grades 6 through 8 during the 2019–2020 and 2020–2021 school years.

Prior to the study, I met with the participants via Zoom for a pre-brief (Appendix A) to describe the purpose of the study, the observation and interview schedule, documents that would be used during the observations and interviews, the process for the

transcription of observations and interviews, data storage and publication, confidentiality, and terms of informed consent. The incentive to participate rested with the opportunity to effectuate change in teacher practices and to share findings with colleagues at the conclusion of the study. I hoped to recruit four teachers to participate in the study. I provided the teachers with Informed Consent forms (Appendix B), the Student Engagement Teaching Practices document (Appendix C), and the Gold Standard Project Design Elements Observation Checklist (Appendix D) prior to beginning the study.

Procedures

I sought approval from the Institutional Review Board (IRB) of St. John's University (Appendix B). Once approval was granted, I sent a "Call to Participants" email to the teachers in the district to ascertain participation in the study from teachers who had implemented PBL units from 2018 to the present time (Appendix F). The participants consisted of teachers who instructed fourth through eighth grade at both Rock Spring Elementary School and Cameron Middle School and who had implemented PBL units in an in-person, hybrid, or remote setting during the second and third trimesters of the 2021 school year. I used in-person or Zoom meetings to conduct semi-structured interviews with the teacher participants. During the interviews, I invited the participants to tell stories that were meaningful for them during their PBL implementations. I attempted to share how those stories resonated with my own experiences as an educator (Trahar, 2009). This process helped me "hear the unanticipated narratives that may lead to profound and different understandings and meanings" (Trahar, 2009, p. 4). I used other collection methods to triangulate the data, such as journal entries, field notes, and analytic memos that pertained to the research.

Data Collection

For this study, I focused on collecting data from three separate 60-minute interviews with each participant. Teachers received a pseudonym to protect confidentiality. The conversations took place at Rock Spring Elementary and Cameron Middle School after school hours on a Zoom call. Teacher interviews were recorded and I took detailed notes during the interviews to note the body language, expressions, and tones of the participants.

Data Analysis

Data analysis occurred after all sources of data were organized and prepared for analysis. Creswell (2014) described this as transcribing interviews, typing up field notes, and arranging the data depending on the different sources. I organized the preliminary data from recordings and the receipt of unit and lesson plans into digital folders on a secure, password encrypted computer. Next, I hired the transcription service Rev.com to process accurate, line-by-line transcriptions of all interviews. I gave the transcriber access to the pseudonyms and asked the company to sign a nondisclosure agreement to protect teacher confidentiality. Upon receipt of the transcriptions, I compared them to my documents from the interviews. I coded and categorized the documents through an inductive process, in that some codes were predetermined in order to integrate the study's conceptual framework; moreover, the PBL components were integrated into the codes. An inductive process took place during the teacher interviews to capture the complex processes in the teacher decision-making process in their PBL implementation. I used predetermined codes to clearly identify PBL implementation and descriptive coding to capture participant insights. Data analysis followed these steps:

1. Collected and reviewed the PBL unit plan and conducted an interview with the teacher.
2. Conducted a first cycle of initial coding. Because the focus was on teachers navigating the components of PBL, I employed predetermined codes to the transcriptions, documents, and artifacts as a detailed inventory of their contents (Saldaña, 2016, p. 73).
3. I repeated the process for the second observation and interview. The process repeated for each teacher participant.
4. Analytic memos in the form of diagrams were drawn as the study progressed.
5. A second round of pattern coding assigning the Gold Standard Teacher Practice codes and the three types of student engagement came next. This highlighted the focused coding for categorization of the coded data as an initial analytic strategy (Saldaña, 2016, p. 74).
6. Code weaving was integrated with individual components (i.e., key code words and phrases into narrative form). This was a synthesis of primary codes, categories, themes, or concepts condensed into a few sentences to suggest causation, indicate a process, or create a broader theme (Saldaña, 2016, p. 276).

Background

I identified themes from the data for this narrative analysis using a two-cycle coding method (Saldaña, 2016). For this method, participants' experiences were transcribed and predetermined coding or a qualitative codebook was developed (Creswell, 2014). Participants' voices were preserved and codes were attached. For this

analysis, I began by cataloging transcripts by code categories or PBL components. Next, I drew diagrams to synthesize the codes by each teacher participant. I then added all analytic memos to the document to ensure easy access to all information. This helped me understand which PBL component the teacher leveraged. Next, I added the teacher practices and three types of student engagement codes to each category by using different color tabs and post-its.

First Cycle Coding

With new resources available to researchers, scholar-practitioners now have the option to hand code or code themes found in their data by computer. This is personal preference, yet it is important for a researcher to choose a program that has all of the components needed to effectively organize and analyze the information (Creswell & Maietta, 2002). For this research study, I hand coded all of the data. Coding data was vital to developing themes, and through hand coding, I was able to gain a deeper understanding of the data as well as to identify themes that were more subtle than those tracked by other coding methods, and that can often be missed in the software used. Bogdan and Biklen (1998) observed and noted codes that frequently were used in qualitative research such as setting, relationships, strategies, and perspectives of participants (Creswell, 2014, p. 244). Through the use of hand coding, I was able to note these different forms of information to begin to piece the "story" together.

I relied on hand coding as the first method of evaluation. At times, over coding can become an issue, and Creswell (2014) cautioned researchers to use codes only as needed. I developed a qualitative codebook consisting of predetermined codes. According to Creswell, this is a "popular approach to use to test a theory being

examined" (p. 199). Though I was not examing a theory, the focus was on investigating the Gold Standard PBL components, Gold Standard teacher practices, and three types of student engagement. After coding the interview transcripts, I proceeded to list all codes and to group them by the three teacher participants. This helped to develop themes for analysis. I also used analytic memos in the form of diagrams before and after the interview process and during the coding phase of the research. Analytic memos and diagrams allowed me to compile my thoughts about the data and analyze what themes I was and was not seeing.

Second Cycle Coding

Once I reduced my data by the three teacher participants, I began to notice different themes emerging from the data collected. At this point, it was important to choose themes that helped answer the research questions. Themes can also be laden with subthemes that give further insight into the phenomenon; they are commonly also layered as major and minor themes or as interrelated. In this study, these two ways to look at the data were dependent on the research question as well as the themes I observed through data analysis.

Using a Narrative Explanation

Explicating the lived experiences of the teachers was the goal of the narrative for the current study. Writing the story to capture the experience required a structure (e.g., the scene and plot; Connelly & Clandinin, 1990). Furthermore, incorporating time, in terms of events of the past, present, and future, provided a framework consisting of multiple data sources. Specifically, "storytelling tends to be located in the past, interviewing located in the present, and letter writing, journaling, and participant

observation located in the future" (Connolly & Clandinin, 1990, p. 5). Incorporating these pieces presented a complete portrait of the narrative.

Presentation of Findings

According to Miles and Huberman (1994), once a researcher develops themes for their research problem, they often use visuals to showcase results. This can be in the form of comparison/demographic tables, tree diagrams, or giving a layout of the setting described in the research (Creswell, 2014). Along with the visual representation, a narrative discussion of the findings provided included descriptions of situations, themes that emerged, dialogue from participants, and tensions that arose throughout the research process. For this study, I chose to present findings using a narrative approach and included visual representations of the themes and subthemes observed through the data. To stay true to the research, I incorporated the participants' own individual indicators such as dialogue, language, and dialect as well as meaningful and accurate quotes to help shape the story (Creswell, 2014).

Although I spent a great deal of time looking for themes across all areas of data collection, Connolly (2007) pointed out that due to the blurred descriptions of "researcher," it is often helpful to add an autoethnographic section to the findings documenting the researcher's own voice and experience throughout the study. This approach accompanied the findings for this study, and I depended upon analytic memos created throughout the data collection and analysis processes for the information. According to Trahan (2009), this process allows the author to not discount the participants' stories or voices, but to be able to document assumptions and feelings

related to the experience. It is the researcher, however, who ultimately decides what is important to the overall study. According to Connolly (2007):

> It is the researcher who inserts, edits out, or overlooks certain features of the narrative. It is being suggested, then, that reporting narratives should more commonly include a report of an autoethnographic nature where the researcher provides an account of his or her own voice, stance, assumptions, and analytic lens so that the reader is abundantly clear on whose story is whose. (p. 453)

Connolly also noted that "layering the narratives—that of narrator and that of listener or researcher" (p. 453) is one way the practitioner can add their autoethnographic "voice" to the study. This is a key section of this study's presentation of findings, as well are from the interviews and researcher memos, all of which I combined to create this part of the narrative. In addition to an autoethnographic report, in Chapter 5 I relate the findings back to the literature and documented limitations noticed throughout the study. I also provide suggestions for further research.

Potential Research Bias

This study had potential limitations. The first related to my role in the school district where the study took place, as there was the potential for researcher bias. I am the Assistant Superintendent of Instruction in the district where the study took place. To counter this, I did not evaluate the participating teachers during the time of the study and did not complete their summative evaluations at the end of the 2020–2021 school year.

Internal Validity and Reliability

Guba and Lincoln (1994) used the term trustworthiness to describe the criteria for evaluating qualitative content analysis. "The aim of trustworthiness in a qualitative

inquiry is to support the argument that the inquiry's findings are worth paying attention to" (Elo et al., 2014, p. 2). In the data collection phase, I ensured trustworthiness by choosing the best data collection method to answer the research questions. I engaged in careful reflection when developing the interview questions so I did not manipulate or lead the participants, but obtained rich data (Elo et al., 2014).

Teacher reflections of their PBL implementation were interpreted and coded in a reliable fashion. Trustworthiness in this phase was achieved by describing how the categories were created. Conformability of findings means the data accurately represent the information the participants provided and the interpretations are not invented by the inquirer (Polit & Beck, 2012). Pyett (2003) suggested revisiting the data to check for consistency between the interpretation and the data and to ensure the identified features are subsequently corroborated by other interviews. This process promotes credibility and validity during data analysis. Finally, trustworthiness was ensured by taking the following steps: "Initially code as data is transcribed; maintain a reflective journal on the research project with copious analytic memos; and check interpretations developed along the way with the participants" (Saldaña, 2016, p. 38). Member checking ensued after I interpreted the data. I shared my interpretations with the participants and allowed them to clarify and discuss the interpretations and contribute new or additional perspectives on the issue under study (Baxter & Jack, 2008).

External Validity and Limitations

External validity is often questioned in narrative inquiry due to the nature of a qualitative study involving telling the story of participants' lived experiences. To combat this notion, I engaged in member checking to ensure the conveyed information provided

by the participants was not distorted in any way. Connelly and Clandinin (1990) discussed the importance of adequacy and plausibility, which contribute to the truth in the narrative writing, where one might say, "I can see that happening" (p. 8). With respect to the interpretations of narrative texts, Polkinghorne (2007) suggested the "claim need not assert that the interpretation proposed was the only one possible; however, researchers need to cogently argue that theirs was a viable interpretation grounded in the assembled texts" (p. 484). In the current study, the context of the classrooms was not consistent (e.g., one classroom had all in-person learning, a second class had a hybrid setting in which a fraction of the students were at home learning and the other fraction were in the classroom). This scenario was not conducive to making a generalization about student engagement; however, validating the teacher's story by the iterative process of returning texts to the teacher to gain clarification on ideas for further exploration infused a level of confidence in the teacher's mind of my commitment to accurately portraying their experience.

Protection of Human Rights

The narrative inquiry approach required me to ensure ethical practices were implemented during the research process. This began with acquiring informed consent from the participants. Informed consent is interwoven with other ethical issues that include power, privacy, and anonymity (Punch, 2002). Confidentiality of the participants was protected by using pseudonyms during data collection and reporting.

In the informed consent letter, participants were informed that their participation was voluntary and they had the ability to withdraw from the study at any time. During the pre-brief with the participants, I asked the group to refrain from giving names of students,

locations, or any other participant to maintain confidentiality during the study. Furthermore, I explained that interviews would be recorded using an iPhone, Google Meet, or Zoom recording function. I used pseudonyms to represent the school district, teachers, and students in all documentation and within the discussion and results chapters of the dissertation. Furthermore, participants will remain anonymous in future presentations of the study results to district teachers and those across the county.

Data Storage

Data were stored on a separate hard drive called a jump drive. All signed consent forms and printed materials were maintained in a locked drawer. Once the objectives of the project have been completed, the data file will be kept for 5 years and then destroyed. All participants were protected through the use of pseudonyms on all documents, from lesson/unit plans, interviews, field notes, analytic notes, and recordings.

Summary

I designed this study on PBL in an attempt to understand the decision-making process teachers undergo to manipulate the PBL components in order to promote student engagement in a varied learning environment (i.e., hybrid, remote, in-person) during the 2020–2021 school year. The research design consisted of a narrative inquiry encompassing upper elementary and middle school teachers with PBL implementation experience. Data collection occurred via teacher interviews, planning documents, field notes, and analytic memos. Predetermined codes in the form of a qualitative codebook were developed. Coding took place from the transcribed observations, interviews, and researcher field notes. A second round of coding for categorization ensued, followed by code weaving to synthesize categories and themes in the form of analytic memos. This

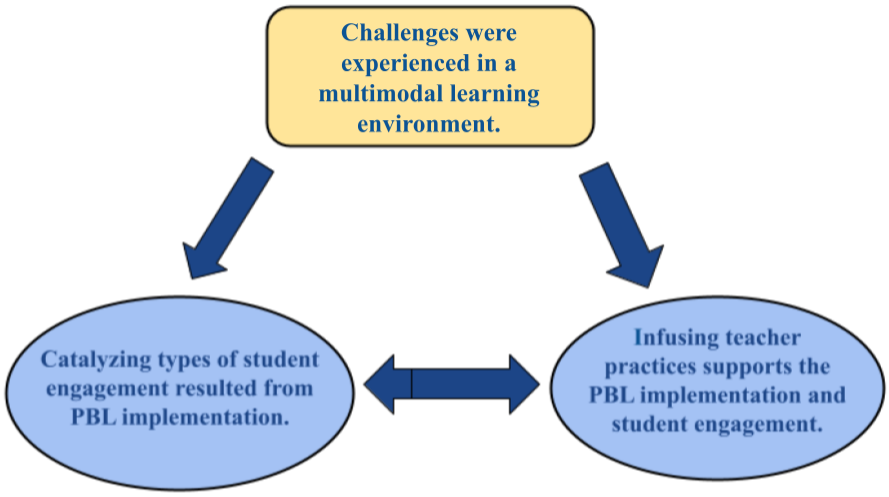
process was replicated for each teacher participant. Member checking occurred by sharing interpretations with the teacher participants to ensure conformability of the findings. Participants were protected through the use of pseudonyms, secured informed consent forms, and data collection on an external hard drive. Continuous transparency of information with all participants took place throughout the study.

CHAPTER 4: REPORT OF RESEARCH FINDINGS

The purpose of this chapter is to present the findings related to the research question: How do teachers leverage PBL components to promote emotional, cognitive, and behavioral engagement in a hybrid, remote, or in-person learning environment? By using a narrative inquiry approach, I attempted to gain insight into the teachers' decision-making surrounding their implementation of PBL during the Spring of 2021 as the learning environment transitioned from a hybrid learning environment to an in-person learning environment. Figure 1 shows the three themes that emerged from the findings.

Figure 1

Themes



Participant Profiles

Teacher 1 is a certified general educator with 20 years' experience. She implemented a PBL unit entitled "How Do We Safely Explore Mars" with 20 fourth

graders in an inclusion classroom. The student population consisted of 20 students in total, seven students with Individual Education Plans (IEPs), six students in the Academic Success Program (ASP), and seven students in the Gifted and Talented program (GT). Teacher 1 had the support of a special education instructor and a student teacher during the PBL unit implementation. I conducted the first interview from my office via a Zoom meeting while the teacher was in her classroom on May 20, 2021. Teacher 1 was upbeat and excited by the launch of her class's PBL, while simultaneously navigating the challenges of hybrid teaching. She began her PBL unit with many students attending in-person school, but had to quickly adjust as a group of students had to be quarantined and learn remotely. Teacher 1 noted a distinct change in the students' behavior, commenting, "Why are you acting differently at home?" She speculated a change in engagement that came as a challenge from remote learning, yet noted that over time the students adjusted, stating, "They're beginning to blossom!" Teacher 1 appeared to be on track with the implementation process with her class of varied learners and students in and out of school with the support of a special educator and student teacher in the room.

Teacher 2 is a certified math and science teacher and teaches the fourth and fifth grade GT program at Rock Spring Elementary School. She has 22 years' experience. Teacher 2 conducted a PBL entitled "Escape of the Missing Stuffed Animals" with her three GT classes over a 7-week period in May and June 2021. Teacher 2 and I met for our first interview via Zoom on May 20, 2021, about 2 weeks after her PBL launch. Teacher 2 was intentional in her description of the learning environment, making apparent that the tumultuous mix of remote, in-person, and hybrid learning was weighing on her. She commented that the learning environment "tugs at me." She was continuously aware of

the varied needs of her students as they shuffled between in-person and remote learning, being careful to consider her word choice when speaking with her students. She did not want to make students feel uncomfortable about remote learning and endeavored to show respect for parents who chose to keep students at home. Teacher 2 stated, "I don't know what it feels like to sit on the other side of the computer."

Teacher 3 is a secondary English language arts teacher with 16 years' experience who conducted her PBL unit entitled "Genocide" with her advanced eighth grade class encompassing 21 students during May and June of 2021. I conducted the first interview with Teacher 3 on May 18, 2021. Teacher 3 is extremely articulate, detailed, and evokes both a serious and concerned tone when speaking about her eighth-grade advanced students and the PBL kickoff. In what she called this "desperate year," her goal was to ensure her students' comfort level when navigating through the tumultuous setting of the learning environment. Additionally, it was clear to me, through the pained look on Teacher 3's face, that she was trying to connect with her students and was handing the reins over to her students to dictate the progression of the project and to support their "safe space" in the learning environment.

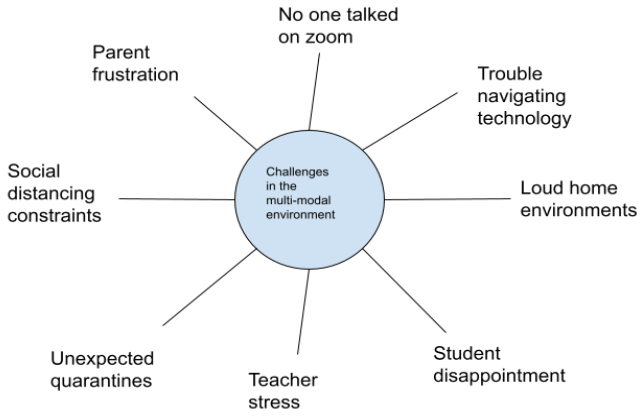
Findings in Relation to Research Questions

The next section outlines the findings using descriptive excerpts from the participant interviews. The descriptions support the data analysis and the themes that were derived from the coding process to explore the research question: How do teachers leverage PBL components to promote cognitive, emotional, and behavioral engagement in a complex multimodal remote, hybrid, or in-person learning environment? Figure 2

illustrates the challenges that were experienced in the learning environment during the PBL unit implementation.

Figure 2

Challenges in the Multimodal Environment



Teacher 1: Challenges Were Experienced in a Multimodal Learning Environment

Teacher 1 experienced a classroom environment that was inconsistent, disruptive, and far from normal. Teacher 1 stated, “So, it’s bizarre to see them in this aspect now that they’re home, they don’t want to talk, and I’m like, you guys did so well, like last week [in school].” School days looked different for each student. The categories a student may fit into were as follows: 100% remote, hybrid, or in-person. Teacher 1 endured challenges during several scenarios, such as when students were at home due to quarantining, when the whole class moved to remote learning, or when instruction was hybrid and Teacher 1 had to manage both in-person and remote learners simultaneously. Teacher 1 recorded the completion and attainment of learning goals and tasks during her 25-day PBL implementation. The following was gleaned from this data source. Teacher 1 charted

student data for 24 days of the PBL unit. A goal or objective was identified each day and Teacher 1 assigned a check if the student achieved that goal or objective. Teacher 1 had 20 students. In an analysis of this data sheet, four out of the 20 students experienced technology or home environment issues during the Mars PBL unit. This was annotated by Teacher 1 with the following comments: "Working remotely, did not respond; Left class with internet issues; Virtual group and did not participate; A lot of distractions from home." Teacher 1 supported these data with her comments as she reflected, "They [students] are not participating at home, whereas in school they were really participating." The students learning remotely from home communicated with their peers and teachers via Zoom. Teacher 1 empathized with two of her remote learners who were not participating. She speculated that the home environment may have been the cause of their reluctance to participate. She commented, "I think it's very loud in their background most of the time . . . so I think they tend to just keep it muted because they're embarrassed of what's going on around them." These two students were very active during in-school learning. Teacher 1 posited, "The other one doesn't want to talk. I definitely think it has a lot to do with what's going on in their homes, which is why they're just acting differently there."

Navigating on Zoom also posed some difficulties during both whole and small group lessons compared to traditional in-person learning environments. Teacher 1 contrasted the previous year to this pandemic year. Moreover, she cited the differences of students working in small groups cooperatively and sharing their materials from previous years' PBL units, compared to now, where working together on a Zoom was more challenging for the students. In frustration, she commented, "Now, it's like, okay, share

your screen. Nope. You're not sharing. You're not sharing. Share it again. It's like, forget it, don't share, we're good."

Technology difficulties continued as students were not sure of when they could talk or not talk during both large group Zooms and small breakout room sessions. Teacher 1 added from a student's perspective, "Am I allowed to unmute? My teacher keeps telling me not to unmute? But can I do it now if I'm in a small group?" Because of this, much time was spent on establishing rules and procedures for this setting.

Disruptions to the learning environment led to both parent and student voiced frustrations. A parent contacted Teacher 1 to express concerns during Zoom work: "The students in the breakout room are not talking, and my child is not getting anything out of it." Furthermore, students who were attending in-person schooling could get sent home for a 10-day quarantine if they were determined through contact tracing to be "a close contact" with a student who tested positive for COVID. One student who experienced this in Teacher 1's class was very excited about his project and expressed his disappointment by stating, "I'm finally getting into doing this project, and now, I got to go home." Teacher 1 added, "He was a little bummed out, because the whole last 2 weeks of his presentation, he was working from home. It was heartbreaking because he was so into it." These challenges led to student disconnect with the project.

Teacher 1 reflected about her PBL implementation at the end of the unit with regard to the varied learning environment and its impact on her students' creativity. Teacher 1 expressed her disappointment in a frustrated tone when she said, "Even though I told them they could present in different ways, their creativity was not there with the presentation because of the in and out of school." The multimodal environment resulted

in frustrations from Teacher 1, her students, and a parent. These factors influenced Teacher 1 and the choices she had to make regarding how to implement and leverage the various PBL components to facilitate student learning. Figure 3 highlights the PBL components for this study.

Figure 3

PBL Components

PBL Components
Challenge Question
Sustained Inquiry
Authenticity
Student Voice/Choice
Reflection
Critique and Revision
Public Product/Presentation

Teacher 1: Catalyzing Student Engagement Through PBL Implementation

Student excitement was evidenced in the fourth grader's voice when he found out they would have an audience to present to. This was indicated here with, "'Wait a minute, so we get to present this and not just to you?' I'm like, absolutely. I think that really helped them," reported Teacher 1. The public event or product was the culminating piece of the PBL consisting of a presentation to a group of experts or creating a product to present. In Teacher 1's Mars unit, the public piece consisted of parents and school personnel coming to the final presentation on a Zoom. The additional PBL components that led to student engagement were the challenge question or problem, voice and choice,

sustained inquiry, authenticity, reflection, critique and revision, and the public product. Teacher 1 implemented each component to varying degrees to engage her students.

The PBL unit began with the challenge, which was, "How do we safely explore Mars?" Each day after, the PBL launch had a specific goal or objective the students had to achieve. Teacher 1 kept data on each student in relation to the learning goals. Each goal can be attached to the different types of student engagement, namely cognitive, behavioral, and emotional. Figure 4 presents examples of the goals.

Figure 4

Learning Goals

Research key facts about Mars's surface
Explore the science goals and atmosphere on Mars.
Compare and contrast Earth and Mars.
Learn how the red planet formed from gas and dust and what its polar ice caps mean for life as we know it.
View multiple videos/discuss.
Think about what your prototype would need? Create a sketch.
Think about what your prototype would need? Continue working on your sketch. Share with group.
Work as a team to choose 1-2 top features from each individual model. Begin discussing how you will combine and create 1 group model.
Groups will designate 1 person to draw their final model and will work together to label final sketch.
Watch/Discuss "The Insane Engineering of the Perseverance Rover" or "Deep Space High."
Work on presentation and discuss group member roles.
Read about Curiosity Rover. Continue to work on presentations.
Work on presentation and model of rover. Learn how to record voice for presentations.
Create document (typed or handwritten) of script for presentation.
Finishing touches on presentations. Begin practicing within your group.
Practice presentations in front of the class.

Students began by creating a drawing to answer the driving question after conducting their own research on Mars. Next, they built prototypes while working in a group. They collaborated by taking the best feature of each of their own prototypes to build the group prototype. While the challenge question grabbed their curiosity, the authenticity component piqued their interests. Teacher 1 explained about showing video clips of the Mars Rover to her students in class: “They love to watch it move and listen to the sounds it made.” Students then engaged in real-world conversations even after the school day was over. Teacher 1 explained that the students came in from home with more information. One student came into the classroom and announced that he learned about the Mastcam-Z camera and the panoramic pictures it can take to help explore the landing spot. Teacher 1 commented with enthusiasm, “They’re actually having conversations outside of school, which is even better.” In Teacher 1’s correspondence with parents through email, she reported that parents told her about the excitement they were hearing at home about the Mars PBL. This was evidence of sustained inquiry in the students’ curiosity to learn more about Mars.

Sustained inquiry was also indicated during the Zoom learning. During the middle of Teacher 1’s PBL, more students were back in school from quarantining. Having more students in person appeared to improve student engagement. Teacher 1 described the Zoom benefits by stating, “I’m seeing them flourishing so much more now that we’re back in and together.” Further benefits emerged from using Zoom in that students were paying attention more closely while listening with their headphones, with one person talking at a time. Furthermore, Teacher 1 continued to use the Zoom breakout room even though many of her students were back in person. This promoted collaboration while

maintaining 6 feet apart with her students in the room. Teacher 1 noticed a positive change in one student's engagement from the beginning of the unit.

Teacher 1 saw a transformation in one student from the beginning of the PBL to the end with respect to her level of engagement and sustained inquiry. She stated, "Whoa. I have never heard this child speak so much. She was interested in what she was doing." One student who was very quiet in the beginning of the unit became very vocal. She was no longer afraid to participate and raised her hand frequently to talk. Finally, Teacher 1 commented, "I was taken aback by her, in taking the lead in her group. I never would've expected her to change like that." Students were talking and felt comfortable, whether in person or in the Zoom. The PBL components of authenticity and sustained inquiry were evidenced during this phase of the Mars unit. Preparing the students to create a public piece as a presentation or a product also led to their engagement.

Students worked in groups to prepare for the public product. For the public presentation, the students illustrated their prototypes and each group member presented a different piece about the prototype and explained its importance. Teacher 1 exclaimed, "They're starting to blossom!" Teacher 1 commented about the students' communication with both their peers and adults when talking about their project, "I think they enjoy talking. Like my group in particular, they just enjoy explaining information, and they'll talk to anybody. And they love when other people are in there and just pop in [the breakout room]." The excitement grew when Teacher 1 told her students that school administrators were coming to the presentations. One student commented, "Wow! They're here to see us!" This was evidence of authenticity contributing to their

engagement. Though the public piece led to much excitement, Teacher 1 reflected about the students' resistance to voice and choice, another PBL component.

Voice and choice opportunities were available in choosing the components to add to the prototype and how they were to present their information. Teacher 1 stated that the presentations were "too cookie cutter." One group added a video and a second used Lego, but the rest were very similar to the two-dimensional prototype on a slide show provided by the teacher. Teacher 1 believed the lack of variety was due to making sure students had all parts in order in answering the driving question. Additionally, this was the first PBL the students ever took part in. Teacher 1 reflected that as students mature and have more experiences with PBL, their final products will be more unique. Although projects lacked originality, Teacher 1 explained her implementation of voice and choice.

> Some were willing to ask, "Do I have to do it [the presentation] this way?" I was like, no, it's your PBL, you do what you want . . . you can't be wrong, as long as you support it. So, some are talking about that already.

The students were very regimented and structured in their approach to ensure they were including all of the elements. Their projects were very similar as evidenced by multiple slide shows with each member of the group narrating their contribution to the prototype during the public presentation. Many of the students also needed support from the three teachers during the PBL. Teacher support was accomplished by the PBL component of critique and revision.

Critique and revision occurs when the teacher sees a student or group of students needs a conference to provide scaffolds, further explanation, or direct instruction on a skill, such as how to take notes. Teacher 1 used the critique and revision component

during small group work along with the student teacher and in-class resource teacher to support the students in their work. This occurred through modeling visuals during a conference. Teacher 1 explained, “This is an example of what it might look like, but it doesn’t have to be.” Teacher 1 also needed to teach the students how to take notes as part of doing research. The students learned how to discern what information was important and what was not. Teacher 1 commented, “That’s why many of them struggled in the beginning, whereas now they’re like, ‘Oh, well that makes sense, I can get it from here.’” Support from the teachers was also critical in teaching collaboration and cooperation. Students learned how to choose a leader, someone to take charge to get ideas flowing and moving. Teacher 1 saw the progress in her students’ communication, stating, “Okay do you want to take care of this, and I will work on this today.” This indicated groups were working well together. Adding onto the idea of a group leader was the concept of giving feedback to each other in the group. Teacher 1 indicated only a few students were able to give feedback to others, including the gifted and talented students and the high achievers, as she said, “They just want to get the work done.” Contrasting positive collaboration during group time was a few students who were not working like a team. Teacher 1 commented about simply changing the students’ roles if they were not engaged. In one situation, a parent reached out and commented on the lack of participation from one student in the Zoom breakout room. This required a meeting with the student. Teacher 1 shared, “A parent who was listening in on your breakout room told me you were not participating with the group.” This conversation seemed to alert the student of the importance of being a team player in his group. He commented that he did not want to let his group down, and got back on track, according to Teacher 1. This student continued to

become more engaged even though his father did not show up for the public presentation. Teacher 1 expressed in relief, “Thank goodness his mom showed up to watch him present.” Teacher 1 postulated that the student appeared very proud of himself and satisfied that he did his job.

Student reflection was incorporated into the Mars PBL during discussion at the end of each lesson and during the public presentation. Students took a poll at the end of their Zooms reflecting on what they learned that day or on how they worked together as a team. An example question was, “What specifically did you learn today that helped guide you to get where you needed to go?” Teacher 1 spoke of the reflections during the public presentations. Students predominantly spoke about working as a team and needing to be brave to present to a real audience. Furthermore, Teacher 1 reflected on the PBL giving students the confidence they did not have before the PBL. Students wrote how challenging this was for them and they were very pleased with how their projects turned out.

Figure 5

Teacher Practices

Teacher Practices
Design and Plan
Assess the Learning
Scaffold the Learning
Build the Culture

Teacher 1: Infusing Teacher Practices Supports the PBL Implementation and Student Engagement

According to PBL Works (Buck Institute for Education, n.d.-c), the following teacher practices in Figure 5 support the implementation of PBL: design and plan, assess the learning, scaffold the learning, and build the culture.Teacher 1 used the practices of design and plan and scaffold the learning more than assess the learning and build the culture.

Design and Plan. Teacher 1 clearly mapped out her PBL unit with tasks and resources. Resources encompassed links to nasa.gov, National Geographic, and other videos on the Mars Rover. Teacher 1 also presented an exemplar of a public piece detailing the expectations for the project. The presentation was a slide show indicating the information needed on each page. For example, slide 3 said, “Take a picture of the sketches and include the four of them on this slide. Talk about the features of each sketch that you selected to use for your prototype.” Teacher 1 also made intentional plans about how she grouped her students. This was apparent in the initial planning of group members to the day’s lessons. She purposely grouped a gifted student, general education student, and a student with an IEP to build in natural student supports. This worked “beautifully as they were always on the same page.” The second consistent piece was how Teacher 1 broke down all lessons and ensured there was a model that provided a visual to support understanding of concepts. Though providing an example was helpful, it was not emphasized to emulate, as she commented, “We always have a model of what it could look like, but then encouraging them to show their product in different ways.” Additionally, Teacher 1 noted that the “conferencing and modeling” within the small

groups helped to support the one remote student who was “shy and the kid that you’ll only see like the top of his head,” and with the whole class on a skill like note taking. Teacher 1 reflected on the design and plan aspect of the PBL with the following: “I think our organization in our planning was great to get them started. But I also think that we didn’t really necessarily assign those roles early enough, which kind of hindered them starting right away.” Next, Teacher 1 used the practice of scaffold the learning extensively as this was most of her students’ first time learning through PBL and they required a lot of guidance from the three teachers.

Scaffold the Learning. Teacher 1’s student data chart indicated seven students out of 20 benefited from small group instruction from one of the three teachers in the room throughout the 25-day PBL unit. She further indicated the supports through annotations of comments like one-to-one discussions and found more resources to support the learners.

Teacher 1 recognized the educational support needed to implement the PBL components throughout the project when she mentioned, “And I tried not to give too much guidance because with PBLs, that should be more kid-based. But we realize that they do need to see how something could be done.” Teacher 1 also used her students as supports for other students who needed more help by grouping the students by skill level and by who would work well with others. She said, “Some just might need a little bit more hand holding and the right placement [in a group].” One student was guided heavily by his groupmates according to Teacher 1, as she commented, “Alright today J. you are going to do this. This is what you need to do. You need to work on that.” This strategy does not always bode well with some students, but Teacher 1 commented how it was very

effective for the one student in that particular group. Scaffolding the learning could sometimes minimize the rigor of the inquiry if too much support was given. Teacher 1 reflected on this teacher practice and how it was implemented. Teacher 1 noted she would have used both design and plan and scaffold the learning to promote more creativity. She hoped for more creativity and variety in students' public presentations. She noted the need to teach them different technology tools like Screencast and Pear Deck. Her goal would be for her students to take more ownership over what they are doing and be happy and comfortable with what and how they present in a variety of ways.

Teacher 2: Challenges Were Experienced in a Multimodal Learning Environment

Teacher 2 lamented about the remote students not having a comparable learning experience as the in-person students. She further empathized with the kids whose parents made the decision to keep them home. Not knowing the circumstances behind these decisions, she said, this "tugs at me." Teacher 2 struggled with juggling the different learning structures all happening simultaneously with her GT groupings in her fourth and fifth grade classes.

While managing the various classroom structures during her PBL implementation, Teacher 2 tried to provide a similar experience for the students at home as the students in school. This was evidenced with her group of fourth graders, all of whom were in the same cohort, so they were either all in-person or all remote, but never in a hybrid learning environment.

Never implementing both in-person and remote simultaneously with her fourth graders resulted in a more manageable instructional setting for Teacher 2. Teacher 2's

other groups were more difficult to navigate, as they were split in a hybrid setting. Fortunately, many came back to in-person schooling by the end of the PBL unit. She reflected, “I think the ones that ended up coming in person ended up having a better experience due to the hands-on nature of this PBL unit.” Another student expressed joyfully about being back in school late in the Spring, “I don’t want this to be over. I feel like I just got to fifth grade.” Struggles of the multimodal setting were evidenced by the teacher and by the students.

Teacher 2 continued to explain the differences between her fourth-grade in-person group and her fifth-grade hybrid group. The in-person fourth graders were energetic and like “dynamite,” showing great enthusiasm when the PBL began: “One student when he learned what we were doing, he knew he had an actual crime to solve, jumped up and down about 50 times.” Conversely, the hybrid fifth-grade class had a different experience. In-person fifth graders about to embark on the launch event of the PBL were suddenly sent home to quarantine without advanced notice. This affected what was planned as a hands-on experience for that day’s lesson. Frustrated by this, Teacher 2 said, “Like my Jenga tower, how stable is it really? I don’t know.” Moreover, Teacher 2’s PBL involved the school’s staff, which posed another difficulty when the learning environment changed. In a frustrating tone, Teacher 2 explained how many other staff members played integral roles in the opening event of the PBL entitled, “The Case of the Missing Stuffed Animals.” The crime scene was physically set up in different spaces in the building, making it hard for her to recreate for quarantined students who were participating virtually. Further, other staff were involved, like the building administrators, the nurse, and support staff. These details appeared to stress out Teacher 2 who was

trying to create an authentic learning experience, a crime scene, but was interrupted with students being sent home unexpectedly.

Teacher 2: Catalyzing Student Engagement Resulted From PBL Implementation

Like Teacher 1, Teacher 2 leveraged some PBL components more than others to forge student engagement with her GT students. The components that came to the forefront in the very beginning of the PBL, "The Case of the Missing Stuffed Animals," were the challenge question, authenticity, and sustained inquiry. She stated:

> Upon entering the class, I asked them [students] to look around, and notice if anything was different. In each class, the kids picked up right away that the stuffed animals, which they believed were for the third graders' project, had gone missing.

Teacher 2 hooked the students in with a slide show illustrating the missing stuffed animals and the possible suspects. Teacher 2 continued with describing the launch event, "I said I needed their help to figure out where they were and to help solve the crime." The authenticity component transitioned into sustained inquiry. The students traveled in trios around the building to find evidence. If one group member was a remote student, then the two in-person students would carry the Chromebook with the third student connecting through Zoom for the investigation. Further, the in-person students needed to narrate what was happening for clarity of the remote student. "When the kids approached the area where the evidence was set up, they shared that with the remote students and asked the remote student what they should do. What did this remind them of?" Teacher 2 noted with a smile, "Of course, the in-person students were suspicious of me, and said, 'Teacher 2, you must have set this up,' but they played along nicely."

Authenticity came to the surface again when the students realized the evidence they found was specific to their groups. Teacher 2 added:

> My volunteers, other staff members had written ransom notes for the animals, and the students realized their evidence was different from each other, that they were searching for and investigating crimes for different animals and that it was unique to them.

Teacher 2 reflected on this segment, "I think that helped raise their engagement level in that this was something that they were personally going to have to do in their detective partnership." As the PBL continued, again the sustained inquiry component surfaced.

Teacher 2 described her students' reactions when discovering the materials they could use: "When they saw gloves they were like, 'I can't touch this without wearing gloves, because then I'm going to ruin my evidence.'" Next, the PBL component of choice became important in how the student groups decided how to analyze their evidence to solve the crime. Choices were evident in two areas: how to investigate their evidence and how to present for their "final determinations." Teacher 2 elaborated on the choices her students had:

> Because I have the pairs or trios of groups, I felt like in the hybrid setting, I needed to have that they didn't have a choice of working alone or who they were going to work with. But the groups now have the choice of what they're going to do with their evidence that they've collected and how they're going to do it.

Teacher 2 described the station structure she had set up in her classroom: "If they want to test out candy that was left behind, if they want to do fingerprints, if they want to do handwriting analysis. Those pieces are available to them." In one class, the groups chose

to interview some of the suspects. Teacher 2 explained, “We did a mini-lesson on how to write a formal email, to request a meeting time, and how they would want to approach that in a professional manner and write a script for what they’re going to say.” This element incorporated critique and revision and sustained inquiry while the component of choice was still apparent, as evidenced by this comment by Teacher 2:

> One group is interviewing staff member X and another group is like, “No, we’re going to test the candy, we’re going to fingerprint dust this.” So, they’re choosing their approach. Then at the end, if they want to do a written report of their findings, they can do that. If they want to do a video of a news report that contains the key pieces of information, they can do a video.

From solving the crime to creating the public piece, Teacher 2 used critique and revision to clarify misunderstandings and troubleshoot difficulties students encountered. This triggered the groups to continue to think critically through the investigation. For example:

> They’re a little bit all over the place, as far as what they’re doing, and how they’re doing it. I questioned just one little thing, and then one group member in particular, he went off. He’s like, “Okay, well Teacher 2, do you have orange jelly beans that I could test? And yellow Skittles?”

Teacher 2 needed to teach the whole group skills like setting goals for each class and creating a list of what needed to be included in their final product. These mini-lessons provided the guidance the students needed to maintain their organization. Teacher 2 taught the students how to set goals at the beginning of each class to help them stay organized. The students developed a list of “must haves” of what needed to be included and what they may have wanted to include. Teacher 2 asked probing questions like,

"What were you looking for, who the suspects were, what your evidence was, who did it, who are the detectives, how did you find out who did it." Furthermore, she modeled for them on how to make sure their whole face was to be on the video if creating a newscast for the presentation. This process led to the development of the public presentation at the end of the unit.

Teacher 2 incorporated the component of reflection in this part of the PBL unit. Like Teacher 1's students, some of the students were very eager to complete a reflection through a discussion, poll, or Google form. Teacher 2 had the students keep an electronic reflection journal where they were free to write in it at any time. This served as a way to clarify and ensure the ongoing inclusion of the remote students. One student wrote in their journal, "Well, this, I don't really know what that's like, because I don't have the materials at home." This journal helped with the teacher–student connection. Teacher 2 continued, "I'll comment back and forth and have some independent dialogue with them." Teacher 2 added that because she did not give grades in the GT class, students received feedback about their progress through a slide deck: "I'll be commenting to them offering suggestions and then within the class, because they are all kind of paced on their own." Teacher 2 spoke of a remote student who had become "enlightened" throughout the project. She explained:

> By reflecting on the observations for his case, he made connections with what was learned in class, and discoveries that other groups were making to be able to move forward with the next part of his team's case. He was then able to become more invested in the final presentation.

Teacher 2 also had students learn how to give compliments during the public piece and shared,

> I have one fifth-grader who all the kids like, "Oh, that was fantastic. He has dramatic music from a newscast and all this stuff" and "Oh, he does that all the time . . . he makes montage videos of blah, blah, blah."

Completing the public presentation also served to contribute to the sustained inquiry and the component of authenticity. Students filmed Flipgrid newscasts or wrote a newspaper article for their public product or presentation. Teacher 2 elaborated:

> The students shared amongst the other classes, and then amongst the staff who volunteered to be the criminals. I think it was a nice conclusion to help in that synthesizing process of the information and also the communication piece, as far as how do we take what we've done and communicate about it effectively through writing, through speaking, and explain to people who don't know, who weren't necessarily in the process.

Teacher 2: Infusing Teacher Practices to Support the PBL Implementation and Student Engagement

Building the Culture. Teacher 2 felt compelled to create an equivalent learning environment for the remote students during her PBL implementation. She reflected on the differences in building rapport with a student online compared to traditional in-person relationship building. The following paints the picture of what this may be like; knowing a child through remote instruction all year, and having an idea what they are like, and then being completely surprised 9 months later, when they physically walk into the classroom for the first time. She explained:

> In class, I'll bring one student into a breakout room to clarify, explain, and talk about what they're experiencing. But it is just a different type of relationship, teacher–student relationship, almost because this is not typical for me in my 20-plus-years of teaching. With some students coming back from all remote this week. One of them came in and I have never seen him, but on the camera and just his physical presence, he's much different from how I view him on the camera. He was much more petite and then he had this big boisterous voice and stuff, which I didn't really have that same impression through the screen. I'm like, oh my gosh, it's May. I've been teaching him since September. Him walking through the door, I was like, do I know this child? Yeah, I know this child.

This is an illustration of how Teacher 2 infused the teacher practice of building the culture to support the PBL components.

From the onset of Teacher 2's PBL implementation, she was adamant about creating an equitable learning space for the remote students, as supported by her comment, "How do I do my best to make the kids at home as equal a part in what's going on?" She said, "I do fear as the teacher that the kids at home may feel that they're missing out on the experience from not being there. Because we don't know why kids are home in all circumstances." She continued to empathize about the remote students with,

> I try to watch very carefully what I say and how I react to them [when they return from remote], because I never want them to feel like, "Finally, you're here for the last 6 months of school, we didn't have the same things going on."

She ended that thought with, “Because the reality is, I don’t know what it’s like to sit on the other side of the computer as a fifth grader or a fourth grader.” Teacher 2 continued to build the culture by creating a risk-free environment.

Teacher 2 contrasted her small group pull-out environment from the large general education classroom during the PBL implementation, in that her students had more freedom to move around because her class size was about eight students as opposed to 20–25 in a general education room. Furthermore, social distancing was easier to maintain even when students were moving around. Additionally, because of the small group number, more hands-on materials could be incorporated into the daily lessons as each student could have their own set:

> When they come to me, they’re able to let loose and relax. They want to talk and be social. I don’t want to say that that’s because it’s being stifled in the general education classroom. I just think they’ve got themselves. We don’t have the plexiglass around, just the physical environment it’s a little bit more open, a little bit freer.

Finally, Teacher 2 encouraged risk-taking in some of the decisions and paths student groups were going to take to solve their stuffed animal crime. She commented, “Even if it’s not successful, it’s not the end of the world . . . the worst that could happen is that we learned something new.” The connection between Teacher 2 and her students was evidenced in her students’ reactions to her:

> When I see the kids in school, one of the nice benefits of this position [Gifted and Talented Teacher] is they think you’re a celebrity or something. They’re like, “Oh my gosh, you’re in person. You’re actually here, you exist, you’re not Santa

> Claus" through the screen. They're very excited about that, which excites me, that they valued our interaction.

Design and Plan. Teacher 2 used the teacher practice of design and plan to mitigate some of the difficulties with the unpredictable learning environments through the use of breakout rooms and handpicking group partners. She described the process:

> It takes a lot of planning. Like, how do we prioritize with our environment that we're currently in? We know our environment is going to change after Memorial Day weekend, what types of tasks can we accomplish when we're all remote, as opposed to when we're in person then when we're remote, I'll probably see them, each of those groups, three times being all remote. I'm going to have to juggle and see where they are. If there's groups that are coming to the conclusion then I'll put them in a breakout room and give them a different task.

The breakout rooms on Zoom served many purposes for Teacher 2. First, the remote students always made the final decision regarding the investigation and the public presentation. Second, when everyone was on remote learning, there were fewer distractions in the learning environment. Teacher 2 reported:

> It's a more focused time too, I think for the hybrid groups to work together because there's not the distraction of someone being in school and someone being at home. I want to seize the opportunity too, that the groups will have quality time together.

The final teacher practice that supported Teacher 2's PBL implementation was scaffold the learning.

Scaffold the Learning. As students prepared for the public presentation, Teacher 2 supported her learners in some technology trouble spots. Teacher 2 worked with students two at a time—one was at home and the other in school. She detailed the scenario here:

> I said, all right, can we do this? Can I put you in a Zoom here? Can we hear the person talking? Do you have to use the internal mic? Do you have to use a headset? Okay, that's not working. Scrap that. Let's try Screencastify or let's try just recording off of your video, then can we splice things together?

Teacher 2 reflected that some students learned quite a few new skills and added some things to their repertoire. Teacher 2 also expanded her students' knowledge by "questioning them a bit further, and how they need to go further into their understanding." She continued, "It's almost like you can see the wheels turning of them digging more into their understanding." Finally, Teacher 2 had to sometimes stop her students who were "perfectionists" and never satisfied with their work. She commented,

> I had one group record their newscast over 20 times; I stopped them and said "that's good enough for me." Another student said, "their animal was kidnapped," and his partner said, "dog-napped," because he has a stuffed dog. The other kid said, "We'll edit it out," and I said, "No, you won't."

Even though Teacher 2 had fewer students in all of her groups, she had to focus on the design and plan and build the culture practices heavily as she had multiple groups consisting of both hybrid and in-person students at different stages in their unit. Furthermore, Teacher 2's schedule reflected meeting with groups two to three times per week, contrasting the daily experiences Teacher 1 and 3 had with their students.

Teacher 3: Challenges Were Experienced in a Multimodal Learning Environment

Teacher 3 expressed frustration with the multimodal learning environment during her "Genocide" PBL unit: "They're always in the breakout rooms, but in the classroom, there's so much sound pollution . . . I don't think the kids can talk, so they use the chat feature because they can't hear each other." Like Teacher 1's difficulties, students were not comfortable talking, but for different reasons. Teacher 3 explained with angst, "They don't feel comfortable talking because they're trying to work in this small setting, but they're all in the room . . . and then you can't put the people together in the room [because of social distancing]." Similar to Teacher 2, Teacher 3 was concerned for the students working at home. She added with a pained look on her face,

> The launch day [first day of PBL] was fine, but I always feel like those kids at home are not engaged . . . it's just harder . . . Because there are a lot of kids in person, it's like 15 I think, so then there are six at home, it's going to be a lot harder for them to be a part of the discussion, and they do, but often it's through the chat and sometimes I'm not looking at the chat, that's not my default setting.

This implies that Teacher 3's teaching muscle memory took over once students were back in the classroom. She more readily adapted to the in-person learners and needed to be more purposeful in reminding herself to check-in on the chat and update the remote learners. This is to be expected, as this model of teaching and learning was unprecedented. Teacher 3 continued to elaborate on the challenges in the learning environment in describing different student scenarios with:

> Sometimes the kids in the room will even say, "X wrote something in the chat," and then I'll read it, and there's a couple kids who will say stuff out loud, but that's a difficult thing to try to fuse everybody together.

Additionally, Teacher 3 described a "weird and distracting environment." During this time, many of her students went home in quarantine, leaving three students attending in-person schooling. An example of her environment is described here:

> There were three students in the room, and one was talking the whole time while in his breakout room. Like I felt like I was in his group the whole time, because it was just this dead silent room and then a constant stream of talking for just one person.

This environment was very different from the typical eighth-grade honors classroom where the teacher prided herself on a rich, discussion-based classroom.

Teacher 3: Catalyzing Student Engagement From PBL Implementation

Teacher 3 had to reframe her approach to bring back student-led engagement within the classroom. She explained her PBL launch event here:

> As part of the PBL rollout, I asked the kids, because this is a desperate year, what have you guys done this year that worked? They all brought up a PBL like assignment from another eighth-grade class where they worked in small groups. So, I think particular to this year, working in small groups is giving the students a situation where they feel safer to talk.

Teacher 3 invoked the PBL component of voice and choice right from the beginning of her "Genocide" PBL unit with her eighth graders. It was a conundrum for Teacher 3 because the period 4–5 class where this study took place was "very chatty and social, but

they never speak on the Zoom." She added, "That's one of the things that motivated me to want to still do this PBL this year and try to make it work. It was also pretty engaging to involve them in the decision-making and planning process." Teacher 3 commented on how she opened the PBL with them:

> Here's what the kids did last year, here's how the pandemic is changing the way we can do this work. And I asked them, did they want to do it, and how did they want to do it. And then I asked them questions just for this beginning rollout, like, "Well, what do you guys think we should do to figure out what the groups will be and what genocide you want to work on?" And they told me what they thought was going to be most efficient. So then they were pretty bought into the system.

From there, Teacher 3 commented, "They were really focused, and on the job." One student pulled up a website on genocides, another student began putting samples on a Jamboard. Students were motivated and added to the Jam without too much guidance from Teacher 3. From here, Teacher 3's students embarked on research of their chosen genocide in small groups. This introduction to the "Genocide" PBL did not provide the challenge initially as it was absent of a driving question or problem called for in PBL. On the contrary, Teacher 3 gave the students the ability to make decisions about the unit, or voice and choice, which promoted their initial engagement.

Early on in the PBL, Teacher 3 surveyed her students about the content they were learning and she explained, "I asked them, how do you feel learning about this stuff? And I am really just curious about that, because I think it's like we're really interested in these things, like true crimes or genocides." Next, Teacher 3 explained to the class about the culminating public piece: "They have to teach the class about the genocide which is one

element, and then share with a group of adults, from the Holocaust Commission." Teacher 3 continued, "Presenting a whole lesson that's that long to the class has made them feel like they've really got to step it up and try. So, everybody seems like they're trying." On subsequent days, Teacher 3 infused the component of critique and revision to assess where each student was in their learning about the genocide and the process of creating a lesson for the class. Teacher 3 explained that process:

> This year I made a Google Form, twice, for them to fill out. And I asked them questions like I would've done in a conference, like what do you hope the audience will feel when they view this presentation? What are you doing to convince the audience that this memorial is going to have the right emotional effect? And what kind of research did you have to do to determine how much it [the Memorial] was going to cost?

Teacher 3 experienced resistance from some of her groups when she posed these questions to them in the breakout rooms or in class. She reported one group responded, "We're not thinking about that yet." Teacher 3 reflected on this, "They're just sticking with what's comfortable for the moment, which is to assemble a bunch of information in a slide show." Teacher 3 said in frustration, "So I pushed a little, like maybe try something not a slide show, maybe a Google drawing where there are links to a timeline, and you break out of the slide show a little bit." Again, Teacher 3 reflected, "I think with the advent of COVID, slide shows have become like the workhorse of middle school education and they're doing a ton of them." Drilling down more, Teacher 3 continued to differentiate the students' level of engagement:

> They are significantly challenged [with the task]. They want the challenge and I think they feel capable of it, or at least they want to try for it. I'm happy to see that, because they do have some ideas and they are talking about it, but I think they're just staying in their comfort zone, and doing this stuff that's a little easier before they tackle this kind of bigger . . . and some of them, their ideas are a little bit less creative or less pushing the boundaries, less engaging for the class than I would hope.

Teacher 3's frustration came through as she described how she tried to assist her students who were "disaffected, devoid of emotional content, and jaded." She asked them:

> What can I do differently? There weren't a lot of suggestions . . . and the suggestions that they did come up with were, "Well, make it so we're not all at home," or negotiating the hybrid thing, or like, "Pay for a bunch of expensive softwares that would let us make things that would be really . . ." Because I think it's a really uniquely difficult assignment for this year because I'm putting them in my position and saying to myself make a really engaging lesson that will reach kids in the room and at home. They know that that's really hard, and they don't have a magic solution. I was hoping they would, and then I could steal it, but they don't know exactly what to do.

Teacher 3 tried again to connect with her students through critique and revision and giving them the autonomy to figure out how to best present on such an emotional topic. Further, it represented her attempt to leverage both critique and revision and voice and choice to engage her students during the COVID-restricted learning environment. She commented about her students, "Yeah, it's like teaching kids who are just like they've

seen it all, like nothing impresses them, nothing's very exciting." Teacher 3 appeared very dejected, and said:

> I'm not used to that, I'm used to it being really exciting that you get a lot of choice and there's an outside audience, or that we're doing a project that is really high level and really interesting, and this group in particular just seems to aim lower and try to do the minimum.

On the bright side, there were examples of students who benefitted from Teacher 3's infusion of critique and revision. A few students benefited from Teacher 3's conferencing time. While talking to the Rohingya Genocide group, they decided to add a QR code to the memorial piece. This motivated one of the group members who also found the hologram idea to add to her memorial piece of the presentation. Additionally, one group needed more clarification from Teacher 3, as their choice of genocide was not clear. Teacher 3 "helped them find a better way" to select a genocide event as she worked alongside them.

As students developed their public presentations, Teacher 3 reported that they met the criteria in delivering the content, but fell short of conveying the emotional impact to the audience, which is what she had intended for them to achieve from the start. One example in the presentation was to incorporate a piece that did not fit the tone of the topic. She elaborated here:

> It wasn't that bad and the group did a great job and they got all the points on the rubric. But they just taught a lesson about the Guatemalan Genocide and in the middle of their slide shows, they gave everyone a brain break in which we did a salsa dancing lesson on YouTube. So I was just like, I think we've missed

> something. And it was super lively but the content of the questions was about genocide. So it's this emotional juxtaposition. That's pretty inappropriate.

Further reflection on the public presentation by Teacher 3 surrounded the component of authenticity. Even though Teacher 3 invited a representative in for the public presentation, it had no impact on her students' engagement. She said, "I don't think I made it real enough. There wasn't really any consequence of sharing it with those people [from the Holocaust Commission]." Teacher 3's continuous reflection of her PBL unit showed the areas where she fell short in terms of implementation.

Teacher 3: Infusing Teacher Practices Supports the PBL Implementation and Student Engagement

Teacher 3 spoke of her inability to build relationships with her students this year. This speaks to the teacher practice of building the culture that supports the PBL implementation:

> I try really hard at the beginning of the year to communicate that I care about kids and get to know them. And I have a high standard. And then I think a lot of kids will work for me because they don't want to disappoint me. They want to meet my expectations. That's been hard to do this year. Those are the pieces that work in my class, because that relationship wasn't there, I can't fix any of it.

From the beginning, Teacher 3 was only comfortable with implementing a PBL in her advanced eighth grade class and not in her general education class. When broaching the PBL idea with this class, they were resistant to the public presentation part with an outside audience. Teacher 3 remarked:

> So, they don't want anybody outside the school. And I think their feelings and my feelings are the same, I think they don't trust themselves . . . and I don't trust them. I don't feel comfortable giving that class as much choice because they push the boundaries and they're not appropriate at times and things get out of control.

Teacher 3's admission of not building the classroom culture led to an absence of certain PBL components, one being sustained inquiry. In a traditional classroom setting, Teacher 3 elaborated on her ability to facilitate high-level discussions with her students with the following:

> I ask the right questions, I rephrase what somebody said, I can make connections between the different things people are saying. I can challenge their logic, and they really like it. It makes them smarter, and it helps them think about something in a new way. And that I think builds respect for me, and it builds my sense of value in the class. And it just wasn't there this year because I was afraid to do those discussion-based things. I couldn't do them. So that was missing. And that left out a really important aspect of my leadership in class.

A second teacher practice Teacher 3 commented about was scaffolding the learning. This is connected to the critique and revision PBL component. Upon reflection, Teacher 3 used more peer sharing and conferencing with her students in previous years. She explained,

> I didn't do that as well this time, and I think that really had a measurable effect on student engagement and investment, because they just didn't have the same amount of guidance, and they didn't get the feedback to improve their products along the way.

Teacher 3 continued to explain why providing feedback was difficult for her:

> The whole social landscape is just harder for me to read. I feel a lot more comfortable doing those peer sharing things when I feel like I have a true sense of how the class gets along, and like who are the outliers, and who's sensitive, and who can be mean, and then watch all that, and I don't know all that stuff this year the same way.

Teacher 3 reported and reflected on the shortcomings of her PBL this year. This process led to how she would use the design and plan teacher practice moving forward to the next school year. She realized the importance of building the culture and would execute the following:

> If I were to do this whole year again, I think in order to create that relationship, I would have a real formal beginning of class activity. I would build those routines of greeting each other, do peer feedback things, and I feel like I've got to manage those feedback interactions and make them individual between me and the group.

Teacher 3 discovered that her students' lack of communication on virtual learning platforms hindered the PBL process. This COVID-created problem caused Teacher 3 to reflect on the PBL components she leveraged, and she came to the conclusion that more time needed to be spent on building the culture by creating student relationships and developing communication skills.

Synthesis of Themes

Three themes emerged in this qualitative study of how teachers leveraged PBL components in a hybrid, remote, or in-person environment to promote cognitive, behavioral, and emotional engagement. The following are the themes derived from the

descriptive codes gleaned from participants' transcripts: multimodal learning challenges, catalyzing engagement through PBL, and teacher reflection and praxis.

The first theme marked the challenges each participant endured while implementing PBL in a volatile learning environment defined by the multiple settings of hybrid, in-person, and remote learning. Furthermore, the challenges illuminated both the teachers' and students' experiences and frustrations during this study. The second theme outlined the specific PBL components the teachers implemented and the effects on their students' engagement. Furthermore, each PBL component was explored to the degree to which it was used by the teacher. Supporting the PBL components is followed by the third theme, indicating the teacher practices of design and plan, build the culture, scaffold the learning, and assess the learning, which sheds light on the details of how the PBL components were implemented by the teachers.

Reflexivity

Conducting this qualitative study and then reflecting on the data and the synthesis of results has been a deep reflective process. Through this process, there have been shifts in my positionality as a change agent/school leader and researcher. These shifts resulted from the analysis of the actual results and my predicted results.

As a school leader and change agent, I have always considered myself to be a collaborative leader who facilitates change through the collective voices of my fellow administrators and teaching staff. Upon reflection on completing this study and analyzing the results, I realize I need to further shift to listen more deeply to the concerns and struggles of the teaching staff and consider solutions other than teacher professional development and coaching. This became clear to me after witnessing the turmoil

experienced by Teacher 3 and the deep concern reflected by Teacher 2. This reflection stems from the analysis of my desired results and the actual results of the study.

Desired outcomes were confirmed in two of the three teacher participants' implementations of PBL. Teacher 3's implementation in the eighth-grade advanced classroom was a complete surprise to me as a researcher. I anticipated the greatest degree of cognitive engagement from this class due to the high-achieving students and the vast experience of the teacher. That was not the case. However, what emerged was the greatest degree of emotional engagement as evidenced by their consistent collaboration in groups, their need to entertain in the public presentation, and their need to please each other, not necessarily the outside visitor from the Holocaust Commission. As a researcher, conducting a narrative inquiry allowed me to capture the authentic perceptions of each teacher. This type of method enabled me to understand the emotional stance of these teachers and their thought processes in instructional implementation. In this respect, sharing the results of this study will be more impactful and accepted by other teachers because of the emotions captured within the teachers' descriptions of their implementation. This, to me, will resonate more with other teachers than data points and a focus on achievement growth that would be typical of a quantitative study. Finally, the implications of this study are to provide a clear path for the implementation of PBL components and when and why to leverage some more than others to render the desired results in terms of cognitive, behavioral, and emotional engagement in the classroom.

CHAPTER 5: DISCUSSION OF THE RESEARCH FINDINGS

The purpose of this narrative inquiry was to investigate the experiences of teachers while implementing a PBL unit during the Spring of 2020's COVID-19 pandemic when students were being educated in a multimodal learning setting. The following research question guided this study: How do teachers leverage PBL components to promote cognitive, emotional, or behavioral engagement in a complex multimodal hybrid, remote, or in-person setting?

The findings from this study can be used to inform practice for all teachers instructing in the upper elementary and middle school grades to promote cognitive, emotional, and behavioral engagement. This study contributes to the extant PBL literature that shows the strategy is unsuccessful with students with learning difficulties and social-emotional deficits. Most significantly, this study was implemented during the COVID-19 pandemic, which makes it unique in that no other studies with elementary and middle school students are evident in the extant literature.

Revisiting the Study: Problem of Practice

This PBL study was prompted by a two-fold problem: the continued downward trend of reading scores evidenced by 12th graders on the 2019 NAEP assessment and the negative impact of the multimodal learning environment on student engagement during the COVID-19 pandemic. I designed this study to investigate teacher participants' thoughts and attitudes about PBL implementation in a multimodal setting. Additionally, I designed the study to add to the literature on student engagement in the distance learning setting and confirm Barbour's (2015) emphasis on building a class culture. These studies prompted me to use the Buck Institute for Education's (n.d.-a) Gold Standard PBL:

Essential Project Design Elements model and its teacher practices. Together these elements incorporate the existing literature's most positive attributes for an effective PBL implementation.

Reiteration of Themes

Challenges Were Experienced in a Multimodal Learning Environment

The first theme emerged out of the frustrations experienced by teachers due to the disruptive and inconsistent learning environment. The root of the frustration came from the teacher participants' need to manage a continuously changing learning setting consisting of hybrid, in-person, and remote learning during their PBL implementations. At any given time, a student or a group of students who were attending in-person schooling, could be sent home on quarantine to learn virtually.

At the onset of the PBL unit, the inconsistent learning environment affected communication between the learners both in person and remotely, and between the teachers and the learners. In some instances, communication was hindered by technology glitches on Zoom or Google Meet. This manifested in several ways. For example, students who were inexperienced with the functions of Zoom/Google Meet struggled with muting, unmuting, or sharing their screens. Additionally, some students did not talk while in a Zoom/Google Meet at home because their home environments were noisy or they were embarrassed by the background of their homes, which would be visible to their classmates. Others did not talk while in a Zoom/Google Meet in school because too many students talking at once caused a very distracting environment. Finally, some students communicated by using the chat feature, but their comments may have been overlooked

as the teacher focused on the in-person students or students asking questions through Zoom orally.

The dual environment affected the teacher participants emotionally as well. They struggled with providing an optimal and equitable learning environment for the students who were learning from home. Teachers empathized with disappointed students who appeared frustrated by quick quarantines, had difficulty with assignments through this format, and felt isolated because of their inability to connect with classmates or teachers. These challenges experienced by the teacher participants prompted the implementation of the different PBL strategies, which leads to the next theme.

Catalyzing Engagement Through PBL Implementation

The teacher participants endeavored to boost student engagement in the volatile learning environment by teaching a unit using the PBL strategy. The strategy consists of the following components: challenge question, sustained inquiry, authenticity, student voice and choice, reflection, critique and revision, and public presentation/product. These components were employed at varying degrees by each teacher participant and affected student engagement in different ways, namely their cognitive, behavioral, and emotional engagement. A contributing factor to the implementation of specific PBL components was the incorporation of the four PBL teacher practices, leading to the third theme of Teacher Reflection and Praxis.

Teacher Reflection and Praxis

Successful PBL implementation requires secondary strategies to be employed by the teacher. These are known as the Gold Standard Teacher Practices (Buck Institute for Education, n.d.-b) and include design and plan, assess the learning, scaffold the learning,

and build the culture. Similar to the PBL components, the teacher practices were employed in varying degrees by the teacher participants. The PBL teacher practices are foundational supports that enhance the implementation of the seven PBL components. The findings reveal the importance of the teacher practices in the overall answer to this study's research question: How do teachers leverage PBL components to promote behavioral, cognitive, and emotional engagement in a complex multimodal hybrid, in-person, or remote learning environment?

What Do the Themes Reveal About the Literature of the PBL Strategy?

The first theme, challenges were experienced in a multimodal learning environment, addresses the gap that exists in the literature involving PBL implementation during the COVID-19 pandemic. Furthermore, the few studies that were found were conducted with high school and college students and only in the one setting of remote, not including a hybrid setting or transitioning back and forth among the three settings (Hira & Anderson, 2021; Wu et al., 2020). A third difference lies in the student population, as I conducted the study on PBL with students in Grades 4–8.

The second and third themes that pertain to teacher implementation of the PBL components during a multimodal learning environment, catalyzing engagement through PBL, and teacher reflection and praxis, addresses another gap in the literature with regard to the social-emotional needs of students. Traditional student needs such as reading and writing difficulties and behavior challenges still existed in each teacher participant's setting. However, the social-emotional needs of the students were amplified, particularly with the remote learners and eighth-grade students in the areas of the following: participation in the Zoom/Google meets while Teacher 3 was present, not cognitively or

emotionally engaged by not connecting with Teacher 3's challenging assignment, and not emotionally engaged by having a live audience for their PBL presentation.

How do the Findings Substantiate the Theoretical and Conceptual Framework?

The theoretical framework that supports this qualitative study was based on constructivism and social constructivism. This consisted of the following: Learning is constructed by: Experiences, in coordination with other human beings, through language and thought, mediated by culture and society, and accessed through scaffolding (Piaget, 1977; Vygotsky, 1978).

Teacher 1 leveraged five out of the seven PBL components, namely authenticity, sustained inquiry, public presentation, reflection, and critique and revision. Not only do these leveraged components connect to the theoretical framework, they also support the conceptual framework on the three types of student engagement: cognitive, behavioral, and emotional. Authenticity and sustained inquiry were evidenced by Teacher 1's students researching and creating a prototype to navigate on Mars safely. Students worked in groups, both through Zoom and in person, to create a prototype for the public presentation. These components substantiate a constructivist view of learning through experiences in coordination with other human beings. They also represent examples of cognitive engagement as the students were rooted in the "investment of learning" (Fredricks & McColskey, 2012, p. 764). Teacher 1's implementation of critique and revision was indicated by employing direct instruction through using models, teaching how to choose a group leader, working one-on-one with a student who was not participating, and conferencing with small groups who needed a little more "hand holding" throughout the process. This leveraged component connects with the

constructivist view of accessing the learning through scaffolding and is an indicator of behavioral engagement as this represents "positive conduct, effort, and attending to task" (Appleton et al., 2008, p. 370). Finally, Teacher 1 used the PBL component of reflection to help students solidify what they learned. Students' reflections pertained to working well as a team and how proud and brave they felt presenting to an audience. This connected to the students' emotional engagement as it manifested in their "positive attitudes about learning" and the constructivist view in which the content was relevant to the learner (Appleton et al., 2008). These PBL components that were emphasized by Teacher 1 were successfully implemented and supported by the four teacher practices of design and plan, assess the learning, scaffold the learning, and build the culture.

The design of Teacher 1's Mars unit embedded 20 learning goals that were assessed throughout the unit by the three teachers. Teacher 1 assessed these goals through observations, conferencing, and by students' reflections at the end of class through a poll. The planning of the unit encompassed the teacher assigning student roles, providing visual models, and the intentional grouping of students. Teacher 1 and the two other teachers in the room scaffolded the learning with groups who needed support with the content and who needed to help on how to work as a team. Teaching groups to pick a group leader led to cohesiveness, which contributed to the class culture. Ultimately, Teacher 1 infused the PBL component of critique and revision and the teacher practice of scaffold the learning to engage her young learners in their first PBL experience. This promoted her students' behavioral engagement to the greatest extent, but minimized their cognitive engagement as their final products lacked originality as their prototypes were

"too cookie cutter," possibly due to the degree of scaffolding that was employed and there not being enough opportunity for the PBL component of voice and choice.

Teacher 2 employed all seven PBL components and all four teacher practices in her unit entitled, "The Case of the Missing Stuffed Animals." This sound execution of PBL components and teacher practices fully supports the theoretical and conceptual framework of this study. Teacher 2 leveraged sustained inquiry to the greatest degree with her GT students. Unlike Teacher 1, Teacher 2's infusion of challenge, authenticity, voice and choice, and critique and revision all contributed to the continuous, sustained inquiry evidenced by her learners. This implementation resulted in a high level of cognitive engagement among her learners.

Like Teacher 1, Teacher 2's implementation of the seven PBL components epitomized the constructivist view of how learning takes place in relation to the theoretical framework. Teacher 2's students were afforded a hands-on, experiential approach in their quest to solve the mystery. Students worked in their investigative trios, which exemplified the PBL component of authenticity and the real-world tenet of constructivist pedagogy. Next, they communicated with their partners, and if a remote student was in their group, that student made the decision on any choices that came up. This supported the theoretical framework element of "mediated by culture and society," as remote students were home due to their parent's decision during the 2020 school year during a pandemic. Teacher 2 employed critique and revision to extend her learners through asking them "why?" in order to promote greater critical thinking. This use of scaffolding highlights the constructivist tenet of "teachers are guides and facilitators of learning" (McLeod, 2019, p. 4). Furthermore, Teacher 2 facilitated the learning by

ensuring her students were afforded choice in how they decided to analyze their collected evidence and in how they would demonstrate their learning in their public product by writing a report or creating a video. Finally, Teacher 2 connected with students in the infusion of the PBL component of reflection. Students developed a rapport with Teacher 2 through their electronic journals where they received ongoing feedback to track their progress. Students provided each other with constructive feedback during class discussions. This reflective piece exemplifies the teaching practice of building the culture and also highlights the emotional engagement experienced by her learners.

The supportive PBL teacher practices that emerged were design and plan and build the culture. Detailed planning was evident by the following actions of Teacher 2: setting investigative partnerships including one remote student, meeting with groups in breakout rooms to extend their learning, engaging school staff in writing ransom notes, setting up multiple stations in the classroom to test evidence, and the overarching goal of creating an equitable learning experience for her remote learners. These actions contributed to the high degree of cognitive engagement among her learners. Emotional engagement was the result of the positive connections between Teacher 2 and her students and the students with each other.

Teacher 3 implemented all seven PBL components and four teacher practices in her "Genocide" PBL unit with her eighth-grade students. Teacher 3's evidence substantiated the constructivist theoretical framework as well as the conceptual framework in the following ways. Teacher 3 leveraged the PBL components of voice and choice and a challenging problem to the greatest extent. This substantiated the constructivist view of teachers as guides and facilitators in a student-centered classroom.

Additionally, the students engaged in choosing a genocide to then present to a panel of visitors both from the school and a representative from the Holocaust Commission from a neighboring university. This represents the real-world component and the relevance to the students. Though Teacher 3 substantiated the theoretical framework through a constructivist lens, the cognitive engagement of her learners was overshadowed by the emotional engagement felt by her learners as the unit progressed.

Teacher 3's employment of the challenge problem during the launch event allowed the students to choose their partners and the genocide they wanted to research. The goal was to teach their peers about their chosen genocide, evoke an emotional response from the audience, and create a monument in remembrance of the lives that were lost. At the onset, the students were on task as they worked cohesively posting genocides on the Jamboard and organizing their groups. This represented both behavioral and cognitive engagement at the beginning of Teacher 3's PBL unit.

Next, Teacher 3 infused critique and revision to assess the students' progress in their research and in their presentations. Teacher 3 was met with resistance from her learners. This was evidenced by students not responding to Teacher 3 when she challenged them about integrating an emotional component to their presentations. When she asked for their input, they asked for expensive technology to help them be more creative, and asked to make it so all the students would be in person instead of hybrid. Teacher 3 was frustrated, as when she entered a Zoom breakout room students would stop talking. This seemed to have a devastating effect on the skilled, veteran teacher as it inhibited the critique and revision component. Teacher 3 continued to invoke critique and revision with her students by making suggestions for different ways to present via a

Google timeline or video. Students appeared to ignore the suggestions and continued to "aim low" and generated a slide show, "the workhorse of middle school education" during COVID-19. In relation to the conceptual framework, students were behaviorally engaged at this time as they were participating in the task; however, they lacked cognitive engagement, requiring being "thoughtful, strategic, and willing to exert the necessary effort for comprehension of complex ideas or mastery of difficult skills" (Fredricks & McColskey, 2012, p. 764).

Teacher 3 did not leverage sustained inquiry with her students as she was afraid to have discussion-based activities with her class. Furthermore, she did not trust how her students would act and admitted to not having a true sense of how the class was getting along. This prohibited her from building the class culture that was desperately needed. In her review of the final presentations, Teacher 3 thought they lacked creativity and were void of the required emotional impact. This was indicated in one presentation where students planned a motor break in the middle of the presentation through a salsa dance. This supported the students' consistent level of behavioral engagement. It further was reflective of the need for them to connect with their peers, more so than with their teacher.

Teacher 3 reflected on her inability to build the class culture this year, which had a negative effect on building a relationship with her students. Furthermore, Teacher 3 reported the absence of the critique and revision component with regard to the conferencing and peer sharing that she employed in past PBL units. This missing element resulted in a decrease in both cognitive and emotional engagement.

Teacher 3's implementation of PBL with her eighth graders brought to light the social-emotional challenges plaguing teenagers in their learning process during the pandemic. Furthermore, Teacher 3's demonstrated ability to connect with her learners through rich discussions was not evident during this time period. Because of this, Teacher 3 hesitated to fully implement the PBL components to the greatest extent possible and allowed her learners to feel safe working in their Zooms with each other. This reveals the social engagement that was lacking for students during the Spring of 2021 that they were craving so much.

Findings in Relation to the Literature

In this section, I compare the findings from this study to the studies of PBL and student engagement in the extant literature. Similarities and differences are explored to glean the significance of this study and shed light on the implications for practice and project to future studies involving the implementation of PBL in multimodal environments.

Teacher 1 employed specific PBL components in her implementation of her "How Do We Explore Mars Safely" PBL unit with her fourth graders that support or can add to the extant literature on PBL and student engagement within an online setting, or PBL implementation during COVID-19. Teacher 1 leveraged the PBL component of critique and revision when teaching her students how to choose a group leader, when teaching a skill to the whole class like how to take notes, and when providing one-to-one assistance to a student or a small group of students. This PBL component of critique and revision was lacking in Filippatou and Kaldi's (2010) study that revealed students with difficulties did not experience cognitive engagement and needed a teacher to provide

direct instruction on cognitive and metacognitive strategies to assist in their learning. Conversely, Hira and Anderson's (2021) PBL study conducted while students were on remote instruction indicated one teacher's success and the importance of one-to-one conferencing with students to provide feedback to support the learning. Teacher 1 also employed the PBL component of reflection through her students engaging in polls at the end of each class. This helped to identify that Teacher 1's students developed self-confidence by working collaboratively as a team. Vaca Torres and Gómez-Rodriguez's (2017) PBL study did not have a mechanism for scaffolding or reflection, which could have identified the ninth graders' fear of oral production in English during their final presentation. Teacher 1's use of reflection adds to the extant literature to identify what is challenging students during a PBL implementation. Finally, Teacher 1's use of voice and choice was not leveraged to its fullest, which resulted in "cookie cutter" presentations that lacked creativity. This PBL component and its importance were documented in the Dole et al. (2016) study where teachers participated in a PBL field experience and recognized the importance of stepping back and allowing students to take a leadership role in demonstrating their learning. Teacher 1's PBL implementation supports the need to scaffold for struggling learners in an in-person, remote, or hybrid environment.

Teacher 2, like Teacher 1, used the PBL component of reflection through electronic journals to help identify where students needed clarification or additional support. This technique would have been advantageous for Hsiao et al. (2017) in their study of college students on remote learning enrolled in a business course. These researchers found the students positively engaged with the real-world aspect of interviewing and engaged positively with the infusion of multimedia technology, but

some students needed more guidance, like instructor notes, to experience success. Teacher 2's employment of voice and choice in the student public presentation mirrored Louwrens and Harnett's (2015) study with middle schoolers who attended Te Kura, a distance education provider. Using the Web 2.0 resource afforded students autonomy in how they demonstrated their learning. Teacher 2 infused Slide Deck, Flip Grid, and Google Apps to enrich her elementary students' experience of their own autonomy over their learning. Additionally, Teacher 2 employed critique and revision to teach her students how to write a professional email. This use of direct instruction to teach a skill mimicked what a teacher from Hira and Anderson's (2021) study employed during remote learning. The teacher wanted his students to develop professional communication skills and etiquette, so he too infused the teacher-directed approach during his PBL unit. Finally, Teacher 2's ability to build her class culture is supported by Barbour's (2015) study in a distance learning format. Like Teacher 2's small class size of no more than eight students, the 2015 study's small classes at the Beaches School helped create a close-knit, family environment that contributed to the students' engagement. Teacher 2's contributions to the extant literature highlight the importance of the design and plan teacher practice when navigating in a multimodal learning environment.

Teacher 3 had the most challenging implementation of PBL, not because she did not leverage any PBL components, but because of the social-emotional needs of her learners, which negatively affected her ability to connect with her students during the Spring of 2021. Teacher 3 leveraged voice and choice and gave the design and plan teacher practice to her student learners to take charge in their "Genocide" PBL. From the start, Teacher 3 asked her eighth graders how they wanted to pick partners, genocides,

and public presentations. Students acquiesced with the same plan as the previous year by inviting a member of the Holocaust Commission in for their presentations. Though Teacher 3 gave the eighth graders the autonomy to design and plan, it did not seem to result in both cognitive and emotional engagement. This was similar to Hernandez-Ramos and De La Paz's (2009) study in which the driving question was framed strictly according to the standards, but unlike this study, as the students had no input. Research from the remote learning setting at the college level shows upticks in engagement when "deliberative discussions" are created across college campuses (Chadha, 2019). These types of thought-provoking discussions were admittedly lacking in Teacher 3's eighth-grade classroom, as she refrained from discussion-based lessons during Zooms because she did not trust her students' responses. Hira and Anderson (2021) explored similar sentiments from their high school teachers' interviews,

> Teachers share that in addition to the rift of not being in the physical vicinity of each other, they are also observing an emotional separation as they cannot make themselves available in their students' lives as caring adults in the same way as being in person in the classroom. (p. 101)

This breakdown in communication and lack of rapport between the students and their instructor was also confirmed in Wu et al.'s study (2020), as results indicated a decrease in student engagement as evidenced by a "dissatisfying response" from the students while videoconferencing with their instructors (p. 7).

Reflections on the Methodological Approach

Narrative inquiry was a highly effective approach for this study in many ways. First, narrative inquiry development was shaped by the philosopher John Dewey (Wang

& Geale, 2015). “For Dewey, to study life and education is to study experience; that is, education, life, and experience are one and the same” (Wang & Geale, 2015, p. 196).

Narrative inquiry was also the right methodological approach to effectively answer the research question, as this hinged greatly on teacher participants’ decision-making. In McEwan and Egan’s (1995) book, *Narrative in Teaching, Learning, and Research*, they described how the teacher is no longer simply an instrument in the production of school achievement, but an intelligent agent in educating children (Hart, 2002). The idea of teacher agency points to the heart of how the teachers had to leverage their PBL implementation to forge student engagement. Specifically, it speaks to the decisions they made regarding which PBL components were weighed heavily over others to spark their students’ behavior, cognitive, and emotional engagement. Finally, using narrative inquiry “amplifies the voices that may have otherwise remained silent” (Trahar, 2013, p. 321). These teachers’ experiences need to be shared with their colleagues and with other teachers across the nation and world. This will create the buy-in for the implementation of PBL as a viable strategy to engage and prepare students for their future. Considerations for future PBL research may include a narrative inquiry from the student perspective.

Implications for Practice

Results of this study provide a clearer understanding of teacher experiences with PBL as told from the perspectives of three experienced educators. The implications for practice from this study are numerous and directives for support span from individual teacher support in both pedagogy and mental well-being to district-wide programming for teachers.

Professional Development for Teachers

Teacher training is paramount for professional growth to occur (Dole et al., 2016; Evans, 2019). Although the teacher participants were all trained in PBL, findings revealed areas that need improvement to enhance their PBL implementation in the future. The areas of focus included scaffolding to support learners, social-emotional support for staff, and technology innovation for teachers.

Scaffolding to Support Learners

Scaffolding refers to the idea that each student receives necessary instructional supports to access the content, skills, and resources; these supports are removed when no longer needed (Buck Institute for Education, n.d.-b). Though PBL is a student-centered approach, students still need ongoing guidance and support throughout the project. One way to provide students with feedback is to confer with them. According to Wiggins (2012), feedback should be timely:

> A great problem in education, however, is untimely feedback. Vital feedback on key performances often comes days, weeks, or even months after the performance--think of writing and handing in papers or getting results on standardized tests. As educators, we should work overtime to figure out ways to ensure that students get more timely feedback and opportunities to use it while the attempt and effects are still fresh in their minds. (p. 12)

Conferences during PBL should be used to "build relationships, be conversational in nature, follow predictable structure, ensure that students are acquiring the desired learning, assist in clarifying potential misconceptions, and gauge how students are feeling about the overall learning experience" (Cooper & Murphy, 2021, p. 86). Not only will

conferring with students help teachers assess the learning, it will inform areas in which students may need clarification or more direct instruction to fill skill deficits. Conferencing with individual students or small groups requires classroom routines to be established.

Establishing routines requires explicit modeling through a think aloud of a situation students may encounter and then an explanation of the process that needs to be followed. Furthermore, teachers need to address the types of questions students may have that warrant a conference interruption. Anchor charts listing these situations will help students become independent learners.

Figure 6

Conference Interruption Anchor Chart

If..	Then..
I am looking for confirmation.	Jot your name and concern on a blue sticky note, and place it in the conference column on the board.
We need feedback before moving on.	Jot your names and concern on a red sticky note, and place it in the conference column on the board.
I don't know where to find something.	Check the directions. Ask another student.
Something is broken.	After the current conference, ask to speak with the teacher.
I feel overwhelmed.	Take a break. Place a sticky note on the teacher's desk.
We don't know what to do next.	Check the directions. Check with another group. Send the teacher an email.
We are finished.	Check the directions. Review the Progress Assessment Tool and reflect upon each learning target.

Simpler charts for younger learners can be made. For example, the "click or clunk" method using a red card and a green card will help students nonverbally communicate when the teacher is unavailable. Placing the green card in the corner of the desk signifies

the student is on track and does not need any help. A red card placed on the corner of the desk indicates the student has a question or needs assistance. Providing teachers with support in creating routines for conferencing and how to conduct a conference will eliminate many barriers that can disrupt a productive PBL environment. Training in these areas can help teachers understand how to employ the teacher practice of scaffolding.

Social-Emotional Support for Staff

Staff well-being has emerged as a critical need after teaching during the COVID-19 pandemic. Though research is limited on this topic, it surfaced in this study with Teachers 2 and 3. Teacher 2 struggled with trying to create an equitable learning environment for her remote learners and Teacher 3 felt as if she had failed in her PBL implementation due to the lack of emotional connection with her students. This unexpected finding needs to be addressed for staff in order to implement an inquiry-based teaching strategy such as PBL. The Collaborative for Academic, Social, and Emotional Learning (CASEL) defines SEL as:

> The process through which all young people and adults acquire and apply the knowledge, skills and attitudes to develop healthy identities, manage emotions and achieve personal and collective goals, feel and show empathy for others, establish and maintain supportive relationships, and make responsible and caring decisions. (Niemi, 2020, para. 3)

Giving teachers the tools to create a classroom culture where students feel safe and comfortable is critical for learning to take place. Additionally, giving staff the support to take care of their own stressors is just as important. Organizations like CASEL and the Yale Center for Emotional Intelligence have conducted studies prior to the pandemic that

indicates there is a need to support teachers in their own well-being. Research by Greenberg et al. (2016) at Penn State University showed "teachers trained and supported in implementing SEL programs have lower job-related anxiety and depression" (p. 8). Furthermore, using federal relief funds to support the social and emotional needs of staff is part of the U.S. Department of Education's (2021) "Supporting Educator and Staff Stability and Well-Being" section of the COVID-19 handbook. One of the stress-producing factors for teachers during the transition to remote or hybrid learning was the integration of technology without the training or expertise necessary to implement effectively.

Technology Innovation for Teachers

Technology integration is an important component of PBL as it is an effective way to engage students when developing their public product or as a scaffold for struggling learners to access information. Teachers had to learn new technologies quickly during the height of the COVID-19 pandemic when students were home on remote instruction. Further complicating the new way of teaching was managing in-person learners and remote learners simultaneously. One survey of teachers showed that prior to the pandemic, "One in seven teachers (13%) had not previously used these services, reporting they started using K-12 digital media services only after the COVID-19-related school closures" (Callanan, 2021, para. 4). In the current study, it was apparent that Teacher 2 had more expertise in technology than Teachers 1 and 3. This was evidenced in the fact that the majority of Teacher 1 and 3's public presentations lacked creativity and were too "cookie cutter." Giving students the knowledge of a multitude of technology to use may prompt their cognitive and emotional engagement. For example, Teacher 2 gave

students the option of making a video newscast to present their final piece. She also used apps like Flipgrid and Screencastify to engage her learners. Providing teachers with professional development on innovative technology tools and apps will bolster their professional toolkit and enhance their PBL implementation.

Recommendations for Future Research

Awareness gleaned from this study invites further research to be explored. This qualitative approach could be enhanced in future studies by adding a quantitative component. This study's findings reflected that students did not communicate at times during the PBL units, whether it was due to their social-emotional status, embarrassment of their surroundings on a Zoom, or lack of connection with their classmates or teacher. Understanding why students were not communicating through a survey would have been advantageous to the teachers to help support the students. Second, ascertaining more information on the teachers' well-being would also be helpful. Using a questionnaire for teachers to reflect on their own well-being during the implementation of PBL may uncover where teachers feel they are lacking in their own knowledge. Capturing both students' and teachers' perspectives may provide a more complete picture of how PBL implementation can be leveraged to promote student engagement.

Though using a narrative inquiry approach allowed me to tell the story of the teacher participants' lived experiences, designing a case study to explore the teachers' challenges may have given additional information about the social-emotional status of the teacher. Furthermore, classroom observations may have provided a more detailed picture of the complexities of teaching in the multimodal environment.

Implementing inquiry-based strategies requires the knowledge and expertise of a highly skilled educator. Critical factors, such as time for planning and the development of teacher expertise in a multitude of areas like technology integration, routine establishment, small group conferencing, and building relationships, are paramount.

Conclusion

This study of three teachers in the Mountain Way School District and how they navigated the implementation of PBL in a multimodal environment resulted in cognitive, behavioral, and/or emotional to emerge. The contributing factors to the results were indicative of the teachers' leveraging of the PBL components and employment of the four teacher practices of design and plan, build the culture, assess the learning, and scaffold the learning. Finally, unanticipated teacher characteristics also may have contributed to student engagement and are worthy of future investigations of PBL implementation.

Teacher 1 leveraged the PBL components of critique and revision and reflection to the greatest extent, which resulted in the manifestation of both behavioral and emotional engagement in her students. This high level of scaffolding and direct instruction may have contributed to the one-dimensional slide shows in the students' public presentations culminating the PBL unit. This decision to emphasize these two components could have stunted the PBL component of sustained inquiry, hence not achieving cognitive engagement to the highest degree. Similarly, Teacher 3's eighth graders did not reach the level of cognitive engagement indicated by leveraging the sustained inquiry component consistently. Though Teachers 1 and 3 had similarities in their outcomes, the reasons why this happened were extensively different.

Teacher 3 leveraged the PBL component of voice and choice to the maximum extent. She gave her students the autonomy to choose groupmates, the genocide they would study, and to agree to the format of the public presentation that was used in the previous year. To Teacher 3's dismay, students did not achieve cognitive engagement as she experienced great difficulty in her ability to build the necessary relationships that would lead to a rich, discussion-based learning environment that she has historically established. Though her approach forged both behavioral and emotional engagement among her learners, it did not promote the sustained inquiry that signifies cognitive engagement. Teacher 3's admitted disappointment was clearly communicated to me during the study and points to the overarching challenge teachers experienced in connecting with their students during the inconsistent structures in the 2020–2021 school year. Teacher 2 also struggled with creating a comparable learning space for her remote learners, which affected her decision-making during her PBL implementation.

Teacher 2 leveraged the PBL component of sustained inquiry to the greatest degree during her PBL implementation. This resulted in an optimal learning environment with learners experiencing cognitive and emotional engagement. Teacher 2 leveraged critique and revision and the teacher practice of design and plan to create opportunities for critical thinking to take place. Just as important to Teacher 2 was getting to know her remote learners and understanding how they were experiencing the learning from home. Teacher 2's decision to make the remote learners the final decision-makers and connect with them through individual Zoom meetings or electronic journals led to a risk-free and collaborative environment. Teacher 2's knowledge and expertise in technology were highlighted in the study through her practice of incorporating the remote students with

the in-person students with consistent Zooms. Second, the incorporation of various apps to develop students' public presentations contributed to the overall success of the PBL implementation.

Implementing PBL during the COVID-19 pandemic contributed to the concern Teachers 2 and 3 felt about their students. Though Teacher 2 established a way to connect in her small group setting, Teacher 3 did not to the extent that was necessary. Furthermore, Teacher 2's knowledge and expertise in technology integration appeared to be a contributing factor in building that classroom culture with her remote learners. This study has resulted in significant take-aways with regard to the implementation of PBL in a varied learning context and its effect on the different types of student engagement. First, the Gold Standard PBL created by the Buck Institute for Education (n.d.-a) is a solid foundation for implementing PBL in the classroom. The components and the teacher practices represent individual levers in which different ones need to be pushed at different times depending on how the learners are demonstrating their knowledge, collaborating with their peers, and communicating with their teachers. Furthermore, this strategy requires frequent teacher reflection to determine which component or teacher practice needs to be employed at a certain time. In conclusion, educators can use the findings of this study to implement PBL long after COVID-19 is over as they serve as an example of how to address a disruption to a traditional learning environment that unfortunately may continue throughout the 21st century learning environment.

APPENDIX A

Pre-Brief With Participants

Researcher: Liz Cole

Script:

Thank you all for your agreement to participate on this zoom today and more importantly, thank you for your interest in participating in this study. The title of the study is: **Leveraging Project-Based Learning to Promote Student Engagement in a Multimodal Learning Environment**.

Today, I would like to review the documents that were sent to you via email. They are: Informed Consent, Project Design Element Observation Checklist, Student Engagement Teaching Practices, Observations, Interviews, and Timelines. As we go through these materials, please ask any questions and share any concerns you may have. I will address these questions and concerns as they arise. There will also be a question-and-answer session at the conclusion of the meeting.

Informed Consent: Share screen with participants. Read through the Informed Consent document and answer any questions.

Project Design Element Observation Checklist: The following document will be used when I observe you in your classroom. Depending on the learning environment we are in, I will zoom if we are on remote learning, or enter your classroom if we are in a hybrid or in-person setting. I am giving you the PBL components ahead of time that are derived from PBL Works. I know all of you have implemented PBL in your classroom settings and are familiar with the elements/components. My interest is in your decision-making

and determinations of how you leverage these components based on the needs of your learners.

Student Engagement Teaching Practices: The following document encompasses four teaching practice categories derived from PBL Works and on longitudinal research on student engagement in an online setting. The categories and descriptions under each category will be incorporated into my interview questions when I meet with you. As mentioned earlier, I am interested in your decision-making process of your PBL implementation which is why I am sharing this with you.

Anonymity: During the teacher interviews, please do not identify students or any other teacher by their names to maintain confidentiality. I will use pseudonyms in my documentation to represent all of you and any students that may become part of our interview discussion.

APPENDIX B

Signed Informed Consent

St. John's University, Department of Education

Name of Investigator(s): Elizabeth Cole

Title of Project: PBL Implementation to Support Diverse Learners and Student Engagement

Informed Consent to Participate in a Research Study

We are inviting you to take part in a research study. This form will tell you about the study, but the researcher will explain it to you first. You may ask this person any questions that you have. When you are ready to make a decision, you may tell the researcher if you want to participate or not. You do not have to participate if you do not want to. If you decide to participate, the researcher will ask you to sign this statement and will give you a copy to keep.

Why am I being asked to take part in this research study?

You are being asked to participate in this study because of your experience and knowledge about implementing Project Based Learning in your classroom.

Why is this research study being done?

The purpose of this research is to explore how teachers leverage PBL components to support the diverse learners in their classrooms and student engagement.

What will I be asked to do?

If you decide to take part in this study you will be asked to do the following:

1. Attend a zoom meeting with the researcher to receive information of the study, including the purpose; review of Gold Standard Project Design Elements Observation Checklist and Student Engagement Teaching Practices template used

during two classroom observations and two teacher interviews after observations; the process for setting up the observation and the interviews.

2. For example:
   1. Three-week PBL
      1.Observation during week 1
      2.Interview after observation, no more than 2-3 days
      3.Observation during week 3
      4.Interview after observation, no more than 2-3 days

Where will this take place and how much of my time will it take?

The observation of the classroom setting will take place through a Google Meet or Zoom, or in-person by the researcher. The observation will be a pre-set time and date and will last no longer than a class period. The interview will take place on a Google Meet or Zoom at a predetermined time and date that is convenient for the participant and will take no longer than 60 minutes. The interview questions will reflect the PBL Works components and PBL Works Teacher Practices.

Will there be any risk or discomfort to me?

There are no foreseeable risks, harms, discomforts or inconvenience placed on you the participant. I, the researcher will be flexible with the observation and interview times, and will be cognizant of the time allotment agreed to.

Signed Informed Consent Document

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**Will I benefit by being in this research?**

There will be no direct benefit to you for taking part in the study. However, the information learned from this study may help your students in your classroom with their learning and
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engagement. Additionally, sharing your experience with your colleagues may promote PBL implementation into more classroom settings across the district.

Who will see the information about me?

Your part in this study will be confidential as only I, the researcher will see the information about you. Your name will not be used in any report or publication.

Data will be collected as follows:

1. The researcher will take field notes of observations if in-person.
2. The researcher will share field notes with the teacher.
3. The researcher will record on Google Meet or Zoom if observation is during remote instruction.
4. The researcher will record the teacher interview on Google Meet or Zoom.
5. The researcher will send recordings of observations and interviews out for transcription and share with the teacher.
6. Transcriptions will be coded by the researcher to identify themes.
7. All transcriptions, zoom recordings, researcher created documentation will be maintained in a google folder entitled Dissertation 2021.
8. At the conclusion of the study all contents in the Dissertation 2021 folder will be destroyed. .

If I do not want to take part in the study, what choices do I have?

Participation may end at any point during this study.

What will happen if I suffer any harm from this research?

No special arrangements will be made for compensation or for payment for treatment solely because of my participation in this research.

Can I stop my participation in this study?

Your participation in this research is completely voluntary. You do not have to participate if you do not want to and you can refuse to answer any question. Even if you begin the study, you may quit at any time. If you do not participate or if you decide to quit, you will not lose any rights, benefits, or services that you would otherwise have as an employee.

Template 1 NU HSRP Rev. 2/7/2017

Signed Informed Consent Document

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**Who can I contact if I have questions or problems?**

If you have any questions about this study, please feel free to contact Elizabeth Cole at 732-513-5512; ecole@tfschools.org.

**Who can I contact about my rights as a participant?**

If you have any questions about your rights in this research, you may contact You may contact:

Marie Nitopi, Ed.D

IRB and Women in Science Coordinator

Office of Grants and Sponsored Research

nitopim@stjohns.edu

**Will I be paid for my participation?**

There will be no payment for participation in this study.

**Will it cost me anything to participate?**

There will be no costs incurred by the participant for this study.

**Is there anything else I need to know?**

**I agree to take part in this research.**

**______________________________________________ _________________________ Signature**

**of person [parent] agreeing to take part Date**

**______________________________________________**
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Printed name of person above

____ ________________________ **Signature**

of person who explained the study to the Date

participant above and obtained consent

____

Printed name of person above

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**Depending upon the nature of your research, you may also be required to provide information about one or more of the following if it is applicable:**

1. A statement that the particular treatment or procedure may involve risks to the subject (or to the embryo or fetus, if the subject is or may become pregnant) which are currently unforeseeable.
2. Anticipated circumstances under which the subject's participation may be terminated by the investigator without regard to the subject's consent.
3. Any additional costs to the subject that may result from participation in the research.
4. The consequences of a subject's decision to withdraw from the research and procedures for orderly termination of participation by the subject.
5. A statement that significant new finding(s) developed during the course of the research which may be related to the subject's willingness to continue participation will be provided to the subject.
6. The approximate number of subjects involved in the study.

Template 1 NU HSRP Rev. 2/7/2017
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APPENDIX C

Student Engagement Teaching Practices

Design and Plan	Build the Culture	Scaffold Student Learning	Assess Student Learning
Plans are detailed and include scaffolding and assessing student learning and a project calendar, which remains flexible to meet student needs.	Norms to guide the classroom are co-crafted with and self-monitored by students	Each student receives necessary instructional supports to access content, skills, and resources; these supports are removed when no longer needed.	Individual student learning is adequately assessed, not just team-created products.
Scaffolding of student learning, critique and revision protocols, assessments and rubrics consistently refer to and support student achievement of specific standards.	Student voice and choice is regularly leveraged and ongoing, including identification of real-world issues and problems students want to address in projects.	Scaffolding is guided as much as possible by students' questions and needs; teacher does not "front load" too much information at the start of the project, but waits until it is needed or requested by students.	Structured protocols for critique and revision are used regularly at checkpoints; students give and receive effective feedback to inform instructional decisions and students' actions.
The classroom features an appropriate mixture of individual and teamwork time, whole group and small group instruction.	Students work collaboratively in healthy, high-functioning teams, much like an authentic work environment; the teacher rarely needs to be involved in managing teams.	Key success skills are taught using a variety of tools and strategies; students are provided with opportunities to practice and apply them, and reflect on progress.	Standards-aligned rubrics are used by students and the teacher throughout the project to guide both formative and summative assessment.
Realistic schedules, checkpoints, and deadlines are set but flexible; no bottlenecks impede workflow.			
Project management tools			

are used to support student self-management and independence.			

Adapted from (Louwrens & Harnett, 2015; Yilmaz & Banyard, 2020)

APPENDIX D

Gold Standard Project Design Elements Observation Checklist

Criteria	Description	Is this component evident in this observation?
Key Knowledge, Understanding, and Success Skills	The project is focused on teaching students' key knowledge and understanding derived from standards and central to academic subject areas.	
	Success skills are explicitly targeted to be taught and assessed, such as critical thinking, collaboration, creativity, and project management.	
Challenging problem or question	Open ended; there is more than one possible answer	
	Engaging for students (Understandable and inspiring to students)	
	Aligned with learning goals; to answer it, students will need to gain the intended knowledge, understanding, and skills.	
Sustained Inquiry	Inquiry is sustained over time.	
	Inquiry is academically rigorous	
	Inquiry is driven by student-generated questions throughout the project.	
Authenticity	The project has an authentic context; involves real-world tasks, tools, and quality standards.	
	The project makes an impact around the world.	
	The project speaks to students' personal concerns, interests, or identities.	

Student Voice and Choice	Provides opportunities for students to express their voice and make choices on important matters (topics to investigate, questions asked, texts and resources used, people to work with, products to be created, use of time, organization of tasks)	
	Students have opportunities to take significant responsibility and work as independently from the teacher as is appropriate, with guidance.	
Reflection	Students and teachers engage in thoughtful and ongoing reflection during the project and after the project related to what and how they learn.	
	Students and teachers engage in thoughtful and ongoing reflection about the project's design and management.	
Critique and Revision	Includes regular structured opportunities for students to give and receive feedback about the quality of their products and work-in-progress from peers, teachers, and if appropriate, from others beyond the classroom.	
	Students use feedback about their work to revise and improve it.	
Public Product	Includes opportunities for students to share their work with an audience beyond the classmates and teachers.	
	Students are asked to explain the reasoning	

	behind choices they made, their inquiry process, how they worked, and what they learned.	

(Buck Institute for Education, n.d.-c)

APPENDIX E

Interview Questions

1. Explain your professional background? (Years of teaching, grade levels, subjects, schools, etc.)
2. What is your current position?
3. Describe the learners in your class this year?
4. Describe the context of teaching this year?
5. What are positives and negatives in terms of the context of teaching this year?
6. What is your knowledge of Project-Based Learning (PBL)?
7. In your current PBL unit, what challenging problem, question or issue are the students investigating?
8. In what ways did your students engage in work that connected to the real-world?
9. In what ways did your students use tools, techniques, or digital technologies that are used in the world beyond school?
10. In what ways did your students have choices about their topic, activities, or products?
11. How did your students share their work-in-progress with peers, you, or others for feedback during the project?
12. In what ways will or did your students share their final product to an audience outside of your classroom?
13. How did your students receive feedback about their final product from you, peers, or others?
14. What did student reflection look like, and when did it occur?

15. How do you think your students thought about how they could improve their own and others' work during this project?
16. How do you know your students are meeting the embedded standards?
17. What actions have you taken to forge student engagement with your learners?
18. What decisions have you made in regards to PBL implementation based on your learners' needs?
19. How did you proceed with those decisions? What are your reflections of the outcome?

(Evans, 2019)

APPENDIX F

Call to Participants

Dear Teachers,

Good morning, I am conducting a study on the implementation of PBL between April and June, 2021. I am reaching out to you to request your participation in this study. My focus is on how teachers navigate the various components of PBL to leverage student engagement as a pedagogical tool with diverse learners while teaching in a remote, hybrid or in-person learning environment. This would require me to observe the implementation of your PBL during the beginning, middle, and end of the instructional unit; followed by an interview no more than one to two days after.

If you are interested, please complete the attached google form.

I realize this is the absolute worst time to ask any of you to do anything more while teaching during a pandemic. That being said, many of you are implementing PBLs already, so this would not be any more planning or work, just some time to discuss your implementation in an interview with me. Furthermore, it's an opportunity to showcase your instruction and how you are positively impacting student engagement in an unprecedented time.

Thank You for your consideration. Please send me a quick email if you are interested in participating. I truly have the greatest respect for all of you and the amazing job you are doing every day.

Sincerely,

Liz

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