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Project-based Learning Implementation in Elementary School

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This is to certify that the doctoral study by

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Walden University
2020

Abstract

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MA, Liberty University, 2015

BEd, University of Hawaii at Manoa, 2012

Doctoral Study Submitted in Partial Fulfillment

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Abstract

Project-based learning (PBL) is a student-centered approach that has been required by state and school-level leadership, but the teachers have not received formal training before implementing it in their classes. This study explored the perception of current PBL implementation among teachers and administrators at an urban elementary school, focusing specifically on fidelity and adaptations. The research questions guiding this study asked what administrators perceive as the intent of PBL instruction and what teachers perceive as the nature of implementation in their classrooms. This qualitative exploratory case study included an analysis of data from interviews, observations, and the relevant documents of 5 teachers and 2 administrators. Teachers were observed in class and interviewed about the PBL implementation evident during the observations. Internal documents in the analysis where the documentation related to the planning and implementation of PBL were reviewed. The strategy used to analyze the data focused on answering smaller subquestions in order to answer the larger research questions about the nature of PBL in this setting. Themes were recorded as any recurring patterns emerged from the data. Evidence was displayed through a narrative of the analysis as a means of allowing readers to review for reliability. The evidence showed several key findings that were used to develop a model for accelerated professional growth. The final results from this study may be used to help leaders improve teacher training and the practice of PBL implementation.

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Dedication

This work is dedicated to Jesus Christ who saved me,

To my mom, Maeva, who motivated me,

To my dad, Elton, who believed in me,

To my lovely wife, Linyan, who supported me,

To my colleagues, Mark and Jandi, who inspired me,

and

To the students and faculty of Princess Miriam K Likelike Elementary School, who daily show me how the strength of a learning community is limitless and whose joy in learning makes this all worthwhile.

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Section 1: The Problem

Introduction

Reports of the concentration of public school students eligible for free or reduced-price lunch data from the National Center for Education Statistics (NCES, 2017) show that 24% of all schools in the United States serve a high-poverty community. In response to this nation-wide equity issue, state departments of education have required schools to implement instructional measures, including project-based learning (PBL), to promote equity and excellence (State of Hawaii Board of Education, 2017a). Understanding more about what intentions administrators have for PBL may provide insight into what barriers one may need to address in order for successful PBL buy-in among teachers to take place. Teachers may not be providing their students with PBL instruction (State of Hawaii Board of Education, 2017a).

It is essential to investigate the fidelity of implementation (FOI) of PBL instruction in a school so that the program can ultimately reach the goals for which it was designed (Lendrum & Humphrey, 2012). High-impact interventions such as PBL programs go through stages of development and adoption that school leaders should evaluate if schools are going to avoid spending unnecessary resources engaging in ineffectual practices (Lendrum & Humphrey, 2012). Insight into PBL implementation may inform teachers, administrators, and other stakeholders about the critical components of PBL and the relationships between those components. The purpose of this study was to explore implementation in such a way as to shed light on the relationship between the intended practice and practical adaptation.

Defining of the Problem

The problem at Pacific Elementary School (PES, a pseudonym), a P-5 urban school in the Western United States, is that teachers are not implementing PBL with fidelity (PES vice-principal, personal communication August 12, 2018). The state offered PBL training to the teaching staff in the PES district, but teachers chose not to attend the training (PES, 2018). As none of the teachers had received training yet, the PES principal provided literature on the subject (PES principal, personal communication, May 21, 2018). The school purchased a PBL science curriculum, but few teachers could show evidence of implementation (PES ART cadre meeting minutes, May 3, 2017). However, PES administration had conducted no formal observations of PBL (PES vice-principal, personal communication, August 12, 2018).

While no observations had yet been made in this school, even while PBL was being encouraged among the teaching staff, it could not be assumed that no form of PBL or no form of any critical component of PBL existed in the school. This study, therefore, explored any adaptations of PBL. In the most recent literature reviews of PBL instruction, much of the research focused on barriers to implementation (Condliffe et al., 2017. There is an apparent lack of research on the adaptations to planned PBL instruction that teachers may employ. Based a detailed review of the literature, it is clear that more research of actual implementation at an elementary school level would be useful (Condliffe et al., 2017; Merrit, Lee, Rillero, & Kinach, 2017).

PES administration has made PBL instruction a priority initiative. This study included the administrators' perceived intentions for PBL instruction and explored what

impact they may have had on the instructional plans that teachers created. In a study by Merrit et al. (2017), researchers analyzed both student perception data and teacher perception data. However, administrator perception has not yet been incorporated into an analysis of PBL implementation (Merrit et al., 2017).

Rationale

Evidence of the Problem at the Local Level

A PES administrator expressed that teachers have not been implementing PBL with fidelity (personal communication, August 12, 2018). This PES administrator was cognizant of resistance among teachers to begin implementing PBL and suspected that it will take time for teachers to buy-in to the curricular shift (personal communication, August 11, 2018). During this academic year, the principal has required each grade level to design a unit of PBL instruction. None of these units have yet been observed (PES faculty meeting minutes, September, 2018). Teachers have also made complaints to the administrator concerning the design of the project-based science curriculum that was purchased for the school (PES principal, personal communication, September 14, 2018).

At an introductory workshop for teachers at PES, a teacher noted that a significantly low percentage of teachers were implementing the PBL science curriculum that was purchased for the school (PES fifth grade teacher, personal communication, December, 2018). Several teachers expressed a need for more high-impact instruction similar to PBL to promote critical thinking (PES P/C day meeting minutes, January, 2019). Other teachers expressed contrary opinions about PBL stating that for English language learning students, PBL would not help to address their much-needed

foundational skills (PES P/C day meeting minutes, January, 2019). This apparent resistance to using the instructional time for PBL creates a need for studying teachers' use of PBL and their understanding of its critical components.

Evidence of the Problem in the Literature

The purpose of this qualitative exploratory case study was to explore how PES teachers may or may not be implementing PBL instructional strategies to support students in the classroom. There is still no consensus as to what constitutes PBL (Condliffe et al., 2017; Thomas, 2000). Though it is not my intent for this study to provide a definitive description of what critical components constitute PBL, this study contributes to the understanding of the relationship between PBL conception and implementation. My intent for this study was to explore the way teachers interpret, practice, and adapt critical components of PBL in their classrooms. One study reported a need for a systematic study of the way teachers implement the project-based approach (Linn, Clark, & Slotta, 2003).

Studies by Ravitz (2010) and Zeiser, Taylor, Rickles, Garet, & Segeritz (2014) reported on the importance of school leadership and culture as it affects PBL implementation. There is a need to explore the effects of culture and local context on the way PBL implementation fidelity varies within that context (Condliffe et al., 2017). Adaptations occur both in instances when the PBL curriculum is teacher-initiated and when designed by a source external to the school. According to Condliffe et al. (2017), further research is needed to explore the effects that adaptations may have on student

learning. This study investigated the adaptations and iterations of PBL in PES classrooms.

Definition of Terms

The following terms supported this qualitative exploratory case study:

Critical component: Critical components are the "building blocks" of the innovation the teacher implements (Century, Rudnick, & Freeman, 2010).

Curriculum: Wiles and Bondi (2015) defined curriculum as the sum of all planned experiences for schools and students.

Fidelity of implementation (FOI): FOI is the extent to which a program is consistent with the intended design (Century et al., 2010).

Process fidelity criteria: Process fidelity criteria are defined as the critical components to the FOI that closely concern how the program or intervention is delivered (Century et al., 2010).

Project-based learning (PBL): PBL is a method of delivering content that is designed to promote deeper learning and transfer of knowledge between content areas through authentic questioning, an extended inquiry process, and carefully designed tasks (Larmer & Larmer, 2015; Cocco, 2006; Dole, Bloom, & Kowalski; 2016; Thomas, 2000).

Structural fidelity criteria: Structural fidelity criteria are those critical components of measuring fidelity that describe the framework for delivering the program or intervention (Century et al., 2010).

Significance of the Study

The results of this study will help teachers interpret, adapt, and practice PBL in order for administrators to provide appropriate support to teachers. According to the U.S. Chamber of Commerce Foundation (2015), there are limits to state administrators' ability to identify the exact causes for the relative success in instruction. The findings of this qualitative case study showed how much or little PBL implementation was occurring in the local setting, helped explain what happens in teachers' classrooms, and showed the difference between what curriculum designers intended and what teachers practiced. The study addressed the problem at PES by providing administrators with information about how teachers were implementing PBL instruction. The findings may lead to positive social change by contributing to a widespread model of training for teachers in PBL instruction.

Based on the current literature on PBL instruction, there is a need to understand how local factors affect implementation (Condliffe et al., 2017). In this qualitative case study I sought to identify local factors and examine the effects that such factors may have on the way teachers define and deliver PBL instruction throughout the school. With a particular focus on differences between structural components and instructional components, I used this study to explain how and whether local factors affect PBL implementation in a school.

This study may benefit a multitude of stakeholders. Administrators at the site and on the state level may find the resulting patterns in data useful for planning training for teachers. Teachers and administrators may find the results helpful when targeting the

gaps in practice that require further refinement. Because the conditions of the context interact in nuanced ways with each case, the data should provide insight to stakeholders and make meaningful reform more accessible (Yin, 2018). At this particular school, if teachers can identify the inconsistencies that may exist between what they may plan and what they practice, the students will benefit by experiencing an increase in academic achievement.

Research Questions

The following research questions focused on understanding what PBL instruction looks like in practice at PES. These questions were developed to explore what gaps may exist between the intended use of PBL and the actual use of PBL in the classroom.

RQ1: According to administrators, what is the intended use of PBL instruction in the curriculum?

RQ2: What is the nature of PBL instruction in PES classrooms?

I constructed the following subquestions to identify specifics of PBL use at PES:

SQ1: What do teachers report are the instructional critical components present in their PBL curriculum?

SQ2: What do teachers report are the structural critical components present in their PBL instruction?

SQ3: What critical components do teachers omit from their PBL curriculum?

SQ4: What critical components do teachers omit from their PBL instruction?

SQ5: What critical components exist in the classroom apart from what teachers report?

Review of the Literature

Grounding this study was an analysis of the current literature on the topic. Several databases that supported the search for relevant literature included *Google Scholar, ERIC*, *ProQuest,* and *EBSCOhost*. Keywords used to search for relevant peer-reviewed articles and current studies included *project-based learning, teacher perceptions, the fidelity of implementation, adaptations,* and *PBL literature review*. I chose the keywords based on their relevance and the focus of the research questions. The themes that the literature presented were: (a) conceptual framework, (b) PBL implementation, (c) benefits, (d) challenges, (e) perception, (f) PBL instruction, (g) PBL curriculum, (h) adaptations, (i) teacher PBL instruction, and (j) PBL science curriculum.

Conceptual Framework

The principle conceptual framework for this study was FOI as described by Century et al. (2010). This framework was most appropriate for this study, as it allows researchers to measure the efficacy of a program or intervention. It also provides insight into the nature of its implementation. One of the most compelling reasons for choosing this framework for the proposed study is that it enables a useful and accurate analysis of a given intervention while considering the adaptations that can take place during implementation.

The current form of FOI has its roots in the work of Dane and Schneider (1998). In their seminal work, Dane and Schneider applied the analysis of program integrity along five dimensions: adherence, exposure, quality of delivery, participant responsiveness, and differentiation. According to Century et al. (2010), the FOI

framework is a combination of Dane and Schneider's dimensional approach, the critical components approach, and the structure and process approach of Ruiz-Primo (2005). In its current iteration, the FOI framework of Century et al. (2010) allowed for a more specific analysis of an organization's program implementation.

The primary constructs of this framework include: (a) structural critical components, (b) instructional critical components, and (c) innovation configurations. *Structural* components fit into two specific categories, called *educative* and *procedural* (Century et al., 2010). Structural-procedural critical components are those that communicate to the teacher what they must do, focusing on the necessary steps that allow users to implement a program according to the designer's intent. Structural-educative components are often those that are present in the form of built-in professional development (PD) and training. These are components based on the assumption that there is specific knowledge that a teacher must know in order to implement the program effectively. *Instructional* components categories include *pedagogical* or *student engagement*. Instructional-pedagogical components refer to the behaviors and strategies that program designers intend for teachers to use while enacting the program. Instructional-student engagement critical components are those behaviors that the students are expected to adopt while participating in the program. *Innovation configurations* refer to the combinations of critical components that are present within a particular context (Century et al., 2010). In other words, innovation configurations describe the adaptations that teachers may make when implementing the intervention.

This construct was essential for this study in that it allowed for a more detailed analysis of the relationships between critical components.

Recent applications of FOI include an analysis by Offerdahl, McConnel, and Boyer (2018) in which the researchers explored the nature of formative assessment. The previous conclusions about formative assessment may be inconsistent due to a possible lack of fidelity with which practitioners have implemented formative assessments. Based on the current literature, the researchers employ the structure and process construct of FOI to determine the critical components of formative assessment. Further, the authors discuss possible adaptations and innovation configurations. The discussion of these variations in implementation provides insight into how the effect size of formative assessment can vary depending on the FOI (Offerdahl et al. 2018).

This study applied the FOI framework to explore the nature of the PBL implementation present at the school, which included an analysis of the critical components and adaptations. FOI was used to support critical components of PBL implementation according to responses from teachers and administrators as well as an analysis of the guiding materials the teachers are supposed to use to design their PBL units. The framework was instructive in documenting the innovation configurations that teachers employ during actual implementation.

Current Literature

Project-Based Learning Implementation

Current research on PBL implementation shows that the relevant instructors have used student-centered practices in higher education (Baysura, Altel, & Yusel-Toy, 2016;

Kokotsaki, Menzies, & Wiggins, 2016) across various disciplines (Harmer & Stokes, 2016) and in the elementary to secondary education setting (MacMath, Sivia, & Britton, 2017). It is important to note that a significant number studies have been conducted about PBL in the higher education setting compared to the lower elementary setting, suggesting a gap in the literature (Merrit et al., 2017). However, PBL instruction has gained traction throughout the field of education due in part to the reported success that various teachers have had in using it to increase student achievement (Kokotsaki et al., 2016; Merrit et al., 2017; Namasivayam, Fouladi, & Chien Hwa, 2017). Aside from revealing its benefits, further attempts to use PBL in various settings have yielded valuable insight into the possible challenges to implementation (Herro & Quigley, 2017).

The growing popularity of PBL instruction has provided some inherent challenges to researchers. Reviews of the literature by Merrit et al. (2017), Kokotsaki et al. (2016), and Condliffe et al. (2017) have described the inconsistencies among researchers as they attempt to define PBL. These inconsistencies may suggest a need to identify the critical components of PBL as well as a more extensive analysis of acceptable adaptations. Further research is needed to determine whether critical components differ depending on the discipline and age group of the students (Merrit et al., 2017).

While there is not a universal consensus on any single definition of PBL within the literature (Merritt et al., 2017), the need for further study of the nature of PBL implementation is a significant recurring theme (Alexander et al., 2014; Alves et al., 2016; Harmer & Stokes, 2016; Kokotsaki et al., 2016). Beyond the general need to study PBL implementation, the findings of Kokotsaki et al. (2016) substantiated a need to

explore FOI and teacher perceptions within the elementary setting. As previously mentioned, both teachers and students have reported perceived benefits of PBL (Sahin & Top, 2015; Terrón-López, Velasco-Quintana, García-García, & Ocampo, 2017). However, a closer look at the FOI among PBL practitioners may justify long-term implementation (Dole et al., 2016).

Benefits

PBL has gained traction among educators around the world because of the reputed benefits it can have toward student achievement and engagement (Sahin, & Top, 2015; Terrón-López et al., 2017). While some researchers argued that further study is required before long-term implementation is justified (Dole et al., 2016) the possible justification for PBL has been explored (Kokotsaki et al., 2016). Despite these and other possible benefits to students, teachers have had mixed reactions and varied success in implementing PBL (Condliffe et al., 2017). As student-centered learning environments like those provided by PBL strategies continue to develop in school districts around the world, understanding the perceptions of the teachers becomes even more necessary.

Teachers experiencing success with PBL have perceived this approach as being useful for raising the level of engagement without sacrificing any rigor (Dole et al., 2016). Teachers in a high school setting found that PBL implementation aids their students' development of 21st-century skills (Sahin, & Top, 2015). Researchers found significant gains in academic achievement as a result of PBL implementation (Sahin & Top, 2015). In addition to the perceived benefits of PBL instruction, the reported challenges of implementation were also significant.

Challenges

Recent analyses of PBL implementation revealed challenges of integration (Alves et al., 2016; Herro & Quigley, 2017). In the case of Alves et al. (2016), instructors implemented a PBL approach with students in an engineering university. These students reportedly experienced increased levels of collaboration with peers and overall engagement. However, challenges arose when instructors attempted to integrate math (Alves at al., 2016). Instructors also experienced challenges with providing an adequate assessment in a PBL environment (Alves et al., 2016).

Herro and Quigley (2017) measured the perceptions of teachers before and after being trained to use a PBL approach. Many of the teachers cited a need to include arts and the humanities in the training process (Herro & Quigley, 2017). This lack of training led to challenges integrating the arts and humanities in their PBL setting. In the study I conducted, I explored teacher perceptions that reflect the training that teachers received in a setting that encourages PBL instruction.

Perception

Though studies have focused on the perceptions of teachers at the secondary and higher education setting, the literature suggests a need to further study PBL implementation in an elementary setting (MacMath et al., 2017). The research also highlights a need to explore PBL implementation among a population of students with special needs (MacMath et al., 2017). Studies of preservice teachers support the need for further research surrounding teacher perceptions of PBL implementation (Oliveira,

Fischer, & Fernando Parisoto, 2015). However, in several studies that did include an analysis of teacher perceptions, several insights were discovered.

Teachers report the importance of training before implementation, as there were several areas of challenge in adopting a PBL approach (Baysura et al., 2016; Herro & Quigley, 2017; Ong et al., 2016). In other studies, researchers found that teachers who experienced success in implementation were more likely to continue using PBL (Márquez, & Jiménez-Rodrigo, 2014; Terrón-López et al., 2017). The majority of studies on the topic of PBL implementation examined settings outside of the elementary school (Kokotsaki et al., 2016). Thus, the need for further research of teacher perceptions of PBL implementation in the elementary setting persists.

Many studies in the literature address shifts in student perceptions as a result of PBL instruction. Several of them show an increase in the students' self-efficacy. Bandura (1995) explained that self-efficacy increases with mastery; however, the increase is typically specific to the skill or competency that the individual mastered. Therefore, it is worth noting the specific skills or content areas that researchers have found an increase in groups within a PBL environment. In one study, researchers measured students' perceived efficacy in working in small groups. In another, Horak and Galluzo (2017) found that the favorable perception of classroom quality among gifted students in PBL classrooms increased. Though much of the literature reveals favorable increases in perception among students in PBL classrooms of various subjects and across grade levels, some studies show mixed results.

In a study on student perceptions of PBL, researchers found that some students disliked the PBL approach (Wijnen et al., 2017). In this study, law students felt that the PBL classroom environment did not sufficiently prepare them to practice law (Wijnen et al., 2017). Other higher education students reported having a positive experience with PBL but feeling that it was somewhat unstructured (Blackwell & Roseth, 2018). The results of this study may confirm those of other studies that suggest that while PBL is beneficial for instilling higher-order thinking skills and collaborative skills, it does not ensure that students have as thorough a grasp of subject knowledge when compared to traditional instructional settings (Schauber, Hecht, Nouns, Kuhlmey, & Dettmer, 2015).

Project-Based Learning Instruction

As an instructional approach, PBL can be consistently characterized throughout the literature by several distinct attributes. Among these attributes, PBL instruction is primarily a student-centered approach. The student-centered nature of PBL can be seen in every study on the topic regardless of the content area or educational level of the student. Several articles compare and contrast PBL instruction against more traditional methods (Firdaus, Wahyudin, & Herman, 2017; Schauber et al., 2015; Seyhan, 2016; Wynn, Mosholder, & Larsen, 2016). Findings in these studies suggest that PBL instruction is more effective in increasing student motivation, engagement, depth of understanding, sense of self-efficacy, and achievement than traditional methods (Firdaus et al., 2017; Schauber et al., 2015; Seyhan, 2016; Wynn et al., 2016). It is worth noting that of these comparative studies, only one focused on a group of students at a level lower than the collegiate level (Firdaus et al., 2017). The remainder of comparative studies

between PBL and traditional instruction focused on university students in the fields of science or history (Schauber et al., 2015; Seyhan, 2016; Wynn et al., 2016).

Most of the literature about PBL instruction analyzes groups studying science, history, economics, and mathematics introducing students to an essential complex question (Abdelkarim, Schween, & Ford, 2016; Ajai, & Imoko, 2015; Argaw, Haile, Ayalew, & Kuma, 2017; Asunda, & Weitlauf, 2018; Bicer, Boedeker, Capraro, & Capraro, 2015; Yukhymenko, Brown, Lawless, Brodowinska, & Mullin, 2014; De Witte, & Rogge, 2016; Firdaus et al., 2017; Khumsikiew, Donsamak, & Saeteaw, 2015; Minarni & Napitupulu, 2017; Ruiz-Gallardo, González-Geraldo, & Castaño, 2016; Sari, Alici, & Sen, 2018; Yukhymenko, Brown, Lawless, & Mohamed, 2015). Students in these contexts are required to collaborate by researching possible solutions to the question or problem posed at the start of the instructional unit. Characterized by a higher degree of rigor, students' investigations of semiauthentic problems provide opportunities for higher critical thinking than would otherwise be presented through traditional direct instruction (Firdaus et al., 2017; Schauber et al., 2015; Seyhan, 2016; Wynn et al., 2016). At the end of instructional units, students are asked to present their findings or results to an audience. Presentations usually include a product that students have created to display their work.

Project-Based Learning Curriculum

Schauber et al. (2015) studied the contexts of the PBL curriculum and detailed several fundamental shifts from a more traditional curriculum. Among these shifts, a PBL curriculum tends to feature interdisciplinary units rather than being centered on an

isolated content area. Literature notes a further emphasis on teaching soft skills in PBL curricula as opposed to strictly adhering to a focus on hard outcomes or content knowledge (Condliffe et al., 2017; Schauber et al., 2015; Wijnen et al., 2017). Soft skills may include critical thinking, collaboration, and communication. These soft skills, often considered 21st-century skills, are necessary for most career environments but belong to no particular discipline (Chua, Tan, & Liu, 2016; Meyer & Wurdinger, 2016).

A focus of PBL curriculum on skills and applied knowledge to problem-solving instead of a broad base of knowledge in a specific content area make PBL distinct from the traditional curriculum (Schauber et al., 2015; Wijnen et al., 2017). In an overwhelming majority of the literature on PBL, students were taught skills that enable them to work in small group settings (Condliffe et al., 2017; Golightly, 2018; Kokotsaki et al., 2016). This blend of collaborative skills, higher-order thinking skills, and integrated content knowledge characterizes the PBL curriculum (Minarni & Napitupulu, 2017).

Adaptation

In any study exploring the FOI of a treatment or program, there arises the need to understand the acceptable adaptations (Century et al., 2010). On the topic of PBL implementation, the literature reveals a need to explore the relationship acceptable adaptations have with critical components when practicing PBL with fidelity (Cook & Weaver, 2015). Research further substantiates the suggestion that a lack of consensus exists around the definition of PBL (Meritt et al., 2017). This study explored the nature

of PBL implementation in an elementary school setting in such a way as to take in to account the adaptations that both are and are not acceptable.

Teacher Problem-Based Learning Instruction

Teacher education is a prominent theme in the literature. Recent studies help provide insight into how instructors can best use PBL with preservice teachers as well as what preservice teachers may need before using PBL effectively. In an article about the implementation of PBL among teacher candidates, researchers found that preservice teachers require training in PBL classroom management (Baysura et al., 2016). However, along with other studies, teacher candidates were found to have a generally favorable perception of the PBL approach (Baysura et al., 2016; Mohamed, 2015). Negative feedback included critiques on the time that PBL requires in comparison to traditional methods as well as a prevailing school culture that is more accustomed to the traditional approach (Mohamed, 2015; Ruiz-Gallardo et al., 2016). Apart from the workload for students being of interest, the study of the actual time spent on different tasks during a PBL unit found that PBL has a significant effect on the attendance and overall engagement of students (Ruiz-Gallardo et al., 2016).

While training prospective teachers, researchers found that PBL was more effective at developing students' ability to transfer knowledge and skills to other disciplines than developing their rote recognition of what they learned (Bergstrom, Pugh, Phillips, & Machlev, 2016). A look at the collaborative nature of PBL during implementation revealed that PBL transformed the perceived relationships between teachers and preservice teachers (Wynn & Okie, 2017). It is worth noting, however, that

the research on PBL is not without both positive and negative results. According to the literature review by Kokotsaki et al. (2016), enough positive and negative results are evident in the literature to prevent conclusively drawing a causal link between PBL and positive student outcomes.

The need for implementation fidelity and instruments to measure PBL practice is apparent in the literature. There is a growing body of research to answer that need. One study discussed the need for instrument validation for PBL among teacher candidates (Chua et al., 2016). Among these new instruments are suggestions for specific measures of implementation. A new framework for implementing PBL was proposed and used in a class for preservice teachers (Zhang, Ridgway, & Sachs, 2015). Technology use in PBL classrooms for preservice teachers is not without specific challenges, though implementation is recommended (Lee, Jane, & Cavanaugh, 2015).

Problem-Based Learning Science Curriculum

About a third of the literature on PBL curriculum examined the outcomes and conditions of PBL implementation in science courses. Several articles described the perceptions of students in STEM courses (Asunda & Weitlauf, 2018; Bicer et al., 2015; Han, Capraro, & Capraro, 2015; Han, Capraro, & Capraro, 2016; Sari et al., 2018; Ralph, 2015). In other non-STEM related articles, researchers discussed PBL instruction in postsecondary medical and biology classes (Chan et al., 2015; Jin, & Bridges 2016; Mumtaz, Latif, 2017; Skinner, Braunack-Mayer, & Winning, 2015; Yan, Ma, Zhu, & Zhang, 2017). Another class examined in the literature was engineering students (Lutsenko, 2018; Terrón-López et al., 2017).

Though STEM research does not entirely overlap with PBL research, the two topics share an emphasis on student-centered instruction and curriculum. In specific settings, the findings of the overlapping research help provide a complete understanding of the outcomes and conditions of PBL STEM instruction. In one study, researchers discussed an apparent shortage of qualified STEM teachers compared with the number of students interested in STEM-related careers (Asunda & Weitlauf, 2018). PBL STEM research shows an increased interest in STEM-related careers among students in certain kinds of schools (Asunda & Weilauf, 2018; Ralph, 2015; Sari et al., 2018). In addition to providing greater insight into shifting perceptions among students, STEM PBL research reveals positive effects among students who typically have low academic achievement when compared to the growth of their higher-achieving counterparts (Han et al., 2015). In a similar study, Han et al. (2016) reported findings that suggest STEM PBL may be beneficial for students of diverse cultural and linguistic backgrounds. STEM PBL could also be useful to help students develop STEM vocabulary (Bicer et al., 2015). The STEM PBL research offers unique insight into the instructional and curricular nature of PBL as an instructional approach.

PBL science instruction is present in the literature via reports concerning postsecondary medical learning environments. In most of the studies on PBL implementation among dental or medical students, researchers examined either the perception of students and teachers or the efficacy of the approach (Abdelkarim et al., 2016; Abercrombie, Parkes, & McCarty, 2015; Khumsikiew et al., 2015; Skinner et al., 2015; Yan et al., 2017; Yu, Lin, Ho, & Wang, 2015). In one study, researchers sought to

explore the scope for potential research in a region that is relatively new to PBL (Servant & Dewar, 2015). In all of these articles, researchers have reported valuable insight into the nature of PBL implementation in a postsecondary medical learning environment.

Reports of positive results from PBL implementation among medical and dental students have suggested that some competencies can be taught successfully using PBL (Khumsikiew et al., 2015; Yan et al., 2017; Yu et al., 2015). Whether the outcomes of PBL implementation were positive or negative among postsecondary medical programs, the analysis revealed several factors as contributing to increased learning. For example, one study suggests that student motivation is key to successful outcomes in a PBL setting (Abercrombie et al., 2015). Skinner et al. (2015) reported that an active attempt at PBL may require more work with students on shaping their epistemological understanding of learning. Findings suggested that helping students understand the nature of learning through discussion and small group collaboration may allow them to experience more success in a PBL environment.

Much of the literature on the PBL implementation in postsecondary engineering courses reveal the benefits of the instructional approach toward preparing students for engineering careers (Lutsenko, 2018; Roach, Tilley, & Mitchell, 2018; Servant & Dewar, 2015). PBL engineering courses have been found to support students' collaboration, communication, and self-directed learner skills in a discipline that typically focuses on developing technical skills (Seman, Hausmann, & Bezerra, 2018; Roach et al., 2018). Authors of one study found that the authenticity of the problems and projects help prepare students for engineering careers (Roach et al., 2018). They suggested that

undergraduate students benefit from coursework that grows increasingly similar to real-world engineering (Roach et al., 2018).

Implications

This study contributed to an understanding of the practice of PBL in an elementary school setting. In this research I intended to explore the adoption, interpretation, and adaptation of PBL implementation. The findings will hopefully be instructive for administrators and district leadership in conceptualizing PD for PBL instructors. The research will ideally be useful in getting closer to a consensus regarding a definition of PBL.

The findings from this study may include information about adaptations that teachers employ when attempting PBL. Findings may be instructive to administrators when considering the acceptable adaptations against the possible unacceptable adaptations. Future PBL training based on this information may prove to be more effective than what administrators previously offered to teachers.

Summary

The following section will detail the methodology and processes that were most appropriate for this study. In order to explore the nature of implementation at PES, the methods needed to allow me to identify critical components of PBL in each case of implementation (see Yin, 2018). The qualitative case study method provided the framework necessary to collect and analyze data on adaptations that exist in the classroom context (Creswell, 2012). I provide a detailed rationale for choosing sample sizes, framework, and data sources in Section 2.

Section 2: The Methodology

Introduction

The purpose of this qualitative exploratory case study was to explore how PES teachers may or may not be implementing PBL instructional strategies to support students in the classroom. This qualitative study explored the complex nature of PBL implementation by examining the experiences and perceptions of practitioners in the field. As the field comprises of a wide variety of factors, the constructivist philosophical stance was useful for the study. This study will help further understanding of the complex relationships between instructional elements within the classroom environment. Participants were studied as separate cases, and they provided valuable insight into the similarities and differences among those practicing PBL.

Research Questions

This research seeks to answer questions about the administrators' intentions about PBL as well as the nature of PBL implementation at PES:

RQ1: According to administrators, what is the intended use of PBL instruction in the curriculum?

RQ2: What is the nature of PBL instruction in PES classrooms?

Subquestions:

SQ1: What do teachers report are the instructional critical components present in their PBL curriculum?

SQ2: What do teachers report are the structural critical components present in their PBL instruction?

SQ3: What critical components do teachers omit from their PBL curriculum?

SQ4: What critical components do teachers omit from their PB instruction?

SQ5: What critical components exist in the classroom apart from what teachers report?

Research Paradigm

These questions aligned with the methodological approach of qualitative exploratory case study in a constructivist context (Yin, 2018). Contrary to a relativistic perspective that assumes multiple realities and subjective meanings, the assumption informing this study was that there is a single objective reality that is subject to observation (Yin, 2018). As previously mentioned, a constructivist worldview compliments the qualitative approach in meaningful ways (Creswell & Creswell, 2018). However, while this study analyzed the reported experiences of teachers, this study required an approach that would help provide a clearer understanding of the PBL implementation happening at PES using the perceptions of teachers who were asked to use the PBL approach.

Research Design

The purpose and questions that drove this study were focused on exploring the nature of PBL implementation in the context of PES. While quantitative methodologies may have been advantageous in an investigation of the extent to which PBL implementation occurs in the school, the contextual factors that may affect implementation and the implementation itself were unclear. Due to the need for rich data, a qualitative approach aligned better with the current study. Creswell and Creswell

(2018) mentioned the inductive nature of qualitative research. Data on specific teachers' perceptions, observations of participants in the particular context, and an analysis of planning documents contributed to the resulting general themes.

Qualitative Approaches

Qualitative research typically includes an inductive approach to complex situations where nuance and individual perception inform the way the data is analyzed (Creswell & Creswell, 2018). While there have been many distinctive qualitative research designs, Creswell and Creswell (2018) described five qualitative designs that served as options for this study: narrative research, phenomenological research, grounded theory, ethnography, and case study. For this study, it was helpful to review the characteristics of each design to discern which one most closely aligned to the study.

Narrative Research

In narrative research, the researcher collects stories from individuals about their experiences (Creswell & Creswell, 2018). The researcher retells this collection in a narrative chronology. According to Creswell and Creswell (2018), this design process often results in a collaborative narrative as the researchers and the participant's views combine. This study's research questions could be answered sufficiently without inquiring about the life stories of participants; therefore, the narrative design was not the best fit.

Phenomenological Research

Phenomenological research comes from the psychological and philosophical traditions and focuses on analyzing the experiences of people surrounding a particular

phenomenon (Creswell & Creswell, 2018). The researcher would aim to explore and add definition to an understanding of the essence of a phenomenon (Creswell & Creswell, 2018). While the current study benefited from the use of interviews, the primary focus was on teachers' implementation of PBL and not on their cumulative experience of a particular phenomenon.

Grounded Theory

Grounded theory allows researchers to approach a topic inductively and refine an emergent theory for how a process or action works based on the experiences of participants (Creswell & Creswell, 2018). This design was particularly relevant to this study; however, grounded theory typically requires multiple stages of data collection (Charmez, 2006). This study on the PBL implementation of teachers required a design that would allow a detailed analysis of the teachers' current practice.

Ethnography

Creswell and Creswell (2018) described ethnography as a design used to seek patterns in the behavior, actions, and language of an entire ethnic group. The aim of this study was not to examine an ethnic group. Therefore, this design was not best aligned to the study. Another disqualifying factor was that the timeframe necessary to do a thorough ethnography would be much longer than the timeframe needed to answer the research questions.

Case Study

As an instrumental case study, the investigation explored the experiences and context of teachers and the administration in implementing PBL practices. This design

entails the detailed analysis of a case, surrounding an activity or practice, or process (Creswell & Creswell, 2018). In a case study, a researcher is bound to a particular time and activity using a variety of data collection methods (Creswell & Creswell, 2018; Yin, 2018). This study allowed me to seek to understand the current nature of the implementation of PBL at PES. A case study aligned best with the purpose of this study as the data collection procedures and framework allowed for the research questions to be answered.

Yin (2018) described a case study as a research design having two primary aspects to its definition. The first aspect has to do with context. Because I was interested in exploring PBL implementation, and the difference between that phenomenon and the context in which it occurs is unclear, a case study was advantageous. The second aspect had more to do with data collection. A case study entails multiple methods or procedures for gathering data. The data from these sources are triangulated during analysis and benefit from a theory that guides the design (Yin, 2018).

Participants

I used the purposeful heterogeneity sampling technique to select the participants for this study. Heterogeneity sampling is a technique aligned to the tradition of qualitative exploratory research where the research question is focused on identifying the essential features of a phenomenon (Suri, 2011). In this study I was considerate of participants' safety, rights, and the integrity of the line of inquiry. The research questions and focus of the research problem necessitated gaining access to the teachers and administration as the primary participants.

PES is a preschool to fifth grade school in an urban community. There are 22 teachers on staff there as well as two administrators. The school serves students from low- to middle-income families. Many of the 350 students come from first- and second-generation immigrant families. The teachers who serve at PES are licensed and qualified for their assignments. With only one exception, they are all tenured with years of experience ranging from 4-20+.

There are currently two administrative faculty members and 22 teachers who are mandated to use PBL implementation. Not all of these individuals needed to be participants as a purposeful heterogeneity sampling technique was employed to determine the sample. For the greatest possible variety in cases, one teacher per grade level team was selected (Suri, 2011). In accord with Creswell and Creswell (2018), a purposeful sample size for a case study was seven, which included five teachers and two administrators. Based on the purpose of exploring PBL implementation among teachers throughout PES, teachers from grades K, 2, 3, 4, and 5 contributed their experience of PBL to the study. As I am part of the Grade 1 instructional team, the study excluded Grade 1 teachers. I chose the sample size deliberately according to the recommendations set forth by Creswell and Creswell (2018). Inclusion criteria were as follows: (a) participants needed to be available for one classroom observation and a 60-minute interview, (b) they had to be at least 21-years-old, and (c) they needed to be a grade-level homeroom teacher in K, 2, 3, 4, or 5.

Protecting Participants

In order to ensure the protection of participants while still conducting a rigorous case study, the objectives and protocols facilitating the study were communicated thoroughly to everyone involved. Communication with participants occurred primarily through e-mail (see Appendix D). However, in-person communication aided in clarifying details in the e-mails and addressing any questions that participants may have had throughout the process. I presented the study to the administrators through e-mail for approval (see Appendix E). I kept administrators and participants informed via e-mail of the two observations and 60-minute interviews as well as the safety and confidentiality measures that would be used to protect them.

At the start of each interview, I reminded participants that any personally identifiable information linking them to their responses would be kept confidential. E-mails served as the primary mode of communication with participants to arrange meeting times and dates. Upon consent, I coordinated observation opportunities with participants based on when they said they would be implementing PBL practices because finding optimal times to learn the most is an essential criterion for selecting cases (Stake, 2010; Yin, 2018). Once informed consent was attained from all participants, I sought Walden University IRB guidance (IRB #01-28-20-0652665) and approval. Following IRB approval, I proceeded with the research.

Data Collection Methods

Observations

Sensitive to cases that may be considered typical as well as those that may prove to be outliers, observations of PBL instruction within the context may be beneficial (Ravitch & Carl, 2016; Stake, 1995; Yin, 2018). This researcher made informants aware of the focus of the study and arranged a time that they thought would be optimal to observe PBL practices. Observing the teacher's behavior within the mediating context provided data that helped to address the research questions. The study used fieldnotes and these observations to inform the interview questions. Specific questions were aimed at having the teacher explain the meaning of what was observed, thereby facilitating an accurate interpretation of the data.

Justification. Observations provided real-time, context-rich data that were necessary for addressing the research questions (Stake, 1995; Yin, 2018). In this study, the research questions asked about the immediate context of PBL implementation. Therefore, direct observation was a valuable source of data. Once triangulated adequately with data from other sources, observational fieldnotes proved to be valuable validation of insights (Ravitch & Carl, 2016).

Source of instrumentation. Data collection instrumentation is often designed by researchers to fit the specific focus of the study at hand (Creswell & Creswell, 2018). The observation protocol was researcher-designed to focus on addressing the research questions posed in this study. The research questions highlight a need to observe the

practices that teachers implement and those that they omit. Direct observation is a useful source of data for gaining insight into current and relevant phenomena (Yin, 2018).

Sufficiency of method. The research questions that drove this inquiry could not be answered by using only archival data or historical documentation. As such, direct observation is both sufficient and necessary to capture the relevant behaviors of participants (Yin, 2018). Observation of specific practices in classrooms may also be able to capture what participants may not reveal through interviews alone (Yin, 2018). Data gathered through observations and interviews may be used to complement one another (Creswell & Creswell, 2018; Yin, 2018).

Collecting and recording data. After arranging an appropriate time and place to observe PBL practices with the teacher, this researcher conducted direct observations of 45-90 minutes. While aiming to generate descriptive field notes, this study attempted to capture the events and environment with as few inferential notes as possible. These were recorded on a document generated using Google docs and saved in a password-secured account. An observation protocol was used as a tool to record data on the behavior of the participants as well as reflexive notes (See Appendix A).

Generating and gathering data. Observation protocol guided the notes taken based on the behaviors exhibited by teachers within the instructional setting (Creswell & Creswell, 2018). The protocol includes prompts to highlight the visible practices as well as any use of instructional materials. In addition to descriptions of the behaviors observed, the field notes included information about the physical layout of the space used

for PBL instruction. Part of the checklist in the observation protocol required notes taken on the time used on certain practices during PBL lessons.

Interviews

Interviews of participants are necessary for understanding the meaning assigned by teachers to the practices they employ regarding PBL implementation (Ravitch & Carl, 2016). Following the classroom observation, a separate meeting with participants was used to conduct semi-structured interviews. By using semi-structured interviews, I was able to be responsive to the feedback that participants gave. Serving also as a time for debriefing teachers on what was observed, these teachers were also invited to explain certain behaviors and their relationship to the fidelity of PBL implementation within their classroom. Interviews provided an opportunity to gain potentially clarifying data. These interviews were audio recorded and transcribed using Nvivo as a means for accurate coding (Creswell & Creswell, 2018). The software was used to identify themes that emerge from interview transcripts.

Justification. Where the observations will help attain data on what happens in the classroom and how things are implemented, the interviews during this study will provide essential data about why certain things were implemented (Yin, 2018). Independent of observations, interviews would still be necessary for the study at hand as they are ideal for ascertaining data about the perception and experience of participants (Yin, 2018). The research questions highlight a need for understanding the way teachers perceive PBL implementation. Through 60 minute semi-structured interviews, the goal of getting teacher perception data about PBL implementation was achieved.

Source of instrumentation. Shorter interviews for use in case studies make it necessary for researchers to adhere somewhat strictly to an interview protocol (Yin, 2018). Adhering to the interview protocol adds consistency and focus to the interviews (Creswell & Creswell, 2018; Yin, 2018). There is a researcher-designed protocol for interviewing teachers that allowed for teachers to report on the critical components of PBL instruction present within their classrooms. The interviews were also an opportunity to debrief teachers about what was observed in their classrooms and gain insight into how they would inform this researcher's interpretation of those observations.

Sufficiency of method. The questions driving this research required data to be gathered about teacher perception of their PBL instruction and curriculum. The specific questions that make interviews necessary allow teachers to provide information about the critical components of PBL present in their instruction and curriculum. The exploratory nature of the investigation lends itself more directly to interviews than alternative methods such as surveys or questionnaires. While interviews alone would not sufficiently address the purpose of this study, namely, to explore the PBL implementation at PES it is an essential source of information when coupled with observation data (Yin, 2018).

Collecting and recording data. Following IRB approval and written permission to conduct the study at PES by the principal, I discussed the study with participants and gained informed consent to proceed. These interviews were pre-arranged via email. In both the emails with participants and the beginning of each formal interview, participants were informed of the purpose and privacy measures in the study. Participation was

voluntary, and participants could withdraw at any time. The interviews themselves were 60 minutes long and took place at a convenient time for participants.

Generating and gathering data. The interview protocol I used added greater consistency and standardization to the study (Stake, 1995; Yin, 2018). The questions were sent to participants in advance. Interviews were recorded using the iPhone voice memo application. These verbal recordings were reviewed and transposed into written transcripts for analysis. NVivo software were utilized to code for the themes. Creswell and Creswell (2017) recommend tools such as these to assist in qualitative analyses due to their ability to help in locating and counting the instances a particular defined code occurs within the textual data. This type of assistance can be especially useful when dealing with large data sets and increasingly complex code groupings (Yin, 2018). A journal was kept to include notes on common responses and reflexive memos.

Document Review

The relevant documents that the school already has were included in this study (Ravitch & Carl, 2016; Stake, 1995; Yin, 2018). These included PBL planning templates that the school's administration has made available for teachers; data team minutes in which teachers note their next steps for implementation and other documents that provided insight into the implementation of PBL. Since the review of relevant existing documentation can take longer than expected, participants were be enlisted to watch for documentation that they think are relevant to PBL (Stake, 1995). The collection of documentation was facilitated through the use of Google Drive, as it can be a secure way to share documents easily.

Justification. The stability of using documentary evidence is well established in the case study design (Yin, 2018). At PES, much of the planning and resource material that administrators had provided to teachers on PBL is readily available in their Google Drive. This availability means that gaining access to such documentation for inclusion into this study was feasible and unobtrusive compared to other sources of data (Creswell & Creswell, 2018; Yin, 2018). Qualitative documentation in the form of meeting minutes and notes that teachers have generated for use in PBL implementation were necessary to include in an exploratory case study focused on analyzing the critical components present in the implementation.

Collecting and recording data. Once the school administrator provides written permission, I will be able to do searches of the PES Google Drive. I searched primarily for documentation relevant to the teachers' planning process of their PBL implementation. Documentation included articles about the processes involved in the PBL curriculum and instruction (Creswell & Creswell, 2018). The search also included templates that teachers were encouraged to use for planning and measuring the quality of their instruction. Data team meeting minutes from grade-level teams reflecting on their practice were also included in the study. Electronic copies of all documentation were kept in a similar Google Drive file for specific use in this case study.

Generating and gathering data. The documents from the school's online drive served to augment the data gathered through interviews and observations (Yin, 2018). Documentation about PBL, however, provided insight into the critical components that teachers may be omitting from practice. Critical components that were suggested by

these documents were inquired of during interviews, thus influencing the way notes from classroom observations were interpreted. By treating the information gathered through a review of documentation as leads to be investigated rather than data to be taken at face value I used documentary evidence in a credible way (Yin, 2018).

Role of the Researcher

My role at PES is currently as a teacher. I do not serve in a role that evaluates teacher performance or exercises influence over the purchase of curricular materials for the school. For this study, my role was as the sole researcher. This included executing the tasks about safety and privacy. I gained access to the data sources by writing letters of appeal to explain the processes and rationale behind the study. Additionally, my role was to conduct interviews and observations. Once I collected the data, I analyzed and discussed the findings in this final written report.

Reflexivity is especially necessary when conducting a qualitative case study, as it requires the researcher to interpret the data (Creswell & Creswell, 2018). To counteract potentially skewing the data, I recorded memos that clarify my observations about the process as well as my relationship with participants within the study. If any experience became relevant to the data, I would have used memos about my reflections on those experiences.

Data Analysis

It was essential to employ a data analysis strategy that both aligned with the purpose of the study and lent credibility to the investigation (Yin, 2018). Yin (2018) advised several practices that facilitate the data analysis process: a) array and display data

in different ways, b) watch for insightful patterns, c) address rival explanations and interpretations, and d) attend to all the evidence. By applying these critical practices to the data collection methods chosen for this study, I ensured the reliability of the interpretations found in the final analysis. I also applied the broad steps that Creswell and Creswell (2018) advised about qualitative research: a) Organize and prepare all the data for analysis, b) Read or look at all the data, c) Start coding all of the data, d) generate a description and themes, and e) representing the description and themes. As data is collected, it was organized by type, participant identifier, and date. The resulting files were kept secure in a password protected computer drive to ensure participant privacy.

Analysis Strategy

Yin (2018) highlighted the need to have a strategy for analyzing the data before collecting any data. In order to ensure reliability throughout the study, the steps and procedures need to be recorded (Creswell & Creswell, 2018). Using the advice outlined by Yin (2018), as I collected the data, I formulated and answered smaller questions leading up to answering the main research questions. I worked progressively toward answering the main questions by resting the tentative conclusions of these smaller related questions on the evidence gathered. I displayed the evidence through a narrative of the analytical process so that readers may assess the reliability of the conclusions.

Observations. Using the observation protocol, I collected data from direct observations of any PBL implementation that occurred in the classrooms. During this time, I took field notes and recorded the date. I initially be organized these notes and observation records by date. As the data from the interviews, observations, and

documents were collected and were ready for coding, I looked for patterns and recurring concepts. As it helped organize concepts and patterns, I focused first on the data that was most relevant to the research questions.

As suggested by Creswell and Creswell (2018), when all the data from observations were collected, reviewed all of the field notes. First, I reviewed the notes for recurring mentions of specific practices that were present in multiple classrooms. I saw similarities and differences among the observed practices. The interview protocol included questions about the purpose of the practices mentioned in the field notes.

Interviews. Following each observation, I conducted a semi-structured interview with the participants. During such interviews, it was necessary to get insight into teacher's perception of the specific practices that were observed in their classroom (Rubin & Rubin, 2016; Stake, 1995; Yin, 2018). I followed an interview protocol that allowed me to probe for data about what critical components of PBL were present in the teacher's practice. Questions in the interview protocol also inquired about their perception of the critical components of PBL that were present in their practice that may not have been observed. In addition to using an interview protocol, I recorded the participants' responses in order to transcribe and review the data. Transcripts were coded according to topics, concepts, and events. These addressed the research questions (Rubin & Rubin, 2016). By generating transcripts of the interviews, these data sources were more easily arrayed in different ways during the analysis process (Rubin & Rubin, 2016; Yin, 2018). Transcripts from recorded interviews were analyzed through NVivo software to identify

themes throughout the data. I analyzed all the data from this source but looked specifically for patterns or quotes that support observation data.

Documentation. Documentary data was gathered from the school's online drive as well as from hardcopy files that participants shared related to PBL implementation. From these files, I organized data by participant identifier, and the date it was generated as well as by specific categories. These categories included templates, rubrics, PBL literature, planning guides, and meeting minutes. By using these categories to organize documentation, I was able to code and analyze the data (Creswell & Creswell, 2018; Yin, 2018). I looked primarily for recurrent concepts that led to themes concerning the critical components of PBL and indicated the relative presence of these components within the participant's practice.

Rival interpretations. Discrepant cases were handled using multiple strategies to test for validity and reliability. By using these strategies, I was able to ensure that the findings were accurate and that they are presented in a way that allows the reader to assess the reliability of any conclusions (Creswell & Creswell, 2018; Rubin & Rubin, 2016; Yin, 2018). These strategies include triangulation, member checks, clarifying researcher bias, and presenting rival interpretations (Creswell & Creswell, 2018; Yin, 2018).

Triangulating data from multiple sources served to substantiate the claims and conclusions made after careful analysis of the data (Creswell & Creswell, 2018). I triangulated data taken from interviews, observations, and documentary evidence in order to reveal the recurring concepts and themes present within the data. In concert with

another that presents rival interpretations, this strategy helped address potential threats to validity.

Member checks allowed me to further ensure that the data collected were accurate. After I transcribed the interviews, I sent them to participants to check for accuracy. I also sent participants summaries of my findings throughout the study so that participants could either confirm or challenge the interpretations of the data. By doing so, I was able to address rival interpretations in my discussion of findings (Yin, 2018).

In addition to providing rich, thick descriptions of the settings I observed, I included positionality memos in order to clarify any bias I may have during the study (Creswell & Creswell, 2018; Yin, 2018). Creswell and Creswell (2018) asserted that qualitative research requires the researcher to make their assumptions, worldview, and any potential bias known. For the sake of validity and reliability, my positionality memos were collected as part of the data collection process and reviewed during the data analysis stage of the study.

Limitations

Reliability and transferability with observations can be a potential limitation of this study (Ravitch & Carl, 2016). By employing a suite of strategies aimed at addressing any threats to validity or reliability and drawing from multiple sources of data, the reader will be able to see the evidence that supports the findings of this research (Creswell & Creswell, 2018). Another potential limitation is of this research is the sample size. Though sufficient for the size of the school under consideration for study, any

conclusions may not be sufficient for making generalizations about the district or the state.

Data Analysis Results

The purpose of this qualitative case study was to explore the nature of PBL instruction and curriculum at PES, focusing on the gaps between the intended use of PBL and the actual practice at PES. To fit the purpose of this study a purposeful sampling of the teaching staff and administrative staff served to determine a set of participants. One teacher from grades K, 2, 3, 4, and 5 were selected from among the 11 teachers who were invited to participate in the study. All of the participants met the criteria to take part in the study by being a homeroom teacher at PES. Perception data was gathered from them through open-ended semi-structured interviews in addition to documentary data and classroom observation data.

Table 1

Demographic Data of Participants

Participant code	Years in education	Years at PES	Content area taught
A01	26	9	NA
A02	20	1	NA
01	30	27	ELA
02	27	8	ELA
03	6	5	Science
04	19	3	Science
05	14	14	Social Studies

Before proceeding with the study, IRB reviewed and approved of the informed consent submitted. Both administrators and each teacher from grades K through 5

(excluding 1st grade due to possible conflict of interest) was emailed an invitation to participate in the study. Those interested, emailed back requesting more information and received a softcopy of the consent form. Participants had to read and agreed to the terms described in the consent form before they were able to schedule an interview.

Two administrators met with me to be interviewed. The administrator interview protocol was used to conduct the semi-structured interviews about their perceived intentions regarding PBL as well as the nature of PBL at their school. Notes from these interviews were stored on a password-protected laptop along with the transcriptions from the subsequent recordings. Nvivo 12 was used to transcribe and code all the interview data for this study.

Preceding the interviews of the teaching staff, data were collected from classroom observations. Field notes included data about the instructor's behavior as well as the elements in the classroom environment. These data were also stored on a password-protected laptop and analyzed using Nvivo 12. The following interviews were conducted using the teacher interview protocol and discussed each teacher's perceptions of PBL, their practice of PBL, and their perceptions of what may have transpired during the classroom observation.

Building on the problem and research questions that focused the study, the meaning of the data provided insight into the nature of PBL at PES. The problem addressed in this study was that teachers were not implementing PBL with fidelity. The research questions guiding this study were designed to explore the nature of PBL implementation at PES. The questions were designed using Century et al. (2010) FOI

conceptual framework. The framework served to enable the researcher to use qualitative data to identify critical components of an approach in order to determine the FOI. Triangulated data from observations, interviews, and documentation were analyzed to explore the possible gaps between PES' intended and actual practice of PBL. Member checks were also employed throughout the analysis process, as interviews were transcribed, in order to ensure the accuracy of the conclusions.

As the research questions were applied to the data, tentative conclusions to the subquestions were formed. Themes and patterns began to emerge from the answers to the subquestions as the data were coded to the research questions. All participants were asked about the critical components of PBL at PES as well as the intentions of certain practices that were either observed or mentioned during the interview. Recurring concepts were recorded as themes during the data analysis process.

To explore the nature of PBL implementation at PES it was necessary to identify what PBL, when implemented with fidelity, was intended to accomplish. The administrators expressed that PBL, when compared to more traditional teacher-centered approaches, would be more effective, engaging and efficient (See Table 2). Another theme in the interview data was that, according to administrators, PBL is particularly well suited to the particular demographics that make up the student body (see Table 3). This theme would also resonate later in the data collected from the teaching staff (see Table 6). Related to this theme of PBL being most appropriate for the school's majority demographics, is the concept of accessibility. One administrator explained that the

school's intention for PBL is to grant greater access and equity to populations of students who were traditionally underserved (see Table 4).

Administrators not only explained their reasons behind practicing PBL but provided information about their aspirations for how PBL ought to occur at PES. They expressed that it was their intent for the school curriculum to be comprised of units designed in-house, standards-based, and vertically aligned among the different grade levels (see Table 3).

Research Questions

RQ1: According to administrators, what is the intended use of PBL instruction in the curriculum?

Both administrators (A01, A02) indicated that PBL is meant to be more engaging and effective than more traditional approaches. Based on their reports, there are perceived gaps in how engaging the curriculum would be apart from PBL elements. The school administrators are also concerned with the transient population in the student body. These are students that either do not remain at the school for the duration of the year or enter school at a time other than the beginning of the year. It is the intent of PES administrators to use PBL to teach integrated units of instruction for the sake of efficiency.

Table 2

Theme 1: Project-Based Learning is More Engaging, Efficient, and Effective Than Traditional Methods

	gaps	engagement	efficient
A01	I think we started going in to PBL in one because we saw that there were gaps in our so-called mandated texts.	I think some of the mandated texts don't always have very engaging units for our kids in Hawaii and I think I could see where some of the teachers felt like it wasn't that exciting to teach these things. So I think there was an appeal… but also being more engaging with what we're teaching…	So, the idea of trying to combine topics and disciplines like language arts and science into a unit or math and art and language arts into a unit was appealing to a lot of us in the school. So I think there was an appeal for, you know, just being more efficient in our teaching, but also being more engaging with what we're teaching, looking at what's around us, our environment, the people.
A02	Yeah, I would say whereas traditional means you have a stated instructional method, whether it be worksheets or you do this book report or whatever it is. I think PBL allows more flexibility because some of the differentiation should be built in.	I would say that it is a structural approach that aims to break free of the traditional text book worksheet model and move towards more. An approach that's more interesting and more connected for kids.	We have some transient kids that come in and out. And so, it's a good way to incorporate a lot of different skills at one time.

The PBL practices are also intended to fill gaps in how effective the curriculum is in reaching the students in the high English language learner demographic. As was previously mentioned, A02 noted that transient students merit the use of PBL for its ability to allow teachers to address multiple skills in less time. PBL is also meant to benefit those students who come from households with low SES. Both administrators express that the PBL practice at PES should, by definition, integrate scaffolds and differentiation that better meets the needs of ELL students.

Table 3

Theme 2: Project-Based Learning is Especially Effective for the Particular Students at Pacific Elementary School

	Transient	Low SES	ELL
A01			It should be rigorous, even at the level, even at a lower level of language learner learning English. You know, it can still be rigorous for them.
A02	We have some transient kids that come in and out. And so it's a good way to incorporate a lot of different skills at one time.	I think the school feels that PBL is a good way to reach our specific population that we have here, including ELLs low socio economic status kids.	I think the school feels that PBL is a good way to reach our specific population that we have here, including ELLs low socio economic status kids. You don't have to learn a lot of English. You just have to have some passing knowledge and not everyone [needs to] be on the same reading level to participate in PBL.

Administrators' explanations of their intention for the way PBL is practiced at PES included thoughts about how PBL can provide greater access. A01 conceives of PBL implementation in terms of what educators determine are the priority standards, based on what their students' needs are and scaffolding to meet those needs. Using the common core state standards, the curriculum maps that the teaching staff develops provides a framework for designing PBL units that are vertically aligned. A02 cites the school's efforts to align with the state's goals for access and equity by implementing PBL with fidelity.

Table 4

Theme 3: Project-Based Learning is to Grant Greater Access and Equity Among Students at Pacific Elementary School

Participant	Interview		
A01	You know, for our community of learners in this school, it may not be the grade level standard, it might be scaffolded.	But if we're going to design units PBL, then I, which they would start with our priority standards because those priority standards are not necessarily. They're based on our state standards and our Common Core standards. But they're not necessarily created in the way that they're presented in the common core.	So, there should be, no if you looked at it objectively from K to 5, you should see topics that are different and engaging, you know, P based. But the standards should be aligned from K-5 as well from our maps.
A02	So, it gives more access to kids. Specifically, to the type of kids that we have.	Absolutely it's in line with the state's goals for equity of access.	

Critical Components

RQ2: What is the nature of PBL implementation at PES?

Subquestions were used in this investigation to find out what teachers and administrators identify as the critical components of PBL. Observations of classroom instruction were conducted to identify which critical components were present, which were not, and what adaptations there may be. Data from participant interviews and documentary sources identify collaboration as a critical component of PBL (see Table 5). This component is evident in participants' report of small groups (01,02, 03, 04, 05, A01, A02), discussions (04, 05, A01, A02), and peer tutoring (02).

Table 5

Theme 4: Collaboration is a Critical Component of Project-Based Learning at Pacific Elementary School

Participant	Interview		
A01	I think collaboration among the students is a big part of it.	And if the kids weren't 100 percent accurate. That's okay. Because a lot of I think but PBL, we want the kids to be able to collaborate.	
A02	I think you would look for kids interacting with each other, because that's a hallmark.		
01	So, a small group. Like for the ones that just came we almost like had different lessons.	They just they think it's the greatest thing ever. And they don't care who they work with.	This is your partner. That's who you work with. But all of them do get excited.
02	And now they're driving, they're discussing, they're learning from each other, going through the book.	A lot of times is just being able to collaborate nicely with the other their partner group and speaking nicely with each other.	I think it has to have some kind of student discussion or students need to be talking to each other. I don't think it can be done strictly with like written material.
03	I guess I expect them to have a little more leadership skills. Taking responsibility when they are working with partners, being able to focus on even being able to work hard to they should be able to create questions on their own.	And that they're willing to act as community interpreter, translator.	
04	I'm not going to be doing it for a very long time before the students have a chance to talk to each other about what we just learned or anything they wanna share.	And then every time we do a collaborative project, we go over it again. And then it kind of helps out other kids end up talking to each other.	
05	You know, because they have to plan. They have to agree to disagree.		

Similarly, student-centered exploration was another theme evident in the data (Table 6). Participants identify this theme as being present in their PBL implementation through the way students voice and choice is leveraged (01, 02, 03, 04, 05, A01, A02). Participants 02, 03, and 04 explain that there are close ties with collaboration and student voice. The students are instructed through PBL to manage their time and make wise choices about who their partners might be. In the case of 02, students were encouraged to conduct themselves in ways that would allow them to work with anyone in their class.

Table 6

Theme 5: Student-Centered Exploration is a Critical Component of Project-Based Learning at Pacific Elementary School

Participant	Interview		Observation
A01	So, I think it definitely focuses on the interests of the students. Because that lead to the kids inquiry, I think, starting with the interest of the kids.	I think for the teacher being more of a facilitator of that process and not so much a provider of information or providing of the answers, you know, that's the whole inquiry, just like you figure it out. Right. And if the kids weren't 100 percent accurate. That's okay.	
A02	And so, it's not necessarily that the teacher is dictating; you will pick from these choices. There should be some flexibility for the kids to come up with that themselves.		
01	So I would define it as where the students work together and they would choose like a topic, like either they choose or I choose. And we would get information.		
02	A lot of the time it's learning by mistake. Because we don't want to give them too much because we actually want them to explore it and learn it.	I guess their voice and choice comes mostly with how they answer their questions, really, I'm not telling them what questions to ask, you know.	Another student, “What is an expository text again?” First student repeats her explanation while the other three students record it in their notebooks.
03	So that's another skill to being able to choose someone that you can cooperate with and work with.		
04	Well, it has to get more multi subject areas. I guess I'm forced to say that it has to relate to grade level standards. I think the students are very interested in it.	And again, I have to go back, and I have to say that I think the main reason is that they are all interested in what they were learning about.	
05	And it's like the reason why I picked that one was because I know there's some artistic kids in here who just like to do art and they want to. They want to do something with art.		

Just as administrators recognize the high percentage of ELL students at PES, teachers realize the importance of languaging (Table 7). Languaging or language acquisition became a theme in the data (01, 02, 03, 04, 05, A01, A02). Participants report that to help students collaborate with one another and explore the content effectively guided language acquisition is essential to their implementation of PBL (Table 7). The high ESL population at PES has become a contextual factor in the nature of PBL on the campus (see Table 7). For example, in the case of 03, we found that technology was used to provide visual aids for students to develop language and content area proficiency (see Table 7). 04 explained that GLAD (guided language acquisition development) strategies were relatively new to that class but that building language proficiency helps develop the discussions on which his PBL practice depends.

Table 7

Theme 6: Languaging is a Critical Component of Project-Based Learning at Pacific Elementary School

Participant	Interview		
A01	It should be rigorous, even at the level, even at a lower level of language learner learning English. You know, it can still be rigorous for them.	I think you, the teacher being a little bit more in tune to our students might know that, you know, these are ESL kids or maybe even the special education kids.	
A02	I think the school feels that PBL is a good way to reach our specific population that we have here, including ELLs low socio economic status kids.		
01	You don't really hear too much communicating or talking, you know, with this bunch of kids.	I don't know, it's because their oral language skills are not developed. OK. Or they don't know how to really express themselves.	
02	Yeah, so we always had that one group, so they Joseph was sitting with the one group with like my real my ELLs.	So, we will ask basically the questions that the kids were asking each other, we'll ask them because they don't quite have that language skills yet to get that far.	I guess right now our PBL is pretty much GLAD
03	Even when they need visuals or something. For example, we did humpback whales recently. They used it to help them to create drawings.		
04	I guess we can ask questions of their translator. I mean, if they don't understand and I notice that I worked really well for like my Chinese speaking students.	Oh, it is the first time I'm really trying to use the GLAD strategies.	
05	I still use that occasionally. I mean, especially if I see something like that needs improving.	I think languaging is important, too, like in terms of how students communicate with each other.	How would I define PBL? A safe place to make mistakes. Uh, collaborative communication.

Authenticity was another conceptual theme in the data (see Table 8). All participants describe the nature of PBL at PES as having products and presentations based on real world scenarios. These products are described as being necessary for implementation. The planning and documentary data I collected also bears this out (see Table 8). As an instructional component, participants 02, 03, 04, and A01 note that the direct instruction that introduces the topic must be brief enough to allow students time to explore the content.

Table 8

Theme 7: Authenticity is a Critical Component to Project-Based Learning at Pacific Elementary School

Participant	Interview data		
A01	We want the kids to create some kind of a product or report of some kind. And that's the experience that I think is important.	And as a unit, there should be some sort of an ultimate. Sharing whether it's a product of some kind that the groups have developed or it's a report. But there should be some, you know, something that you can touch and see that should be shared.	
A02	I think you have to have some goal for like if you're PBL lesson stretches for two weeks, then you have to have some short-term goals for you and accomplish this by this date. This type of... Product and whatever requirements you have for that.	The way I envision PBL is that you have some overarching goal, but there's flexibility for how kids get there and there's flexibility perhaps in what type of product they come up with.	
01	And then probably I think we'll do a like a project with maybe for building, they could build, or they could even draw something.	In kindergarten, maybe we could use pictures and then they would present it here as a group or as a class.	
02	But like we're doing our leaders and so our PBL for our leaders is… In the end, they're going to have to do like a child published book.		
03	The problem they could solve using magnets. They would also create a solution.	If not, magnets for them are probably just toys that stick to the whiteboards. So we are just seeing a real life application.	The end project, which could be either presentation, poster, brochure.
04	Like there should be some, either hands on stuff, or pictures, or what we call realia.		
05	Real world experiences, I guess, like tying it into like the museum curator, you know, because we're going to do like a game of life so we're talking about careers and stuff like this.	Definitely. And it allows them to apply what they've learned in the classroom and to project.	They want to do something with art. And just being able to see his occupation, you know, maybe some of them might go. That sounds interesting.

When discussing the structural or curricular aspects of PBL, nearly all participants name the standards as a critical component (see Table 9). 03 discusses the standards as they provide a starting place to plan and conceive of appropriate assessments. 04 mentions the close connection that standards and integrating multiple content areas have in the planning process for their PBL implementation. A01 mentioned the essential role that standards play in PES' PBL design and implementation as a starting point for conceiving of new PBL units (see Table 9).

One notable outlier in the data is participant A02. A02 never mentions standards. However, A02 does discuss PES' use of data team meetings. According to A02, data team use at PES illustrates the relationship between content area standards and PBL implementation. The time spent conducting data team meetings were spent examining student achievement data. This consisted of teachers analyzing the skills and competencies that students were developing as a result of the instruction provided to them. While standards may be where instructional planning begins, for A02, teachers' focus on raising student achievement is emphasized when they consider how PBL is implemented (see Table 9).

Table 9

Theme 8: Standards Have a Critical Role in Project-Based Learning at Pacific Elementary School

Participant	Interview		
A01	So it might be a supporting standard, but it should be standards based.	I would say those priority standards should be where we focus and ensure that we're hitting those standards in our curriculum, whether that's through PBL and or other wonders and stepping stone text, that's fine.	But if we're going to design units PBL, then I, wish they would start with our priority standards because those priority standards are not necessarily, - they're based on our state standards and our Common Core standards - But they're not necessarily created in the way that they're presented in the common core.
03	As projects that are based on real world problems and then from my understanding is at the end they create a culminating project to show their understanding of the standard.	But it would also be the same as in that unit because we start with the standard.	That was actually more just of a. It wasn't necessarily an entire PBL unit. It was more of a uh small lesson based on just one standard. It was holding an entire unit.
04	I guess I'm forced to say that it has to relate to grade level standards.		

Omissions

Omissions in PES' PBL implementation are the critical components that were present in the interview and documentary data but were not present in the observation data. 01 mentions that inquiry and collaboration are present in the instruction though no inquiry was observed (see Table 10). Collaboration was not observed as part of the lesson. However, the interview data describes that inquiry, though present and important, looks different for students in a lower elementary classroom. 01 explains that before students can be expected to effectively engage in inquiry to formulate complex solutions to authentic projects, they must first gain practice asking and answering questions (see Table 10). Similarly, in order for the youngest students at PES to collaborate effectively, they must first receive instruction in basic communication skills.

Though discussed in interviews, integrated content area instruction was not present in observation data for certain cases. 01 was observed teaching an ELA (English language arts) lesson and integrated no other content area standards (see Addendum C). In contrast, 02 had students engaged in an ELA lesson wherein they discussed a text that incorporated social studies content (see Addendum C). In the other classes observed, there were language content standards being taught alongside either science or social studies standards.

Another notable omission is the use of reflection before, during and after the project. In every case, though inquiry may have been used, the kinds of reflection found in the documentary data was not observed in the classrooms. These planning documents are useful in exploring the nature of PBL instruction at PES. Participants suggest in their

discussions of collaboration and inquiry that reflection does happen. However, according to 01 and 02, reflection can be irregular and informal throughout the course of the project (see Table 10). Knowing more about the perceived practice of PBL among participants will help complete this study.

Table 10

Theme 9: Apparent Omissions Affect the Nature of Project-Based Learning Implementation

Participant	Interview		
A01	You know, for our community of learners in this school, it may not be the grade level standard, it might be scaffolded.	But if we're going to design units PBL, then I, which they would start with our priority standards because those priority standards are not necessarily. They're based on our state standards and our Common Core standards. But they're not necessarily created in the way that they're presented in the common core.	So there should be, no if you looked at it objectively from K to 5, you should see topics that are different and engaging, you know, P based. But the standards should be aligned from K-5 as well from our maps.
A02	So, it gives more access to kids. Specifically the type of kids that we have.	Absolutely it's in line with the state's goals for equity of access.	

Perceived Stage or Nature of Practice

Each participant described their practice of PBL as being toward a beginning stage (See Table 11). A01 explained that PES teachers have all designed and implemented PBL but have not yet reflected on their work or redesigned their units based on that reflection. A02, 03 confirms the school being in the beginning stages (see Table 11). A02 and 02 also mention that for some in the school, there are concerns over the time constraints that PBL implementation can place on teachers. 05 offered that part of the difficulty of practicing PBL is a need for training (see Table 11).

Table 11

Theme 10: Faculty Perceives Project-Based Learning Implementation to be in It's Beginning Stages at Pacific Elementary School

Participant	Interview		
A01	I think we've had every grade level design and implement. I don't know if we've necessarily reflected enough to refine the unit plans that we have designed.	New plans. I think, you know, technology always introduces new ideas to teachers and grade levels.	I'd like to get to a point where every grade level does, you know, one or two PBL units a quarter.
A02	I think we're in the beginning stages of it.	But I don't think it's embedded in the way that maybe we wanted to be.	I think some teachers don't know a whole lot about it and need to know more.
01	Very simple. I think I would have to model. I would have to model a lot.		
02	Poorly.	I have these wonderful plans in my head and these wonderful ideas of what I want to do. And then I start to plan and I go, Oh my God, this is going to take me for ever.	I guess right now our PBL is pretty much GLAD, If you can even call GLAD PBL.
03	I would say, well, because I'm still learning.	Not repetitive.	
04	Oh, it is the first time I'm really trying to use the GLAD strategies, not just because I had to, but I actually going to teach using the GLAD strategies.	Very irregular, not consistent.	
05	Beginning in the beginning stages.	For me, it's hard to pick up something that ... like auditory and just like listening to it. I have to see it and actually, you know. Yeah. So I think it would be good if I could see somebody who is pretty seasoned.	

Adaptations and Discrepant Cases

A01 maintains that adaptation is expected and acceptable at PES (see Table 11). Explaining further, A01 expects that PBL components be practiced across content areas as they would be useful in a variety of lessons regardless of the discipline being taught. For the purposes of this study, therefore, a summary of instances when PBL was adapted will be useful. Discrepant cases, or instances when observed behaviors were significantly different from the other cases, are also included.

Technology was used in every classroom to facilitate instruction and collaboration in a more efficient way (see Table 11). In cases 04 and 05 the technology enabled small group collaboration that would otherwise have been possible through sharing hardcopy texts as in the case of 03, and 02. Technology was used in case 01 to facilitate the whole group instruction (see Addendum C). Students used recordings to respond to and practice using certain language. So prevalent was the use of technology for instruction and assessment that it was considered a possible theme or critical component. However, as the documentary data does not mention technology as an explicit enough component of PBL, it is more likely that PES' use of technology is not directly correlated to their use of PBL (see Addendum D). None of the interview data reflects that teachers or administrators conceive of technology as being necessary for their practice of PBL.

01 was not observed implementing inquiry or collaboration in the way documentary data describes inquiry and collaboration. However, interview data reveals that the students in this class require direct instruction in prerequisite foundational skills (see Table 12). A review of the documentary data alongside the observation and

interview data reveal that the use of certain critical components are adapted to be appropriate for students in the earliest grade levels at PES. A02 posits that implementation at PES is characterized by a need to balance academic achievement in foundational skills and fidelity in PBL (see Table 12). This is one possible explanation for why implementation is different in the 01 classroom than described in the documentary data.

Table 12

Theme 11: Project-Based Learning Implementation at Pacific Elementary School is Characterized by Adaptations

Participant	Interview	Observation
A01	So if you're just doing a wonders unit, which is fine, too. We are all under school or Stepping Stones, math. There should be PBL practices in place so that maybe that's student collaboration, the central questions and guiding questions for the student learning.	NA
A02	We're focused on student achievement, but what's the best way to test it? Right. I think that's what we're truly looking at.	NA
01	You have to look at your project, you know, your PBL, your project and then see what kind of children you have and then simplify it. Because this year might be different from next year.	Students sit on the floor in three rows in front of the white board while a student facilitates the routine after coming back from recess. Students are led to recite the days of the week.
02	But I take it out of order and do it different ways. I guess it makes more sense to me.	On rear bulletin board student writing is featured under a heading "GLAD" The writing may be a result of a GLAD strategy used in either a whole group/small group setting.
04	And it's like, oh, my, yes. The hard part of it, the glad strategy, is trying to work it in into the other stuff you have to do. You know, like the regular like when I was doing wonders and we have to work. And it's hard to connect to into. And so now that was it.	Students are watching information on the laptop and communicating with each other in what I assume is Chuukese.
05	Definitely more efficient. I think it saves a lot of paper. Tyler: Using Google Docs and definitely because we can share documents back and forth on Google Docs, presentations.	Google translate was used to provide questions and prompts for students. Research using technology.

Summary

The problem prompting this study was that despite being expected to implement PBL, that teachers are not implementing PBL with fidelity. PBL is a learner-centered approach to teaching and curriculum design that increases engagement, inquiry, and is designed to ultimately lead to greater student achievement. This qualitative case study utilized Century et al.'s (2010) FOI as it provides a theoretical framework that allows one to examine an intervention based on its critical components. Two questions were used to explore this problem:

RQ1. According to administrators, what is the intended use of PBL instruction in the curriculum?

RQ2. What is the nature of PBL instruction in PES classrooms?

In the data gathered, themes and subthemes regarding the intentions and practice of PBL at PES are apparent. Themes found in the data include information about meeting the needs of English language learners, increasing engagement, critical components of PBL, omissions or adaptations, and the perceived level of practice that educators have at PES. The intended and actual practice of PBL seen at PES is largely oriented around the needs of the students. Teachers and administrators have explained that PBL is intended to engage students who are learning English as a second language. The critical components that participants described, like collaboration and authenticity, were strategies meant to attend to these students' specific needs. Certain omissions and adaptations were observed. The most notable was the absence of collaboration or inquiry in a kindergarten class as well as the ubiquity of technology in every class.

All the participants described their practice of PBL as being in its beginning stages. One teacher explained that there is a need for a training that includes being able to observe a more experienced teacher's practice of PBL. One of the administrators mentioned that there is a need for implementation to be taken to the next step through a reflecting on previous practice and refining implementation. By addressing the needs identified in the data, there may be a way to better support teachers and increase student achievement.

Section 3: The Project

Introduction

The purpose of this qualitative case study was to explore the nature of PBL implementation at PES. I gained approval to proceed with the study from IRB, and the appropriate informed consent was granted by the participating school where I collected the data. Through classroom observations of teacher-participants and follow-up interviews, I collected data on the nature of PBL at PES. Interview data were also collected from administrators about the perceived implementation of PBL at PES as well as their intentions driving that implementation. Documentary data were collected to provide additional accuracy to the interpretations that would emerge from interview and observation data.

An analysis of the data revealed that PES teachers and administrators perceive their practice of PBL as being in its beginning stages. Some suggested that with ongoing reflection on their instruction, their instructional units could be refined and improved. Analysis also revealed that participants felt there could be improvements with more time and training that includes opportunities to observe other teachers. Interview data also revealed that PES was currently trying to balance the time spent in their data team and articulation meetings between PBL planning and targeted strategies for meeting more specific academic gaps. Based on the analysis of this data, I developed a model for PBL planning and a 4-day PD. In this section, I describe the project's objectives, rationale, the current relevant literature, evaluation process, and possible implications.

Rationale

The problem addressed in this study was that teachers at PES were not implementing PBL with fidelity. It was unclear what the nature of PBL implementation was at PES. An analysis of the data revealed that PBL was implemented in a variety of ways with adaptations and omissions of, what participants identified as the critical components of PBL. As a result, I developed a model for PBL collaborative planning and a 4-day PD for administrators and teachers.

The data collected during the course of this study revealed that both administrators and teachers viewed themselves as being in the beginning stages of PBL implementation. Administrators described how they believed that if given an opportunity to reflect on attempts at PBL and plan refinements to those units, the instruction would improve. An analysis of the data also revealed that teachers lack what they view as the time and training necessary for planning and implementing PBL proficiently. Participants mentioned that they need the opportunity to develop their skill in using PBL by observing others.

I developed a model for PBL collaborative planning and accompanying 4-day PD because participants expressed the need for training in PBL as well as the opportunity to reflect and refine previous practice. Administrators will be invited to attend the PD training because they have expressed that instructional improvement through vertical alignment among the grade level teams was a priority at PES. The training will take place during the school year (once a quarter) to give teachers the chance to implement their plans and observe one another in peer-coaching relationships.

The PD will address the needs apparent in the findings of the study. In three of the four sessions, a summary of the study's findings will be provided. The findings will provide research-based support for the practices introduced and developed throughout the PD. The training will include instruction on how to conduct regular PLC meetings and how to plan integrated PBL units that incorporate language support strategies. The content of the PD will also include conceptual instruction and practical tools for using peer observation as a means for building capacity throughout the year.

The year-long effort will also provide for ample opportunity to reflect and plan successive learning experiences. The model for PBL collaborative planning provides a framework for continuous instructional improvement in PBL. Instructional teams will use site-identified critical components for PBL, such as authenticity, inquiry, and collaboration. Teams will use these critical components in concert with student data to drive the creation of instructional action plans. The model also provides a method for teams to observe and provide feedback to each other.

Review of the Literature

The analysis of the data I collected exposed a need to address the professional development of those implementing PBL. Using ProQuest, ERIC, SAGE and EBSCOhost, I conducted a literature review to better understand how to address the gap in practice. The search terms I used included: *professional development for project-based learning, collective capacity building, professional learning community, learner-centered teaching, communication in professional development, action research, positive intervention, collective efficacy,* and *problem solving in systems theory.*

Learner-Centered Teaching

The development of this project was guided by the research on learner-centered teaching. This inquiry-based, collaborative approach is characterized by a process wherein teams of students are presented with a problem, develop a project that addresses the problem, and present the project to an authentic audience (Kokotsaki et al., 2016; Thomas, 2000). In PD opportunities where learner-centered teaching principles are integrated, teachers' content knowledge and beliefs about PBL improved (Lotter et al., 2020; Maass, Swan, & Aldorf, 2017; Miller, 2017). Even educators who were simply exposed to teaching in a learner-centered environment benefited in various ways (Tsybulsky & Muchnik-Rozanov, 2019). In this project, the PD course will use PBL principles to further instruct teachers on how to better implement PBL.

Though sometimes called inquiry-based or learner-centered, the literature reveals elements of PBL that have commonalities but are not necessarily identical in every case (Lotter et al., 2020; Miller, 2017). One study identified five essential features and used those as a framework for investigating teacher practice and perception (Ngaewkoodrua & Yuenyong, 2018). In their widely used work, the Buck Institute described seven elements to PBL (Larmer et al., 2015). However, in every case where PBL was used for PD, because of PBL's nature of integrating collaboration and inquiry, all participants had a role in shaping what the PD would entail. In this way, PBL can be used as an effective protocol for facilitating reflection and sustainable change (Miller, 2017).

Andragogy

The literature on adult learning, including PD incorporate the concepts of andragogy (Meyers, Molefe, Brandt, Zhu, & Dhillon, 2016; Schattman, Kaplan, Aitken, & Helminski, 2019). Andragogy, as described in the literature, is a learner-centered approach to helping adults learn (Schattman et al., 2019). According to Knowles et al. (2005), the key concepts characterizing andragogy include (a) learners need to know why they need to learn something; (b) learners have an independent self-concept; (c) learners' life experience needs to be acknowledged as a valuable resource; (d) learners are problem oriented and need to know how new knowledge will be applicable; and (e) as growth occurs, the motivation to learn is internal. The literature shows that these elements of andragogy have been utilized in creating PD courses and have yielded positive results (McQuillan, 2018; Schattman et al., 2019; Senyshyn & Smith, 2019).

What stands out in the literature about andragogy and how it is used to design professional learning opportunities is how different it can make these opportunities when compared with PD that may be more common in certain districts. One practice that a PD design informed by andragogy might employ would be focused collaboration among teachers through articulation teams (Capraro et al., 2016). As a practice that is self-directed, professional learning communities have been used to realize greater student achievement through greater fidelity (Capraro et al., 2016).

Professional Development

Literature on PD has yielded evidence that suggests a variety of benefits for instruction and student learning (Lotter et al., 2020). Findings also show that the effects

of certain kinds of PD differ among teachers of varying age, years of experience, and qualifications (Ali, 2018). However, for the purposes of this project, the insights that research provides on what characterizes effective PD for teachers on PBL informed the design of the project.

One insight found in the literature was that sustained PD can be effective when codeveloped with the teaching faculty over time (Hirsh et al., 2015). Another factor that contributes to successful PD is when schools seek the help of external agents to facilitate team-based PD (Gast, Schildkamp, & Van Der Veen, 2017). These findings would inform a PD course that would facilitate teams of teachers to collaborate on employing new practices and reflecting over time. This course, when designed and implemented with an external agent would provide enough of a balance between structure and flexibility to improve collegiality (Gast et al., 2017). Such a PD project would be effective among professionals of varying age and experience.

Professional Learning Community

Though the literature reveals challenges to effective professional learning communities (PLCs), the contributing factors to successful PLCs are nearly universal. The challenges for facilitators to conduct successful PLCs included the need to avoid being perceived as experts and sustaining a collegial rapport with participants while remaining in a position to offer constructive criticism (Klehr, 2015). Collaboration, self-exploration, learning autonomy, and leadership were found to contribute to effective PLCs (Sargent, 2015; Somprach, Tang, & Popoonsak, 2017). This projects' design

depended on leveraging the factors that literature suggested were beneficial while avoiding those characteristics that tended to be counterproductive.

Leadership can be supportive in multiple ways. According to Somprach et al. (2017), school principals who engage four of the nine leadership styles that were identified in their study are more likely to successfully affect positive teacher participation in PLCs. Principals who intentionally guided the participating teachers toward roles of leadership saw positive results in PLCs (Hunuk, Tannehill, & Levent, 2019; Somprach et al., 2017). As leadership plays a positive role in enacting a productive PLC, encouraging a culture of trust and teamwork becomes essential (Schechter & Feldman, 2019).

Capacity Building

A significant theme in the literature on PD in PBL and otherwise is the practice of developing leadership roles among teachers, or capacity building. Capacity building has mainly to do with the ability of an organization to make systematic change through training and developing roles of responsibility among teachers (Gasston-Holmes, 2019). Numerous studies across content-areas, geographic regions, and levels of education have seen positive, indirect relationships between a school's ability to build capacity and the sustainable instructional change that can occur (Paletta, Basyte Ferrari, & Alimehmeti, 2020; Randall, Turner, & McLafferty, 2015). The apparent consensus in the literature, as well as the insightful distinctions, will be useful for designing the current project.

Useful distinctions in the research on capacity building occur in findings that suggest the use of job-embedded support from experts, rather than the leadership of

teachers in high poverty school settings (Stosich, 2016). In schools situated in rural areas, training school-based coaches that include the teaching staff are seen to result in improved knowledge and FOI (Cavanaugh & Swan, 2015). Despite this important distinction for capacity building implementation, the findings in the literature would suggest that capacity building strategies allow schools to address long-standing low achievement rates, a need to increase teacher knowledge and sustainable improvement in instruction (Cavanaugh & Swan, 2015; Childs & Russell, 2017; Strickland-Cohen, Kennedy, Berg, Bateman, & Horner, 2016; Yakavets, Frost, & Khoroshash, 2017).

In order to successfully build a school's capacity to positively change instructional practices, shared leadership is only essential aspect related to continuous school improvement. Capacity building relies on the school's increased ability to use data to evaluate teacher and principal performance (Betters-Bubon, & Donohue, 2016; Paletta et al., 2020). Systemic change seems to rely heavily on an organization's ability to consistently use evaluative processes that help teachers reflect on practice and learn more about what they need to grow professionally (Betters-Bubon, & Donohue, 2016; Gasston-Holmes, 2019; Lyons, & Brasof, 2020; Paletta et al., 2020; Randall et al., 2015; Yakavets et al., 2017). The use of data to evaluate and reflection will be integrated into this project.

Communication

Communication has been shown to be a key factor in helping to develop productive relationships between staff and school leadership (Darvin, 2020; Li, & Hallinger, 2016). Communication in an organization enables PD projects to yield

positive results (Li & Hallinger, 2016). The literature also shows evidence that PBL helped develop communication skills among professionals (Li, Wang, Zhu, Zhu, & Sun, 2019). Communication strategies will be used throughout this project to facilitate the free flow of information.

Communication can be formally conducted through memos, meetings, or phone calls (Li & Hallinger, 2016). Technology has offered new methods of communication for professional learning with mixed results (Ciampa & Gallagher, 2015; Piña & Harris, 2019). Though new methods of communicating, like blogging, have shown to be useful for networking among colleagues and sharing information, some teachers expressed the view that these methods had limited usefulness (Ciampa & Gallagher, 2015). This project will need to leverage active collaboration to make communication as open and as free flowing as it needs to be.

Project Description

The project I propose is an accelerated improvement model called, "Matou." Along with the model the 4-day PD will feature collaborative planning, peer observations, group and individual reflection, as well as capacity building exercises that allow teachers to collectively improve instruction. The 4-day PD training will take place over the course of the year with one session per quarter. These quarterly sessions will provide teachers with a clear understanding of the critical components to PBL and how guided language acquisition strategies can be integrated to better suit the needs of their students. Also present in the sessions will be some direct instruction on how to use PLCs as a means for leveraging apparent instructional strengths and apply insights from student

data. Over the course of the year, the primary goal of the project will be to initiate a sustainable practice of instructional improvement.

Resources and Possible Barriers

Current practices at PES such as peer tutoring (as an instructional method) and data teams are resources of experience that currently exist on campus. During the course of introducing the project, a major part of the strategy for success is to leverage these kinds of resources. By bringing attention to positive current practices, this project will allow teachers and administrators to more rapidly improve the PBL instruction in every classroom through reflection and collaboration. The PD will introduce a model for continuously identifying, sharing, and refining instructional practices that are worth celebrating.

Another resource at PES is the school administration. Already, the openness to study and improvement shown by the current administrative team has been an encouraging sign to teachers. School culture is largely a by-product of school leadership (Darvin, 2020; Li, & Hallinger, 2016). Because of the positive school leadership, the environment at this school will likely be receptive to the training and changes to build capacity among the teaching staff.

A possible barrier to the successful implementation of this project may be a lack of funds. Due to the current economic crisis in the country, budget cuts may limit the days available during the school year to train staff. This barrier may be avoided by offering the training for free to the school. To offset the costs of substitute teachers it may be possible to acquire funds through public and private grants.

Proposal

Once this project nears the final stages of revision with my committee, I plan to initiate conversations for implementation with the principal of PES. I will present the goals and research grounding the project to the administrative staff and get their feedback on specific dates and times for when to hold the sessions. When the dates for sessions can be agreed upon, I will reserve the library for those dates and begin working with the principal to send out invitations to staff through email. I will also give a brief summary of goals and purpose for the project to the staff during the school Steering Committee meeting and the full faculty meeting. This will allow me the opportunity to remind the staff to secure substitutes for those days as well as begin to establish the importance of the training itself.

Roles and Responsibilities

My primary role is to oversee the implementation of the project and to deliver the initial training during the 4 sessions. I will be responsible for ensuring administrators clearly understand the purpose and process of the project. This will require me to review the plans with them ahead of each session and debrief with them after each session. My role will, therefore, also include evaluating the overall effectiveness of the project by using multiple methods of communication.

Grade-level chairpersons as well as the Principal and Vice Principal play unique roles in the success of this project through the way they communicate with staff about the vision of the school. These on-campus stakeholders are influential, but they are by no means the only ones. Certain teachers on staff are similarly influential either because

they are the most experienced on their team, the most vocal, or both. It will be important for me to check-in with these individuals and ensure that they are having success with the project as they implement the process.

Project Evaluation Plan

Using the following formative and summative methods, I will be evaluating the project's effectiveness to ensure that the project will reach its primary objectives. These formative evaluations will also allow me insight into how the project is unfolding and what factors I need to be aware of to course-correct along the way.

Primary Objectives

The project's primary objective is to initiate a sustainable model of accelerated growth in student achievement through collaborative PBL planning, data-mining, peer observation and reflection. Each session of PD is designed to give teachers a clear understanding of the process and the research that grounds it. During each session, grade-level teams will have the opportunity to practice collaborative planning. At the close of each session, teachers will be asked to decide what specific PBL instructional practices they will employ. Between sessions, teachers will be expected to try-out the data-mining, peer observation process, and reflection practices introduced at the training. They will also be expected to bring artifacts of these attempts to the following session. Bringing artifacts of learning will allow us to review prior knowledge, share new knowledge and celebrate the learning of both our colleagues and students.

Formative

Formative evaluation is essential for successful implementation of this project. Through listening in on collaborative conversations during planning sessions and checking-in with teachers during the presentation I will be assessing what content is resonating most with participants. Using these methods, I will also be attending to any misconceptions that may arise. Formative evaluation will also take the form of post-session debriefing with administrators. It will be important to get administrator feedback as we proceed since they will be the ones to articulate instructional goals even after the project has completed.

At the close of each session, exit tickets and a closing conversation will allow me the opportunity to collect and evaluate what teachers say about what they are gaining from the experience. I will be using this opportunity to help teachers reflect on what actionable steps they will take in their planning or instruction and share their learning with the group. This will also be a time to express any lingering questions or concerns going forward. Opening the group up to hearing the questions and insights from one another in a safe inquiry-based conversation can help shape the culture of the teaching staff further into one of active collaboration.

Summative

As the accelerated growth model depends on the entire staff adopting several key practices, I will be evaluating the effectiveness of the project by considering the extent of that adoption for each practice. First, the model is concerned with improving teacher planning. Teachers will be provided with planning templates that teams will use to

design their PBL instructional units and lessons. I will be collecting completed templates via Google Drive and will evaluate them based on whether or not they are complete, how well they evidence the collaboration of the team, and the internal alignment of the instruction with stated goals.

Another key practice is peer-observations. Teachers will be asked to pair-up to observe each other's instruction. They will be provided with a worksheet that helps facilitate their communication about what PBL critical components were apparent in the instruction, what the teacher being observed would especially like feedback on, and what notable improvements may be made. They will be encouraged to think of the observations as opportunities to get more information that can be used to help the students and not as a means to assess one another. Teachers will be invited to be observed at least twice but encouraged to be observed at least once a quarter. I will be collecting completed observation templates via Google drive and evaluating them by comparing early observations of a teacher with later observations.

A related practice is data-mining. Both peer-observations and data-mining ask the teacher-teams to reflect. Reflecting both critically and appreciatively on instruction places teachers in a posture of listening and problem solving. Analyzing student data allows teachers as individuals and as teams to be diagnostic about what is happening in their classrooms. They are also enabled to be prescriptive about what specific strategies they will employ to meet student needs. I will be collecting completed data teams agendas and evaluating the growth evident in the teams' notes.

Project Implications

Based on my analysis of the data in this study, teachers' implementation of PBL features certain omissions and adaptations of critical components. The evidence suggests a need for training and a structure for PLCs. The structure offered through this project is designed to build on what teachers have already accomplished in their PBL instruction and enable them to accelerate their professional growth as a team. This model for growth includes ample opportunity to reflect, not only as individuals but as a cohesive instructional unit. This allows PES to consider the overall impact of instruction in a grade level as well as the effect that specific strategies have on specific groups of students.

Building capacity as an instructional team not only means refining practice by reflecting on data but sharing new knowledge. Sharing new knowledge and innovations on effective PBL adaptations over time is designed to be a part of the model for accelerated growth. As teachers share their new insights and experiences in formal faculty and PLC meetings they may develop as instructional leaders on their campus. One possible implication for this project is that the development of teacher leaders may become common practice at PES.

Increased teacher knowledge is another anticipated implication of this project's implementation. Both teachers and administrators may benefit from knowing more about the critical components of PBL. While many critical components of PBL were found in the observation and interview data, others were absent. Many teachers may also find the insights in the literature on PBL useful toward improving instruction. I will provide

context for understanding what PBL has been intended to accomplish in previous settings and how it was used.

Possible social change resulting from this project could take the form of freer communication. Open and problem-solving based discourse among teachers and administrators could yield significant cultural changes in schools that are just beginning to implement new initiatives. This model relies on increased collaboration among stakeholders, as well as generating and sharing new knowledge. If this project can be useful toward finding a replicable model for accelerated learning among educators, then social change may come as other districts utilize similar approaches to reach students in the most challenging settings.

Section 4: Reflections and Conclusions

Project Strengths and Limitations

The purpose of this qualitative exploratory case study was to investigate how PES teachers may or may not be implementing PBL instructional strategies to support students in the classroom. This project's strength is that it provides a direct and structured approach to training instructional teams to implement PBL with greater fidelity. By organizing the learning activities within a PLC framework, this project helps to address concerns of consistent delivery of instruction within and among grade-level teams. Increased consistency across grade-levels allow for a common vocabulary about PBL implementation. This approach may benefit grades 3-5 the most as it requires grades K-2 to consistently provide PBL instruction. School-wide alignment of PBL understanding, goals, and implementation is designed to yield greater student achievement in every classroom.

Another strength of this project is that it addresses concerns about sustainable fidelity and acceptable adaptations. By using a model for growth that is designed to use PLCs, the project helps develop the school's ability to build the capacity of teachers to take on roles of greater responsibility over time. This is a healthy expectation, as the school already requires teachers to meet regularly and plan instruction. As this project spans the course of an entire year of instruction, enough time is allotted to see stable change occur before the conclusion of the final session.

One limitation for this project is the possible cost to the participating school. Because the design of the project requires teachers to plan together, implement what they

have planned, observe one another, and share findings throughout the year, finding the funds necessary for substitute teachers may be a barrier to implementation. Though the school has done such school-wide trainings during the normal school day before, the current economic constraints of this year may limit the school's ability to access similar funds for the following year. Getting public or private grants may mitigate this limitation.

Another limitation to implementation is the possible lack of time. The data shows that teachers feel the lack of time is a limitation to what they may be able to accomplish in a day. The proposed model may help address this concern through providing tools that help focus discussions during meetings and professional conversations. The tools included in this model may further help address the limitation of time by making the time that teachers spend on planning and reflecting more effective toward instructional change.

Recommendations for Alternative Approaches

The problem that prompted the study is still present at PES. The data revealed that teachers and administrators perceive their current practice of PBL as being in the beginning stages of adoption. The analysis of the data suggested the use of a structure and additional training that improves the fidelity of PBL implementation. One alternative approach to addressing this problem is to train preservice teachers in PBL instruction before they reach schools like PES (Tsybulsky & Muchnik-Rozanov, 2019). Another recommendation not included in this project is to evaluate the project's effect by examining the long-term change it initiates (Rodriquez, 2018).

Scholarship, Project Development and Evaluation, and Leadership and Change

As a researcher, I have noticed real and important growth in myself throughout the process of developing this project study. I have grown in my understanding of PBL implementation but more importantly my understanding of research in education as a field. By doing the literature review, I have developed my ability to collect, organize and use literature to solve problems. The skills and understanding that I have gained over the course of preparing this study have increased not only my proficiency as a researcher, but my appreciation for those who are truly exemplary scholars.

Collecting and analyzing the data was the most enjoyable part of the process for me. Assuming the role of a researcher at a school placed me in a position to observe and enjoy the things that educators were doing in their respective environments. Getting to conduct interviews with educators opened my eyes to how adept they are at planning instruction that takes into account the complex mix of factors that affect the learning experience for students. The interviews that I conducted with administrators were also encouraging as I got to hear about their vision for PBL instruction at PES.

As a teacher at PES, I have experienced opportunities to take leadership roles and opportunities to contribute to the success of PES. I would most likely not feel the confidence to accept these opportunities were it not for the experience of preparing this project. I have become more aware of the educational practices at PES regarding PBL and the way that many of my colleagues consume research. I have come to appreciate how conversations among colleagues can shape the instruction that gets delivered to students.

Reflection on Importance of the Work

As a teacher, I am aware of new initiatives being introduced with seemingly growing frequency and thus creating the need for teachers to be open to further training. That being the case, being able to adopt and excel at implementing new initiatives quickly becomes even more important. The importance of this project is not just in the promise of gains in student achievement but in the possibility that this model may be used to adopt future innovations quickly. Moreover, as sharing and creating new knowledge through an accelerated model for professional growth becomes common practice, the creation of new innovations and useful adaptations over long-term becomes possible.

Implications, Applications, and Directions for Future Research

One observation that led to this project was that although PBL training had been offered through the DOE, none of the teachers from PES attended the training. As a result, one administrator had not observed PBL present in classrooms. Therefore, this project was designed to provide PBL training. Using the data gathered during the course of this study, the model for growth should meet the specific needs of the teaching staff at PES. When implemented, the project should clarify what PBL is for teachers and enable them to practice it with fidelity.

Future research might include an analysis of what long-term change was initiated by the use of this project. Findings in other studies of new learning methods make clear that the significance of an approach can only be measured in terms of its long-term effects (Rodriguez, 2018). Once the project is implemented the school-wide practices

that can be observed in classrooms at PES would be an interesting area of study. A study to track the changes in practice over time may provide administrators with insight into new ways to support teachers' PD.

Further research may include replicating the study in a different region. Research on PD shows that results can differ for certain training and interventions when implemented in rural as opposed to urban settings (Cavanaugh & Swan, 2015; Stosich, 2016). Results may also differ if the study were conducted in different countries as PBL has been implemented elsewhere with varying degrees of success. A larger sample size may provide insights that were not available to me by exploring just one school. The data set may lead to different conclusions if all the schools in the district were included in a similar study.

Conclusion

This qualitative exploratory case study sought to examine the nature of PBL implementation at an urban elementary school. Seven participants were interviewed (5 of whom were observed) to collect data about the intentions and the actual practice of PBL at the school. An analysis of the perception data revealed that omissions and adaptations of the PBL critical components were apparent. The data suggested the need for a training that provided a clear understanding of PBL implementation and an accelerated professional growth model that would build teacher capacity over time.

Through my research, I found that no training or strategy would make an impact if it could not have a lasting effect on teacher practice after the training was over. To have any real significance, the training would have to incorporate common components

from both andragogy and PBL. Soft skills such as communication, creativity, and collaboration had to be part of the model if the training would have any lasting effect. Insights from this study also suggested that the model needed to account for acceptable adaptations to practice. By addressing the school's need to purposefully adapt and develop leadership skills among teachers over time, this project may promote positive social change.

References

Abdelkarim, A., Schween, D., & Ford, T. (2016). Implementation of problem-based learning by faculty members at 12 U.S. medical and dental schools. *Journal of Dental Education, 80*(11), 1301–1307. doi:10.1002/j.0022-0337.2016.80.11.tb06215.x

Abercrombie, S., Parkes, J., & McCarty, T. (2015). Motivational influences of using peer evaluation in problem-based learning in medical education. *Interdisciplinary Journal of Problem-Based Learning, 9*(1), 33–43. doi:10.7771/1541-5015.1501

Ajai, J. T., & Imoko, B. I. (2015). Gender differences in mathematics achievement and retention scores: A case of problem-based learning method. *International Journal of Research in Education and Science, 1*(1), 45–50. doi:10.21890/ijres.76785

Alexander, C. C., Knezek, G. G., Christensen, R. R., Tyler-Wood, T. T., & Bull, G. G. (2014). The impact of project-based learning on pre-service teachers' technology attitudes and skills. *Journal of Computers in Mathematics & Science Teaching*, *33*(3), 257-282.

Ali, A. D. (2018). Identifying training needs of in-service EFL teachers in inclusive schools in Egypt. *Arab World English Journal*, *9*(1), 163–183. doi:10.24093/awej/vol9no1.12

Alves, A. C., Sousa, R. M., Fernandes, S., Cardoso, E., Carvalho, M. A., Figueiredo, J., & Pereira, R. M. (2016). Teachers' experiences in PBL: Implications for practice. *European Journal of Engineering Education*, *41*(2), 123-141. doi:10.1080/03043797.2015.1023782

Argaw, A. S., Haile, B. B., Ayalew, B. T., & Kuma, S. G. (2017). The effect of problem-based learning (PBL) instruction on students' motivation and problem-solving skills of physics. *EURASIA Journal of Mathematics, Science & Technology Education, 13*(3), 857–871. doi:10.12973/eurasia.2017.00647a

Asunda, P. A., & Weitlauf, J. (2018). STEM habits of mind: Enhancing a PBL design challenge--integrated STEM instruction approach. *Technology & Engineering Teacher*, *78*(3), 34–38.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Macmillan.

Baysura, O.D., Altun, S. & Yucel-Toy, B. (2016). Perceptions of teacher candidates regarding project-based learning. *Eurasian Journal of Educational Research, 16*(62), 33-54. doi:10.14689/ejer.2016.62.3

Bergstrom, C. M., Pugh, K. J., Phillips, M. M., & Machlev, M. (2016). Effects of problem-based learning on recognition learning and transfer accounting for GPA and goal orientation. *The Journal of Experimental Edu- cation, 84,* 764-786. doi:10.1080/00220973.2015.1083521

Betters-Bubon, J., & Donohue, P. (2016). Professional capacity building for school counselors through school-wide positive behavior interventions and supports implementation. *Journal of School Counseling*, *14*(3), 1–35.

Bicer, A., Boedeker, P., Capraro, R. M., & Capraro, M. M. (2015). The effects of STEM PBL on students' mathematical and scientific vocabulary knowledge. *International Journal of Contemporary Educational Research, 2*(2), 69–75. Retrieved from https://files.eric.ed.gov/fulltext/ED573146.pdf

Blackwell, J. A., & Roseth, N. E. (2018). Problem-based learning in a woodwind methods course: An action research study. *Journal of Music Teacher Education, 28*(1), 55–69. doi:10.1177/1057083718769262

Capraro, R. M., Capraro, M. M., Scheurich, J. J., Jones, M., Morgan, J., Huggins, K. S., Corlu, M. S., Younes, R., & Han, S. (2016). Impact of sustained professional development in STEM on outcome measures in a diverse urban district. *Journal of Educational Research*, *109*(2), 181–196. doi:10.1080/00220671.2014.936997

Cavanaugh, B., & Swan, M. (2015). Building SWPBIS capacity in rural schools through building-based coaching: Early findings from a district-based model. *Rural Special Education Quarterly*, *34*(4), 29–39. doi:10.1177/875687051503400404

Century, J. J., Rudnick, M., & Freeman, C. (2010). A framework for measuring fidelity of implementation: A foundation for shared language and accumulation of knowledge. *American Journal of Evaluation*, *31*(2), 199-218. doi:10.1177/1098214010366173

Chan, L. K., Brdges, S. M., Doherty, I., Ng, M.L. (2015). A qualitative study on how health professional students and their PBL facilitators perceive the use of mobile devices during PBL. *Interdisciplinary Journal of Problem-Based Learning*, *9*(1), 83–95. doi:10.7771/1541-5015.1510

Charmaz, K. (2006). *Constructing grounded theory: Methods for the 21st century*. UK: SAGE.

Childs, J., & Russell, J. L. (2017). Improving low-achieving schools: Building state capacity to support school improvement through race to the top. *Urban Education*, *52*(2), 236–266. doi:10.1177/0042085916656899

Chua, B. L., Tan, O. S., & Liu, W. C. (2016). Development and validation of the problem-based learning process inventory (PBLPI). *New Waves-Educational Research and Development Journal*, *19*(1), 20–40. Retrieved from https://files.eric.ed.gov/fulltext/EJ1211395.pdf

Ciampa, K., & Gallagher, T. (2015). Blogging to enhance in-service teachers' professional learning and development during collaborative inquiry. *Educational Technology Research & Development*, *63*(6), 883–913. doi:10.1007/s11423-015-9404-7

Cocco, S. (2006). *Student leadership development: The contribution of project-based learning* (Unpublished Master's thesis). Royal Roads University, Victoria, BC, Canada.

Cook, N. D., & Weaver, G. G. (2015). Teachers' implementation of project-based learning/lessons from the research goes to school program. *Electronic Journal of Science Education, 19*(6), 1-45. Retrieved from https://ejse.southwestern.edu/article/view/13781

Condliffe, B., Quint, J., Visher, M. G., Bangser, M. R., Drohojowska, S., Saco, L., & Nelson, E. (2017). *Project-based learning: A literature review* (Working paper). New York, NY: MDRC. Retrieved from https://files.eric.ed.gov/fulltext/ED578933.pdf

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (Laureate Custom Ed.). Boston, MA: Pearson Education.

Creswell, J. W.,Creswell, J. D. (2018) *Research design: Qualitative, quantitative, and mixed methods approaches*. CA: SAGE Publications.

Dane, A. V., & Schneider, B. H. (1998). Program integrity in primary and early secondary prevention: Are implementation effects out of control. *Clinical Psychology Review, 18*, 23–45.

Darvin, J. (2020). How technology is changing teachers' discussion skills. *Educational Leadership*, *77*(7), 75–79.

De Witte, K., & Rogge, N. (2016). Problem-based learning in secondary education: evaluation by an experiment. *Education Economics, 24*(1), 58–82. doi:10.1080/09645292.2014.966061

Dole, S. D., Bloom, L., & Kowalske, K. (2016). Transforming pedagogy: Changing perspectives from teacher-centered to learner-centered. *Interdisciplinary Journal of Problem-Based Learning*, *10*(1), 45-58. doi:10.7771/1541-5015.1538

Durlak, J. A., & DuPre, E. P. (2008). Implementation matters: A review of research on the influence of implementation on program outcomes and the factors affecting implementation. *American Journal of Community Psychology*, *41*, 327-350 327. doi:10.1007/s10464-008-9165-0

Firdaus, F. M., Wahyudin, & Herman, T. (2017). Improving primary students' mathematical literacy through problem based learning and direct instruction. *Educational Research and Reviews, 12*(4), 212–219. doi:10.5897/err2016.3072

Fullan, M., & Pomfret, A. (1977). Research on curriculum and instruction implementation. *Review of Educational Research, 47*, 335-397. doi:10.3102%2F00346543047002335

Gast, I., Schildkamp, K., & van der Veen, J. T. (2017). Team-based professional development interventions in higher education: A systematic review. *Review of Educational Research*, *87*(4), 736–767. doi:10.3102/0034654317704306

Gasston-Holmes, B. (2019). The connection between leadership and learning: A middle leader's experience navigating the waters. *Leading & Managing*, *25*(1), 15–28.

Golightly, A. (2018). The influence of an integrated PBL format on geography students' perceptions of their self-directedness in learning. *Journal of Geography in Higher Education, 42*(3), 460–478.

Han, S., Capraro, R., & Capraro, M. (2015). How science, technology, engineering, and mathematics (Stem) project-based learning (PBL) affects high, middle, and low achievers differently: The impact of student factors on achievement. *International Journal of Science & Mathematics Education*, *13*(5), 1089–1113. doi:10.1007/s10763-014-9526-0

Han, S., Capraro, R. M., & Capraro, M. M. (2016). How science, technology, engineering, and mathematics project-based learning affects high-need students in the U.S. *Learning & Individual Differences*, *51*, 157–166. doi:10.1016/j.lindif.2016.08.045

Harmer, N., & Stokes, A. (2016). "Choice may not necessarily be a good thing": Student attitudes to autonomy in interdisciplinary project-based learning in GEES disciplines. *Journal of Geography in Higher Education*, *40*(4), 531-545. doi:10.1080/03098265.2016.1174817

Hawaii Department of Education. (2017a). Strategic plan. Retrieved from http://www.hawaiipublicschools.org/VisionForSuccess/AdvancingEducation/StrategicPlan/Pages/home.aspx

Hawaii Department of Education. (2017b). Likelike elementary three-year academic plan 2017-2018, 2018-2019, 2019-2020. Retrieved from https://sites.google.com/a/likelike.k12.hi.us/likelike-elementary-school/

Herro, D., & Quigley, C. (2017). Exploring teachers' perceptions of STEAM teaching through professional development: Implications for teacher educators. *Professional Development in Education*, *43*(3), 416-438. doi:10.1080/19415257.2016.1205507

Hirsh, S., Simmons, M. H., Christensen, P., Sellar, M., Stenström, C., Hagar, C., . . . Alman, S. (2015). International perspectives in LIS education: Global education, research, and collaboration at the SJSU school of information. *Journal of Education for Library & Information Science*, *56*, S27–S46. doi:10.12783/issn.2328-2967/56/S1/5

Horak, A. K., & Galluzzo, G. R. (2017). Gifted Middle School Students' Achievement and Perceptions of Science Classroom Quality During Problem-Based Learning. Journal of Advanced Academics, 28(1), 28–50.

Hunuk, D., Tannehill, D., & Levent Ince, M. (2019). Interaction patterns of physical education teachers in a professional learning community. *Physical Education & Sport Pedagogy*, *24*(3), 301–317. doi:10.1080/17408989.2019.1576862

Jin, J., & Bridges, S. (2016). Qualitative research in PBL in health sciences education: A review. *Interdisciplinary Journal of Problem-Based Learning, 10*(2).

Khumsikiew, J., Donsamak, S., & Saeteaw, M. (2015). A model of small-group problem-based learning in pharmacy education: Teaching in the clinical environment. *IAFOR Journal of Education, 3*(2), 95–108. doi:10.22492/ije.3.2.06

Klehr, M. (2015). Community engagement as catalyst for professional learning, reflection, and agency in preservice-teacher education. *New Educator, 11*(4), 277–291. doi:10.1080/1547688X.2015.1087746

Kokotsaki, D. D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools*, *19*(3), 267-277. doi:10.1177/1365480216659733

Knowles, M., & Holton, E. (2005). *The adult learner*. Oxford: Butterworth Heinemann.

Larmer, J., & Larmer, J. (2015, April 21). Gold Standard PBL: Essential Project Design Elements. Retrieved from https://www.pblworks.org/blog/gold-standard-pbl-essential-project-design-elements

Larmer, J., Mergendoller, J. R., & Boss, S. (2015). *Setting the standard for project-based learning: A proven approach to rigorous classroom instruction*. Alexandria, VA: ASCD.

Lee, J. W., Kane, J., & Cavanaugh, T. (2015). One Happy Union: Infusing community-based learning projects through online instruction. *Journal of Public Scholarship in Higher Education, 5*, 31–48.

Lendrum, A. A., & Humphrey, N. (2012). The importance of studying the implementation of interventions in school settings. *Oxford Review of Education, 38*(5), 635–652. doi:10.1080/03054985.2012.734800

Li, L., & Hallinger, P. (2016). Communication as a mediator between principal leadership and teacher professional learning in Hong Kong primary schools. *International Journal of Educational Reform*, *25*(2), 192–214. doi:10.1177/105678791602500205

Li, L., Hallinger, P., & Ko, J. (2016). Principal leadership and school capacity effects on teacher learning in Hong Kong. *International Journal of Educational Management*, *30*(1), 76–100. doi:10.1108/IJEM-03-2014-0035

Li, Y., Wang, X., Zhu, X., Zhu, Y., & Sun, J. (2019). Effectiveness of problem-based learning on the professional communication competencies of nursing students and nurses: A systematic review. *Nurse Education in Practice, 37*, 45–55. doi:10.1016/j.nepr.2019.04.015

Linn, M. C., Clark, S., & Slotta, J. D. (2003). WISE design for knowledge integration. *Science Education, 87*(4), 517-538. doi:10.1002/sce.10086

Lotter, C., Carnes, N., Marshall, J. C., Hoppmann, R., Kiernan, D. A., Barth, S. G., & Smith, C. (2020). Teachers' content knowledge, beliefs, and practice after a project-based professional development program with ultrasound scanning. *Journal of Science Teacher Education*, *31*(3), 311–334. doi:10.1080/1046560X.2019.1705535

Lutsenko, G. (2018). Case study of a problem-based learning course of project management for senior engineering Students. *European Journal of Engineering Education, 43*(6), 895–910.

Lyons, L., & Brasof, M. (2020). Building the capacity for student leadership in high school: a review of organizational mechanisms from the field of student voice. *Journal of Educational Administration, 58*(3), 357–372. doi:10.1108/JEA-05-2019-0077

Maass, K., Swan, M., & Aldorf, A. M. (2017). Mathematics teachers' beliefs about inquiry-based learning after a professional development course: An international study. *Journal of Education and Training Studies*, *5*(9), 1–17. doi:10.11114/jets.v5i9.2556

MacMath, S., Sivia, A., & Britton, V. (2017). Teacher perceptions of project-based learning in the secondary classroom. *Alberta Journal of Educational Research*, *63*(2), 175-192.

Márquez, E. & Jiménez-Rodrigo, M.L. (2014). Project-based learning in virtual environments: A case study of a university teaching experience. *Revista de Universidad y Sociedad del Conocimiento, 11*(1), 76-90. doi:10.7238/rusc.v11i1.1762

McQuillan, N. (2018). Middle school flips the script. *Learning Professional*, *39*(2), 24–27.

Merritt, J., Lee, M., Rillero, P., & Kinach, B. M. (2017). Problem-based learning in K–8 mathematics and science education: A literature review. *Interdisciplinary Journal of Problem-Based Learning*, *11*(2), 1-12. doi:10.7771/1541-5015.1674

Meyers, C. V., Molefe, A., Brandt, W. C., Zhu, B., & Dhillon, S. (2016). Impact results of the eMINTS professional development validation study. *Educational Evaluation and Policy Analysis*, *38*(3), 455–476. doi:10.3102/0162373716638446

Meyer, K., & Wurdinger, S. (2016). Students' perceptions of life skill development in project-based learning schools. *Journal of Educational Issues, 2*(1), 91–114. doi:10.5296/jei.v2i1.8933

Miller, A. (2017). Process for discovery. *Learning Professional, 38*(5), 35–39. Retrieved from http://www.andrewkmiller.com/wp-content/uploads/2018/09/Process-for-Delivery-Article-Learning-Professional-Journal.pdf

Minarni, A., & Napitupulu, E. E. (2017). Developing instruction materials based on joyful PBL to improve students' mathematical representation ability. *International Education Studies, 10*(9), 23–38. doi:10.5539/ies.v10n9p23

Mohamed, M. E. S. (2015). An Investigation into pre-service teachers' perceptions of learning primary school science using the method of problem-based learning (PBL). *World Journal of Education, 5*(3), 44–60. doi:10.5430/wje.v5n3p44

Mumtaz, S., & Latif, R. (2017). Learning through debate during problem-based learning: An active learning strategy. *Advances in Physiology Education, 31*(3), 390–394.

Namasivayam, S. S., Fouladi, M. H., & Chien Hwa, C. (2017). A case study on the implementation of the conceive - design - implement - operate framework. *International Journal of Mechanical Engineering Education*, *45*(1), 28-46. doi:10.1177/0306419016674141

National Center for Education Statistics. (2017). *Concentration of public school students eligible for free or reduced-price lunch.* Retrieved from https://nces.ed.gov/programs/coe/indicator_clb.asp

Ngaewkoodrua, N., & Yuenyong, C. (2018). The teachers' existing ideas of enhancing students' inventive thinking skills. *TOJET: The Turkish Online Journal of Educational Technology, 17*(2), *169–175*. Retrieved from https://files.eric.ed.gov/fulltext/EJ1176172.pdf

Offerdahl, E., Mcconnell, M., & Boyer, J. (2018). Can I have your recipe? Using a fidelity of implementation (FOI) framework to identify the key ingredients of formative assessment for learning. *CBE Life Sciences Education, 17*(4). doi:10.1187/cbe.18-02-0029

Oliveira, M. M., Fischer, R., & Fernando Parisoto, M. (2015). Project-based learning applied in pre-service teacher education. *Latin-American Journal of Physics Education*, *9,* 1404, 1-6.

Ong, E., Ayob, A., Ibrahim, M. N., Adnan, M., Shariff, J., & Ishak, N. (2016). The effectiveness of an in-service training of early childhood teachers on STEM integration through project-based inquiry learning (PIL). *Journal of Turkish Science Education)*, *13,* 44-58. doi:10.12973/tused.10170a

Paletta, A., Basyte Ferrari, E., & Alimehmeti, G. (2020). How principals use a new accountability system to promote change in teacher practices: Evidence from Italy. *Educational Administration Quarterly*, *56*(1), 123–173. doi:10.1177/0013161X19840398

Piña, A. A., & Harris, P. (2019). Utilizing the AECT instructional design standards for distance learning. *Online Journal of Distance Learning Administration*, *22*(2), 1–13.

Ralph, R. A. (2015). Post Secondary Project-Based Learning in Science, Technology, Engineering and Mathematics. *Journal of Technology and Science Education, 6*(1), 26–35.

Randall, L., Turner, S., & McLafferty, L. (2015). A colourful dot on a dreary economic canvas: Building capacity for innovation in schools through the Coach Consult Programme. *Educational & Child Psychology, 32*(4), 69–80.

Ravitz, J., & Blazevski, J. (2014). Assessing the role of online technologies in project-based learning. *Interdisciplinary Journal of Problem-Based Learning*, *8*(1), 65-79. doi:10.7771/1541-5015.1410

Ravitch, S. M., & Carl, N. M. (2016). *Qualitative research: Bridging the conceptual, theoretical, and methodological*. Los Angeles: Sage.

Roach, K., Tilley, E., & Mitchell, J. (2018). How Authentic Does Authentic Learning Have to Be? Higher Education Pedagogies, 3(1), 495–509.

Rodriguez, C. M. (2018). A method for experiential learning and significant learning in architectural education via live projects. *Arts and Humanities in Higher Education, 17*(3), 279–304. doi:10.1177/1474022217711878

Rubin, H. J., & Rubin, I. S. (2016). *Qualitative interviewing: The art of hearing data*. Los Angeles: Sage.

Ruiz-Gallardo, J. R., González-Geraldo, J. L., & Castaño, S. (2016). What are our students doing? Workload, time allocation, and time management in PBL instruction. A case study in science education. *Teaching & Teacher Education*, *53*, 51–62. doi:10.1016/j.tate.2015.10.005

Ruiz-Primo, M. A. (2005). *A multi-method and multi-source approach for studying fidelity of implementation*, Los Angeles: Center for Research on Evaluation, Standards, and Student Testing/ University of California, Los Angeles. CSE: Technical Report 677

Sahin, A., & Top, N. (2015). STEM students on the stage (SOS): Promoting student voice and choice in STEM education through an interdisciplinary, standards-focused, project-based learning approach. *Journal of STEM Education: Innovations & Research*, *16*(3), 24-33.

Sanderse, W. W., Walker, D. D., & Jones, C. A. (2015). Developing the whole child in an age of academic measurement: Can this be done according to U.K. teachers? *Teaching & Teacher Education*, *47,* 95-203. doi:10.1016/j.tate.2015.01.010

Sargent, T. C. (2015). Professional learning communities and the diffusion of pedagogical innovation in the Chinese education system. *Comparative Education Review, 59*(1), 102–132. doi:10.1086/678358

Sari, U., Alici, M., & Sen, Ö. F. (2018). The effect of STEM instruction on attitude, career perception, and career interest in a problem-based learning environment and student opinions. *Electronic Journal of Science Education, 22*(1), 1–21. Retrieved from https://files.eric.ed.gov/fulltext/EJ1187992.pdf

Schattman, R. E., Kaplan, M., Aitken, H. M., & Helminski, J. (2019). Climate change curricula for adult audiences in agriculture and forestry: A review. *Journal of Adult and Continuing Education*, *25*(1), 131–151. doi:10.1177/1477971419840670

Schechter, C., & Feldman, N. (2019). The principal's role in professional learning community in a special education school serving pupils with autism. *Journal of Special Education Leadership*, *32*(1), 17–28.

Schauber, S. K., Hecht, M., Nouns, Z. M., Kuhlmey, A., & Dettmer, S. (2015). The role of environmental and individual characteristics in the development of student achievement: A comparison between a traditional and a problem-based-learning curriculum. *Advances in Health Sciences Education, 20*(4), 1033–1052. doi:10.1007/s10459-015-9584-2

Seman, L. O., Hausmann, R., & Bezerra, E. A. (2018). Agent-based simulation of learning dissemination in a project-based learning context considering the human aspects. *IEEE Transactions on Education*, *61*(2), 101–108. doi:10.1109/te.2017.2754987

Senyshyn, R. M., & Smith, P. (2019). Global awareness dialogue project: Exploring potential for faculty transformation through a professional development series. *Journal of Transformative Education*, *17*(4), 318–336. doi:10.1177/1541344619833342

Servant, V. F. C., & Dewar, E. F. A. (2015). Investigating problem-based learning tutorship in medical and engineering programs in Malaysia. *Interdisciplinary Journal of Problem-Based Learning, 9*(2). doi:10.7771/1541-5015.1442

Seyhan, H. G. (2016). The efficacy of problem-based learning in an instrumental analyze laboratory. *Higher Education Studies, 6*(4), 100–118. doi:10.5539/hes.v6n4p100

Skinner, V. J., Braunack-Mayer, A., & Winning, T. A. (2015). The purpose and value for students of PBL groups for learning. *Interdisciplinary Journal of Problem-Based Learning, 9*(1), 19–32. doi:10.7771/1541-5015.1499

Somprach, K., Tang, K., & Popoonsak, P. (2017). The relationship between school leadership and professional learning communities in Thai basic education schools. *Educational Research for Policy & Practice*, *16*(2), 157–175. doi:10.1007/s10671-016-9206-7

Stake, R. E. (2010). *The art of case study research*. Thousand Oaks, CA: Sage Publishing.

State of Hawaii Board of Education. (2017a). General business meeting minutes from September 5, 2017. Retrieved from https://lilinote.k12.hi.us/STATE/BOE/Minutes.nsf/a15fa9df11029fd70a2565cb0065b6b7/0b834b8a9bc62eed0a2581bb006ec39b?OpenDocument

State of Hawaii Board of Education. (2017b). General business meeting minutes from October 3, 2017. Retrieved from https://lilinote.k12.hi.us/STATE/BOE/Minutes.nsf/a15fa9df11029fd70a2565cb0065b6b7/87c8cca33a4b3d510a2581bd0005a6e2?OpenDocument

State of Hawaii Board of Education. (2017c). General business meeting minutes from June 20, 2017. Retrieved from https://lilinote.k12.hi.us/STATE/BOE/Minutes.nsf/a15fa9df11029fd70a2565cb0065b6b7/7a3a799c8ce54c150a2581620007efc5?OpenDocument

Stosich, E. L. (2016). Building teacher and school capacity to teach to ambitious standards in high-poverty schools. *Teaching & Teacher Education*, 58, 43–53. doi:10.1016/j.tate.2016.04.010

Strickland-Cohen, M. K., Kennedy, P. C., Berg, T. A., Bateman, L. J., & Horner, R. H. (2016). Building school district capacity to conduct functional behavioral assessment. *Journal of Emotional & Behavioral Disorders, 24*(4), 235–246. doi:10.1177/1063426615623769

Suri, H. (2011). Purposeful sampling in qualitative research synthesis. *Qualitative Research Journal, 11*(2), 63-75.

Terrón-López, M., Velasco-Quintana, P., García-García, M., & Ocampo, J. R. (2017). Students' and teachers' perceptions: Initial achievements of a project-based engineering school. *European Journal of Engineering Education*, *42*(6), 1113-1127. doi:10.1080/03043797.2016.1267715

Thomas, J. W. (2000). *A review of research on project-based learning.* San Rafael, CA: The Autodesk Foundation.

Tsybulsky, D., & Muchnik-Rozanov, Y. (2019). The development of student-teachers' professional identity while team-teaching science classes using a project-based learning approach: A multi-level analysis. *Teaching & Teacher Education*, *79*, 48–59. doi:10.1016/j.tate.2018.12.006

U.S. Chamber of Commerce Foundation. (2015). *Laggards to leaders: How three states found their way forward*, Washington DC: Author. Retrieved from http://www.leadersandlaggards.org/sites/default/files/022592_LaggardsLeaders_2015_FIN.pdf

Vega, A., & Brown, C. G. (2012). The implementation of project-based learning. *National Forum of Educational Administration & Supervision Journal*, *30*(1), 4-29.

Wijnen, M. , Loyens, S. M. M. , & Schaap, L. (2016). Experimental evidence of the relative effectiveness of problem-based learning for knowledge acquisition and retention. *Interactive Learning Environments, 24*(8), 1907–1921. doi:10.1080/10494820.2015.1060504

Wiles, J., & Bondi, J. (9th ed.). (2015). *Curriculum development.* New York: Pearson Education.

Wynn, C. T., Mosholder, R. S., & Larsen, C. A. (2016). Promoting post-formal thinking in a U.S. history survey course: A problem-based approach. *Journal of College Teaching & Learning, 13*(1), 1–20. doi:10.19030/tlc.v13i1.9567

Yakavets, N., Frost, D., & Khoroshash, A. (2017). School leadership and capacity building in Kazakhstan. *International Journal of Leadership in Education*, *20*(3), 345–370. doi:10.1080/13603124.2015.1066869

Yan, Q., Ma, L., Zhu, L., & Zhang, W. (2017). Learning effectiveness and satisfaction of international medical students: Introducing a hybrid-PBL curriculum in biochemistry. *Biochemistry and Molecular Biology Education, 45*(4), 336–342. doi:10.1002/bmb.21046

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Thousand Oaks, CA: SAGE Publications.

Yu, W. C. W., Lin, C. C., Ho, M. H., & Wang, J. (2015). Technology facilitated PBL pedagogy and its impact on nursing students' academic achievement and critical thinking dispositions. *TOJET: The Turkish Online Journal of Educational Technology, 14*(1), 97–107. Retrieved from https://files.eric.ed.gov/fulltext/EJ1057343.pdf

Yukhymenko, M. A., Brown, S. W., Lawless, K. A., Brodowinska, K., & Mullin, G. (2014). Thematic analysis of teacher instructional practices and student responses in middle school classrooms with problem-based learning environment. *Global Education Review, 1*(3), 93–110. Retrieved from https://files.eric.ed.gov/fulltext/EJ1055181.pdf

Zhang, G., Ridgway, A. J., & Sachs, D. (2015). Cultivating preservice secondary teachers for project-based learning: A four-step model. *AILACTE Journal, 12*(1), 1–15.

Zeiser, K., Taylor, J., Rickles, J., Garet, M. S., & Segeritz, M. (2014). *Evidence of deeper learning outcomes*. Washington, DC: American Institutes for Research. Retrieved from https://www.air.org/sites/default/files/downloads/report/Report_3_Evidence_of_Deeper_Learning_Outcomes.pdf

Appendix A: A Model of Accelerated Professional Growth and Project Based Learning

Matou

What: A 4-day PD and a model for PLCs that feature collaborative planning, peer observations, group and individual reflection, as well as capacity building exercises that allow teachers to collectively improve instruction.

Purpose: To equip teachers with the training necessary to implement high-quality project based learning (PBL) units with fidelity.

Goals

- Provide teachers with a clear understanding of the critical components to PBL and how guided language acquisition strategies can be integrated to better suit the needs of their students.
- Provide direct instruction on how to use PLCs as a means for leveraging apparent instructional strengths and apply insights from student data.
- Establish a practice of peer observations and sharing new knowledge.

When: The 4-day PD training will take place over the course of the year with one session per quarter.

How: Along with the model, the 4-day PD will feature collaborative planning, peer observations, group and individual reflection, as well as capacity building exercises that allow teachers to collectively improve instruction.

Action Steps for Accelerated Growth

Step 1. Plan- Using the PBL unit/lesson plan template teacher-teams plan instruction.

Step 2. Prepare- PLCs will collaborate on preparing instructional materials.

Step 3. Implement- Teachers will periodically observe each other's implementation of the instructional plan using the Peer Observation Template and discuss findings during PLC meetings.

Step 4. Reflect- PLCs will meet to reflect on practice as it relates to student performance evident in data. Discussion notes should reflect group decisions and instructional changes.

Step 5. Refine- PLCs will implement and periodically present instructional changes as new knowledge to the faculty.

Matou Peer Observation Template

Pre-Observation

Name of Educator: Name of Observer: Date:

Time: Content Areas:

Strategies being observed:

Areas of interest that the teacher wants to be observed

What goal or desired personal outcome does the educator have for this lesson?

What desired outcomes do you have for your students?

Group 1:

Group 2:

Group 3:

Group 4:

Group 5:

Reflection (Individual):

Complete this section before debriefing with your PLC partner.

1. In what ways did you meet your goals and desired personal outcomes?

2. Who benefitted from your instruction? Who did not benefit?

3. What outcomes surprised you about the effect of your instruction today?

Observation Notes

1. What is the teacher doing?

What do I see?	What do I think?

2. What are the students doing?

What do I see?	What do I think?

PLC Agenda and Minutes

Date:	**Time:**	**Location:**
Present:	**Absent:**	**Unit:**

Content/Standard	Topic	Notes: Observations	Strategies

Next meeting:	Data Required:

Unit Plan Template

Driving Question:

Authenticity: What guiding questions will you use to engage students in "real world" problems?	Language Supports:	Resources and Supports needed:	Formative Assessments:
Challenge: What strategies will ensure students are thinking deeply and strive for excellence?			
Product: How will students share their learning with others and receive feedback?			
Collaboration: In addition to working in teams, what strategies will help students work with experts and community members?			
Project Management: What tools will you give students to help them learn to use project management processes?			
Reflection: What will help students assess and suggest improvements in their work?			
Student Voice and Choice: How will you leverage student voice?			

Standards/Learning Targets			
	Scaffolds	Reflection Methods	Assessments
Week 1 Activities			
Week 2 Activities			
Week 3 Activities			
Week 4 Activities			
Week 5 Activities			
Criteria for Team Product	Beginning	Developing	Distinguished
Criteria for Individual Learning			

Exit Ticket

1. How might the learning today impact your teaching?

2. What are your next steps?

3. What are some questions you might have about what was addressed today?

4. What support or information might you need in order to leverage the learning today?

Matou

Purpose and Description: Matou, is the Tahitian word for "we," and the name of an accelerated professional growth model that features collaborative planning, peer observations, group and individual reflection, as well as capacity building exercises that allow teachers to collectively improve instruction. Along with the model, a 4-day training was designed to provide teachers with a clear understanding of PBL critical components and will cover methods to ensure increasing fidelity over time.

Learning Objectives: Each day, occurring once a quarter, will be spent receiving new information about the research behind PBL and PLCs. About half the time in the training day will also be allotted for teacher-teams to begin the planning step of the growth model. During Day 1, I will help participants define the critical components of project based learning and begin identifying that language support strategies that they can use that quarter. In Day 2, we will address the principles for PLC success and explore how peer observations may facilitate accelerated learning. Day 3 introduces teachers to the major concepts surrounding capacity building. During Day 4, teachers will solidify new practices through identifying, sharing, and celebrating the learning they gained during the course of the year.

Day 1

Marrying PBL and Guided Language Acquisition

Time	Activity	Notes
8:00am – 8:30am	"We are…" Wall	Sign-in and assign table jobs. Teachers will add sketches, words, or phrases that describe their learning community to the posted wall.
8:30am – 8:45am	Welcome and Introductions	Introduce Matou and establish community norms.
8:45am – 9:30am	PBL Components: Which are the most critical?	Review the days' learning objectives. Teams will discuss and prioritize the critical components of PBL.
9:30am – 10:00am	Reflection: *What components are in your classroom? Which components are missing?*	Review a summary of findings from the study and possible interpretations of the data. Introduce the idea of acceptable adaptation.
10:00am – 11:00pm	Approach the Barrier	Discuss the possible barriers to implementing PBL and identify the supports that mitigate those barriers.
11:00pm – 12:00pm	Matou planning guide	Introduce participants to the planning guide and how to integrate language supports.
12:00pm – 1:45pm	Lunch	Lunch is on your own.
1:45pm-2:50pm	Grade-level teams Plan	Participants will practice using the planning guide to design units with PBL components and language supports.
2:50-3:00	Reflection/Exit Ticket	Celebrate learning and complete exit ticket.

Day 2

PLC success and Peer Observation

Time	Activity	Notes
8:00am – 8:20am	"We are…" Wall part 2	Sign-in and assign table jobs. Teachers will add to the We are wall as well as post artifacts of PBL implementation about the room.
8:20am – 8:25am	Welcome and Introductions	Reiterate community norms and introduce the new learning objectives.
8:25am – 9:30am	Why PLC?	Review the data suggesting the importance of PLCs. Discuss andragogy and the commonalities between PLCs and PBL.
9:30am – 10:00am	Reflection: Self-audit your PLC experience	Participants will list their top three PLC strengths/weaknesses and compare/contrast their individual lists with PLC partners.
10:00am – 11:00pm	Peer Observation	Introduce the peer observation template. Participants will choose their partners and make arrangements to conduct an observation.
11:00pm – 12:00pm	Matou planning guide	Discuss and celebrate previous implementation of the units they designed during Day 1. Introduce the action steps of Matou and how to use the PLC meeting template.
12:00pm – 1:45pm	Lunch	Lunch is on your own.
1:45pm-2:50pm	Grade-level teams Plan	Participants will practice using the planning guide to design units with PBL components and language supports.
2:50-3:00	Reflection/Exit Ticket	Celebrate learning and complete exit ticket.

Day 3
Capacity Building

Time	Activity	Notes
8:00am – 8:20am	"We are…" Wall part 3	Sign-in and assign table jobs. Teachers will add to the We are wall as well as post artifacts of PBL and PLC implementation about the room.
8:20am – 8:25am	Welcome and Introductions	Reiterate community norms and introduce the new learning objectives.
8:25am – 9:30am	What is capacity building?	Introduce capacity building and discuss its' relationship to PBL and PLCs.
9:30am – 10:00am	Reflection: Of the colleagues who shared, which resonated with you the most? What questions might you have about your own practice?	Participants will have a chance to present their artifacts with the group.
10:00am – 11:00pm	"My TED talk would be…"	Introduce the practice of sharing new knowledge. Participants will discuss the possible supports and barriers to sharing innovations. Share findings from the study regarding observation data.
11:00pm – 12:00pm	Observations: Faculty Debrief	Discuss previous challenges and successes. Participants will discuss what innovations they observed in their partners' class and the power of shared knowledge.
12:00pm – 1:45pm	Lunch	Lunch is on your own.
1:45pm-2:50pm	Grade-level teams Plan	Participants will practice using the planning guide to design units with PBL components and language supports.
2:50-3:00	Reflection/Exit Ticket	Celebrate learning and complete exit ticket.

Day 4
Recognizing Accomplishment and Casting Vision

Time	Activity	Notes
8:00am – 8:20am	"We are…" Wall part 4	Sign-in and assign table jobs. Teachers will add to the We are wall as well as post artifacts of PBL implementation about the room.
8:20am – 8:25am	Welcome and Introductions	Reiterate community norms and introduce the new learning objectives.
8:25am – 9:30am	Step 1: Pick a topic.	Review principles of andragogy. Participants will collaborate on a menu of skills and practices that they can share.
9:30am – 10:00am	Step 2: Plan your TED	Participants will prepare a 3-5 min. presentation on a topic voted on by their colleagues.
10:00am – 11:45pm	Step 3: "Lights!, Camera!..."	Participants will present their innovations.
11:00pm – 12:00pm	Reflection: Likelike 2030	Participants will collaborate on a shared vision statement in the form a news article released in the year 2030 about their learning community.
12:00pm – 1:45pm	Lunch	Lunch is on your own.
1:45pm-2:50pm	Grade-level teams Plan	Participants will practice using the planning guide to design units with PBL components and language supports.
2:50-3:00	Reflection/Exit Ticket	Celebrate learning and complete exit ticket.

Day 1 Trainer Notes

1. Have sign-in sheet, group sorting cards, paint pens and butcher paper ready for participants.

2. Explain that Matou is the name of the model for accelerated professional growth and that the project has an accompanying PD that was based on the findings from the study.

3. Matou is the Tahitian word for "we." Explain that the key to accelerated growth, in this model, is the strength of collaboration.

4. Review suggested norms and confirm whether the list needs to be amended.

5. Review the list and confirm whether it needs to be amended.

6. Have sets of cards with critical components printed on them available for each group. This activity should engage groups in discussion on what they believe each word means and explaining reasons for why one may be more important than another. Leave time for each group to share their thinking and process.

7. Share findings about the critical components present in the data.

8. Talk through the criterion for acceptable adaptations and the importance of adaptations in an accelerated growth model.

9. Have teachers create and display their barriers on post-it notes on the chart paper posted around the room. Facilitate a discussion on the ideas that teachers generate.

10. Introduce and distribute the planning guide via Google Drive or email. Have hardcopies available. Explain how the template can be used to adopt all the critical components of PBL and to ensure linguistic supports are present in strategic ways. Be

explicit about what assessments may be used as summative products and that formative assessments for content need not be different from conventional formative assessments.

11. Note that lunches are on their own.

12. Teachers should use the time to practice using the template on a unit they will implement in the coming quarter. Teachers may choose to revise thematic units they've used in the past or come up with an entirely new one.

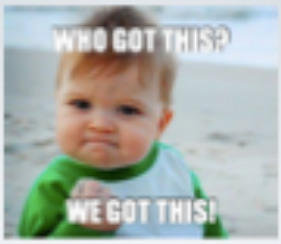
13. Provide teachers with time to complete the exit ticket and share their reflections on the day's learning.

WELCOME

- Please be sure to:
- Sign-in
- Choose a card
- Add a sketch, word, or phrase that describes your learning community

MĀTOU

An Accelerated Professional Growth Model



MĀTOU

"we"

COMMUNITY NORMS

- Stay engaged throughout the meeting.
- Professional discourse is solution-oriented.
- Contribute respectfully to discussions.

LEARNING OBJECTIVES

- Gain a clear understanding of the critical components to PBL.
- Build understanding of how to integrate guided language acquisition strategies in PBL lessons.
- Identify potential barriers and supports to implementation.
- Begin planning for accelerated professional growth.

PBL: CRITICAL COMPONENTS

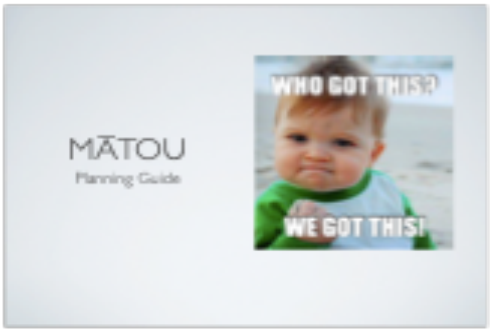
- With your group, discuss your understanding of each critical component and arrange them in order from most important to least important.

FINDINGS: CRITICAL COMPONENTS

- Intended use of PBL is oriented around ELLs.
- Critical components (authenticity, collaboration)
- Omissions (collaboration, inquiry)
  - Note: collaboration, though mentioned in every case, was not observed in every case.
- Adaptations (use of technology)

ACCEPTABLE ADAPTATION

- Is NOT a lack of fidelity
- Intentional
- Responsive to data
- Tracked through data



Day 2 Trainer Notes

1. Have sign-in sheet, group sorting cards, paint pens and butcher paper ready for participants. Have blue tape ready for teachers to post artifacts.
2. Welcome participants and reiterate the name of the project.
3. Reiterate collaboration as a key factor to success.
4. Review suggested norms and confirm whether the list needs to be amended.

5. Review the list and confirm whether it needs to be amended.

6. Have sets of cards with descriptors of andragogy and pedagogy printed on them available for each group. This activity should engage in group discussion. Leave time for each group to share their thinking and process. Explain that the difference and similarities between andragogy and pedagogy provides us with a way to think about PBL and PLCs.

7. Explain the similarities between PBL and PLCs in practice.

8. Review the findings in the data that suggest the need for PLCs.

9. Participants will reflect on their experience of PLCs in the past, listing what they believe are the top three strengths and weaknesses of the way their PLC was done in the past. Have participants compare lists and share out a summary of their group discussion. Highlight the benefits of using PLCs using participant feedback and mention that the template may help mitigate or limit the extent of the challenges with PLCs (eg. Time constraints, disagreements etc.)

10. Introduce peer observation as a way to share best practices. Explain that peer observations are a means for individualized feedback and reflection on practice. Emphasize that, when done school-wide, peer observation can increase collective teacher efficacy. Mention that the effect size of collective teacher efficacy is 1.97 (Hattie, 2017). Be ready to answer questions about time constraints by explaining how these tools and practices address issues around focus and efficacy that limit the time wasted and ensure that the time spent is effective toward sustainable change.

11. Introduce the PLC meeting template and explain how it may be used to mitigate previous data-team or articulation meeting challenges.

12. Lunch will be on your own.

13. Grade-level planning should allow time to circulate and talk with teams about what's working for them and what challenges they may be having.

14. Provide teachers with time to complete the exit ticket and share their reflections on the day's learning.

WELCOME

- Please be sure to:
- Sign-in
- Post your PBL artifacts around the room.
- Add a sketch, word, or phrase that describes your learning community.

MĀTOU

An Accelerated Professional Growth Model

MĀTOU

"we"

COMMUNITY NORMS

- Stay engaged throughout the meeting.
- Professional discourse is solution-oriented.
- Contribute respectfully to discussions.

LEARNING OBJECTIVES

- Gain a clear understanding of the basic principles of Professional learning communities (PLCs).
- Build understanding of what peer observation is.
- Develop understanding of how peer observation might be used to accelerate professional growth.
- Continue planning for accelerated professional growth.

PBL VS. PLC

- Sort the attributes cards of andragogy and pedagogy with your team. Be ready to explain your thinking.

PBL VS. PLC

- Voice and Choice
- Self-directed
- Mastery and Recognition
- Learner-Centered

FINDINGS: NEED FOR PLC

- Need for refining existing PBL units.
- Need for addressing both PBL instruction and closing student achievement gap.
- Need for vertical alignment of PBL instruction.
- Current perceived level of practice: "beginning"

REFLECTION: PLC SELF-AUDIT

- List your top three PLC strengths
- List your top three PLC challenges
- Discuss your lists with your group.
- What similarities and differences are there?

PEER OBSERVATION

- Share best practices.
- Individualized
- Formative
- Culture-Shaping
- Empowering
  - Note: Collective teacher efficacy

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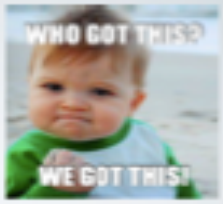
PLC Meeting Template



GRADE-LEVEL PLANNING

EXIT TICKET

[bit.ly link to exit ticket]

Day 3 Trainer Notes

1. Have sign-in sheet, group sorting cards, paint pens and butcher paper ready for participants. Have blue tape ready for teachers to post artifacts.

2. Welcome participants and reiterate the name of the project.

3. Reiterate collaboration as a key factor to success.

4. Review suggested norms and confirm whether the list needs to be amended.

5. Review the list and confirm whether it needs to be amended.

6. Invite teachers to explain what their experience has been so far in implementation and explain their artifact. Give participants time to reflect on the learning prompts. Provide time for participants to share their reflections.

7. Explain how capacity building occurs when sharing new knowledge among teachers becomes a common practice. Discuss the learning prompts. Emphasize limitless growth possible when your learning benefits more than just your students.

8. Review the findings in the data that came from triangulated observation data. Reiterate the power of shared strategies when discussed and implemented through a system where PLCs and peer observations are common practice.

9. Review benefits of peer observation and have participants discuss the innovations they observed in their partners' classrooms.

10. Invite lingering questions and concerns that participants may still have about using any of the templates and tools provided.

11. Lunch will be on your own.

12. Circulate and discuss progress with individuals as instructional teams plan.

13. Reflect and celebrate learning before completing exit tickets.

WELCOME

- Please be sure to:
- Sign-in
- Post your PBL artifacts around the room.
- Add a sketch, word, or phrase that describes your learning community.

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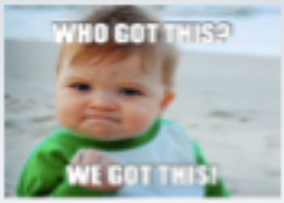

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"we"

COMMUNITY NORMS

- Stay engaged throughout the meeting.
- Professional discourse is solution-oriented.
- Contribute respectfully to discussions.

LEARNING OBJECTIVES

- Gain a clear understanding of the basic principles of capacity building.
- Build understanding about how capacity building relates to PBL and PLCs.
- Develop understanding about how peer observations may contribute to individual and institutional capacity building.
- Continue planning for accelerated professional growth.

REFLECTION

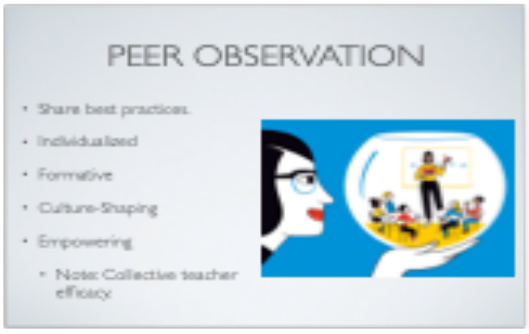
- Of the colleagues who shared their artifact today, which resonated with you the most?
- What questions or insights might you have about your own practice?

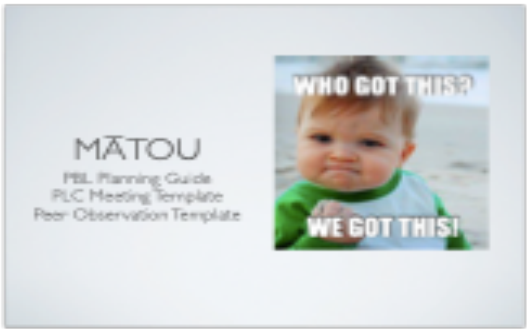
"MY TED TALK WOULD BE…"

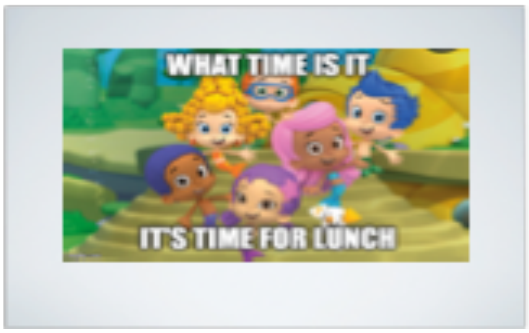
- Sharing new knowledge
- What are some possible barriers to sharing new ideas?
- What may be some possible supports?
- Who benefits from your learning?

FINDINGS: OBSERVATIONS

- Certain instructional strategies were in some classes but not others.
- Integrated language arts content were taught alongside social studies or science.
- Reflection and inquiry were present in the interview data but not observed.
- Current perceived level of practice: "beginning"







Day 4 Trainer Notes

1. Have sign-in sheet, group sorting cards, paint pens and butcher paper ready for participants. Have blue tape ready for teachers to post artifacts.
2. Welcome participants and reiterate the name of the project.
3. Reiterate collaboration as a key factor to success.

4. Review suggested norms and confirm whether the list needs to be amended.

5. Review the list and confirm whether it needs to be amended.

6. Explain that today is all about celebrating their learning achievements as a community. Have participants list their most valued skills and strategies on post-it notes and have a TED menu poster ready for them to add to. Have colored dot stickers ready for teachers to "vote" on the strategies that most interest them. Be sure that every participant has had at least one strategy be voted on.

7. Instruct participants to prepare their 3-5 minute talk based on what was voted on. Have them prepare one powerpoint slide to accompany their presentation.

8. Participants will share their presentations.

9. Have participants collaborate on a shared vision statement. Explain that their statement should be in the form of an exciting news article that gets released in the year 2030. Their statement should reflect all that they will have achieved and what will make them "news-worthy" in 10 years.

10. Lunch will be on your own.

11. Grade-level teams will plan instruction/assessments for the final weeks of school. Have them spend special attention to the ways that they will allow students to reflect, celebrate learning and be recognized for their achievements.

12. Present completion certificates, recognize specific teams for evidence of collaboration, authenticity, inquiry, intellectual rigor, deep reflection, project management, and exemplary product/presentation skills. Have participants complete final exit ticket.

WELCOME

- Please be sure to:
- Sign-in
- Post your PBL artifacts around the room.
- Add a sketch, word, or phrase that describes your learning community.

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COMMUNITY NORMS

- Stay engaged throughout the meeting.
- Professional discourse is solution-oriented.
- Contribute respectfully to discussions.

LEARNING OBJECTIVES

- Practice sharing instructional strategies.
- Collaborate on a shared vision for instructional growth.
- Continue planning for accelerated professional growth.

STEP ONE: PICK A TOPIC

- Create a short list of strategies and skills that you value in your teaching.
- Post those skills and strategies on the TED menu.
- Colleagues will vote on what they are most interested in.

STEP 2: PLAN YOUR TED

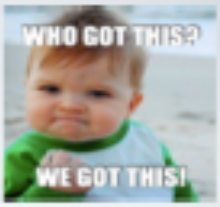
- Prepare a 3-5 minute presentation.
- Be sure to include a one slide PPT.
- Audience: Your colleagues
- Goal: To share your innovation/insight so that others may use it.

LIGHTS!, CAMERA!...

- Present your TED talk.

REFLECTION:

Likelike Elementary School
2030
With your group, collaborate on a **shared vision statement** in the form of a **news article** about your **learning community** released in the year **2030**.



GRADE-LEVEL PLANNING

EXIT TICKET

[bitly link to exit ticket]

Appendix B: Interview Protocol

Teacher Interview Protocol

Researcher:

Approximately 60-Minute Semi-Structured Interview Protocol

Time:

Date:

Participant Code:	Years Experience:
Grade Level:	Content Area(s) of Lesson:

Interview Questions:

1. How would you define PBL?
2. What are the components of PBL that are necessary for instruction?
3. What would you say were critical components to a PBL lesson or unit?
4. How might you describe your practice of PBL?
5. Observation Debrief question(s): (e.g., I noticed you…Tell me about the purpose of this practice/strategy.)

Administrator Interview Protocol

Researcher:

60-Minute Semi-Structured Interview Protocol

Time:

Date:

Participant Code:	Years Experience:
Grade Level:	

Interview Questions:

1. How would you define PBL?
2. What are the components of PBL that are necessary for instruction?
3. What would you say were critical components to a PBL lesson or unit?
4. How might you describe your school's practice of PBL?
5. How would you describe the intentions of your school's implementation of PBL?

Appendix C: Direct Observation Protocol

Direct Observation Protocol

Background

Observer:	Observation Date:
Length of Observation:	Observed from: to:
Integrated Lesson: Yes No	Content Area(s):
Participant Code:	Average age of students:
Number of Students:	Teacher years experience:

Observation Notes

1. What is the teacher doing?

What do I see?	What do I think?

2. What are the students doing?

What do I see?	What do I think?