2020

Teacher Perspectives of Project-Based Learning Implementation in Middle-Grade Classrooms

Lyndria Regina Bland
Walden University

Walden University

College of Education

This is to certify that the doctoral study by

Lyndria R. Bland

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Heather Caldwell, Committee Chairperson, Education Faculty
Dr. Christopher Cale, Committee Member, Education Faculty
Dr. Crissie Jameson, University Reviewer, Education Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2020

Abstract

Teacher Perspectives of Project-Based Learning Implementation in Middle Grades Classrooms

by

Lyndria R. Bland

MA, Central Michigan University, 2004

BS, Georgia State University, 1994

Project Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

April 2020

Abstract

Teachers at a middle school in a Southeastern U.S. state were not implementing project-based learning (PBL) as mandated by the district. The purpose of this qualitative case study was to examine the perspectives of teachers concerning PBL implementation and how their self-efficacy shaped their perspectives. Bandura's self-efficacy theory provided the framework for the study. Data were collected through interviews with 11 participants and examination of PBL artifacts. Data were analyzed using thematic, open and axial coding to discover patterns and themes. Findings indicated that teachers shaped their perspectives regarding PBL through their experiences while implementing PBL, collaboration among teachers is imperative when implementing new strategies such as PBL, and training before and during implementation is essential. Self-efficacy had a positive effect on PBL implementation. A recommendation was given to provide time for collaboration and to implement a professional development program developed for this project study. Findings may be used to increase teacher self-efficacy by offering appropriate resources to improve future PBL implementation.

Teacher Perspectives of Project-Based Learning Implementation in Middle-Grade Classrooms

by

Lyndria R. Bland

MA, Central Michigan University, 2004

BS, Georgia State University, 1994

Project Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

April 2020

Dedication

This work is dedicated to God who makes all things possible.

I would also like to dedicate this journey to my mother, father, and husband. To my mother who spent her life being my loudest cheerleader. She supported me through this process until her death. My mother believed that I was capable of everything I tried, even when I wasn't sure. I miss her solid assurance. Even as cancer ravaged her body, she insisted that I continue the work I started. "We aren't quitters." To my father who spent all his life making me feel like a princess. He gave me tools that would lead me through my life and helped me find my way in the world. To my husband who took on the role of cheerleader, confidant, and encourager after we married. I am amazed by the sacrifices he made during this journey. At times, I thought it was too difficult to continue, but he was there to nudge me forward.

Acknowledgments

I would also like to recognize Dr. Heather Caldwell, chairperson of my committee, who has advised me, been a guide, and come to my rescue throughout this process. At times, we have both been frustrated, but she always kept our focus on the finish line.

In addition, I want to acknowledge Dr. Cale and Dr. Jameson who have been instrumental in guiding me through this journey. Dr. Cale, thank you for taking a first look at this work and moving it further with patience and kindness. Dr. Jameson, thank you for helping me gain IRB approval in such a short period of time. Even as an object is the sum of its parts, this paper is the sum of all the details you have guided me through.

Table of Contents

List of Tables

Section 1: The Problem

The Local Problem

The current educational environment requires a new skill set for teachers to be effective in the classroom as learning is centered on changes to match the way the world communicates and collaborates in the 21st century. The new skill set will make classrooms student centered with the inclusion of strategies such as PBL (Wan Husin et al., 2016). Teachers at a middle school in a Southeastern U.S. state are not implementing PBL as mandated by the district. Teachers can no longer rely on disseminating information to students and using grades as the primary indicator of mastery (Riley & Ward, 2017). For 21st-century education, teachers are expected to provide lessons that will help students create, communicate, collaborate, research, think critically, solve problems, make decisions, and use technology and information efficiently (Smith & Gibson, 2016). Teachers must possess the appropriate skills and resources to assist their students. It is important that they become facilitators within the classroom to help students take responsibility for their learning (Canuto, 2015).

PBL is an application that requires teachers to be facilitators, guiding students in an interdisciplinary study (Martelli & Watson, 2016). A student-designed product or presentation is the goal of PBL, but the process is as important as the outcome. The problems students work to solve are real world and open ended. The problems are authentic and require an authentic product (Martelli & Watson, 2016; Petersen & Nassaji, 2016). PBL is a collaborative process, and students must research on their own with guidance by the teacher so that they can find a solution to the problem (Wallace & Webb, 2016).

An essential job of schools is to improve 21st-century skills in students as these skills will help them succeed in the workforce of the future (Erdogan, Navruz, Capraro, & Younes, 2016). PBL can be a way to help students master their 21st-century skills in the classroom (Baysura, Altun, & Yucel-Toy, 2016). This strategy is composed of several components that align with the skills that students will need as they move into the future. A few of the skills include the effective use of technology, problem solving, collaboration, and public speaking. The efficient use of technology is vital to PBL implementation and is an important 21st-century skill (Mosier, Bradley-Levine, & Perkins, 2016; Smith & Gibson, 2016). Students must learn to synthesize information from several sources, create products using technology, and adapt to the many ways that technology will influence their lives in the future (Smith & Gibson, 2016).

Collaboration is another 21st-century skill that is incorporated into PBL. Students must communicate with team members, listen, compromise, and complete tasks assigned to them for the success of the group (Jacques, Bissey, & Martin, 2016). Public speaking helps students present their ideas, research results, and speak to an audience. PBL requires students to present products to individuals or groups outside the classroom so they learn to target different audiences (Baysura et al., 2016). PBL is an effective way to introduce and improve 21st-century skills in the classroom (Mosier et al., 2016).

Research showed that PBL has a positive effect on student performance (Bilgin, Karakuyu, & Ay, 2015; Erdogan et al., 2016; Han, Rosli, Capraro, & Capraro, 2016; Reisi & Saniei, 2016). PBL enhances the ability of students to solve problems and create authentic products that often change the way students think. Students design research and products on their

own, which strengthens their self-efficacy (Svihla & Reeve, 2016). Using real-world problems is a way to engage students in the process by giving them choice and allowing them to make decisions about how their learning will take place. The practice of problem solving can influence students' critical thinking. Student knowledge is expanded because they explore concepts beyond what is required by states and districts (Jacques et al., 2016; Mosier et al., 2016).

Technology is an essential component of PBL. The use of technology provides opportunity for collaboration outside of the classroom, enhances the amount of information that students can access, gives students new and innovative ways to display or express their learning, and promotes communication skills (Hopper, 2014; Halaweh, 2017). As technological advances continue, students must learn to navigate an ambiguous culture (Starr & Minchella, 2016). PBL is linked to 21st-century education because it embodies many of the skills that students will need to be productive in a technologically driven society. The explosion of information availability due to technological advances will create a global environment that will require 21st-century skills to be productive (Mosier et al., 2016). Globalization will require skills that have not been previously nurtured in traditional educational settings (Smith & Gibson, 2016). Technology can also provide ways to collaborate and communicate with learners in another location (Hopper, 2014; Cho, 2017). Working alongside others outside of a student's normal parameters can increase their ability to work with others when solving a problem (Svihla & Reeve, 2016).

In some cases, PBL has little positive influence on student performance. Many teachers create PBL projects with a focus on standards or benchmarks, and this makes it difficult for students to maintain autonomy and may disrupt student engagement. When students can explore

a topic that interests them, they gain more perspective and insight that will fuel their desire to learn more (Harmer & Stokes, 2016). When students are not given the freedom to go where the information takes them, they may not be motivated to be engaged with the material (Svihla & Reeve, 2016). PBL can be ineffective if not used in the appropriate circumstances where students have voice and choice in what they do. It is important that 21st-century skills are related to the curriculum when students are engaged in PBL (Baysura et al., 2016; Martelli & Watson, 2016).

The administrators and staff of Foster Middle School (FMS, pseudonym) in a suburban area are determined to provide student-centered learning using PBL because it is a district mandate (FMS Principal, personal communication, November 15, 2015). FMS is in Polk County. Data from walkthroughs (brief classroom observations), surveys, and data chats showed that PBL strategies presented briefly at the district level were poorly implemented into classrooms as teacher training continues (FMS Assistant Principal, personal communication, October 13, 2015). In response, the district required teachers to focus on eight essential product design elements of PBL implementation (Solis, Larmer, & Olabuenaga, 2015). With input from the data collection tools, the administrators at FMS embraced the district training tools and began the process of full implementation during the 2015 school year (Cook & Weaver, 2015).

Using a qualitative case study, the perspectives of faculty members were examined as they implemented PBL strategies in their classrooms. I sought to obtain a deeper understanding of the perspectives of faculty concerning their ability to implement PBL strategies. The data collected consisted of interviews and artifacts. The artifacts included teacher BIE checklists (see Appendix E) and student products from the PBL experience. This case study may provide

findings that will assist the faculty of FMS and Polk County Public Schools (PCPS) (pseudonyms) in determining whether the program should continue as planned or be revised based on results of the study.

Educators have long believed that teacher self-efficacy influences their ability to instruct students in an effective way (Dickey, Walinsky, Rofkahr, Richardson-Cline, & Juntunen, 2016). When there is a new directive for middle school classrooms, it is important that teachers have the resources and training necessary to feel competent to instruct students (Özdemir & Demircioğlu, 2016). FMS administrators were interested in determining whether teachers have enough self-efficacy to implement PBL and to understand how teachers believe these tools should be used. PBL is emphasized at FMS because it is a district mandate and because it is best practice according to research. PCPS administrators have determined that PBL is cutting edge, researched-based instruction that will prepare students for the 21st century (Bilgin et al., 2015; Erdogan et al., 2016; Han et al., 2016; Reisi & Saniei, 2016). This case study addressed the problem that teachers at a middle school in a Southeastern state are not implementing PBL as mandated by the district.

Rationale

According to the principal at FMS, PCPS is a school district located in a Southeastern state that had a total population of 1,288,478 students during the 2015-2016 school year. There are 95 schools in the district: 16 high schools, 16 middle schools, 58 elementary schools, and five instructional centers. The school is in a suburban area. FMS's population reached 1,517 during the 2015-2016 school year (National Center for Statistics, 2016).

PCPS educational leaders desire to move students toward 21st-century learning through evidence-based pedagogy (Principal, personal communication, 2015). PBL embodies many of the skills students will need to master to be successful in the future (Baysura et al., 2016). These skills include critical thinking, problem solving, research acumen, communication skills, collaboration and cooperation, and reasoning. To help teachers accomplish this goal, the superintendent has mandated implementation of PBL in each school. District training began a year after the mandate was communicated to principals. According to data collected by school administrators during the 2014-15 school year (such as classroom walkthroughs and teacher surveys), teachers at FMS did not implement PBL according to district requirements. This is a problem because the district has mandated that all classroom teachers must implement PBL by the end of the 2015-2016 school year according to specific criteria.

A subject area supervisor for PCPS revealed that many of the teachers at the school had difficulty implementing PBL (Subject Area Supervisor, personal communication, 2013). This supervisor completed several visits to classrooms at FMS and met with teachers. She found that teachers were unsure about what the district required. FMS administrators, along with others in the district, have identified the instructional concerns of teachers and reported these concerns to district administrators. The district has used current trends in educational research to discover strategies to address teacher concerns. According to the PCPS Subject Area Supervisor (personal communication, November 15, 2015), teacher concerns about district PBL expectations led to a cooperative effort with the BIE. Teachers were trained to use eight essential project design elements as a guide for creating PBL projects. These eight elements are described in Section 2.

In addition to concerns about expectations, teachers listed the resources needed to implement PBL. Teachers were given several options in classrooms: BIE teacher training, laptops, Chrome books, Google classroom, teacher experts, 90-minute blocks, professional learning communities (PLCs), interdisciplinary teams (ITs), WEvideo, Edmodo, PCPS GO, and Wi-Fi. Teachers can use technological devices such as laptops and Chrome books provided by the school, but the number of devices is limited. Students without personal devices have preference in using school devices while in the building. Wi-Fi has been provided to allow students the use of software such as Google classroom, WEvideo, Edmodo, and Socrative for assignments and projects. Teachers are also given opportunities such as PLCs and ITs for collaboration. The training and preparation from the BIE offer ideas, strategies, and materials that can be used when implementing PBL (Technology Resource Trainer, personal communication, October 21, 2016).

At the PLC and IT meetings that take place on a regular basis throughout each week, the teachers also collaborate on academic plans and student concerns. As a result of attending the PLC and IT meetings, school administrators gained insight into what teachers were working on and how they needed more guidance. The district mandate is a driving force for implementing PBL, but the faculty of FMS also sought to increase the number of students who score at the proficient level on the state test (Site Testing Coordinator, personal communication, 2015). During the 2015-2016 school year, these were the FMS passing rates on the state test: English 89%, Math 89%, History 94%, and Science 90% (Department of Education, 2016). Although

these scores are comparable to state and district scores, FMS administrators and faculty noted that there is room for improvement.

In addition to supplying teachers with applicable resources, administrators found that teachers desired close alignment between the content of PD sessions at FMS and the needs of PBL implementation. After brainstorming ways to align PD with the needs of PBL implementation, administrators implemented a PD called Shared Learning Experience (FMS Principal, personal communication, November 15, 2015). This PD can be described as job-embedded PD because it occurs at the school and is facilitated by school staff members who have prior experience concerning relevant topics through personal research or learning opportunities outside of the district.

Job-embedded PD is a part of the school culture and includes PLCs, interdisciplinary planning, and collaboration between teachers and administrators (Althauser, 2015). Shared Learning Experiences was different from the previous program (PD offered at the district level) because it focused on topics that were unique to the school, faculty, and students. Before Shared Learning Experiences was implemented, the administrators focused on district-wide topics that were often already implemented by the school's faculty. The administrators began to approach PD from a school perspective rather than a district perspective. This approach promotes a relationship between what teachers and students need in a school and what is offered during PD sessions at no cost to the teacher (Brown & Militello, 2016).

The structure of faculty meetings was changed during the 2013-2014 school year. Meetings were abbreviated to make time for the PD aligned with what research literature

recommended. One way the sessions were effective was that they were necessary to address the needs of students and teachers in this setting. When the faculty meetings ended, preassigned groups went to specified workshops in several places throughout the building. Each group visited a different workshop each month following the faculty meeting. One group may have attended a workshop about how to use Google docs in the classroom. Another group may have attended a workshop about how to address the needs of English language learners at different levels. A third group may have attended a workshop pertaining to teacher knowledge about diverse groups represented in the school. The final group may have attended a PBL session. This session provided an opportunity for discussion but did not lead to deeper learning. The groups rotated each month. This PD format provided relevant information that met the needs of teachers and students in the building.

Another way that this PD format was aligned with research literature was that it provided teachers with multiple ways to process the information and with opportunities to collaborate (Brown & Militello, 2016). The strategies and information provided in these sessions were also discussed during curriculum learning team meetings and interdisciplinary team meetings during the weeks between sessions. The teachers and administrators collaborated in these meetings during the school day. Teachers then implemented the knowledge in classroom instruction. Team members observed each other and provided feedback. Teachers also signed up to attend shorter sessions to meet their individual needs, such as using a new technological device or incorporating Google classroom into the instruction. Google classroom is a technological application that allows teachers to create assignments and provides a collaborative tool for

students. In subsequent years, the focus for professional development became PBL. The district sessions covered a broad range of strategies, but the site-based sessions focused on what teachers needed to implement PBL (Bolt, Fenn, & Ohly, 2016; FMS Assistant Principal, personal communication, October 15, 2015). The implementation of PBL was the focus of this study.

PBL emerged from the learning-by-doing movement of Dewey (2016). This strategy was developed from questions or problems that reflect the real world. These questions or problems have complex answers or solutions. In this way, students grapple with problems and chart their path to a solution that is beneficial to their community and beyond. PBL is meant to be interdisciplinary, student-centered, collaborative, and geared toward 21st-century skills (Baysura et al., 2016).

Definition of Terms

The terms in this section are defined because they do not have a common meaning known to everyone. They were important to this qualitative case study because they are technical terms that clarify the components of this study. These terms were defined to ensure that everyone understood the terms as they were used in this case study.

Data chat: A collaborative meeting held to brainstorm strategies for students who are struggling academically or behaviorally. These students can also be experiencing emotional difficulties that stem from divorce, death of a loved one, or social crises. After strategies have been implemented, the goal of the meetings shifts to evaluating the effectiveness of the strategies by looking at student success (Gerzon & Guckenburg, 2015).

Expert teachers: Teachers who are motivated to control their learning to increase their pedagogy. They reflect on their practices to continue making progress in their classrooms (Cortina, Miller, McKenzie, & Epstein, 2015).

Interdisciplinary instruction: Interdisciplinary instruction involves the teaching of content from more than one curriculum or subject in a way that makes instruction more effective. This form of instruction includes a premise, problem, or topic (Baker & Däumer, 2015).

Job-embedded professional development: Teacher learning that occurs during daily practice to enrich content instruction (Althauser, 2015). There are different goals for every teacher, according to individual needs (Ittner, Helman, Burns, & McComas, 2015).

Professional development: A form of teacher learning that provides opportunities for teachers to hone their skills, learn how to integrate different strategies and disciplines, or provide a deep understanding of the content (Abdul-Majied, Johnson, & Campbell, 2017).

Professional learning communities (PLCs): Collaborative groups of people who share knowledge of and provide feedback concerning changes in instructional practice to promote growth and increased student achievement (Watson, 2014; Battersby, 2019).

Project-based learning: According to the BIE (Solis et al., 2015), "students work on a project over an extended time that engages them in solving a real-world problem or answering a complex question. They demonstrate their knowledge and skills by developing a public product or presentation for a real audience" (What is PBL?, n.d, para. 1).

Walkthroughs: Administrative visits to classrooms with a duration of 5-10 minutes. During the visit, a checklist is completed to gather data about what instruction looks like in the

building. Because some components of the checklist occur at specific times during the block, such as warmups and closings, walkthroughs are completed at different times on different days. The data from these walkthroughs can be used to determine the degree to which staff members and students are moving toward accomplishing a goal (Niemeyer & Gerber, 2015).

Significance of the Study

PCPS researched best practices and evidence-based strategies to determine the direction instruction would take in the coming years. The district determined that PBL would be an effective means of improving student learning and created a process for implementation. This qualitative study addressed teacher perspectives on the process of implementing PBL.

It is important for teachers to implement PBL into classrooms because it is a district mandate. The district mandated the implementation of PBL to educate students with research-based strategies to become productive citizens. The focus of this study was to explore the perspectives of teachers and their self-efficacy as they implement PBL. The standard for effective implementation has been those set forth by the district. There are eight elements that teachers are expected to include in their PBL lessons:

"challenging problem or question, sustained inquiry, authenticity, student voice and choice, reflection, critique and revision, and public product" (Solis et al., 2015, pg. 10). These elements are used by the BIE to train teachers to design appropriate PBL projects.

Research Questions

This qualitative case study addressed faculty perspectives of teacher implementation of PBL at FMS. FMS administrators expect that teachers will implement strategies using the tools

and training provided by the school and the district. Using self-efficacy theory as the theoretical framework for this study, I collected data through interviews and examination of documents from teachers in Grades 6-8. Self-efficacy supports the idea that teachers must believe they can perform a task to be successful. Teachers' level of self-efficacy may determine whether they are able to complete the task of implementing PBL in their classroom instruction (Bedel, 2016). In this study, I explored faculty perspectives about the level of comfort they have with the strategies provided to implement PBL in the classroom. The data collected were used to answer these research questions:

1. How well do teachers believe they were able to implement PBL?
2. How well do teachers feel supported to implement PBL?

The research questions guided the study to determine whether teachers were able to implement PBL in classrooms. I investigated teacher accounts of the level of support they received from coworkers, administrators, and district resources. I also explored whether teachers encountered any barriers while attempting to implement PBL. A qualitative case study design was appropriate to determine whether teacher implementation of PBL had been successful because all teachers were in one location.

Review of the Literature

The purpose of this qualitative case study was to examine the perspectives of teachers concerning PBL implementation and how their self-efficacy shaped their perspectives. The framework that supported this study was self-efficacy. After research showed that PBL was evidence based and would enhance student development of 21st-century skills, the administrators

of PCPS issued a district-wide mandate for teachers to implement PBL in classrooms. The district administrators knew that this undertaking would span several years, so they began with small steps.

Literature related to the problem addressed in this study focused on case studies, middle school instruction, teacher implementation, teacher buy-in, and teacher motivation. Peer-reviewed journal articles and books were located by searching the Walden University library databases such as Education Research Information Center (ERIC), Education Research Complete, Sage Publications, and ProQuest. Key terms used in searches included *professional development*, *PBL*, *self-efficacy*, *evaluation theory*, *middle school instruction*, *teacher implementation*, *teacher buy-in*, and *teacher motivation*.

Conceptual Framework

Self-efficacy theory provided the framework for this study because it highlights the understanding of a teacher's ability to implement new strategies that differ from their usual practices (Bandura & Perloff, 1967). Self-efficacy theory refers to an individual's belief that they can carry out necessary behaviors to complete important tasks (Bandura, 1993). When a person is successful, they are more willing to try new things and believe that they will be successful. When an individual does not feel efficacious, they tend to avoid situations that may cause failure (Bandura, 1989).

If teachers are well trained on topics that will help them address issues in their classrooms, their level of self-efficacy will increase and change will occur at the classroom level (Svihla & Reeve, 2016). The teachers at FMS are working toward active engagement through

PBL in their classrooms (FMS Assistant Principal, personal communication, December 9, 2014). People with a higher level of self-efficacy will set higher goals and expectations (Bandura, 1989). Self-efficacy can influence how teachers are able to implement new and complicated strategies. Individuals who have a high sense of self-efficacy can imagine success as they plan activities and lessons. This ability will push these individuals to create more sophisticated lessons because they can envision success. Those with a low sense of self-efficacy have trouble envisioning success (Bandura, 1993).

Self-efficacy can change teachers' attitudes concerning how students learn. Improved teacher self-efficacy improves their ability to motivate and support the learning of students who have difficulty performing (Bandura, 1993). The main constructs of self-efficacy that were the lens through which I analyzed data were teacher beliefs about self-efficacy, whether teachers believe that they are proficient enough to perform at an appropriate level, and whether they have a high level of knowledge and skills related to implementation of PBL (Budge, Mun Yuk, & Minero, 2017).

Motivation, interest, and achievement are influenced by self-efficacy. Teachers are often reluctant to implement new strategies when they do not believe they are able to do so (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996). Teachers who have high self-efficacy perform better because they are more self-assured (Wagner & Imanuel-Noy, 2014; Frazier, Bendixen, & Hoskins, 2019). There is a relationship between what teachers believe they can accomplish and what they accomplish (Bandura et al., 1996). Self-efficacy refers to the need of every teacher to have confidence in their ability to meet the needs of their students by providing active

engagement based on proper training (Sánchez-Castro, & Strambi, 2017). The confidence that comes from self-efficacy can motivate teachers to perform in ways that are different from the norm (Bandura, 1989). Self-efficacy gives a person the ability to adjust their thinking and their actions, which can change the dynamics of their classroom (Bandura et al., 1996).

To understand changes in self-efficacy, I chose a case study as the best way to explore teachers' perspectives during the implementation process. FMS represented a closed case that could be examined in detail. The research questions addressed teacher perspectives of progress as their self-efficacy changed. The questions also addressed the extent to which teachers implement PBL and whether they felt capable of implementing PBL. The instruments used for this study included an interview protocol and an examination of student work from PBL assignments. I also used a checklist provided by BIE to further validate whether PBL was implemented appropriately. These instruments enabled me to obtain a better understanding of the extent to which PBL has been implemented. I described the role of self-efficacy in teachers' ability to implement PBL strategies.

Review of the Broader Problem

The literature reviewed in this section included research on PBL, how teachers instruct students in Grades 6-8, what elements are involved in implementing changes in classrooms, teacher buy-in, and motivation. These topics were addressed to shed light on aspects of teacher self-efficacy and how they relate to the implementation of PBL. Teachers want to improve their teaching (Shaffer & Thomas-Brown, 2015), but they must feel competent to do so (Flores, 2015).

Project-based learning. PBL can be used to create opportunities for teachers and students, including communication, collaboration, creativity, critical thinking, and problem-solving (BIE, n.d.). These skills will be important for students as they fill their roles in society (Lee, 2015). In PBL, students prepare an answer to a question (or a solution to problem) in groups and apply their information to a useful solution for the problem or question that guides the task (Márquez & Jiménez-Rodrigo, 2014; DeMink-Carthew, & Olofson, 2020). PBL collaboration occurs in an inquiry-based activity that emphasizes problem-solving (Kızkapan & Bektaş, 2017). The problems that students solve must be relevant to engage them in the investigative process (Lee, 2015).

PBL is used to promote collaboration, creativity, and problem-solving (Jacques et al., 2016). Through these elements, students experience an increase in critical thinking and self-efficacy (Kızkapan & Bektaş, 2017). The collaboration adds a social aspect that fosters an increase in enthusiasm for learning (Karaçalli & Korur, 2014; Lee, Huh, & Reigeluth, 2015). Students take responsibility for their learning by engaging in the planning, investigating, and creating of a product that will answer a guiding question for the project (Stover, 2014; Sakulvirikitkul, Sintanakul, & Srisomphan, 2020).

PBL is well suited to science instruction because it is a student-centered collaboration with the opportunity for differentiation and scaffolding. PBL can be used to introduce, extend, or emphasize previous content (Jacques et al., 2016). The assessment of PBL projects is different from traditional testing in that students create products that show what they have learned and how they have applied their knowledge to a new situation (Lee, 2015). PBL helps students build

on knowledge and skills through student-led investigation that will result in better retention (Karaçalli & Korur, 2014; Sakulvirikitkul, Sintanakul, & Srisomphan, 2020).

Middle school instruction. Middle school instruction requires an element that speaks to the students who sit in the classroom, and teachers should understand how they learn (Thomas & Sondergeld, 2015). All instruction should be based on how students learn, but this is important at the middle school level when distractions such as puberty exist (Taboada Barber et al., 2015). Middle school students are engaged in active learning (Goldberg, Magee, & Madden, 2015) because instruction is authentic, differentiated, and related to personal experiences (Hollo & Hirn, 2015). As students associate subject matter concepts with everyday living, their comprehension improves (King & Ginns, 2015). Another engaging factor is allowing students to plan their learning (Peters-Burton, Merz, Ramirez, & Saroughi 2015). Students may also be engaged through song. Song lyrics can help with vocabulary, memory, and creativity. Music stimulates brain activity that promotes memory in unique ways (Governor, Hall, & Jackson, 2013; Bell & Bell, 2018).

Another important factor that teachers must consider is the fact that reading comprehension will influence student learning. As students gather information from various sources, they are exposed to information in different formats. Teachers can help students overcome some deterrents to reading comprehension. Teachers should offer students the opportunity to practice and master vocabulary in context (King & Ginns, 2015). Teachers can provide strategies to help students deal with disorganized or poorly written text. Students may need assistance with text that contains unnecessary information or too many isolated facts. When

textbooks or other resources are not written to support student comprehension, teachers must provide the required support (Taboada Barber et al., 2015).

It is important that teachers consider the best way to assess the mastery of information in middle school. Middle school teachers often consider the effectiveness of a point system, rubrics, and standards-based written feedback (akrak-Ekin & Balcikanli, 2019). When these elements are compared, standards-based written feedback fared better for student achievement than a point system or rubric. The point system does not tell students why they earned the score. Rubrics are more subjective and provide some feedback for students to improve (Kilgour, Northcote, Williams, & Kilgour, 2020). Written feedback about targets toward mastery of standards is the best grading practice for middle schoolers as it provides the most thorough means of individualized feedback. This feedback includes what students should do to improve (Bo Zhang & Misiak, 2015). Assessment should be frequent, varied, and centered around feedback (Goodwin, 2016).

Teacher implementation. There are several barriers that may make it difficult for teachers to implement the information they gather. Although there are many reasons teachers do not implement new strategies, there are some elements that can prevent implementation (Nadelson & Seifert, 2016). One major barrier to teacher implementation of strategies is that they are veteran teachers with entrenched beliefs and pedagogy. Another factor that contributes to the lack of implementation is the absence of teacher understanding of what has been presented in training and lack of motivation to implement the training (Looi, Sun, Seow, & Chia, 2014; Sahin & Top, 2015).

When teachers have entrenched beliefs, they are not open to new ideas, and this leads to stagnant instruction (Cofré et al., 2015). These beliefs often come from experiences as a student in teacher training courses (Kavanoz, Yüksel, & Varol, 2017). A teacher's entrenched beliefs can influence the culture of learning in the classroom (Şen & Sarı, 2017). The way teachers instruct students can be restrictive when they believe that specific information or procedures are necessary. When this occurs, it can be difficult for students to learn content in courses like mathematics and science in a meaningful way (Purnomo, 2017). Demographic factors such as gender, age, and teaching experience can also play a role in teacher beliefs (Chung-Yuan, Meng-Jung, Yu-Hsuan, & Jyh-Chong, 2017). It is possible for teachers to change their way of thinking if they are open to new ideas (Kavanoz et al., 2017).

A lack of understanding concerning important concepts to be taught can cause difficulty when implementing new strategies (Lancaster, Corrigan, Fazio, Burke, & Overton, 2017). Reflective thinking allows teachers to explain their learning as they move through the process of learning, thereby enhancing clarity and accuracy when they teach their students (Son & Lee, 2016). Understanding of concepts can be improved by reflective thinking (Junsay, 2016). It is important that teachers have a rational program of study so that they can make sense of the information presented to them (Lipp & Helfrich, 2016). Such programs include the learning cycle that consists of phases that are sequenced (Odom & Bell, 2017). Reflective thinking and consistent programs can enhance teacher understanding of concepts to be taught.

There are factors that appear to help teachers implement strategies in their classroom instruction (Stasinakas & Athanasiou, 2016). When teachers master the content they teach, the

context of knowledge, and the pedagogy necessary to plan effective activities, they are more likely to implement new strategies. As teachers learn about what makes activities and lessons work in classrooms, they become comfortable with information they were unsure. Teachers are more willing to change their instructional practices if the new pedagogy meets a need for them and their students (Looi et al., 2014; Karacabey, 2020).

Some elements of training help teachers remain open to new approaches. These behaviors include being comfortable with integrative teaching of core curriculum subject matter, the promotion of PD content throughout the building, the availability of outside resources, using instructional technology, and the inclusion of 21st-century skills. When these fundamentals are in place, the implementation of what is presented will become part of instruction as the self-efficacy of teachers improves. Teachers can seek and embrace new knowledge and adopt change (Nadelson & Seifert, 2016).

Teacher buy-in. Teacher buy-in is found in the confidence teachers have in strategies, programs and initiatives that they perceive to have merit for classroom change and student achievement. Teacher buy-in means that teachers are committed to the understanding and use of PD (Fasteen, Thanheiser, & Melhuish, 2015). For teacher buy-in to occur, certain things must be in place. Teachers want evidence that the “next big thing” is going to make a difference in their instruction and student learning. It is important for teachers to find that they can implement the changes necessary to make a transformation. Teachers are looking for changes that stand the test of time. Teachers are seeking to lead change that occurs in their classrooms (Lukacs, 2015).

When teachers receive training, they are more inclined to buy into making changes when they have a say in what will be presented and how it will be implemented. In this way, they have the assurance that these changes will be aligned with the needs of their classrooms. Teachers want skills that will be beneficial to student achievement and can be used immediately (Fasteen et al., 2015). They are also more willing to engage in PD and implement strategies when presenters are knowledgeable with authentic classroom experience (Puskar, Mitchell, Kane, Hagle, & Talcott, 2014; Macias, 2017).

Administrators play a pivotal role in promoting teacher buy-in. Using data about classroom and student performance will allow teachers to perceive how specific strategies can improve instruction and learning in the classroom (Yoon, 2016). Constructing teacher buy-in can be a difficult task as teachers are skeptical (Vogel, Cannata, Rutledge, & Socol, 2016). Administrator buy-in is important but should be combined with administrative support as teachers attempt to implement PD (Yoon, 2016).

Teacher motivation. Teacher motivation is important for effective classroom instruction (Öztürk, 2015). The goal of schools and districts is to promote teacher motivation to encourage teachers to change and grow (Carpenter, 2016). Teachers who take an active role in their training report being motivated to make changes in instruction because of the ability to tailor their learning experiences (Angeline, 2014; Wagner, Ossa Parra, & Proctor, 2019). Teachers are also motivated after attending professional development that includes collaboration, active learning, and content that builds on prior knowledge. These elements give teachers the opportunity to find

solutions to issues or questions that are applicable to their classroom and teaching style (Carpenter, 2016).

Teacher development is in constant progression, and teachers need to plan their journey (Agneline, 2014; Wagner, Ossa Parra, & Proctor, 2019). Professional development that is mandated by districts or schools may hinder teacher motivation. Teachers feel that they are required to take a passive role in learning when mandates take precedence over their needs. They may also feel that the information does not apply to their needs (McMillan, McConnell, & O'Sullivan, 2016). To motivate teachers, it is important to give them a voice in the training and resources that will be available to them (McMillan et al., 2016).

Intrinsic and extrinsic motivation can lead teachers to implement PD strategies. Factors that improve intrinsic motivation should be a priority for administrators to provide for their staff (Can, 2015). Intrinsic motivation does not require external factors and is more desirable for encouraging teachers to implement PD (Öztürk, 2015). Training such as professional development can give teachers the confidence to implement strategies and can provide intrinsic motivation. Teacher motivation is important for implementing PD (Can, 2015).

Implications

The results of this case study are anticipated to help improve teacher implementation of PBL strategies. Faculty responses to interview questions were analyzed to determine the degree to which they were or were not able to implement PBL strategies. This case study also uncovered any barriers to implementation. The results of this case study illustrated teacher perspectives

concerning the process of teacher implementation and provided data that may increase administrative awareness of barriers to implementation.

Faculty responses to interview questions were analyzed to reveal patterns that may improve understanding of teacher perspectives. The results of the case study were used to create a professional development workshop to address the experiences and perspectives of teachers as they attempt to implement the strategies from PBL into classroom instruction. The results also included recommendations for future implementation of PBL.

Summary

Implementation of research-based instruction is an important component of school improvement; however, many issues may arise that can impede the process of implementation. PCPS has mandated that all teachers implement PBL. Foster Middle School found that many teachers were not able to implement the new strategies. After the district mandate was issued, many school principals provided information from teachers concerning difficulties that inhibit the use of PBL in their classrooms. These discoveries led to school and district administrators working together to improve teacher awareness of expectations and to provide them with viable resources. The school would like to determine whether teachers now feel that they have the necessary support to implement PBL and whether they believe that the resources provided for them are adequate to improve implementation.

The need for this study centers on the importance of implementing a district mandate. This study focused on a learning approach, PBL, to determine whether teachers were using this strategy in classrooms. Each teacher has unique needs that, if addressed, would produce

compliance with district mandates. Questions that were addressed by this case study include: How well do teachers believe they were able to implement PBL? How well do teachers feel supported to implement PBL? These questions guided the focus, methodology, and outcomes of the case study.

In section two, I will present the methodology for this case study. This will include the qualitative design and approach, participant selection, data collection and analysis, and goals for completing the case study. In section three, the deliverable will be described. This description includes reasons for the appropriateness of the deliverable chosen and rationale. The description will include a discussion of the purpose of the research project, an outline of the expectations, and the local needs addressed. Section four will contain the case study strengths and limitations, recommendations for a different approach, scholarly reflections, implications, applications, and direction for future research, as well as its impact for social change.

Section 2: The Methodology

Research Design and Approach

The purpose of this study was to determine how well teachers at FMS are implementing PBL. PCPS administrators have issued a mandate for all classroom teachers to implement PBL in their classrooms (FMS Principal, personal communication, November 15, 2015). A qualitative case study was conducted to determine the effectiveness of the PBL implementation (Kozleski, 2017). Teachers had the opportunity to describe their personal experiences and perspectives to give credibility to the outcome of this study.

I sought to explore how teachers at FMS were implementing PBL in Grade 6-8 classrooms. The research design was a qualitative case study. A qualitative case study was the most appropriate method to answer the research questions. The research design was chosen from the problem and research questions because it would enable me to understand teacher perspectives of the process of implementing PBL.

A case study was used to guide the methodology of this study and provide a description of a bounded system. Case studies are used to explore meaning and insight into a situation, which in this case was the implementation of PBL under a district mandate. A case study was appropriate to explore teachers' unique experiences so that a deep understanding of how teachers view the process of implementing PBL could be obtained (Yin, 1981). Case studies are used to answer *how* and *why* questions in a detailed manner (Creswell & Plano, 2007; Mindog, 2016). Implementing a case study methodology ensured a rich description of this case. Case studies can be used to tell the story of a situation because they include interviews, artifacts, documents, or

observations. These data sources focus on the experiences of individual participants and give them the opportunity to present their experiences in detail (Freeman Herreid, Prud'homme-Généreux, Schiller, Herreid, & Wright, 2016).

I used an intrinsic case study approach, which allowed me to look at a case in detail. A case study must have its foundation in a real-life situation, and the participants of this study were working through PBL implementation (Yamin-Ali, 2016). Self-efficacy theory states that teachers must feel competent to complete a task. It is important that they believe they have the skills, training, and resources to complete the task (Bandura, 1986). One of the research questions in this study addressed whether teachers could implement PBL. A case study was used to determine how well implementation was occurring at FMS. Another research question for this study addressed how well teachers feel supported to implement PBL. A case study design gave teachers the opportunity to discuss their perspectives, attitudes, and experiences concerning the implementation of PBL (Kozleski, 2017).

A quantitative study would not have provided the rich descriptions necessary for a deeper understanding of the phenomenon under study (Kozleski, 2017). A mixed-methods approach was not chosen because I was seeking an in-depth understanding of the perspectives of faculty members concerning PBL and quantitative data were not needed to answer the research questions as I needed participants to reveal their personal experiences (Almpanis, 2016). Artifacts were examined to deepen the understanding of participant experiences (Olson, Leko, & Roberts, 2016). A qualitative case study design was chosen because it provided a deep understanding of the experiences of the participants as they attempted to implement PBL

strategies into classroom instruction (Kozleski, 2017). Responses to interview questions provided an in-depth understanding of teachers' perspectives about implementing PBL strategies (Zadrozny, McClure, Lee, & Jo, 2016). This research design was used to identify barriers that may impede the implementation of PBL strategies and factors that may aid in successful implementation.

Participants

I used purposeful sampling to select teachers who were involved with the implementation of PBL at FMS. The participants were core subject area teachers at FMS. There were 35 core subject teachers at FMS in Grades 6-8. Core teachers teach math, science, history, and English courses. Each of the core subject teachers were invited to participate in the study. Eleven of these core subject teachers participated in this study. I did not want to interview more than 15 teachers because I wanted to understand the issues surrounding PBL implementation. I was able to achieve data saturation with interviews from 11 teachers (Fusch & Ness, 2015). The number of participants was an appropriate sample size to ensure adequate time and resources for analysis (Zadrozny et al., 2016). Using a small sample also provided the opportunity for a deeper understanding of the case. I was able to analyze the responses to uncover themes and patterns that helped determine the effectiveness of the program. Table 1 provides information about the demographics of the participants for this study.

Table 1

Participant Demographics

Participant	Years in education	Subject	Highest degree	Career switcher	Years of PBL	BIE PBL training
Participant 1	8	History 7 Civics 8	Master's	No	4	Yes
Participant 2	10	Science 7	Master's	Yes/Biotech Sales	4	Yes
Participant 3	25	History 7	Master's	No	4	Yes
Participant 4	12	Algebra	Doctorate	No	4	No
Participant 5	33	English 7	Master's	No	2	No
Participant 6	3.5	Science 8	Doctorate	Yes/Cancer Research	3	No
Participant 7	8	Science 8	Bachelor's	No	3	Yes
Participant 8	8	English 6	Master's	Yes/Airline Industry	2	Yes
Participant 9	3	Science 7,8	Master's	No	3	No
Participant 10	5	English 7	Master's	Yes/ Journalism	2	No
Participant 11	21	Science 6	Master's	Yes/ Business Administra-tion	1	No

Note. Years in education refers to the total number of years in education. Subject refers to the subject taught at the time of the study. Highest degree refers to the highest degree earned by participants. Career switcher refers to participants who had a previous career. Years of PBL refers to the number of years teachers have attempted to implement PBL. BIE PBL training refers to whether participants were trained at the time of the study.

Participant Access Procedures

Faculty members were invited to participate in the study if they were core subject area teachers because the district mandated that core subject area teachers implement PBL in their classrooms. The participants in the pilot study were three core teachers who were located at FMS the year before but moved to different schools in the year that data were collected. Faculty were invited to participate in the study via an email message approved by the district. The email included information about the study, such as voluntary participation and no compensation. I also included contact information for the Walden Institutional Review Board (IRB) should the prospective participants have any questions or concerns. I received approval from the Walden IRB (12-22-17-0242141) before collecting data. When teachers accepted the invitation, we set an appointment for the interview. Semi structured, one-on-one interviews took place after hours. Seven interviews took place during the summer because I began the process very close to the end of the school year. The interview sessions were recorded and stored in my password-protected computer. Although I work with these faculty members as a seventh-grade science teacher, there was no conflict of interest because I was not in a supervisory position, so I had no jurisdiction over any potential participants.

Researcher-Participant Relationship Methods

I was a seventh-grade science teacher at the study school for 10 years. All the participants in the study were my colleagues. I was a member of three teams and several committees but did not have any authority over prospective participants. The first team, the interdisciplinary team (IT), consisted of the math, science, history, and English teachers who teach the same students.

The second team, the professional learning community (PLC), consisted of teachers who teach the same subject but on a different IT. Another team consist\ed of all teachers in the building who teach the same subject. This is the department team. I was team leader for the IT for 8 years. This is a liaison position.

Ethical Protection of Participants

Before the interview, each participant was able to ask questions or voice concerns. I explained the procedures that would be used to complete the interview session. This meeting was important because it developed the researcher-participant working relationship. This initial contact with each participant before the interview provided them with information about their rights, their confidentiality, and how they were protected from harm. At this point, participants were able to give informed consent before taking part in the interview process. The faculty members who were interviewed were identified by an individual code. The interview locations were confidential so that participants would not be identified by others. Concealing the identity of participants protects them from discovery. The external auditor signed a confidentiality form (Appendix G) to ensure that they did not share any information from the study. Teachers removed identifying information from student-produced artifacts such as student names before submitting them to me for review.

Data Collection

Data collection was guided by the constructs of self-efficacy theory. After obtaining IRB approval, I applied for approval from the research department of my district. When I received IRB approval, I contacted three teachers from a different school who also implemented PBL at

FMS to pilot my interview questions. These three teachers were former members of FMS faculty and implemented PBL in previous years. They also implemented PBL at their current school. I knew that they would be able to give useful feedback about the interview protocol for this study. I contacted each teacher via email to ask if they would be willing to participate. Each of them agreed to participate in the pilot study by returning a signed consent form. I contacted their principal first via letter to ask permission to complete the pilot in the building. When I received permission, I met each of these teachers at their building after school and presented them with written copies of the interview protocol. The teachers went through each question, making notes and providing written answers that would help me determine whether I would get the information I expected based on the wording. Each participant in the pilot study also discussed the questions with me following their written analysis of the protocol. They made suggestions to add information to some questions and provided suggestions for follow-up questions that emerged from our discussions.

After the pilot study was complete, teachers from FMS were invited to participate in the study via email. Once teachers agreed to participate in the study by email, a meeting time was scheduled for teachers to receive information about the study. sign the consent form, and participate in the interview. The artifacts (in the form of student work samples and the Essential Project Design Elements Checklist) were examined to determine how teacher perspectives align with their actions in the classroom. To understand the experiences of teachers as they implement PBL, it was important to view student work samples. Examination of student work allowed me to compare student performance against teacher reports of self-efficacy to determine if it

supported teacher perspectives of their ability to implement PBL. Teachers communicated information about their experiences with the implementation of PBL. Teachers also submitted artifacts, which includes student work samples, and teacher BIE essential project design elements checklists that enhanced insight into information from interviews (Yin, 1981).

The qualitative instruments used for this study were an interview protocol (Appendix D) and the Essential Project Design Elements Checklist created by BIE (Appendix E). The interview protocol provided information about the perspectives of teachers concerning the implementation of PBL. The Essential Project Design Elements Checklist provided information about how well teachers included the 8 essential elements of PBL into their projects, according to the BIE. The first research question is focused on how well teachers were able to implement PBL. The data collection tools used guided teachers into a discussion of their experiences with PBL implementation. The second research question is focused on how well teachers felt supported to implement PBL.

Interviews

Through the data collection process, teachers discussed the resources that helped them implement PBL as well as barriers that made implementation difficult. I created the interview protocol for this study so that the unique circumstances of FMS were addressed. The questions were piloted by three teachers from a different middle school to determine their validity. There were no suggestions for revisions, but additional information and follow-up questions are found in Appendix D. I planned to conduct at least 10 interviews, but I was able to include one more interview and achieve data saturation. The duration of interviews may be as lengthy as an hour.

Clarifying questions and interview responses determined the exact duration. The interviews were conducted after school in a confidential location. The interviews were attended by one participant and the interviewer. The interviews were recorded via password-protected cell phone, and field notes were taken during the interviews to record visual data such as body language. None of the interviews lasted an hour; however, the duration of each interview allowed participants to reveal their story in a relaxed and self-paced environment. The responses from the interviews received a code for confidentiality. The responses were printed and then sorted by each question.

The interview questions were used to determine how well teachers felt supported to implement PBL. The interviews included in-depth responses about faculty perspectives of supports and barriers that helped or hindered their implementation of PBL strategies. Data collection began with interviews that included questions about teacher perspectives and possible barriers to implementation. There were eleven teachers who participated in this study. These were core teachers from grades 6-8 at FMS. Each grade level and subject were represented in the group of participants.

Artifacts

The data collection tools for this study began with interviews but included additional materials to add credibility to the findings. The artifacts included a teacher Essential Project Design Elements Checklist and student products from PBL lessons. PCPS utilized 8 elements provided by the Buck Institute for Education (BIE) to assist teachers in the creation of effective PBL. These elements contain expectations for effective PBL lessons throughout the district. The

elements have been described below. Teachers provided a copy of the Essential Project Design Elements Checklist and at least two student work samples for each project submitted. These items were obtained before or during interview sessions so that they could be examined against the 8 elements suggested by the BIE to create effective PBL. They were used as a reference during the interviews. The artifacts further illuminated teachers' perspectives. The data were appropriate for the case study because it gave readers a deeper understanding of the extent to which implementation of PBL occurred in the classroom.

The 8 elements of PBL, according to BIE, provide students with a project experience that attains all the benefits of PBL. Key knowledge, understanding, and success skills are important because they help to focus the project with standards that provide content skills. A challenging problem or question is a frame that provides a meaningful problem to solve or question to answer that is interesting. Sustained inquiry engages students with a process that helps them ask questions and find answers. Authenticity makes the project seems meaningful to students because it applies to the world around them. Student voice and choice gives students the opportunity to make decisions about the process or the product. Reflection offers students and teachers an opportunity to think about the learning process (Mukeredzi, 2014). Critique and revision teach students how to use feedback to improve their projects or those of other students. A public product assures that student products are helpful to people outside the classroom (BIE, n.d.). I utilized the checklists and student work samples to examine the validity of teacher statements of self-efficacy. I cross-checked the teacher statement of self-efficacy with the

number of elements they were able to include in the projects. I also checked the level at which student work samples matched the checklist.

Processes

The data collection instruments used in this case study included a semi-structured interview protocol (Appendix D) and artifacts that were evaluated the Essential Project Design Elements Checklist (Appendix E). The artifacts included teacher BIE checklists (Appendix E) and student products from PBL lessons. Examination of the artifacts answered research question 1 which asked how well do teachers believe they were able to implement PBL? I used the artifacts to assess whether the essential elements from BIE are present in projects. The process of implementation of PBL at FMS may occur at any school. However, the resources, faculty, and training are specific to this building. Therefore, I aligned the protocol with the circumstances at the site. I designed the protocol so that it was appropriate for FMS and PCPS. I recorded audio during the interviews using a cell phone. Once an interview was completed, I deleted the recording from the phone and uploaded it to a flash drive secured in a lockbox.

Artifacts were collected in the form of de-identified student work and teacher checklists (Appendix E) for a PBL assignment completed this year. No student information appeared on the products created during PBL lessons. The participants provided documents for my review. The documents included one project design checklist from each teacher and two student work samples. The project design overview (BIE, n.d.) is used by teachers to plan PBL experiences and accompanied the student work samples. The projects that students completed must contain a digital product. The digital products resulting from projects are created by students using

technology. The digital products can include Google slides, a YouTube video, and Prezi presentations. The projects were collected as data before or at the time of the interviews. To determine whether teachers were able to implement PBL, each participant provided at least two student work samples. Student work samples must be from the same PBL assignment. All identifiable information such as student and teacher names and student identification numbers were removed from each document. Teachers created and assigned PBL projects in professional learning teams. If teachers were unable to provide these documents, a team member's documents were used for both teachers. Once these data were procured, they were used as reference points during the interview and were analyzed using the BIE checklist found in Appendix E. As data were examined and categories emerged, I utilized a color-coding system to create a visual for similarities, patterns, themes. The data were divided into categories, and I maintained a reflective journal to preserve reliability.

System for Data Tracking

To collect data for this case study, I employed 10 open-ended questions during 11 semi-structured individual interviews (Appendix D). Each participant was a core subject, middle school teacher who attempted to implement PBL in their classroom. Each participant was asked questions from the interview protocol with prompts and follow-up questions as needed to determine whether teachers were able to implement PBL and at what level of self-efficacy. The interviews were recorded for accuracy. Teachers also provided student work that I examined to determine whether elements from the BIE training were present in the projects. The intention

was to know whether the success of the projects matches the level of teacher self-efficacy reported during interviews.

After collecting data through the semi-structured interviews and student work samples, I used the interview recordings to transcribe participant responses. I typed the interview responses and printed the transcripts. These printed transcripts were used to begin the coding process. I completed thematic coding, open coding, and axial coding. I read the responses several times while writing notes about my initial thoughts before coding the data. Thematic coding was used to uncover patterns, commonalities, and information that stood out to me during initial readings. Open coding put the information into categories that emerged from the data. Axial coding revealed relationships between the categories in the data. Table 2 shows emergent themes found through thematic coding, open coding, and axial coding.

Table 2

Student Work Samples

Participant	Number of elements	Training	Teacher-reported self-efficacy
Participant 1	8	Before	High
Participant 2	5	After	Good
Participant 3	8	Before	High
Participant 4	2	Not at the time of interview	Good
Participant 5	5	Not at the time of interview	Good
Participant 6	6	Not at the time of interview	Good
Participant 7	5	After	High
Participant 8	2	Not at the time of interview	Low
Participant 9	6	Not at the time of interview	High
Participant 10	6	Not at the time of interview	Good
Participant 11	2	Not at the time of interview	Good

Note. Table 2 displays the number of 8 required elements that are included in the projects provided by participants. The table also provides information about whether participants were trained before or during implementation or not trained at the time of the study. The table also shows their description of self-efficacy concerning PBL implementation.

Procedures for Gaining Access to Participants

To gain access to participants for this study, I emailed teachers at schools outside FMS to participate in the pilot study (Appendix B). These teachers were members of FMS faculty during the previous year and had participated in the implementation of PBL in their classrooms. When they agreed to participate in the pilot study, they set up a time for the interview. These teachers provided information in writing pertaining to the validity of the questions in the interview protocol. Their responses helped me create follow-up questions and clarifying information.

According to a mandate from PCPS, all subject-area teachers are responsible for implementing PBL in the classroom. I received permission to contact faculty members responsible for implementing PBL from the principal of FMS. To gain access to potential participants at FMS, I emailed all core subject teachers (Appendix C). This included math, science, history/civics, and English/language arts teachers in grades 6-8. There were 26 core subject teachers in the building at that time. The email explained that I needed teachers to participate in an interview and provide documents to support research results. When teachers agreed to participate, another email provided instructions for them to set up a time for the interview, and it explained how to choose student work samples.

Researcher's Role

I have also been a member of the school improvement committee (SIP), positive behavioral interventions and supports committee (PBIS), student engagement committee, and the academic advisory committee. The school improvement team develops the school improvement plan for the subsequent years. The PBIS team promotes positive behavior by creating innovative

activities, lessons, and programs to encourage students to behave as expected. The student engagement committee establishes novel ways for teachers to engage students in learning. The academic advisory committee looks at data collected from different sources within the school building to determine which strategies are working and which ones may need to be improved. This committee includes parents and stakeholders.

Although I am a member of the faculty at the study site, the working relationship with potential participants is positive. Teachers in this facility have been opened to participating in research studies, and many of them have conducted their studies in the past. Potential participants were informed of confidentiality, so they should be willing to share their true experiences. During the initial meeting, I emphasized that there are no expectations concerning responses to interview items. It is possible that my relationship with sample members could affect their decision to participate in this case study as I work with many potential participants. It was emphasized that this was voluntary, and no compensation was awarded to any of the participants. It is also possible that my experiences or biases could come into play during this evaluation. For this reason, transcript reviews and external auditor were utilized to minimize this possibility.

Limitations

One limitation for this study includes verbal ambiguity in participant responses. Vague responses from participants can reduce credibility of research. Verbal ambiguity can be eliminated with probative follow-up questions to gain clarity. Another limitation for this study is that purposive sampling may decrease the randomness of participants which may cause some

inconsistencies in data collected. Purposive sampling will ensure that all participants are familiar with the purpose of the study. Purposive sampling can have a positive impact on results if it brings about a diverse group of participants. A third limitation for this study is that participants may feel that they will be judged for negative responses. If the researcher makes the participant feel at ease and gives them the opportunity to tell their personal story, it is more likely that participants will answer honestly.

Data Analysis Results

When collecting data for research, it is important that the data collected be of impeccable quality (Gordon, Griffiths, Kraemer, & Sniedner, 2017). I sent the 10 interview questions, along with other information and documents, to individuals who agreed to participate in the study by signing the consent form. The questions were included to alleviate any anxiety. To generate data, I conducted interviews with 11 participants using the 10 questions and follow-up questions. Interviews were individual, and I created a calm, casual atmosphere by engaging in light conversation. I also tried to make the interview feel as though participants were involved in a conversation with me. The interviews varied in length depending on the depth of conversation. Each participant also provided two student work samples that I used to validate teachers' perspectives about self-efficacy when implementing PBL in classrooms. These work samples were submitted via email before the interview or in person during the interview. The interviews were recorded using my password-protected Google Pixel 2XL smartphone and the Smart Record Application. I transcribed the data and printed the transcripts to use coding. The results

of coding are found below in Table 3. I also created field notes on non-verbal expressions to add more texture to teacher responses. The data are summarized in the findings section below.

I created written transcripts of the interview responses for each participant. I compiled a separate collection of all responses for each question. After reading all responses for a question, I used highlighters to color code responses that appeared more than once. These responses became the overarching themes that were produced during the first round of coding. I conducted two subsequent careful readings of the responses. Each time, I added more themes. From the themes that emerged from the data, I used open coding to isolate themes into categories. I divided the themes into groups that discussed the same subject or concept. For each group, I created a category title that summarized the responses. Finally, I used axial coding to determine relationships between categories. I further utilized the notes and coding to organize the data according to research questions:

RQ1: How well do teachers believe they were able to implement PBL?

RQ2: How well do teachers feel supported to implement PBL?

Table 3

Coding Results

Research questions	Thematic coding	Open coding	Axial coding
RQ 1: How well do teachers believe they were able to implement PBL?	Teacher Engagement Student Work Samples Self-Efficacy	Uncertain Beginning End of Unit vs. PBL Students Own Learning Revision Improves PBL Projects look like PBL Trial and Error	Meeting expectations by moving forward alone Work samples match teacher reports of self-efficacy Collaboration among teamed teachers Teacher self-efficacy increases as implementation strategies improve Training should occur in a timely manner
RQ 2: How well do teachers feel supported to implement PBL?	Assets to Implement Teacher Needs Factors Necessary to Change Instruction	Success increases self-efficacy Technology is a Help Clear Expectations Collaboration Early Training is Best	Technology provides foundation for project success Knowing the difference between an end of the unit project and PBL

Note. This table displays the results of coding using three methods.

Findings

During this study, the interview responses, examination of student products, and checklists provided the findings based on the problem, and research questions. When the district mandated that teachers implement PBL in their classrooms, many teachers were not successful according to data collected at the school level. Teachers were able to share their perspectives concerning the implementation of PBL during interviews, and the student work samples provided validity to teacher responses.

All participants felt it difficult to implement PBL at the onset because they did not understand what PBL was and how it would look in the classroom. To these participants, district expectations were unclear, and they felt uneasy about moving ahead without complete understanding. Participants also lacked self-efficacy because they were not able to meet expectations. Participants that were trained discussed the essential elements of PBL from the BIE website and book. They felt that they missed some of them and were concerned about the incomplete status of their projects.

Two factors were noteworthy as I began to analyze the data. First, nine participants were confused about how PBL fit into the curriculum. They believed that students did not have enough background knowledge to complete extensive and rigorous projects during a unit. There was a disconnect between district expectations and teacher understanding because many teachers lacked training while attempting to implement PBL. Participant 11 said, “Well, I don’t feel I’m clear on what the district expectations are… They must know everybody’s just flopping around awkwardly for a while ‘til they find out exactly what you guys [the district] want from us.”

The district expected the PBL project to be a tool that can be used during a unit alongside all other forms of instruction that might be used according to BIE training. The project was intended to aid in the learning process. True to prior practices, the participants had been trying to fit the project in as they would an end-of-unit project. However, if teachers are using PBL in the same way they use an end-of-unit project, many of the BIE elements will be missing.

The second factor that stood out during the analysis of data was that four participants were not sure how to go about creating projects. They found projects online that could be modified for their needs. They also took existing projects from their collection and adjusted it to be a PBL project. Still, others started from scratch. Participants were never sure whether their method was correct because they felt that it was difficult to incorporate all 8 elements of PBL according to the BIE. Without a clear understanding of what was expected, there was much angst among participants concerning implementation.

Participant 1 stated, “I would have loved for there to be a database so that anybody who teaches 8th grade Civics, [would have] a PBL product that I made so that you look at it to stem ideas from.” Participant 7 explained, “I was hoping to have more of a solid understanding of what PBL exactly was. Like what the official definition was and then tools to help with that planning process. Or, even to have a library of things to pull from, and I didn’t get that.” Participant 5 shared, “… there’s still so much I don’t know. That’s kind of hard for a teacher because we don’t like to be in the unknown. We like to know what to expect.” Participant 8 said that, “The biggest hindrance was what I said at the beginning-not knowing exactly what it was. Not knowing what I needed to put into it to create true project-based learning.” Participant 9

offered, “I would just like an overall clearer picture I guess of what each of the elements look like in practice and how to … implement that in the lessons I am giving to students…”

As interviews progressed, it became clear that student success in these projects gave participants increased self-efficacy for implementing PBL. Ten participants began with at least a moderate level of self-efficacy, which increased as they moved through the implementation process. Three of the participants knew that their project did not meet gold standard expectations, but because they worked well in the classroom and had the desired results for students, their self-efficacy level increased for implementing PBL.

Participant 1 explained why she felt confident: “Prior success. The fact that the kids like the business portfolio project. They talked about it. They worked hard on it. That motivates me to want to try something similar or take another risk. The fact that it was effective.” Participant 3 said that her confidence came from “seeing the success. At first, I was worried that if I wasn’t giving the direct instruction, then the kids wouldn’t get it. But, the sustained inquiry and choice for them creates a higher level of interest for them.” Participant 8 reflected, “I was pretty confident even though I didn’t have enough pieces. It was because I had nothing to lose. No one had shown me anything, so I said, “OK, this is what I am [going to] do. And it was OK. Looking back, obviously, as we’ve grown, I knew it wasn’t going to be the best, but I didn’t mind trying. I didn’t have anything to lose.” Only one participant reported that they were not confident as they began the implementation of PBL. Participant 7 reported, “I was not confident. I started PBL before I had any training [be]cause it was coming down the pipeline, we were headed this way, so you might as well start.”

The following sections discuss the themes that resulted from the data for this study: teacher engagement, assets for implementation, teacher needs, student work samples, and self-efficacy. Each theme and subtheme describes findings that are vital to the study. Research question 1 asks how well do teachers believe they were able to implement PBL? The results of the study that answer this question are found below.

Theme 1 RQ1: Teacher Engagement

Finding 1: Meeting district expectations. Teacher commitment to the task of PBL implementation was a support during the process. All 11 participants stated that they were dedicated to the implementation of PBL because they believed that it would bring about deeper learning for students. Participants spent countless hours attempting to create PBL that was cutting edge so that students would have the best opportunity to gain knowledge and practice 21st-century skills. Seven of the participants in the study completed their research to understand PBL as well as possible.

Teacher commitment caused participants who were not trained to look at ways of using PBL in their classroom based on information from research, collaboration with colleagues, and school-based professional development. Professional development at the school happened in short, informational sessions and would only focus on a specific aspect of PBL implementation. Participants noted that it was helpful but not enough for a true understanding of the process.

Participants 1 and 3 were more interested in meeting the expectations of the district. They were trained early in the PBL processes.

Participant 1 shared:

I am very organized. I am a checklist person, which is helpful. I feel confident when I feel like I've done everything at least to the bare minimum, and I know that I covered my bases and can explore beyond that. So, I felt like I was confident because I had the check sheet. I felt like I had done what I was supposed to do and expanded on it. I was not as confident only because I felt like I was going alone.

Participant 3 explained,

Well, when the county directed us to move toward project-based learning, I figured why not, in one fell swoop, design 13. It started on my first one with geography of nations at a PBL conference during training by BIE, and I designed one for each individual unit. This is my fourth year, so there are changes and additions to make it more authentic and more student choice; more them learning on their own rather than me directly teaching.

Participant 7 decided to move forward into PBL implementation on her own. She was not

trained until later in the process of implementation. She stated: "I was not confident. I started PBL before I had any training because it was coming down the pipeline, we were headed this way, you might as well start… I had no background information."

The teachers who were trained before implementation was mandated had better self-efficacy than those who were not trained before classroom implementation began. Participant 1 explained, "I felt very confident because I felt that I hit all the elements on the checklist." She held up the checklist and smiled.

At the beginning of the implementation process for PBL, the district mandated that teachers implement four elements of PBL. As the implementation process continued, the district

expanded to the eight elements of PBL from the BIE. Training through BIE has been rolled out over several years. Three participants who were not trained at the time of this study continued to create projects using the initial expectations of PBL and did not realize that the expectations were expanded to include BIE gold standard PBL elements. Gold Standard PBL is the title given to a complete representation of PBL that is researched-based and helps teachers create effective projects. When teachers began to implement PBL, the focus for most of the participants was to implement a project. They wanted to get one done. Later, they were able to implement projects with less angst than before because they had some experience.

The participants considered successful projects to be those that yielded the appropriate product as successful. Each time they implemented a project they found to be successful, their self-efficacy improved whether the project was true PBL or not. Participant 7 said, “I learned more from trying to do it versus the training.” This participant was very honest about how much she did not enjoy the training. She made a point of saying that she felt it was “unnecessary.” According to two other participants for this study, the expectations from the district level were not clear enough to implement PBL. Participant 2 stated that “I feel that the district expectations were not very clear.” Participant 7 made this response about district expectations: “So, I felt like I was throwing a dart at a dartboard that was 100 miles away, and I couldn’t see it.”

In the beginning, training at the building level described 4 elements necessary to complete a PBL project. These elements included key content knowledge, a challenging problem or question, authenticity, and a public product. All participants found these elements doable and moved forward. Later, the 4 elements were expanded to the 8 elements of the BIE gold standard

PBL, and participants were informed of this during training with the BIE. Six participants have not been trained at this point, and they are not yet implementing the additional elements. Participants who have not been trained learn from those who have been through training, but their self-efficacy has suffered. Participant 5 said her self-efficacy "vacillates." She added, "When listening in building PD sessions or other places where people are talking, you realize that there are lots of things you still need to learn." She laughed nervously during this part of the interview. She was awaiting the training but felt that she was already behind because of what she didn't know.

Theme 2 RQ1: Student Work Samples

Finding 1: Work samples, teacher reports of implementation, and self-efficacy. Each teacher provided work samples from students who participated in PBL projects as well as information and the BIE Essential Project Design Elements Checklist. This checklist measures whether the 8 elements of Gold Standard PBL are present in project. Research question 1 asked if teachers believed they were able to implement PBL. Teachers provided the answer based on their conclusions about their work with PBL implementation. I asked for student work samples as another indicator of whether the teacher was able to implement PBL according to the BIE Essential Project Design Elements Checklist. When I viewed the checklists and student work samples, I was able to see how teacher perspectives of project success correspond to the level of PBL elements found in their projects.

The two participants who were trained in PBL implementation early provided projects and checklists that were aligned with their perspectives about the effectiveness of their projects

and the level of self-efficacy they reported. Participants who have not been trained exhibited a high occurrence of self-efficacy after implementing multiple projects, but the work samples they submitted only matched the BIE PBL checklist when there were team members who had been trained. Teams where no members were trained implemented projects that were not PBL. Participant 4 submitted work samples that only had 2 of the 8 elements of PBL (key knowledge and student voice and choice). This participant works on a team of teachers with no training at the time of data collection for this study. Early in the implementation process, teachers were asked to include at least 3 of the 4 elements of PBL that were expected by the district at that time. Because none of the teachers on this team have been trained, they were not aware that the expectations have expanded to 8 elements. Participant 8 also had no training and created projects that were not Gold Standard PBL because they only exhibited 2 of the 8 elements (key knowledge and public product).

Participants 1 and 3 were able to include all eight of the elements of PBL, and both were trained before implementation process began. Each of these teachers was using resources from BIE, such as checklists and project planning overview forms, to create Gold Standard PBL projects. During interviews, these teachers exhibited a great deal of confidence as they answered questions and discussed their projects. They explained how they created projects that had all the elements, but still needed revisions during the process of implementation to help students succeed. Participants 1 and 3 have been implementing PBL for four years and are very satisfied with their projects. Their projects demonstrate complexity and help students reach a deeper level of learning.

Theme 3 RQ1: Self-Efficacy

Finding 1: Teacher perspectives. The conceptual framework that guides this study is self-efficacy. Bandura (1995) stated that there are four sources of self-efficacy. These sources include mastery experiences, vicarious experiences, social persuasion, and physiological and emotional states. Research question 1 asks how well do teachers believe they were able to implement PBL? If teachers believe they were able to implement PBL, their self-efficacy (belief that they can perform their job well) should be high.

Participants 1 and 3 were trained before the implementation of PBL and reported having confidence based on the skills received during training. They each created projects that included all 8 of the elements for BIE gold standard PBL using resources obtained through BIE training. Participant 1 created projects using the BIE Essential Project Design Checklist and was able to move to gold standard PBL quickly. She continues to use the checklist as a resource to create projects. She gestured with her hands, smiled, and had several pieces of evidence to share during her interview. Participant 3 used the BIE resources from the PBL 101 book she received in training to transform existing projects into gold standard PBL. This participant was eager to share how her perception of PBL changed after she implemented PBL in her classroom.

Participants 2, 7 and 8 were trained during the PBL implementation process. Each of them created successful projects, but they lacked some elements necessary for gold standard PBL. It took some time and revision for Participant 2 to create projects that included all 8 of the elements for gold standard PBL. She found the resource book received during training helpful because it included helpful elements like sample rubrics and activities to help students navigate

PBL. Participant 7 and her team continue to work toward gold standard PBL. Two members have been trained and one member is still waiting. Their collaboration creates projects that they believe are engaging for students, but they have difficulty including a public product. Participant 8 was trained days before her interview. She felt that her initial attempts at PBL implementation failed because she didn't have the knowledge necessary to implement effectively.

Participants 4, 5, 6, 9, 10 and 11 were not trained at the time of their interview. Participants 4 and 5 were very unsure of district expectations but attempted to implement PBL. Their team projects were still only incorporating the 4 standards initially required for gold standard PBL. Participant 6 was more confident during the implementation process because there was one member of the team that was trained by BIE. They were able to move toward gold standard PBL as they edited and revised their projects over several years. They know which elements are missing and they are working toward including all 8 elements in their project. Although participant 9 has not been trained, he relies on his trained teammates to take the lead in creating PBL. Participant 10 was part of a team with no trained members. This participant's team only creates projects with the initial 4 elements. Participant 11 also worked on a team with no training. He was very confused about district expectations and gave up on trying to create projects that are PBL. This study shows that teacher experience increased their levels of self-efficacy when they experienced project success, added experience, and collaboration. A lack of training negatively affects teacher self-efficacy.

The literature states that it is important for teachers to have a firm knowledge of what they are to do before they enter the classroom (Stasinakas & Athanasiou, 2016). When they are

sure of what to do, they are more certain of their ability to do it (Flores, 2015). Self-efficacy is tied to a person's belief in their ability to complete a task well. Teachers who were trained before implementation have the belief that they can implement PBL well (Stasinakas & Athanasiou, 2016). Those who are recently trained or not trained found the projects cumbersome. They enjoyed the fact that their projects were completed by students with products that were adequate. It was apparent by their responses to interview questions and demeanor during interviews, that the lack of knowledge made them uneasy about the process (Looi et al., 2014; Saribas, Kucuk, & Ertepinar, 2017).

PBL training is to take place across several years. As sessions are offered, teachers sign up to attend until the sessions are full. Training began before the initiative was established. Participants reported a high level of self-efficacy when they were trained early. Two participants were trained before the initiative was introduced to teachers. Participant 3 said that she had a high level of self-efficacy after "Seeing the success as the projects were implemented from year to year made me see the success of it." Participant 1 stated that "the fact that I am not glued to the check sheet shows that I am more confident. I rely on check sheets, so if I don't have one in front of me, it usually means that I am in the zone." I noted that these participants felt that the ability to create and recreate projects made them more successful.

Other participants were not trained before the initiative began and always felt the need to rush toward successful PBL implementation. Because the strategy was already being used by many teachers who were trained, they felt it necessary to be successful as well because it was an expectation at the district level. Participant 8 stated, "I thought I did a fair job." She was trained

two days before her interview. When I spoke with her after the training, she said this, "…now I have a better idea of how I can work it into my standards." Her first quote came at the beginning of the interview and the second toward the end. Her demeanor changed by the end of the interview. She was optimistic about what she would do from that point. The participants who were not trained before their interview seemed to feel some level of self-efficacy because the projects implemented had at least 2 essential elements present. However, they were disheartened by conversations overheard between teachers who were already trained and the fact that they weren't sure their projects were adequate. Participant 4 stated that he was ready for more information on "what the requirements/expectations are" concerning the projects. He reported that his self-efficacy was good.

Participants who were trained at the beginning of the PBL initiative experienced self-efficacy early on, and those who were trained later (or not at all) experienced little self-efficacy until they completed a few projects. Although all participants expressed having self-efficacy as implementation continues because of revision and trial and error, the only participants that did not experience a lack of self-efficacy were those who were trained early. Teachers not trained early reach self-efficacy with project success, but the projects were not Gold Standard PBL. Trial and error often lead to teacher self-efficacy but may not lead to Gold Standard PBL. As participants implemented PBL, learned from mistakes, and tweaked the projects to be more effective, the level of self-efficacy increased. Four participants stated that their self-efficacy improved after training. Participant 2 stated the following: "I did feel more confident after I had attended the BIE training and going through that process." Participant 5 was going to be trained a

week after the interview. She had this to say about how difficult it is to hear others talking about information you do not have: “I am looking forward to next week (BIE training). I have a lot of apprehension. The hardest thing has been not knowing what I don’t know. Feeling so uncomfortable with that aspect.”

A large part of PBL implementation that increased self-efficacy in participants was the process of revising, editing, improving their projects. As participants found ways to enhance their projects, their self-efficacy concerning PBL implementation increased. Participant 1 revealed that “I had a different direction sheet, but I saw that they didn’t understand…so I turned it into a Google slide so that each page was a slide showing this is what you need for this part…it allowed them to have ideas they could run with.” Participant 3 added that the process of “refining, changing, improving over the last 2 years” took hours, but made the project more successful. Participant 6 stated that “each year we added something.” Participant 7 said of her project, “there are still things I want to tweak…how can I do more…?” Participant 10 said “Well, the next year that we did it, we were again very excited about it, we made some changes based on what we learned the first time around.”

Prior success is another element of PBL implementation that increased self-efficacy. When participants were able to complete a project that was successful in their classroom, it gave them enough self-efficacy to try again. As participants noticed the engagement of the students and the fact that students took ownership of their learning, they became interested in creating new products that students would enjoy and learn from.

Participants have found that more experience brings more confidence. As they attempted new projects, they gained experience, learned from their mistakes, and they became more self-assured. Participants explained that jumping in with no prior knowledge or experience allowed them to get one project under their belt. This often led to an increase in self-efficacy as they took on a learn-by-doing attitude.

Collaboration brought self-efficacy to participants as they worked with others to create projects that encompassed Gold Standard PBL. Participants found that collaboration produced rich and meaningful project with a question or problem that students would be able to grapple with for an extended period.

Self-efficacy was inhibited by a lack of training. Only two teachers received training early in the PBL implementation process, and they were able to accomplish rich projects from the beginning. The other nine participants were trained well into the process, or not at all, and they have found their self-efficacy was at a low level until they created enough projects to increase their confidence, and thus, their self-efficacy.

Because of these findings, I am convinced that teachers need to experience another layer of training that begins with the basics and moves teachers through the process of creating a project with a team, having the project vetted by two other teams, and then having the opportunity to dialogue about the feedback they receive (Lee, 2015). They need a culture that includes individualized learning, extended time to create and implement projects several times, receiving feedback through collaboration, and having access to experts who can coach them

along the way (Nadelson & Seifert, 2016). Every teacher will experience a higher level of self-efficacy if they can work through the process in this way (Shaffer & Thomas-Brown, 2015).

Research question 2 asks how well do teachers feel supported to implement PBL? The results in the following section answer the question. Participants of the study describe those components of implementation that supported their efforts in the classroom.

Theme 1 RQ2: Assets for Implementation

Finding 1: Technology provides a foundation for project success. All participants stated that technology was very supportive for PBL implementation. The participants of this study agreed that technology was responsible for their ability to implement PBL in the classroom. The technology allowed students to find their answers to questions through research. Students could use resources provided by the teacher or they could complete the research on their own. Students were able to collaborate with teammates in school and outside of school. The products were enhanced because students were able to use technology.

The use of technology also helped participants create resources for students using technology such as Google drive, classroom, docs, slides, and sheets. These tools allow teachers to alter information, instructions, and resources in real-time so that students could access these documents or create them no matter where they were. The ability of students to access websites that contained helpful information and resources that were needed to complete the project was appreciated by all participants.

Technology (such as Google products, chrome books, and laptops) enhanced the success of projects because students were able to collaborate using Google products outside of the

classroom. Participant 3 stated that Google products were “infinitely helpful” because students “can pull up the document in Google classroom, and all the links can be embedded.” These products are employed throughout the building, and students are adept at using them for a variety of activities. The technology allowed students to work together from different locations (even different countries). When technology was used, time restrictions were erased. Participant 5 stated that students “needed time in class and out of class. They had the equipment and their devices to work on their Shark Tank projects. It was very necessary. I don’t know how it could have been done without it (technology).” Students were able to complete digital projects that were more detailed and intricate in design than traditional projects such as tri-boards. They completed podcasts, videos, and infographics. Participant 2 said the following concerning the use of technology:

The WIFI and chrome books were instrumental in implementing PBL. That would have been difficult to do in the way that we were able to do it without those resources. The resources were helpful in giving a better product that is more real to what the students would hopefully experience in a job setting later in life.

Participants of this study were enthusiastic about the use of technology and found it to be the foundation of success for PBL in their classroom. Participant 2 said that technology “resources were helpful in giving a better product that is a more real experience like what students would encounter in job settings.” Participant 3 stated that students were able to “click on (resources provided in Google Classroom) to find a plethora of resources to meet their individual

needs." Participant 3 was very sure of herself concerning the implementation of PBL. She was trained before she began implementing PBL.

Even participants who had to share technological devices among their teams were excited about the way that technology changed the dynamics of collaboration in the classroom. The internet alone allowed students the ability to find resources and information that would otherwise be out of reach. Participant 3 stated that she "often used the school website to put her units there" so that students have access anywhere. Participant 4 stated that students were given "the ability to research fractals to find ways that researchers and scientists are using them today." Participant 5 commented on how technology allowed students to increase the time they had to work on a project. She said, "I don't know how it could have been done without it [technology]." Each of these participants was convinced that they couldn't have implemented appropriate PBL projects without Google products, school WIFI, and chrome books.

Finding 2: Collaboration among teammates. Informal learning was supportive for teachers during PBL implementation because they were able to work with colleagues and research on their own to find answers to questions. During interviews, 5 participants discussed their informal learning outside of professional development. Informal learning included their personal learning as well as collaboration with other colleagues. They were able to use resources they found on their own to help with the implementation process. They met with colleagues to pool their resources and garner new information. While practicing trial and error, they were able to share positive and negative experiences with others. Sometimes, teachers with no training were able to implement projects because of collaborative efforts.

Foster Middle School is a community where collaboration among faculty members has been woven into the fabric of the school culture since it opened. The original principal, following best practice from the research literature, created a collaborative environment throughout the school. Teachers rely on feedback, ideas, and cooperation from others in the building. Collaboration among teachers was a necessary component of PBL success, according to participants in this study. Participant 9 stated that "designing [projects] with a team is helpful." Participant 2 explained that "working as a group helped pull all 8 of the elements into a project." Participants believed that more time spent working together would improve projects and self-efficacy. The need for collaboration among teachers who are teamed (teaching the same subject) was mentioned throughout the interviews. Teachers also seek assistance from support staff as well. Participants 5, 7, and 10 discussed the benefit of assistance from library personnel as students completed projects. Each of them used lessons from library staff who prepared resources to assist students in citing sources, conducting effective research, finding reputable sources, and using library resources. Participant 5 stated that students "needed to know how to do research, and the librarian helped us." Participant 6 spoke of librarians helping with "credible sources," and Participant 10 said that "We had all the tools that we needed as far as library resources for research and online databases for research." These participants felt that the library resources were helpful in implementing PBL.

As participants implemented PBL, the administrative team encouraged them to collaborate in two groups. One group included teachers who taught the same students (interdisciplinary team), and the other group included teachers who taught the same subject

(curriculum team). Teachers at FMS are expected to collaborate. Participant 1 stated that "…when I went into training, I remember feeling bummed out because I think it would have made more sense for them to put people of the same subject area in training together."

When PBL implementation was first initiated in PCPS, curriculum teams created two projects each year. After the first full year of implementation, interdisciplinary teams were mandated to create two projects each year instead of curriculum teams. Participants reported positive outcomes from collaboration but found working with teachers who taught the same subject more beneficial. Teachers working in groups that taught the same students created interdisciplinary projects. Participants found this grouping difficult because it was difficult for teachers to focus on the project instead of their subject content. Participant 8 commented on working with the interdisciplinary team. She indicated that working with the other teachers was difficult. "I have one idea, and other teachers have their ideas." Teachers working in groups that taught the same subject were able to create a project that encompassed standards in that subject area. Participants felt that working in subject-specific groups was easier to manage than working in interdisciplinary groups. Because training occurred in phases, sharing ideas and resources helped participants create projects that would have been difficult to prepare on their own. There were teams with no training, so this did not happen in all instances. Participant 9 explained that "I just picked up bits and pieces from co-teachers…" These data show that collaboration was an important asset to PBL implementation, but there are also barriers to implementation.

Theme 2 RQ2: Teacher Needs

Finding 1: The difference between an end-of-the-unit-project and PBL. Participants 4, 5, and 8 had no training at the time of this study and did not understand the difference between an end-of-unit project and PBL. End-of-unit projects are used to measure what students have learned after unit instruction. At times, this project may take place after the unit test. PBL allows students to complete the learning process for a unit while solving a problem or answering a question during a PBL project. Teachers are expected to provide instruction intermittently during the project to ensure that students are gaining the knowledge required by the district. PBL is the vehicle that leads to learning, not the assessment at the end of a unit. During the interview process, it became evident that participants without training believed that they needed to teach the information to students before they implemented PBL. They were still thinking of end of unit projects. Participant 2 suggested that students "do not have enough background knowledge to be able to work on real world problems in all of the units that are covered." This causes teachers to feel that the project interferes with curriculum pacing. Lack of time and too many standards suggests to participants that Gold Standard PBL is not attainable in the classroom. Participant 4 stated that "time constraint on the amount of material that we have to cover is where the difficulty is." Also, one participant discussed the lack of student knowledge that impeded project progress. Participant 2 said that students "just don't have the background on the challenging concepts at this age." The interview responses show that untrained participants do not realize that PBL is the vehicle for learning and not the assessment of learning. Participant 4, 8, and 11

submitted student work samples that were more of a dessert project and not Gold Standard PBL based on the checklist.

Eight of the 11 participants mentioned they do not understand the connection between PBL, the curriculum, and student learning. PBL is considered a tool that should be used to get students to deeper learning. The curriculum guides teachers concerning what students should know, but PBL helps students access deeper learning by embedding PBL within the framework of the curriculum and moving students beyond the state standards. It is not surprising that participants without training were not as aware of these connections as those with training. Participants who were not trained indicated that one expectation of PBL was that it will provide an understanding of what PBL should look like in the classroom.

Finding 2: Understanding district expectations. PCPS issued a mandate that teachers would begin to implement PBL in classrooms. It began with 4 essential elements derived from BIE. The expectation was that teachers would include at least 3 of those elements in their projects. Teachers were asked to complete a specific number of projects in a year, depending on their school administration. Teachers felt that these directions were clear because they did not understand what PBL was or how the district intended them to use the projects. Participant 7 explained that she "did my research…the training should be scaffolded like we would do in our classrooms-if you know this, you go here; if you know that, you go there…"

Finding 3: Databases would help promote true PBL. Four participants expressed a need for having a database where they can find Gold Standard PBL that can be used as a template or guide to assist teachers in creating projects that embody the expectations of the

district. A few participants seemed distraught about having to create their PBL, along with other duties and responsibilities. Participant 7: “I feel I can’t focus on using more PBL and providing more opportunities for students, but if there were a bank of resources of other PBL lessons that might make me have more opportunity to provide that for students.” Participant 1 said, “I would have loved a database…here’s a PBL project made so that you look at it to stem ideas.” It was clear that participants would like to find sample projects that can help them create appropriate Gold Standard PBL projects.

Theme 3 RQ2: Factors Necessary to Change Instruction

Finding 1: From professional development to classroom instruction. The transfer of PD to classroom instruction was slow for those who were trained and impossible for those who were not trained in the implementation of PBL. Because the training did not mirror what should happen in the classroom, there was a disconnect that caused frustration and difficulty in moving forward. Participants noted that getting stuck or having to figure out what to do in certain areas of the project made it difficult to implement. Three participants who were trained felt that the training did not complete the task for which it was designed. Participant 3 stated, “Well, I needed to know what the expectations were? What could I do? What couldn’t I do? And I always wished that there was some expert who would come into the building and tell me yay or nay.”

Finding 2: Coaching. The fact that there was no ongoing coaching after the initial training was a barrier for all participants. They wanted someone who knew PBL well to be there to answer questions, bring clarity to district expectations, and let them know when they were not on the right track. They also wanted resources to help them make projects well, such as a

database of sample projects that could be modified by teachers of any subject and grade. They wanted to create excellent projects as they would want their students to create excellent work. Participant 3 chided, “Wouldn’t mind a BIE representative to come in and say, ‘Hey, this is project-based learning. This is not.’ That is something that I wished happened. Experts come in and grade you.”

Finding 3: Site-based professional development. The lack of site-based PD was another barrier to PBL implementation. Participants wanted to be able to create projects during the training with their team. FMS is a professional learning community, and everyone works as a team. The school culture is such that teachers default to teamwork. The longer the team has worked together, the more they are able to tackle a problem and find solutions. The training required teachers to create a project that they would be able to use in their classrooms. However, creating a project without the benefit of team input was difficult because it went against the culture of the school. Participant 9 remarked that “designing with a team is very helpful.” Having teams meet and collaborate would be more efficient if they worked together in a space where they are familiar and have all of their supplies

Discrepant Data

Nine of those who participated in the study found collaboration among teachers very effective for creating Gold Standard PBL. However, two participants did not find collaboration helpful at all. Participant 8 stated that team collaboration was difficult because of:

logistics and being able to work [together]…In some cases, we weren’t sure if we should be working with our interdisciplinary team. There was also the issue of we’re expected to

collaborate. Well, getting everyone on board: I have one project, but the English teacher wants to do something different. So, those were some of the stumbling blocks.

Participant 8 seemed to be very agitated while talking about collaboration. She often sighed during this part of the interview. She also became very expressive with her hands as though she was trying to make her point clear. Participant 10 stated,

As she made the last statement, her shoulders slumped as though she remembered having to give in or compromise. She did say that "we were proud of our project the second year."

I asked if they changed anything after the first year. She stated that they did make

changes. Participants 8 and 10 presented discrepant data in that they found it difficult to collaborate with others to create PBL. Their experiences did not change the outcome of data for collaboration, as most teachers found it effective.

Evidence of Quality

I utilized several processes to ensure reliability and credibility in this study. These processes included a pilot study, transcript review, student work samples, and an external audit.

Pilot Study

An interview protocol was evaluated by three teachers who created and implemented PBL in the previous year at FMS. Although these teachers have moved on to another school, they were very familiar with the focus of the study and were able to provide recommendations after reviewing the questions. Each teacher read the interview questions and provided written answers. They also included recommendations for follow-up questions and additional information for clarification. I modified the interview protocol to include the recommendations.

Transcript Review

I provided each participant with a copy of the transcript from their interview. Each participant was able to review their transcript privately before discussing it with me. At an appointed time, I met with them to ask if they agreed that the information in the transcript accurately reflected their words. All participants agreed that their transcripts were accurate. In addition, participants were later provided an opportunity to review coding categories to determine whether they agreed with my interpretation of their data. Each participant agreed that their data were included in the correct categories and was an accurate interpretation of what they intended to convey during the interview.

Student Work Samples

In addition to participant interviews, each participant provided at least two samples of student work. This allowed me to assess teacher self-efficacy reports against the degree to which student work samples included each of the elements of PBL provide by the BIE. The BIE provides the Essential Project Design Elements Checklist (see Appendix E), and I used it to determine how thorough the student products were. I cross-checked this information with the report of teacher self-efficacy provided in each interview. This information is included in the findings of this study.

External Audit

After completing the coding process and writing my initial findings, I utilized an external auditor to determine whether I interpreted participant responses logically and appropriately in my findings. The external auditor earned a PhD in biomedical sciences and is an author in the field

of medical research. She has gathered data through qualitative and quantitative methodologies. After the auditor reviewed all the information I provided, we met to discuss her interpretation. The external auditor reported that my findings were accurate based on the data generated from the interview protocol, student work samples, and notes. She stated that my thematic, open, and axial coding processes organized the information into logical themes and sub themes that were a true representation of the data. She also stated that she detected no researcher bias in any of the findings. Before I released data to her, she signed a confidentiality agreement approved by the Institutional Review Board (IRB).

Summary of the Findings

The goal of this study is to discover the perspectives of middle school teachers at FMS as they implement PBL in their classrooms. Three major results emerged from the analysis of data and are discussed below.

Data were collected and manually coded for this study in three stages: thematic, open, and axial coding. I was able to answer the following research questions based on the analysis of the data. The first research question asked: How well were teachers able to implement PBL? Data from interviews, checklists, and student work samples showed that teachers who were trained at the beginning of PBL implementation process had a greater understanding of what district expectations were and how BIE elements of PBL would fit into classroom implementation. Participants also revealed that trial and error helped them revise their projects and make them more effective over time.

The second research question asked: How well did teachers feel supported as they implemented PBL? Data showed that participants were comfortable attempting PBL even if they were not trained to adhere to the district requirements. Participants commented that technology and collaboration among teachers supported the implementation of PBL. They also stated that a lack of training and unclear district expectations impeded the implementation process.

Participants were engaged in the process of implementation because of the district mandate and because they saw that PBL was a research-based strategy. They found that it would be difficult to implement PBL without technology. Participants found it easier to work with curriculum team members than interdisciplinary team members because a group who taught the same subject was able to focus on standards as they created a project.

It was difficult for participants to understand the difference between an end-of-unit project and PBL. This, coupled with confusion about district expectations, created failures in the implementation of effective PBL. After analyzing student work samples, project checklists, and participant reported self-efficacy, I found that two participants reported higher self-efficacy even though their projects and student work samples did not meet district expectations according to the checklists.

The conceptual framework that guides this study is self-efficacy. The major tenant of this framework is that a person will have low self-efficacy (feeling able to complete a task) when they are not equipped. This framework supports the findings of this study because participants reported that it was difficult to complete the task of PBL implementation without appropriate training and understanding of expectations.

Summary in Relation to the Literature

The findings of this study showed that a major barrier to the implementation of PBL stemmed from the uncertainty of participants about what PBL is and how it would look in the classroom. There were three groups of participants: those who had been trained by the district early in the process, those who were trained later in the process, and those who were yet to be trained. Each participant who was already trained articulated a need for more structured training so that they could understand what they were implementing and how to surmise success or failure. Those who had not been trained at the time of this study described the need for training to help them transition from implementing what they think is PBL to meeting district expectations. The district-wide training was a principal topic for most of the interviews.

Findings in the literature speak to the increased need for informative training that can be used to implement new strategies in the classroom. According to (Kavanoz et al., 2017), it is important that educators have a clear understanding of expectations, ways to implement, and how to track the success of the implementation process. Effective PD gives teachers the necessary information and encouragement to get the job done (Lukacs, 2015). Training that never ties content and methodology together makes it difficult for teachers to go back into the classroom with a clear picture of what to do and how to do it (Lipp & Helfrich, 2016).

The earlier the training occurs for participants, the more self-efficacy participants reported (Shaffer & Thomas-Brown, 2015). Those trained early in the process felt that their implementation efforts were successful even though they desired more guidance. They were able to employ trial and error to correct mistakes and improve projects over time. Participant 1 felt

confident enough to create subsequent projects without the aid of checklists and planning guides. Participant 3 used pitfalls that occurred early to create projects she believed to be successful. The participants who were trained early still wanted opportunities to communicate with an expert that could give them feedback on their projects and increase their success. Participant 1 stated that expert feedback would have accelerated her success. Three participants were not trained until the process was further along and felt that they needed more training because of the lack of experience. Participant 6 felt that there needed to be a "next level training" to alleviate some of the uncertainty she had about the implementation process. These teachers reported a lack of experience and the trial and error process that hindered their confidence in their projects.

There were also participants who had yet to be trained at the time of their interview. These participants were still using the initial expectations for PBL and had no idea that the expectations had changed unless they had team members who were already trained. If no one on the team had training, they had no real knowledge of the expectations of PBL projects because the book and online resources were shared during training. Participant 9 said that he "picked up bits and pieces from teammates" who were trained. Participants who were not trained at the time of this study were confused about the process of PBL and how it differed from several other initiatives that were introduced earlier than PBL. During the interview process, 4 were unaware that there were 8 essential elements necessary for PBL implementation. Participant 4 was not aware that a successful project included 8 elements, not four.

These findings are aligned with the research literature, which reveals the necessity for professional development that is individualized and relevant to the needs of participants

(Lancaster et al., 2017). It is important that professional development include extended time for teachers to increase their proficiency in learning about the strategy to be implemented and to become confident in their ability to implement PBL (Svihla & Reeve, 2016). As teachers move through the process of implementation, they continue the learning process as they make mistakes, learn from them, and make changes that improve their projects, so extended time during professional development is necessary (Nadelson & Seifert, 2016).

Deliverable as an Outcome

After analyzing the data from this study, the findings show that professional development is necessary to further assist teachers in their understanding of the implementation of PBL and support their self-efficacy. The first round of training answered some questions concerning PBL, but teachers are still unfamiliar with the resources provided by the BIE, and they are not sure of the district expectations. An extension of the initial professional development will give teachers more expertise and familiarity with the available resources to increase the successful implementation of PBL. The initial phase of implementation required teachers to include only 4 of the 8 elements suggested by the BIE. At this time, teachers are required to include all elements.

This study includes a deliverable providing a three-day professional development workshop. It is necessary that teachers be made familiar with the resources provided by the BIE and that they understand the expectations of the district describing what PBL should look like in the classroom. The BIE provides a plethora of resources that provide support for teachers as they move through the implementation process, but many have not utilized the materials. The district

expectations include using PBL to help students to exhibit 21st-century skills. These expectations will be covered in the workshop. Many teachers were not yet trained at the time of data collection for this study. These individuals have been struggling to implement PBL and will benefit from this workshop.

The workshop provided as a deliverable for this study encompasses effective strategies described in the literature. Teachers will encounter relevant information provided in individualized learning opportunities. As the workshop progresses, teachers will be able to collaborate, providing feedback and dialogue. Teachers will also receive opportunities for reflection. These elements will help teachers move toward deeper learning as they work to complete a meaningful project that will be successful in their classrooms. BIE materials will be included so that teachers will use them in their planning process from the start. Teachers will be able to bridge the gap between standards and effective PBL.

The focus of this professional development is to be sure that teachers can implement PBL in classroom instruction. Teachers felt that PBL took away essential instructional time and didn't understand that PBL should be integrated into the instructional process. Teachers were also not sure that they were implementing PBL correctly, so they felt unsure about the success of their projects. The BIE materials explain the purpose and expectations for implementation. These types of miscommunication have caused some confusion amongst teachers and should be eliminated immediately.

In conclusion, this professional development was developed for PCPS as a deliverable for this study and will address the issues in this district. It will extend the initial training for teachers

who have been trained and will also benefit teachers who have not received the initial training. The workshop will include opportunities for teachers to work with their teammates to create a dynamic project that each teacher can use in their classroom in unique ways.

Section 3: The Project

Introduction

The purpose of this professional development project is to assist teachers in the appropriate implementation of PBL projects. The results of the study indicated that teachers require more in-depth training to implement PBL. Teachers reported that they did not leave the training with the full understanding of PBL and were not sure that their projects were Gold Standard PBL. There are two goals for this professional development program. The first goal is to give teachers resources to help them understand PBL and improve implementation. The second goal is to use learning teams that will support each other in the implementation of PBL. There are three learning outcomes associated with the professional development program: The learner will describe PBL and articulate the necessary elements of Gold Standard PBL, the learner will use the elements to create Gold Standard PBL projects, and the learner will use the tools provided by BIE to implement appropriate PBL for grade levels and subject areas. The target audience for this professional development program is the core subject area teachers from schools in PCPS.

This 3-day training is a follow-up to the BIE training provided at the district level. This training should occur at the building level so that teachers will have an opportunity to collaborate with their colleagues. Three 8-hour days of training will focus on PBL elements to help guide teachers to create an appropriate project that can be used in their classrooms. Day 1 will focus on background information about PBL. Day 2 will provide teachers an opportunity to complete the work of project creation. Day 3 will include the review, critique, feedback, and reflection portion

of creating PBL. Teachers will work in their subject area/grade level teams. For instance, all seventh-grade science teachers will collaborate to create a project using their curriculum. The entire science department will trade and provide feedback. Teachers will determine a topic or project that will be the foundation of their PD work throughout the 3 days. This project can be an existing project or one that stems from a new idea.

Rationale

I chose to create a professional development series because participants in this study pointed to the lack of detailed training needed to implement PBL. I manually coded the data from interviews and examined how well student work samples followed BIE requirements for PBL. The data analysis produced major themes: teacher engagement, assets for implementation, teacher needs, and self-efficacy. Interview results showed that participants needed another layer of training to create dynamic projects. Participants mentioned several important components that were missing from the initial training they received. These components included personalized training, collaboration, and practice and revisions.

Personalized learning engages learners because it embraces their interests, passions, and learning styles. According to Carpenter and Linton (2016), teachers are finding that professional development strategies are transferred to classroom instruction when they include choice. Teachers look for PD opportunities that focus on content that is important to them and their students. Participant 6 stated the following:

It was 3 8-hour days for nothing. To go over the same thing. We were also at an unfair advantage because we had already been given minimal training at school… and I did my

research, so I came in with a lot more information than other people. So, I think maybe the training should be scaffolded like we would do in our classroom: if you know this, you go here, if you know that, you go there. It was a waste of my time. I found most of the information on my own.

Carpenter and Linton (2016) found that teachers are very eager to participate in PD that includes collaboration. Collaboration enhances the quality of projects by allowing more creativity and rigor. According to Bowe and Gore (2017), collaboration will enable teachers to improve instruction by sharing ideas and working to solve problems. Participant 1 stated that "I felt like my creativity was hindered because I didn't have a lot of people to collaborate with who were PBL trained and so I was not feeling confident that I hit all of the steps along the way." Creating a professional development series that includes collaboration will help teams create projects that can improve PBL.

As teachers implement PBL, they find problems in the projects that require them to revise the project. The revision process is what makes PBL projects more effective. These changes can occur in any component of the project, such as unclear instructions, lack of classroom management, or lack of teacher training (Baghoussi, & El Ouchdi, 2019). The participants referred to the relationship between editing and revising their projects and increased self-efficacy. Participant 3 explained when revisions took place:

"at least an hour over the last 2 years refining, changing, improving. A lot of that work would happen after we went through the unit…sometimes the trial and error was that you thought it would be interesting for them, but it was not. Or it was too difficult for them."

The goal of this project was to provide teachers with research-based PD practices that will enhance their ability to implement PBL. Teachers received initial training through BIE that addressed the elements deemed necessary for effective PBL. However, the training did not provide opportunities to have personalized learning, to collaborate with team members, and to revise projects through feedback. This project was designed to help teachers create gold standard projects suitable for allowing students to hone their 21st-century skills. During this professional development series, teachers will encounter opportunities to interact with information in a way that suits them. There will be extended time to collaborate, create and gather feedback, and edit and revise projects. These components of research-based professional development allow teachers to create a successful project.

I included activities to address the issues discussed in interviews. Teachers will have choices as they research information about the implementation of PBL so that they interact with the information in ways that incorporate their interests and learning styles. Teachers will work with their curriculum team to create one project that can be used by each of them. The collaboration will add innovative ideas to projects. Moreover, teachers will receive feedback from peers that will provide an opportunity for revisions that will create a more successful project. There will be an opportunity to practice the project from the perspective of a student. This practice will be used to identify issues before the implementation of the project. The addition of these elements in the PD series will provide a more effective PD experience.

Review of the Literature

Introduction

My review of the literature indicated that the genre of professional development was suitable for the problem and the results of the research led to this genre. In this literature review, I provide a review of scholarly articles about how theory and research supported the structure of this project. The findings from this study were based on the problem and research questions. The problem was that teachers have not been able to implement Gold Standard PBL. The research questions how well do teachers believe they were able to implement PBL? How well do teachers feel supported to implement PBL?

Implementation of PBL, support for the implementation of PBL, and barriers to the implementation of PBL were the main categories derived from the analysis of data. With those categories were subthemes such as understanding the process, increasing self-efficacy, technology, and site-based professional development. The project genre chosen was a professional development plan that follows the needs of teachers discussed in the interviews and best practices found in the literature that detail how professional development should be structured as teachers learn about PBL.

To complete this review of the literature, I used the Walden University library databases: Eric, Education Complete, ProQuest, and EBSCO. Key search terms used to complete the review included *professional development, project-based learning, teacher understanding, teacher self-efficacy, informal learning, informal professional development, instructional methods, teaching methods, professional development transferred to classrooms, transfer of knowledge from*

professional development, teachers common planning time, and *professional development format, site-based professional development, coaching* and *professional development, teacher support after professional development, implementing professional development,* and *teacher commitment to implementation.* Some searches included combinations of search terms.

Implementation of Project-Based Learning

Teachers must understand the process. It has been agreed upon that a project is something that people do. What teachers need to grasp is that PBL is a vehicle that provides learning. All the standards, activities, and information should be part of the PBL project. Students are not required to have prior knowledge when participating in PBL because the project is used to teach the content. Until teachers understand this, they will never be able to implement PBL (Hanney, 2018). To facilitate a change in the classroom in the use of PBL, one professional development model asked teachers to experience their project simultaneously as a teacher and a student. Teachers could work through the project as a student while addressing questions and issues as a teacher in this model. In this way, the project is refined and better suited to be used in the classroom (Freeman et al., 2018).

Teachers face many challenges when implementing PBL. These challenges include teachers being unable to align the projects with curriculum standards, technology being used inappropriately, teachers having difficulty finding balance between providing students with autonomy and giving them adequate support, and teachers not fully understanding the process (Herro & Quigley, 2017). During the interview process, all participants except Participant 11 explained that their knowledge and skill level pertaining to the implementation of PBL increased

when they could improve implementation through practice and when given extended time to reflect on progress. The addition of these elements to the regular PBL training was a great enrichment to the experience of teachers. Teachers suggested that PD be extended to give them time to understand the process necessary for implementing inquiry learning. Hands-on training helped to engage PD participants (Ong et al., 2016).

When moving from teacher-centered to student-centered classrooms, new teachers are often more willing to choose the student-centered approach; however, all teachers must understand the process of PBL before they can implement it into classroom instruction. New teachers are often exposed to cutting edge, research-based strategies. Understanding these strategies will help teachers change the way they approach teaching and learning (Uyar & Karakus, 2017). If teachers are comfortable with the intricacies of developing, implementing, and evaluating gold standard PBL, they will be able to implement it well (Vanhala, 2018).

With a complete understanding of PBL, teachers are more comfortable with the process. They can provide students with more autonomy in their journey to find solutions to problems or answers to questions (Pilten, Pilten, & Sahinkaya, 2017). To facilitate the acquisition of new understanding, teachers should have training that results in the evaluation of projects they have created so that they have a clear understanding about guiding students through PBL, a process that will help them gain the knowledge and skills needed for a 21st-century world (Uyar & Karakus, 2017). Teachers must understand that students should have supports, such as prompts and technology, to guide them through the process of PBL. It is important to support students who are new to PBL (Chen, 2017).

Understanding increases self-efficacy. In this study, when teachers do not understand the process of PBL, self-efficacy suffers. As these teachers attempt to make sense of the ideals that drive PBL, they lose self-efficacy because they do not feel successful. Struggling is one way that these teachers lose self-efficacy, including those who are veteran teachers. The loss of self-efficacy can be challenging for a veteran teacher because they are known to be the keepers of knowledge and should never be caught not knowing. Getting an understanding of the process of PBL helped all participants walk into implementation with more self-efficacy that will transfer to student confidence. If the teacher can explain the process well, students can undertake the tasks involved with a clearer understanding (Vanhala, 2018). Teachers' self-efficacy improves when they have had an opportunity to implement PBL after hands-on PBL training that allows them to create projects and receive feedback (Mahasneh & Alwan, 2018).

Teacher self-efficacy is increased through professional development for PBL, but only after they have had time to improve implementation through trial and error. It takes time for teachers to move from traditional educational practices to inquiry-based learning. Teachers gradually showed a preference for inquiry learning over traditional learning as they became more comfortable implementing PBL. These changes were made possible through professional development opportunities such as workshops and grade-level content support (Mentzer, Czerniak, & Brooks, 2017). Teachers also believe that common planning time and interdisciplinary teaming are critical to the increased achievement of students, and it improves teacher self-efficacy (Lomascolo & Angelle, 2017).

A lack of self-efficacy may influence how participants approach professional development opportunities. When teachers participate in professional development, they will exhibit levels of engagement based on their level of self-efficacy, and different levels can be demonstrated through a variety of behaviors (Poulou, Reddy, Dudek, 2018). Teachers can exhibit positive engagement with high self-efficacy or negative engagement with low self-efficacy during the process of professional development. Participants in professional development who are engaged may have a higher level of self-efficacy (Mahasneh & Alwan, 2018). These participants may put forth more effort in learning the strategies presented in professional development. Other participants may not be as engaged because they have a low level of self-efficacy. These participants may use technology, food, conversation, or other distracting elements to remain detached (Ryan, 2019).

A significant element of PBL is student collaboration. When beginning to implement PBL, teachers have a difficult time assisting students in the act of collaboration. This difficulty can have negative effects on teacher self-efficacy. Helping teachers understand the process of moving from the one with all the answers to the one who coaches students toward their answers must be part of PD (Cook & Weaver, 2015). Teachers must understand all the fundamentals behind PBL to have the self-efficacy needed to implement it well. When teachers understand the science behind the strategy, they will then understand how and why it works. This knowledge will help them better understand how to utilize it in their classroom (Havice, Havice, Waugaman, & Walker, 2018).

Teachers often display a higher level of self-efficacy when they are prepared to use the strategies presented in professional development. Those who do not receive adequate professional development often display a lower level of self-efficacy (Lomascolo & Angelle, 2017). Teachers take a positive view of initiating new strategies when they are prepared by professional development. They are more engaged when the professional development experience provides the necessary strategies needed for classroom instruction. Teachers feel that professional development should be on-going so that they can implement, reflect, and adjust their implementation (Horan, 2019).

Support for Implementation of PBL

Teacher support. Teachers require support after professional learning takes place. Professional development sessions are an overview of strategies. Deeper learning must take place over time and must include enough time for teachers to work with the strategies to understand them. It is also important for teachers to be able to make the material their own so that it fits the needs of their classrooms (Urban, Navarro, & Borron, 2017). PBL has been used to engage students but does not appear to be used to engage teachers when they participate in professional development. Teachers may be able to understand PBL and implement it better if they are participants themselves (Miller, 2017).

Teachers who participated in a program to help them implement PBL found that the opportunity to use internet resources gave them better information and helped them obtain better products than their previous attempts (Ravelle, 2019). The collaboration afforded by the program gave teachers additional perspectives that helped them create more useful products than working

alone. Another positive aspect of the program included coaching support from the instructor. They noted that this support from the instructor helped them think more critically using the feedback obtained as well as using higher order thinking skills (Paskevicius & Bortolin, 2016).

Professional development has been missing one element: guiding teachers through the process of implementing PBL (McKeown, Brindle, Harris, Sandmel, Steinbrecher, Graham, & Oakes, 2019). A key component in effective PBL is that it provides teachers with relevant feedback and coaching while they are implementing. This means that they are not left to their devices after formal training has ended (Bowe & Gore, 2017).

One way to support teachers in implementing new strategies would be to train all teachers before implementation begins. When large numbers of teachers must be trained, one way to make sure that teachers get the training necessary is to train teacher leaders as the first wave of professional development (Baghoussi & El Ouchi, 2019). Later, these leaders will hold smaller professional development sessions to train others. This approach to PD allows many teachers to be trained in a short amount of time. Teacher leaders who will direct the seminars are familiar with the specific needs of classroom teachers, such as district expectations (Maaß, 2018).

Informal learning and professional development. Informal learning is the learning that takes place in the workplace rather than courses, professional development, or workshops. Informal learning can be more related to context than formal learning (Lecat, Raemdonck, Beausaert, & März, 2019). In context, teachers can learn about the nuances of implementing strategies like PBL in classroom instruction. Formal learning is often rigid and, in many situations, does not fit the needs of individuals, but informal learning can be related to the issues

that come up when teachers have entered the implementation phase (Kyndt, Gijbels, Grosemans, & Donche, 2016).

Teachers learn in informal settings all day, and these informal learning situations influence outcomes of professional development (Kyndt et al., 2016). Teachers learn as they work each day, and this new knowledge can influence what and how they teach. Informal learning is an unplanned and unorganized opportunity for learning that occurs in the process of completing ordinary activities. These activities can be discussions with other teachers, sharing thoughts, perceptions, guidelines, and tactics with others, or individual research. For instance, several teachers may have a casual conversation about a strategy they have all tried in their classrooms. If only one of them has had great success with this strategy and shares his techniques, others may try again using this new information (Sefton, 2018).

Informal learning can occur in tandem with or instead of formal professional development. However, there should be an opportunity for teachers to discuss their informal learning while still benefitting from professional development (Sefton, 2018). Often, the knowledge gathered through informal learning can be as necessary as that which is gained through more structured means. When teachers have ongoing collaboration, they can pass along information that will enable everyone to implement PBL information that will enable everyone to implement PBL better. This process can also increase their self-efficacy (Kyndt et al., 2016).

Informal learning can be seen in several different activities. Teachers can exhibit informal learning while participating in hands-on learning, getting ideas from other teachers, reflecting on their practice, and trial and error. Teachers may engage in these activities before,

during, or after formal training (Sefton, 2018). Formal training is that which is prescribed by the district or building administrators. Teachers often supplement formal professional development with informal activities that allow them to increase knowledge and enhance implementation (Jones & Dexter, 2018).

Teacher commitment. Teacher commitment to a practice or strategy can be difficult to sustain as the learning, and hard work take their toll on teacher time and energy. Innovative strategies and initiatives can be taxing because they often differ from the norm (Odongo & Davidson, 2016). Although teacher commitment is not enough to create successful implementation, it is one issue that can cause a lack of achievement. Teachers must be committed to implementation because it will not happen otherwise. Teachers who lack commitment may find reasons to abandon the implementation process (Zalles & Manitakos, 2016).

When professional development is aligned with what teachers do daily and how they wish to improve, it can foster the commitment needed to create a successful implementation in the classroom. It is difficult to foster commitment amongst teachers when they are being evaluated based on arbitrary indicators of progress (Martinez, 2016). Teachers should have a voice in determining what is essential for their classrooms and how they should be evaluated. When teachers are committed to the process of implementation and not just the outcome, the level of implementation and the quality of instruction will increase. Teachers are more committed to authentic learning and the influence it can have in their classrooms (Su, Feng, & Hsu, 2018).

Teacher perception is an important element when considering their commitment to implementation. Teachers must be able to approach a new strategy or initiative with the understanding that there is an expected benefit (Zalles & Manitakos, 2016). Teachers need to be knowledgeable about the content they are expected to implement so that they can validate their work to implement. When the level of knowledge is shallow, the commitment will also be superficial. It is also vital that teachers believe the initiative or strategy they are to implement will be useful and have a positive influence on student achievement. If teachers can perceive a positive outcome, they will be committed to the implementation (Martinez, 2016).

Attitude often plays a role in teacher commitment to implementation. If teachers have a poor attitude toward a strategy or initiative, it can cause their implementation to be inadequate (Su et al., 2018). Teachers with a positive attitude toward the strategy or initiative will put more effort into implementing well. Teachers with positive attitudes can foresee the benefits of their efforts as they move through the process. These benefits allow them to overcome hurdles that otherwise might be discouraging (Odongo & Davidson, 2016).

Technology. Teachers rely on technology to increase the rigor and effectiveness of PBL. Technology can change teacher-led instruction to student-led instruction by altering how students interact with information. It creates an authenticity that is found when students can utilize resources outside the classroom (Shukie, 2017). Students become independent learners responsible for their questions, answers, and research. Projects can move in a different direction when students begin to connect with the process of answering questions and finding solutions (Gil, 2017).

One of the most important contributions technology makes to the implementation of PBL is improved collaboration. Students have better access to resources and instructional materials that enhance their ability to collaborate even when they are outside the classroom (Dumitrache & Gheorghe, 2018). Technology can help teachers create more rigorous, intricate projects that will engage students in authenticity. It can also empower students to be better users of online resources, which will add to their 21st-century skills (Alharbi, Athauda, & Chiong, 2018). Technology allows teachers to offer students so many choices concerning products that they can create far beyond the trifold board (Baser, Ozden, & Karaarslan, 2017).

Barriers to Implementation of PBL

Teaching methods must change. The way that teachers instruct students should change to make sure that traditional teaching strategies are replaced with inquiry-based learning such as problem-based learning, PBL, and personalized learning (Andriți oi, Luca, & Fuior, 2019). How teacher training is formatted may be instrumental in determining whether teachers will gain the knowledge and skills necessary to implement PBL. Teachers should experience the same learning students will experience when using their projects in class (Hanuscin et al., 2016).

There must be an increase in the implementation of inquiry learning, such as PBL, to create a positive change in instruction. There must also be a change in professional development so that teachers can embrace the process of PBL as well as their role as the facilitator of students' discovery of knowledge. They must move toward active learning as an integral part of their daily instruction (Capraro et al.,2016). Professional development is the most common tool used to

improve teacher classroom practices. It takes practice to move from a teacher-centered classroom to one that is student-centered (Dole, Bloom, & Kowalske, 2016).

Several elements will help to improve instruction through professional development. Often, professional development plans may neglect elements that will help to improve instruction because they focus on a prescribed set of strategies (Cui, Liao, Wang, & Dong, 2019). One way that professional development can improve instruction is to allow teachers to collaborate because teachers are able to work out issues and share successes with others in their building. Collaborating to give and receive feedback, share the workload and ideas helps to create more valuable instruction (Céline & Michel, 2018).

Professional development should correlate with state, district, and school learning goals. For an excellent chance of success, curriculum, instruction, and assessment must be aligned. Also, if professional development is not aligned with these factors, it diminishes the opportunity for achievement (Dole et al., 2016). Curriculum, instruction, and assessment are critical elements in the teaching and learning process that work together to create effective education. Professional development must be the catalyst for strengthening the correlation between these elements (Abrams, Varier, & Jackson, 2016).

Teachers need the opportunity to use trial and error to determine the best practices that work best for them and their students. Learning from trial and error can also improve self-efficacy. Self-efficacy also plays a role in improved instruction (Svihla & Reeve, 2016). Teachers are sometimes afraid to make mistakes because they feel that these mistakes will be a negative. Administrators need to allow for mistakes (such as failed activities) so that teachers

feel empowered and have the self-efficacy to attempt new strategies (Stosich, Bocala, & Forman, 2018).

Transfer of professional development to classroom instruction. It is critical that teachers transfer what they have learned to their classrooms. The issue is that it is difficult for teachers to take what they have learned in professional development sessions into the classroom because their learning is theoretical, but what they do in the classroom is not (Herro & Quigley, 2017). What should happen in professional development is that teachers should have the opportunity to learn in a way that is comparable to what they do with students. Teachers should have time to collaborate, practice and create meaning (Vesikivi, Lakkala, Holvikivi, & Muukkonen, 2019).

There must be adequate time to do these things before implementation is possible (Dole et a., 2016). PD should be focused at the school level to move toward PD that will impart learning that teachers can transfer to their classrooms (Capraro et al., 2016). Teachers are expected to implement student-centered, hands-on projects for students. However, it is challenging to implement this type of activity when this is not part of the professional development. When teachers can inspect their products, they can be clear about what they can expect from students (Ong et al., 2016).

Teachers must understand the strategies that they will be expected to implement into classroom instruction. One tool that can be used to ensure that teachers can transfer theory into practice is a needs assessment (DiBenedetto, Willis, & Barrick, 2018). Needs assessments will give teachers a voice in what will be presented during PD so that the information presented will

match the needs teachers have as they implement strategies like PBL. The PD should use a step-by-step approach that spells out what teachers can do to implement. Aligning implementation to standards is also important because teachers often struggle when trying to align standards and new initiatives (Nollmeyer, & Bangert, 2017). Providing teachers with model PBL projects that align with the curriculum and standards can help them create their gold standard PBL projects (Herro & Quigley, 2017).

Does the format of professional development matter? When providing professional development to teachers, they must be considered individuals and not as a whole group. When teachers are considered to have the same needs and expectations for PD, that PD will miss the mark with most teachers. Teachers need to experience more than one strategy when engaging in professional development (Carpenter & MacFarlane, 2018). These strategies could include auditory, visual, and kinesthetic learning approaches. Different strategies allow teachers to find those that work for them. Online training can provide teachers with an opportunity to access the information at their pace. If offered PD using several different strategies and learning styles, teachers can choose the learning methods that best suit their learning needs (Pittman & Lawdis, 2017).

One model that could prove fruitful in offering teachers a more successful format is Edcamp. This professional development model is an unconventional professional development, not at all like a conference (Carpenter & Linton, 2016). Instead of speakers and programs, these events are driven by the participants. They choose the topics and share information with their colleagues. As these Edcamps become a part of districts across the

country, they provide consumable information and strategies for teachers because they decide what they want to learn (Carpenter, 2018).

Teachers enjoy the practice of using video recordings of implementation to use in post discussions. Using videos of their implementation as well as their colleagues' have helped teachers improve their implementation processes (Zaccarelli, Schindler, Borko, & Osborne, 2018). It is valuable to see the implementation in a video and be able to manipulate that video so that it creates an opportunity for informed conversation, critique, and feedback among colleagues. Even notes taken during observations can be lacking in pertinent information that would show up on a video of that same lesson. The video is a complete recording of what happened during implementation (Liang, 2015).

Coaching. Coaching sets up an opportunity for teachers to have a conversation with an expert who can help them achieve the goals they have set for themselves and their students. Coaching sessions can occur as often as necessary and can take on various formats (Becker, Staub, & Waldis, 2019). Coaching can occur electronically or face-to-face. Teachers and coaches can guide the sessions so that the desired outcome can be achieved. Coaching can take place before and after instruction so that both the coach and the teacher are aware of elements that will be observed and discussed during the sessions (Carr, Holmes, & Flynn, 2017).

Coaching allows a person to set goals to help them move forward. Coaching can be a way to help teachers become comfortable with strategies they learn in professional development. Teachers need additional time to interact with the information and time for reflection (Ernst & Erickson, 2018). If teachers can participate in a coaching relationship, they might be able to set

goals and make a plan that would help them reach their implementation objectives. Being able to have conversations centered on questions they have can help them work through any difficulties that affect their implementation success. Coaching conversations consists of the coach and the person being coached, so being transparent can be achieved. Working with a coach after professional development can create an atmosphere of responsibility and self-awareness (Palacio, Vargas, & Taborda, 2019).

Once teachers have participated in a professional development session, they can work on processing the information presented at their pace and according to their learning style. Having a sounding board to try ideas and get advice while working toward successful implementation can be benefits of coaching relationships (Ernst & Erickson, 2018). This association can provide extended learning time, reflection, and feedback without having to attend another professional development session where individual attention would not be possible (Nicolaidou, Karagiorgi, & Petridou, 2018).

Reflection is essential as teachers practice using the strategies presented in professional development. Through coaching, teachers can focus more on the process of implementation and less on the outcome (Crawford, Zucker, Van Horne, & Landry, 2017). Teachers can benefit from the help of a coach as they navigate the progression of using reflection to improve implementation. It is vital for teachers to reflect on feedback as well so that new ideas and practices can be incorporated. When teachers reflect on feedback as well as actions, they can find new strategies to improve implementation (Gonen, 2016).

Site-based professional development. Teachers who participate in PBL training will gain knowledge, strategies, and self-efficacy if their training takes place in their work setting. Site-based training occurs at the school and can be relevant to a group because it takes place in their environment. Participants have access to materials and tools they will be using to implement PBL (Bertling & Rearden, 2018). Having access to everything they need creates the opportunity to utilize strategies from training. Participants must be in an environment that is comfortable and familiar to them, which can cause less anxiety (Papatraianou, Strangeways, Beltman, & Schuberg Barnes, 2018).

Professional Learning Communities (PLCs) can be very important in schools. If teachers can participate in their work environment, they can communicate and collaborate as a team throughout the training. Having a connection to the other participants as well as the location of professional learning can create an effective atmosphere for learners (Parker, Growth, & Byers, 2019). Not only are participants who work together familiar with each other, but they can also benefit from the camaraderie of working toward a common goal. Whether the training provides an opportunity for teams to create a project, they will be able to create ideas and decide how the project will look. One way to accomplish site-based professional development is to invite trainers to the school or send faculty members to be trained so that they can return to school and share their knowledge with others (Lysaght & O'Leary, 2017).

Site-based learning in schools becomes a constant professional development that leads the teacher through all phases of preparation and implementation. When site-based learning is provided for teachers, it becomes part of the implementation process (Bertling & Rearden, 2018).

Site-based learning helps teachers to discover practices that will lead them to better instruction. Site-based learning can allow teachers to understand hidden beliefs that might challenge their ability to move forward. Teachers may also discover that looking at their work throughout the phases, instead of only at the end, can create significant changes in their implementation strategies (Lysaght, 2015).

Site-based learning allows teachers to collaborate during the process of on-going professional development, which helps them to create a body of knowledge from which to draw when determining what works best. Through site-based instruction, teachers not only learn about their practices but those of the students as well (Schrum, Kortecamp, Rosenfeld, Briscoe, & Steeves, 2016). Continual professional development can help teachers see how student learning is impacted by strategies and practices used by teachers in the classroom. Teachers need to utilize this opportunity to work as a team to solve problems (Heredia, Furtak, Morrison, & Renga, 2016).

Conclusion

Providing another level of PBL professional development for teachers will increase the effectiveness of PBL implementation in the classroom. Analysis of data collected during this study uncovered information under three categories: implementing PBL, supports for implementing PBL, and barriers to implementing PBL.

Participants of this study were concerned about implementing PBL in the classroom. They were unclear about the expectations of the district. They were not sure about how PBL

should be integrated into instruction from day to day. The uncertainty caused teachers to question their ability to implement, which led to diminished self-efficacy.

Participants reported several elements that supported them in their implementation process. Informal learning was helpful for many participants as they were able to use their relationships with colleagues to complete their understanding of PBL. They were able to learn from the mistakes of others and to share successful attempts at implementing PBL. Teacher commitment was a support to implementation because it allowed participants to find ways to overcome obstacles to implement a strategy that they believed in. Technology was beneficial because participants were able to create projects that they could be proud of because they engaged students. One thing that would have been a great support to participants was access to sustained support, such as extended time to implement and collaboration with other teachers during PD.

Barriers to the implementation of PBL were discussed at length during interviews. It was clear that three participants had difficulty implementing PBL because they were not able to adjust their teaching methods. They spoke about PBL implementation, as though it was an end-of-unit project. This idea could be a symptom of not being clear about how to transfer professional development concepts to classroom instruction. The format of PD was also an issue. Participants experienced lecturing, and several stated that they were not presented with the fundamentals of PBL, including a definition.

A need for coaching was expressed quite often during the interviews. Participants were clear about the fact that they needed a sounding board, feedback, and guidance during the

implementation process. They felt that they had to go it alone without expert assistance. Site-based PD would give participants the opportunity to work with their team members to create projects that they would use in their classrooms. Participants are used to working as a team and were quite uncomfortable working outside that purview. Many of the concerns shared by participants reflected a lack of effective PD. An extension to the PD offered by the district is the result of this research.

Project Description

Resources

Potential resources for the implementation of professional development include building professional development funds, support from the administrators and custodians, and existing technology. Schools are given a budget to use for professional development. These funds could help to purchase supplies such as post-it notes, post-it posters, construction paper, printer paper, butcher paper, coloring pencils, markers, pens, pencils, scissors, glue (sticks and liquid), masking tape, and scotch tape. Administrative and custodial support includes procuring space for the sessions, preparing materials, and setting up.

A major resource for the professional development sessions would be the technology. Teachers have assigned laptops that will be an integral part of professional development. Teachers will be able to access digital materials to help them complete assignments during the sessions, and they will be able to utilize the internet as a resource. I expect participants to use Google products such as Google slides, Google drive, and Google docs. My computer will be used to display Google slides presentations to move the sessions through each day. My laptop

will be linked to projectors in the auditorium. The cafeteria will be used as a workspace for groups.

A potential barrier to implementation of this professional development will be technical issues. Because everyone will be using technology during the sessions, there is a risk of malfunction. Also, participants may encounter difficulty using specific applications and may need assistance. For this reason, I will ask that a technology expert be present during the sessions.

Implementation

The professional development will begin at Foster Middle School. Other schools throughout the district will be able to adapt the model as well. I will use the cafeteria and auditorium to complete the three days of training. The first day of training will begin in the auditorium at 8:00 AM. Participants will complete an entrance ticket and end with an exit ticket. At 8:30, participants will complete a sorting activity and debriefing. At 9:45, teachers will spend the rest of the morning using a playlist to access information about PBL. Lunch will be from 12:00 to 1:00. After lunch, teachers will explore resources on the BIE website and create their database of resources. The last hour of the day will provide teachers an opportunity for presentations, discussions, and reflection from the playlist and the exit ticket.

On day 2, participants will begin with an entrance ticket and end with an exit ticket. They will spend the day planning and creating a PBL project using BIE materials. Teachers will complete their projects in groups that are grade and subject specific. At 8:15, teachers will gather resources. At 9:35, they will create a plan for a PBL project. By the end of the session, from

10:35 to 11:30, teachers will have all the elements necessary to create the project. After lunch, teachers will have an hour and fifty minutes to evaluate their work using the plan and develop the project.

During day 3, teachers will begin with an entrance ticket and end with an exit ticket. During the morning, teachers will edit and revise their projects until lunch. After lunch, they will submit their projects to a group of teachers in a different grade level, but the same subject. Each group will provide feedback to another group. When projects are returned with feedback, all teachers from each grade level will come together to discuss the projects. Each group will be able to complete a final revision before turning in an evaluation of the project using a BIE tool. Each team will leave the professional development with a viable project.

Role of the Researcher

As the researcher and creator of this project, I will lead the professional development series the summer after graduation from Walden University. I will be responsible for working with the administrators of Foster Middle School to set up the professional development sessions and conduct them over the 3 days. I will be responsible for providing a copy of the final study to the administration of Foster Middle School and the district. I will also provide a summary of the findings to the participants of the study. The administrators of Foster Middle School will be responsible for providing a copy of the study in the professional library of the school. Members of the district research department will be responsible for providing the research findings to other stakeholders.

Role of the Participants

Teachers responsible for implementing PBL in the classroom will be expected to participate in the professional development sessions provided. They will be expected to gain an understanding of what PBL is and how it looks in the classroom compared to what is typically done. Teachers will be asked to learn to use the BIE online resources to help create projects that are gold standard. Once teachers are familiar with the resources, they will be asked to use them to create a project. Each subject has two teams, one that includes teachers from the same grade, and one that includes teachers from all grades. Teachers will create projects in grade-level teams but will receive feedback from a different grade-level team. This process will allow them to revise projects so that they are as effective as possible.

Project Evaluation Plan

A formative assessment is one that allows the instructor to modify previous instruction to provide better knowledge gains for students. Both student and instructor gain feedback that speaks to the current understanding of the student (Ng, 2018). As instructors utilize the information from formative assessments, the way that content is disseminated to students affects understanding going forward. As instructors collect this data, students also become aware of how they are learning and whether it is successful (Kazragytė & Kudinovienė, 2018). Formative assessment is critical because it measures student progress toward mastery of the content. Formative assessment can also provide information about the effectiveness of teaching strategies in the classroom (Sanaeifar & Nafari, 2018).

Formative assessment of a professional development helps to improve that program by collecting data from participants during the learning process. This information is then used to modify the professional development series so that it becomes more useful for participants. Formative assessment is an appropriate evaluation format for this project because it will be used at Foster Middle School and throughout the district to improve the training of teachers in the implementation of PBL. The initial training served the purpose of giving teachers general information about the application of PBL. This professional development series will provide teachers with the nuts and bolts necessary for implementation. The professional development series will begin at Foster Middle School. At this site, data will be collected through entrance and exit tickets each day and a more formal survey at the end of the series. The entrance and exit tickets will be distributed using Google form, and the responses from the forms will be collected in a spreadsheet. The spreadsheet will be used to find the most frequent answers. These responses will be used to increase the effectiveness of the professional development series. The more formal survey will be comprised of multiple-choice questions about the experience. An opportunity to expound about any questions, concerns, or praise concerning the experience will be at the end of the document. These questions will address the goals of this project.

Overall Goals of the Project

One general assessment goal for this project is to encourage participants to produce a gold standard PBL project using BIE criteria and tools. Another is to help participants to collaborate with team members. And finally, to encourage teachers to implement PBL into classrooms using extended time and reflection. The first goal was addressed in the initial

training, but the second and third goals were missing from that training. During the collection of data for this study, participants stressed the need for collaboration and more time to implement and reflect.

The evaluation goals for this project include giving instructors immediate feedback on the experience of participants in terms of project goals, to allow instructors to adjust the curriculum for the professional development series, allowing participants to evaluate their learning. The evaluation goals will ensure that instructors and participants are aware of whether the strategies and materials disseminated in the series are appropriate to the learning process and to show whether participants are retaining the information. If instructors can adjust the information in real time so that participants are getting what they need, then participants can walk away with valuable strategies that prepare them to implement PBL in their classrooms.

Stakeholders

Critical stakeholders for this professional development program include FMS and PCPS. FMS teachers comprised the participants for this study, and they will benefit from this initial professional development program. FMS is a progressive school that utilizes research-based strategies, tools, and materials to prepare students for their future better. For this reason, the teachers at Foster Middle School are excited to implement PBL but want to make the implementation effective. This professional development is a direct result of concerns they have about the initial training and implementing of PBL. Foster Middle School is part of PCPS and has mandated that teachers can implement PBL. For this district, PBL is part of a collection of tools that will lead students to deeper learning. The focus is on 21st-century learning. The

success of this project will give FMS (and PCPS) the necessary tools to increase the ability of teachers to implement PBL well. As a mandate of PCPS, PBL implementation is key for teachers in the district.

Project Implications

Professional development on a district level falls short of improving instruction as teachers are expected to come to sessions with the same background knowledge, needs, and goals. Also, teachers are expected to process information in the same way and at the same rate. When teachers are expected to make changes in the classroom, the training they receive should help them in the process. When they leave the training with uncertainty and frustration, then PD is not adequate.

Participants of this study were frustrated with the process of training because it occurred in waves. At the time of this study, several teachers had not received training, while others had been trained two to three years earlier. The training was also varied in that some presenters used a lecture format, while others included opportunities to move around and participate in relevant activities. The training did not provide essential information about PBL, such as what it is and how it might look in the classroom. It became evident in interviews that participants did not understand the purpose of PBL as a tool to move students to in-depth learning. An instructional leader explained that PBL is one tool that can be combined with others or used alone to improve student learning Lead Teacher, personal communication, 2018).

This project will increase awareness of the necessity of teacher input when creating professional development. It is vital to tailor professional development for teachers so that they

receive the maximum benefits that can be transferred to the classroom. PCPS will become aware of the fact that teachers must be included in the process of creating professional development as a tool to improve instruction. Even the most impressive professional development will fall short of meeting teacher needs as they are not aware of the needs of specific teachers or those in a building.

As teachers experience PD to effect change in their classrooms, they should be able to transfer what they learn in PD to their classroom instruction. PD must reflect the change that should occur in the classroom. Teachers should have the opportunity to experience instruction from the perspective of the student so that they are aware of potential problems before they arise. This perspective will also allow them to anticipate questions that students might have and formulate a way to guide them to an answer. The PD sessions provided as a result of this research will assist teachers in implementing PBL by meeting their individual needs. Social change can occur when there is an increase teacher self-efficacy by offering appropriate resources to build efficacy and recommendations were made for ways to improve future implementation.

Section 4: Reflections and Conclusions

Project Strengths and Limitations

During the analysis of data collected in this project, it became clear that one barrier teachers faced when implementing PBL was that they did not receive the kind of training they desired. The teachers preferred more in-depth information about what PBL should look like in the classroom, whether their projects were gold standard, and how to use the tools from the BIE. According to these findings, there were several strengths associated with this study. The first strength of this project was that teachers were offered an opportunity to approach learning in several different modes. Second, teachers can collaborate with their colleagues during and after professional development sessions. Thirdly, teachers will be afforded the time to implement and reflect as they participate in the implementation process.

In this project, teachers will be able to choose the modalities they prefer when accessing information. They will use several learning styles to acquire knowledge that will help them better implement PBL. The importance of a teacher's ability to study in ways that work for them is central to this project. It sends the message that the needs of each teacher are important.

Site-based professional development allows teachers to work with their team members to create gold standard projects that will be used in the classroom. Working in teams provides support for teachers. Teams provide feedback, division of labor, and the ability to include more than one perspective in planning. Teachers will be provided with this format because it will help them to create the best project possible for students.

The chance to receive feedback, revise, and reflect on the project is important for teachers. During interviews, several participants spoke about the importance of trial and error. In this case, feedback from other colleagues will provide teachers the opportunity to work out the problems in their projects before they implement them. Trial and error improve teacher self-efficacy, and it is possible that this process may accomplish the same result.

Some limitations were associated with this project. The project was limited to BIE resources because they provided the first training and their PBL implementation structure is encouraged by PCPS. I suspect that teachers will be able to use the resources well, and I am avoided any additional resources during the sessions to encourage teachers to use the BIE resources.

Professional development days throughout the school year are prearranged by the district and will not be available for this professional development program. The only other opportunity for 3 consecutive days of PD would be during the summer. Teachers could attend these sessions during preplanning before the school year begins, but 3 consecutive days would still be difficult. The sessions could occur on days that are not consecutive, but that might affect the integrity of the PD because each day is a precursor for the next.

Recommendations for Alternative Approaches

I chose to explore the perspectives of teachers concerning the implementation of PBL. According to findings from this study, teachers require more professional development to feel confident in their attempts to implement PBL into the classroom. My approach provides teachers

with the strategies needed to accomplish the goal of PBL implementation. It is important to meet the needs of teachers during PD so that they can meet the needs of students in the classroom.

An alternate approach to this problem would be to add observations as another element of triangulation. I was not able to include observations as a source of data for this study because I knew that teachers would be completing much of their implementation of PBL during the beginning of the year to midyear before I obtained IRB approval. My research would be conducted toward the end of the year when conducting observations would not be possible due to state testing and end-of-year obligations.

A different way to approach the problem of inadequate professional development would be to create a program evaluation. This assessment would explain to the district how the program falls short of teacher expectations and what would help to develop a program of professional development that would give teachers the guidance and insight they need to succeed in the implementation of PBL. A program evaluation would allow the district to change professional development so that it would better meet the needs of teachers and provide them with subsequent professional development. The idea of offering training in waves was not efficient because much time elapses between the beginning of training and the end of training. The evaluation would provide the district with information about the gap between what teachers need and what the current PD offers.

Scholarship, Project Development and Evaluation, and Leadership and Change

During this process, I have had many obstacles that I needed to overcome. My mother passed away before I entered the IRB phase. Throughout the process, I dealt with severe medical

issues that were difficult to control and often left me exhausted and frustrated. After receiving IRB approval, I had to obtain permission from the district where I would be conducting the research. This was a slow process, but I was able to begin collecting data during the same school year. When collecting data, I had to be available when participants were able to accommodate me. This situation caused more frustration because we were well into the state testing window when I began the study. Analyzing the data was time-consuming but revealing. I was so excited to see results, and it spurred me on to complete several rounds of coding. When I was able to see viable results, it made facing all the obstacles I had to get through seem worth it.

When I looked at the results of my data collection, I found that the most substantial barrier to implementing PBL was the lack of training appropriate for these teachers. Therefore, I determined a professional development plan would be most appropriate for the project. I included what teachers shared was missing from their initial training and added other elements that the literature review stated were necessary for effective professional development. It became important that I find a way to give these teachers what they needed to implement PBL in their classrooms. I listened as they shared their perspectives and identified many issues that should be addressed as the district moves forward with PBL.

Leadership is an essential characteristic for anyone, and I now see myself as a leader because I have learned, through this process, how to ask questions and find the answers in viable research. When speaking with my colleagues, I can share my findings about many topics pertaining to education, and the dialogue is much more profound. Parents also find it important that I use research-based strategies in my classroom and that I approach teaching children in a

holistic manner. My students trust the time and attention that I put into the presentation of the curriculum. They know that their experiences will be rigorous and suitable for their lives in the 21st century.

As I complete this process, I am looking forward to shifting from the classroom to a district office where I can effect change for more students. My concentration is curriculum, instruction, and assessment. I am enthusiastic about finding innovative ways to align all three elements to make student learning focused on enhancing 21st-century skills such as problem solving, collaboration, effective use of technology, and creativity. Students cannot be effective if teachers do not change what they do. Inquiry-based learning is essential and should be an integral part of every child's education. My goal is to make sure this happens.

Reflection on Importance of the Work

The process of conducting research has shown me how I can find answers to research questions and make changes that will create a positive influence. I do not have to rely on others to add to the literature and wait for them to answer the questions that I encounter. I found myself capable of answering my questions, and I can use the answers to improve circumstances. The most important outcome of this process was that I want to continue to address questions and problems, conduct research, and use the answers to create a better situation for others.

As a researcher, I set out to explain the struggles concerning PBL implementation at FMS. Teachers were motivated to implement, and they believed that the strategy would be successful in the classroom. However, they seemed to struggle with the mechanics of implementation. This study addressed PBL implementation difficulties throughout the building. I

had research questions and wanted to find answers to those questions so that problems could be solved.

Throughout this study, it was clear that teachers wanted to implement but were unable to do so. During the data analysis, I discovered that teachers were not able to transfer their learning to the classroom. I found that more professional development would give them the knowledge and strategies necessary to improve implementation. Moving from interviews and consideration of student work to analyzing data and finding a solution for the problem, I was amazed at how logical the process is and how it can provide answers and more questions.

Implications, Applications, and Directions for Future Research

This study may change the way that PCPS and buildings within the district approach the learning of educators. The ways that teachers implement best practices in their classrooms are also appropriate for adult learning. Adults have different learning styles compared to children. Adults need time to practice and reflect. Adults do not wish to be unsuccessful in their learning endeavors.

This project can be applied to any professional development. If used by the district, teachers will always be involved in the process of creating PD and there will be opportunities to meet the needs of all teachers by varying the modalities and other aspects of PD sessions. The application of this project will give teachers extended PD, coaching, and collaboration. If this application occurs, PD will improve and be transferred to classroom instruction.

Conclusion

When the district mandates implementation of a strategy or program, teachers feel compelled to comply with the mandate when they see the importance of the change in instruction. Teachers at FMS in PCPS wanted to implement PBL but lacked understanding and resources to implement PBL. Offering professional development does not always mean that new strategies will transfer from the program to the classroom.

Professional development must be a useful tool that guides teachers through a process of implementation. In this study, I wanted to discover how teachers were able to implement PBL into their classrooms and whether their self-efficacy influenced them. The 21st century requires new skill sets, and the classroom must change. PBL is a useful tool to help students hone 21st-century skills such as collaboration, creativity, and problem solving.

PCPS desires to assist students as they practice these 21st-century skills to prepare them for a lifetime of productivity. The district determined that teachers should implement PBL and disseminated a mandate for all teachers. As a result, teachers showed varying degrees of success with implementation, and this study was designed to determine what supports created successful implementation and what barriers prevented successful implementation. A case study revealed that teachers need additional professional development to aid them in the process of implementing PBL. This additional PBL may increase the efficiency of implementation and teacher self-efficacy.

A case study was appropriate for this study because it allowed me to learn the details of the implementation process from each participant to obtain an in-depth understanding of this

process. The participants were core subject teachers from FMS, and each took part in one face-to-face interview. Participants also submitted student work samples. Thematic, open, and axial coding were used to find patterns and themes in the data. Student work samples were used to substantiate teacher reports of implementation success.

The data analysis showed that PBL was implemented in some classrooms but not in others. Most teachers felt that they were implementing PBL, while student work samples showed that some were not implementing PBL. In most cases, teachers lacked the understanding to implement PBL. Having conversations with the participants inspired me to create the professional development program that they need. Teachers will be required to complete certain tasks, and they must be confident in their ability to complete these tasks well.

I created the project associated with this study to provide teachers with the knowledge and skills to develop gold standard PBL. The ability to accomplish the task of implementation will increase self-efficacy and will allow teachers to comply with the district mandate. Teachers agree that PBL is an asset to classroom instruction, and this is an excellent reason for them to work toward successful PBL implementation.

References

Abdul-Majied, S., Johnson, C., & Campbell, J. (2017). Professional development and early childhood teachers' performance: A view through an undergraduate foundation course. *Caribbean Teaching Scholar, 7*47-65. https://journals.sta.uwi.edu/cts/

Abrams, L., Varier, D., & Jackson, L. (2016). Unpacking instructional alignment: The influence of teachers' use of assessment data on instruction. *Perspectives in Education, 34*(4), 15-28. https://journals.co.za/content/journal/persed

akrak-Ekin, G, & Balcikanli, C. (2019). Written corrective feedback: EFL teachers' beliefs and practices. *Reading Matrix: An International Online Journal*, *19*(1), 114–128. http://www.readingmatrix.com/

Alharbi, N. M., Athauda, R. I., & Chiong, R. (2018). Empowering collaboration in project-based learning using a scripted environment: Lessons learned from analysing instructors' needs. *Technology, Pedagogy & Education*, *27*(3), 381–397. doi:10.1080/1475939X.2018.1473289

Almpanis, T. (2016). Using a mixed methods research design in a study investigating the "heads of e-learning" perspective towards technology enhanced learning. *Electronic Journal of E-Learning*, *14*(5), 301-311. http://www.ejel.org/main.html

Althauser, K. (2015). Job-embedded professional development: Its impact on teacher self-efficacy and student performance. *Teacher Development*, *19*(2), 210-225. doi:10.1080/13664530.2015.1011346

Andrițoi, D., Luca, C., & Fuior, R. (2019). Modern teaching methods used in the study of sensors and transducers in the biomedical field. *ELearning & Software for Education, 3*, 261–266. https://doi-org.ezp.waldenulibrary.org/10.12753/2066-026X-19-173

Angeline, V. R. (2014). Motivation, professional development, and the experienced music teacher. *Music Educators Journal, 101*(1), 50-55. https://journals.sagepub.com/home/mej

Baghoussi, M., & El Ouchdi, Z. (2019). The implementation of the project-based learning approach in the Algerian EFL context: Curriculum, designer's expectations and teachers' obstacles. *Arab World English Journal, 10*(1), 271-282. https://awej.org/

Baker, W. D., & Däumer, E. (2015). Designing interdisciplinary instruction: exploring disciplinary and conceptual differences as a resource. *Pedagogies, 10*(1), 38–53. https://doi-org.ezp.waldenulibrary.org/10.1080/1554480X.2014.999776

Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist, 44*1175-1184. doi:10.1037/0003-066X.44.9.1175

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28*(2), 117-148. doi:10.1207/s15326985ep2802_3

Bandura, A. (1995). Comments on the crusade against causal efficacy of human thought. *Journal of Behavior Therapy and Experimental Psychiatry, 26*(3), 179-190. doi:10.1016/0005-7916(95)00034-W

Bandura, A., Barbaranelli, C., Caprara, G. V., & Pastorelli, C. (1996). Multifaceted impact of self-efficacy beliefs on academic functioning. *Child Development, 67*(3), 1206-22. https://srcd.onlinelibrary.wiley.com/journal/14678624

Bandura, A., Barbaranelli, C., Caprara, G. V., & Pastorelli, C. (2001). Self-efficacy beliefs as shapers of children's aspirations and career trajectories. *Child Development*, *72*(1), 187. https://srcd.onlinelibrary.wiley.com/journal/14678624

Bandura, A., & Perloff, B. (1967). Relative efficacy of self-monitored and externally-imposed reinforcement systems. *Journal of Personality and Social Psychology, 7,* 111-116. https://www.apa.org/pubs/journals/psp/

Baser, D., Ozden, M. Y., & Karaarslan, H. *(*2017). Collaborative project-based learning: An integrative science and technological education project. *Research in Science & Technological Education*, *35*(2), 131-148. doi:10.1080/02635143.2016.1274723

Battersby, S. L. (2019). Reimagining music teacher collaboration: The culture of professional learning communities as professional development within schools and districts. *General Music Today*, *33*(1), 15–23. https://doi-org.ezp.waldenulibrary.org/10.1177/1048371319840653

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

Bedel, E. F. (2016). Exploring academic motivation, academic self-efficacy and attitudes toward teaching in pre-service early childhood education teachers. *Journal of Education and Training Studies*, *4*(1), 142-149. http://redfame.com/journal/index.php/jets

Becker, E. S., Staub, F. C., & Waldis, M. (2019). Advancing student teachers' learning in the teaching practicum through content-focused coaching: A field experiment. *Teaching &*

Teacher Education, *83*, 12–26. https://doi-org.ezp.waldenulibrary.org/10.1016/j.tate.2019.03.007

Bell, J., & Bell, T. (2018). Integrating computational thinking with a music education context. Informatics in Education, 17(2), 151–166. https://doi-org.ezp.waldenulibrary.org/10.15388/infedu.2018.09

Bertling, J., & Rearden, K. (2018). Professional development on a sustainable shoestring: Propagating place-based art education in fertile soil. *Discourse & Communication for Sustainable Education*, *9*(2), 5-20. doi:10.2478/dcse-2018-0011

Bilgin, I., Karakuyu, Y., & Ay, Y. (2015). The effects of project based learning on undergraduate students' achievement and self- efficacy beliefs towards science teaching. *Eurasia Journal of Mathematics, Science & Technology Education*, *11*(3), 469-477. doi:10.12973/eurasia.2014.1015a

Bo Zhang, B., & Misiak, J. J. (2015). Evaluating three grading methods in middle school science classrooms. *Journal of Baltic Science Education*, *14*(2), 207-215. http://www.scientiasocialis.lt/jbse/

Bolt, S., Fenn, J., & Ohly, C. (2016). Let them see it: A project to build capacity by raising awareness of teaching-development pathways. *Journal of University Teaching & Learning Practice*, *13*(4), 1–9. https://ro.uow.edu.au/jutlp/

Bowe, J., & Gore, J. (2017). Reassembling teacher professional development: the case for quality teaching rounds. *Teachers and Teaching*, *23*(3), 352-366. doi: 10.1080/13540602.2016.1206522

Brown, C., & Militello, M. (2016). Principal's perceptions of effective professional development in schools. *Journal of Educational Administration, 54*(6), 703-726. doi:10.1108/JEA-09-2014-0109

Buck Institute of Education (BIE). (n.d.). Why PBL? https://www.pblworks.org/why-project-based-learning

Budge, S. B., Mun Yuk, C., & Minero, L. P. (2017). Trans individuals' facilitative coping: An analysis of internal and external processes. *Journal of Counseling Psychology*, *64*(1), 12-25. doi:10.1037/cou0000178

Can, S. (2015). Investigation of the motivation level of teachers working at state schools in relation to some variables. *International Journal of Progressive Education*, *11*(3), 153-161. http://inased.org/ijpe.htm

Canuto, A. T. (2015). Reflections on theory and pedagogy of challenges in facilitating children's dialogues in the community of inquiry. *International Journal of Whole Schooling*, 11(1), 1-15. http://www.wholeschooling.net/Journal_of_Whole_Schooling/IJWSIndex.html

Capraro, R. M., Capraro, M. M., Scheurich, J. J., Jones, M., Morgan, J., Huggins, K. S.,… & 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. https://doi-org.ezp.waldenulibrary.org/10.1080/00220671.2014.936997

Carpenter, J. (2018). Educator perceptions of district mandated Edcamp unconferences. *Teaching and Teacher Education*, 75, 1879-2480. https://www.journals.elsevier.com/teaching-and-teacher-education

Carpenter, J. P., & MacFarlane, M. R. (2018). Educator perceptions of district-mandated Edcamp unconferences. *Teaching & Teacher Education*, *75*, 71–82. https://doi-org.ezp.waldenulibrary.org/10.1016/j.tate.2018.06.002

Carpenter, J. P., & Linton, J. N. (2016). Edcamp unconferences: Educators' perspectives on an untraditional professional learning experience. *Teaching & Teacher Education*, *57*, 97–108. https://doi-org.ezp.waldenulibrary.org/10.1016/j.tate.2016.03.004

Carpenter, J. P. (2016). Unconference professional development: Edcamp participant perceptions and motivations for attendance. *Professional Development in Education, (42)*1, 78-99. http://dx.doi.org/10.1080/19415257.2015.1036303

Carr, M. L., Holmes, W., & Flynn, K. (2017). Using Mentoring, Coaching, and Self-Mentoring to Support Public School Educators. *Clearing House*, *90*(4), 116–124. https://doi-org.ezp.waldenulibrary.org/10.1080/00098655.2017.1316624

Céline, L., & Michel, G. (2018). Teacher collaboration's influence on inquiry-based science teaching methods. *Education Inquiry (Co-Action Publishing)*, *9*(4), 363–379. https://doi-org.ezp.waldenulibrary.org/10.1080/20004508.2018.1428037

Chen, C. H. (2017). Exploring Scaffolding Modes in PjBL: A Professional Development Course to Promote In-Service Teachers' Technology Integration. *Journal of Educational Multimedia and Hypermedia*, *26*(2), 105–129. http://www.learntechlib.org/p/172161

Cho, Y. (2017). Identifying interdisciplinary research collaboration in instructional technology. *TechTrends: Linking Research & Practice to Improve Learning*, *61*(1), 46–52. https://doi-org.ezp.waldenulibrary.org/10.1007/s11528-016-0124-6

Chung-Yuan, H., Meng-Jung, T., Yu-Hsuan, C., Jyh-Chong, L. (2017). Surveying in-service teachers' beliefs about game-based learning and perceptions of technological pedagogical and content knowledge of games. *Journal of Educational Technology & Society, 20*(1), 134-143. https://www.jstor.org/journal/jeductechsoci

Clark, L., Majumdar, S., Bhattacharjee, J., & Hanks, A. C. (2015). Creating an Atmosphere for STEM Literacy in the Rural South through Student-Collected Weather Data. *Journal of Geoscience Education, 63*(2), 105–115. https://nagt.org/nagt/jge/index.html

Cofré, H. L., Santibáñez, J. P., Jiménez, A. S., Carmona, F., Navarrete, K., & Vergara, C. A. (2015). The effect of teaching the nature of science on students' acceptance and understanding of evolution; myth or reality? *Journal of Biological Education, 49*(2), 1-14. https://www.tandfonline.com/loi/rjbe20

Cook, N. D., & Weaver, G. C. (2015). Teacher's implementation of project-based learning: lessons from the research goes to school program. *Electronic Journal of Science Education (Southwestern University/Texas Christian University), 19*(6). http://ejse.sourthwestern.edu

Cortina, K., Miller, K., McKenzie, R., & Epstein, A. (2015). Where low and high inference data converge: Validation of class assessment of mathematics instruction using mobile eye tracking with expert and novice teachers. *International Journal of Science & Mathematics Education, 13*(2), 389-403. doi:10.1007/s10763-014-9610-5

Crawford, A., Zucker, T., Van Horne, B., & Landry, S. (2017). Integrating Professional Development Content and Formative Assessment with the Coaching Process: The Texas

School Ready Model. *Theory into Practice*, *56*(1), 56–65. https://doi-org.ezp.waldenulibrary.org/10.1080/00405841.2016.1241945

Creswell, J. W., & Plano Clark, V. L. (2007). Designing and conducting mixed methods research. (2nd ed.). Los Angeles: SAGE Publications.

DeMink-Carthew, J., & Olofson, M. W. (2020). Hands-joined learning as a framework for personalizing project-based learning in a middle grades classroom: An exploratory study. *Research in Middle Level Education Online*, *43*(2), 1–17. https://doi-org.ezp.waldenulibrary.org/10.1080/19404476.2019.1709776

Dewey, J. (2016). Excerpts from democracy and education (1916). *Schools: Studies in Education*, *13*(1), 127-139. https://www.journals.uchicago.edu/toc/schools/current

DiBenedetto, C. A., Willis, V. C., & Barrick, R. K. (2018). Needs assessments for school-based agricultural education teachers: A review of literature. *Journal of Agricultural Education*, *59*(4), 52–71. https://doi-org.ezp.waldenulibrary.org/10.5032/jae.2018.04052

Dickey, L. M., Walinsky, D., Rofkahr, C., Richardson-Cline, K., & Juntunen, C. (2016). Career decision self-efficacy of transgender people: Pre- and post-transition. *Career Development Quarterly*, *64*(4), 360-372. doi:10.1002/cdq.12071

Dole, S., Bloom, L., & Kowalske, K. (2016). Transforming Pedagogy: Changing Perspectives from Teacher-Centered to Learner-Centered. *Interdisciplinary Journal of Problem-Based Learning*, *10*(1). https://docs.lib.purdue.edu/ijpbl/

Dumitrache, A., & Gheorghe, M. (2018). Project Based Learning. Practical Steps in Completing a Learning Assignment. *ELearning & Software for Education*, *1*, 95–100. https://doi-org.ezp.waldenulibrary.org/10.12753/2066-026X-18-012

Erdogan, N., Navruz, B., Capraro, R. M., & Younes, R. (2016). Viewing how STEM project-based learning influences students' science achievement through the implementation lens: A latent growth modeling. *Eurasia Journal of Mathematics, Science & Technology Education*, *12*(8), 2139-2154. doi:10.12973/eurasia.2016.1294a

Ernst, J., & Erickson, D. M. (2018). Environmental education professional development for teachers: A study of the impact and influence of mentoring. *Journal of Environmental Education*, *49*(5), 357–374. https://www.tandfonline.com/loi/vjee20

Fasteen, J., Thanheiser, E., & Melhuish, K. (2015). Teacher buy-in for professional development: 4 distinct profiles. *Conference Papers -- Psychology of Mathematics & Education of North America*, 960-963. https://www.pmena.org/

Flores, I. M. (2015). Developing preservice teachers' self-efficacy through field-based science teaching practice with elementary students. *Research in Higher Education Journal*, 27, 1-19. https://www.springer.com/journal/11162

Frazier, R., Bendixen, L. D., & Hoskins, W. J. (2019). Exploring the role of self-efficacy in prospective teachers' career decision-making. *Journal of Ethnographic & Qualitative Research*, *13*(4), 261–271. http://www.jeqr.org/

Freeman Herreid, C. H., Prud'homme-Généreux, A., Schiller, N. A., Herreid, K. F., & Wright, C. (2016). What makes a good case, revisited: The survey monkey tells all. *Journal of College Science Teaching*, *45*(1), 60-65. https://www.nsta.org/college/

Freeman, J., Kowitt, J., Simonsen, B., Wei, Y., Dooley, K., Gordon, L., & Maddock, E. (2018). A High School Replication of Targeted Professional Development for Classroom Management. *Remedial and Special Education*, *39*(3), 144–157. https://journals.sagepub.com/home/rse

Fusch, P. I., & Ness, L. R. (2015). Are we there yet? Data saturation in qualitative research. *The Qualitative Report*, *20*(9), 1408-1416. https://nsuworks.nova.edu/tqr/

Gerzon, N., & Guckenburg, S. (2015, April 1). Toolkit for a workshop on building a culture of data use. Retrieved October 11, 2015, from http://eric.ed.gov/?id=ED555739

Gil, P. (2017). Short Project-Based Learning with MATLAB Applications to Support the Learning of Video-Image Processing. *Journal of Science Education & Technology*, *26*(5), 508–518. https://doi-org.ezp.waldenulibrary.org/10.1007/s10956-017-9695-z

Goldberg, R., Magee, N., & Madden, L. M. (2015). Using authentic data to enhance middle school atmospheric science instruction. *Science Scope*, *38*(8), 25-32. https://www.jstor.org/journal/sciencescope

Gonen, S. I. K. (2016). A Study on Reflective Reciprocal Peer Coaching for Pre-Service Teachers: Change in Reflectivity. *Journal of Education and Training Studies*, *4*(7), 211–225. http://redfame.com/journal/index.php/jets

Goodwin, A. (2016). Effectiveness of word solving: Integrating morphological problem-solving within comprehension instruction for middle school students. *Reading & Writing, 29*(1), 91-116. doi:10.1007/s11145-015-9581-0

Governor, D., Hall, J., & Jackson, D. (2013) Teaching and learning science through song: Exploring the experiences of students and teachers. *International Journal of Science Education, 35*(18), 3117-3140. DOI: 10.1080/09500693.2012.690542

Halaweh, M. M., (2017). Using Mobile technology in the classroom: A reflection based on teaching experience in UAE. *TechTrends: Linking Research & Practice to Improve Learning, 61*(3), 218–222. https://doi-org.ezp.waldenulibrary.org/10.1007/s11528-017-0184-2

Han, S., Rosli, R., Capraro, M. M., & Capraro, R. M. (2016). The Effect of Science, Technology, Engineering and Mathematics (STEM) Project Based Learning (PBL) on Students' Achievement in Four Mathematics Topics. *Journal of Turkish Science Education (TUSED), 13*3-30. doi:10.12973/tused.10168a

Hanney, R. (2018). Doing, being, becoming: a historical appraisal of the modalities of project-based learning. *Teaching in Higher Education*, 23(6), 769-783. doi: 10.1080/13562517.1421628

Hanuscin, D., Lipsitz, K., Cisterna-Alburquerque, D., Arnone, K., Garderen, D., Araujo, Z., & Lee, E. (2016). Developing Coherent Conceptual Storylines: Two Elementary Challenges. *Journal of Science Teacher Education*, *27*(4), 393–414. https://doi-org.ezp.waldenulibrary.org/10.1007/s10972-016-9467-2

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

Havice, W., Havice, P., Waugaman, C., & Walker, K. (2018). Evaluating the effectiveness of integrative STEM education: Teacher and administrator professional development. *Journal of Technology Education, 29*(2), 73–90. https://scholar.lib.vt.edu/ejournals/JTE/

Heredia, S. C., Furtak, E. M., Morrison, D., & Renga, I. P. (2016). Science Teachers' Representations of Classroom Practice in the Process of Formative Assessment Design. *Journal of Science Teacher Education, 27*(7), 697–716. https://link.springer.com/journal/volumesAndIssues/10972

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. https://doi-org.ezp.waldenulibrary.org/10.1080/19415257.2016.1205507

Hollo, A., & Hirn, R. G. (2015). Teacher and student behaviors in the contexts of grade-level and instructional grouping. *Preventing School Failure, 59*(1), 30-39. doi:10.1080/1045988X.2014.919140

Hopper, S. B. (2014). Bringing the world to the classroom through videoconferencing and project-based learning. *Techtrends: Linking Research and Practice to Improve Learning, 58*(3), 78-89. https://www.aect.org/techtrends_-_linking_research.php

Horan, M. (2019). Teachers' perceptions of the effect of professional development on their efficacy to teach pupils with ASD in special classes. *REACH Journal of Special Needs Education in Ireland, 32*(1), 34-49. https://mie-ie.libguides.com/Inclusive_Ed/Special_Ed

Hsu, C.-Y., Tsai, M.-J., Chang, Y.-H., & Liang, J.-C. (2017). Surveying In-Service Teachers' Beliefs about Game-Based Learning and Perceptions of Technological Pedagogical and Content Knowledge of Games. *Journal of Educational Technology & Society, 20*(1), 134-143. https://www.jstor.org/journal/jeductechsoci

Ittner, A., Helman, L., Burns, M., & McComas, J. (2015). Data drive these coaches: Literacy project merges school goals with teachers' learning needs. *Journal of Staff Development, 36*(2), 20-22. https://www.learntechlib.org/j/ISSN-0276-928X/

Jacques, S., Bissey, S., & Martin, A. (2016). Multidisciplinary project-based learning within a collaborative framework. *International Journal of Emerging Technologies in Learning, 11*(12), 36-44. doi:10.3991/ijet.v11i12.5996

Jones, M., & Dexter, S. (2018). Teacher Perspectives on Technology Integration Professional Development: Formal, Informal, and Independent Learning Activities. *Journal of Educational Multimedia and Hypermedia, 27*(1), 83–102. https://www.learntechlib.org/j/JEMH/

Junsay, M. (2016). Reflective learning and prospective teachers' conceptual understanding, critical thinking, problem solving, and mathematical communication skills. *Research in Pedagogy / Istrazivanja U Pedagogy, 6*(2), 43-58. doi:10.17810/2015.34

Karacabey, M. F. (2020). Perceptions of school administrators on their contributions to teacher professional development. *Journal of Theoretical Educational Science / Kuramsal Eğitimbilim Dergisi*, *13*(1), 78–90. https://doi-org.ezp.waldenulibrary.org/10.30831/akukeg.541053

Karaçalli, S., & Korur, F. (2014). The effects of project-based learning on students' academic achievement, attitude, and retention of knowledge: The subject of electricity in our lives. *School Science and Mathematics*, *114*(5), 224-235. https://onlinelibrary.wiley.com/journal/19498594

Kavanoz, S., Yüksel, H. G., & Varol, B. (2017). Evolvement of pre-service language teachers' beliefs through teacher education. *International Journal of Progressive Education*, *13*(1), 119-135. http://ijpe.penpublishing.net/

Kazragytė, V. I., & Kudinovienė, J. (2018). Formative Assessment in Arts Education Lessons: Episodic or Integrated with Effective Teaching? *Pedagogy Studies/ Pedagogika*, *131*(3), 217–232. https://doi-org.ezp.waldenulibrary.org/10.15823/p.2018.43

Kilgour, P., Northcote, M., Williams, A., & Kilgour, A. (2020). A plan for the co-construction and collaborative use of rubrics for student learning. *Assessment & Evaluation in Higher Education*, *45*(1), 140–153. https://doi-org.ezp.waldenulibrary.org/10.1080/02602938.2019.1614523

King, D., & Ginns, I. (2015). Teaching and learning at the creek. *Teaching Science: The Journal of The Australian Science Teachers Association, 61*(3), 26-36. https://asta.edu.au/resources/teachingscience

Kızkapan, O., & Bektaş, O. (2017). The effect of project-based learning on seventh grade students' academic achievement. *International Journal of Instruction*, *10*(1), 37-54. http://www.e-iji.net/

Kozleski, E. (2017). The uses of qualitative research. *Research & Practice for Persons with Severe Disabilities*, *42*(1), 19-32. doi:10.1177/1540796916683710

Kyndt, E., Gijbels, D., Grosemans, I., & Donche, V. (2016). Teachers' everyday professional development. *Review of Educational Research*, *86*(4), 1111–1150. https://doi-org.ezp.waldenulibrary.org/10.3102/0034654315627864

Lancaster, G., Corrigan, D., Fazio, L., Burke, J., & Overton, D. (2017). Towards building science teachers' understandings of contemporary science practices. *IAFOR Journal of Education*, *5*(1), 17-30. https://iafor.org/journal/iafor-journal-of-education/

Lecat, A., Raemdonck, I., Beausaert, S., & März, V. (2019). The what and why of primary and secondary school teachers' informal learning activities. *International Journal of Educational Research*, *96*, 100–110. https://doi-org.ezp.waldenulibrary.org/10.1016/j.ijer.2019.06.003

Lee, D., Huh, Y., & Reigeluth, C. (2015). Collaboration, intragroup conflict, and social skills in project-based learning. *Instructional Science*, *43*(5), 561–590. https://doi-org.ezp.waldenulibrary.org/10.1007/s11251-015-9348-7

Lee, Y. M. (2015). Project-based learning involving sensory panelists improves student learning outcomes. *Journal of Food Science Education*, *14*(2), 60-65. doi:10.1111/1541-4329.12057

Liang, J. (2015). Live video classroom observation: an effective approach to reducing reactivity in collecting observational information for teacher professional development. *Journal of Education for Teaching*, *41*(3), 235–253. https://doi-org.ezp.waldenulibrary.org/10.1080/02607476.2015.1045314

Lipp, J., & Helfrich, S. H. (2016). Pre-service teachers' growth in understandings of best practice literacy instruction through paired course and field experience. *Reading Horizons*, *55*(2), 43-62. https://scholarworks.wmich.edu/reading_horizons/

Lomascolo, D. J., & Angelle, P. S. (2017). A national study of common planning time activities: Examination of differences by state. *Middle Grades Research Journal*, *11*(2), 21–31. http://mlersig.net/research/publications/middle-grades-research-journal/

Looi, C., Sun, D., Seow, P., & Chia, G. (2014). Enacting a technology-based science curriculum across a grade level: The journey of teachers' appropriations. *Computers & Science,* 222-236. https://doi-org.ezp.waldenulibrary.org/10.1016/j.compedu.2013.10.006

Lukacs, K. (2015). 'For me, change is not a choice': The lived experience of a teacher change agent. *American Secondary Education*, *44*(1), 38-49. https://www.jstor.org/journal/amersecedu

Lysaght, Z. (2015). Assessment "for" Learning and "for" Self-Regulation. *International Journal of Emotional Education*, *7*(1), 20–34. https://www.um.edu.mt/ijee

Lysaght, Z., & O'Leary, M. (2017). Scaling Up, "Writ Small": Using an Assessment for Learning Audit Instrument to Stimulate Site-Based Professional Development, One

School at a Time. *Assessment in Education: Principles, Policy & Practice*, *24*(2), 271–289. https://www.tandfonline.com/loi/caie20

Maaß, K. (2018). Scaling Up Innovative Teaching Approaches in Mathematics: Supporting Teachers to Take Up a New Role as Professional Development Course Leaders for Inquiry-Based Learning. *Journal of Education and Training Studies*, *6*(7), 1–16. http://redfame.com/journal/index.php/jets

Macias, A. (2017). Teacher-Led Professional Development: A Proposal for a Bottom-Up Structure Approach. *International Journal of Teacher Leadership*, *8*(1), 76–91. https://www.cpp.edu/~ceis/education/international-journal-teacher-leadership/index.shtml

Mahasneh, A. D., & Alwan, A. F. (2018). The effect of project-based learning on student teacher self-efficacy and achievement. *International Journal of Instruction*, *11*(3), 511–524. http://www.e-iji.net/

Márquez Lepe, E., & Jiménez-Rodrigo, M. L. (2014). Project-based learning in virtual environments: a program evaluation of a university teaching experience. *RUSC: Revista De Universidad Y Sociedad Del Conocimiento*, *11*(1), 76-90. doi:10.7238/rusc.v11i1.1762

Martelli, C. D., & Watson, P. (2016). Project-based learning: Investigating resilience as the connection between history, community, and self. *Voices from the Middle*, *23*(3), 10-16. https://ncte.org/resources/journals/voices-from-the-middle/

Martinez, M. (2016). Teachers' voices on social emotional learning: Identifying the conditions that make implementation possible. *International Journal of Emotional Education, 8*(2), 6-24. https://www.um.edu.mt/ijee

McKeown, D., Brindle, M., Harris, K. R., Sandmel, K., Steinbrecher, T. D., Graham, S., Lane, K. L., & Oakes, W. P. (2019). Teachers' voices: Perceptions of effective professional development and classwide implementation of self-regulated strategy development in writing. *American Educational Research Journal*, *56*(3), 753–791. https://doi-org.ezp.waldenulibrary.org/10.3102/0002831218804146

McMillan, D. J., McConnell, B., & O'Sullivan, H. (2016). Continuing professional development – why bother? Perceptions and motivations of teachers in Ireland. *Professional Development in Education*, *42*:1, 150-167. doi:10.1080/19415257.2014.952044

Mentzer, G. A., Czerniak, C. M., & Brooks, L. (2017). An Examination of Teacher Understanding of Project Based Science as a Result of Participating in an Extended Professional Development Program: Implications for Implementation. *School Science & Mathematics*, *117*(1/2), 76–86. https://doi-org.ezp.waldenulibrary.org/10.1111/ssm.12208

Miller, A. (2017). Process for Discovery. *Learning Professional*, *38*(5), 35–39. https://learningforward.org/the-learning-professional/

Mindog, E. (2016). Apps and EFL: A case study on the use of smartphone apps to learn English by four Japanese university students. *JALT CALL Journal*, *12*(1), 3-22. https://journal.jaltcall.org/

Mosier, G. G., Bradley-Levine, J., & Perkins, T. (2016). Students' Perceptions of Project- Based Learning Within the New Tech School Model. *International Journal of Educational Reform*, *25*(1), 2-15. https://journals.sagepub.com/home/ref

Mukeredzi, T. G. (2015). Creating space for pre-service teacher professional development during practicum: A teacher educator's self-study. *Australian Journal of Teacher Education, 40*(2), 125-145.

National Center for Education Statistics (NCES) Home Page, part of the U.S. Department of Education. (n.d.). Retrieved June 12, 2016, from http://nces.ed.gov/

Nadelson, L. S., & Seifert, A. L. (2017) Integrated STEM defined: Contexts, challenges, and the future. *The Journal of Educational Research, 110*(3), 221-223. doi:10.1080/00220671.2017.1289775

Ng, E. M. W. (2018). Are Students Receptive to Formative Assessment When Authoring Wiki Projects? *Ubiquitous Learning: An International Journal*, *11*(3), 1–15. https://doi-org.ezp.waldenulibrary.org/10.18848/1835-9795/CGP/v11i03/1-15

Nicolaidou, M., Karagiorgi, Y., & Petridou, A. (2018). Professional Learning through Reflection Promoted by Feedback and Coaching (PROFLEC) in Cyprus. *International Journal of Leadership in Education*, *21*(4), 412–426. https://www.tandfonline.com/loi/tedl20

Niemeyer, D. J., & Gerber, H. R. (2015). Maker culture and minecraft: Implications for the future of learning. *Educational Media International*, *52*(3), 216-226. doi:10.1080/09523987.2015.1075103

Nollmeyer, G. E., & Bangert, A. W. (2017). Measuring elementary teachers' understanding of the NGSS framework: An instrument for planning and assessing professional development. *Electronic Journal of Science Education, 21*(8), 20–45. http://ejse.sourthwestern.edu

Odom, A. L., & Bell, C. V. (2017). Developing PK-12 preservice teachers' skills for understanding data-driven instruction through inquiry learning. *Journal of Statistics Education*, *25*(1), 29-37. doi:10.1080/10691898.2017.1288557

Odongo, G., & Davidson, R. (2016). Examining the Attitudes and Concerns of the Kenyan Teachers toward the Inclusion of Children with Disabilities in the General Education Classroom: A Mixed Methods Study. *International Journal of Special Education, 31*(2). http://www.internationalsped.com/policy.cfm

Olson, A., Leko, M. M., & Roberts, C. A. (2016). Providing students with severe disabilities access to the general education curriculum. *Research & Practice for Persons with Severe Disabilities*, *41*(3), 143-157. doi:10.1177/1540796916651975

Ong, E. K., 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. https://www.tused.org/index.php/tused

Özdemir, M., & Demircioğlu, E. (2016). Examination of attitudes towards profession and self-efficacy beliefs of pedagogical formation students. *Journal of Higher Education & Science / Yükseköğretim Ve Bilim Dergisi*, *6*(3), 327-334. doi:10.5961/jhes.2016.169

Öztürk, E. (2015). A qualitative study on the motivation of Turkish EFL teachers working at state universities. (English). *Journal of Theory & Practice in Education (JTPE), 11*(4), 1436-1453. http://journaldatabase.info/journal/issn1304-9496

Palacio, C. G., Vargas, D. E. G., & Taborda, H. P. (2019). Coaching as a professional development strategy for adjunct instructors in a Colombian university. *Issues in Teachers' Professional Development, 21*(1), 121-135 https://revistas.unal.edu.co/index.php/profile

Papatraianou, L. H., Strangeways, A., Beltman, S., & Schuberg Barnes, E. (2018). Beginning Teacher Resilience in Remote Australia: A Place-Based Perspective. *Teachers and Teaching: Theory and Practice, 24*(8), 893–914. https://www.tandfonline.com/loi/ctat20

Parker, A. K., Groth, L. A., & Byers, C. C. (2019). *Designing and Implementing Site-Based Courses in Elementary Teacher Preparation*. *New Educator* (Vol. 15, pp. 130–155). https://doi-org.ezp.waldenulibrary.org/10.1080/1547688X.2019.1572255

Paskevicius, M., & Bortolin, K. (2016). Blending our practice: using online and face-to-face methods to sustain community among faculty in an extended length professional development program. *Innovations in Education & Teaching International, 53*(6), 605–615. https://doi-org.ezp.waldenulibrary.org/10.1080/14703297.2015.1095646

Peters-Burton, E., Merz, S., Ramirez, E., & Saroughi, M. (2015). The effect of cognitive apprenticeship-based professional development on teacher self-efficacy of science teaching, motivation, knowledge calibration, and perceptions of inquiry-based teaching. *Journal of Science Teacher Education, 26*(6), 525-548. doi:10.1007/s10972-015-9436-1

Petersen, C., & Nassaji, H. (2016). Project-Based Learning through the Eyes of Teachers and Students in Adult ESL Classrooms. *Canadian Modern Language Review, 72*(1), 13-39. doi:10.3138/cmlr.2096

Pilten, P., Pilten, G., & Sahinkaya, N. (2017). The Effect of ICT Assisted Project Based Learning Approach on Prospective ICT Integration Skills of Teacher Candidates. *Journal of Education and Training Studies, 5*(3), 135–147. http://redfame.com/journal/index.php/jets

Pittman, C. O., & Lawdis, K. (2017). Does the Use of Multifactorial Training Methods Increase Practitioners' Competence? *Journal of Educators Online, 14*(2). https://www.thejeo.com/

Poulou, M. S., Reddy, L. A., & Dudek, C. M. (2019). Relation of teacher self-efficacy and classroom practices: A preliminary investigation. *School Psychology International*, *40*(1), 25–48. https://doi-org.ezp.waldenulibrary.org/10.1177/0143034318798045

Purnomo, Y. (2017). A scale for measuring teachers' mathematics-related beliefs: A validity and reliability study. *International Journal of Instruction*, *10*(2), 23-38. http://www.e-iji.net/

Puskar, K., Mitchell, A. M., Kane, I., Hagle, H., & Talcott, K. S. (2014). Faculty buy-in to teach alcohol and drug use screening. *The Journal of Continuing Education in Nursing*, *45*(9), 403-409. https://www.healio.com/nursing/journals/jcen

Reisi, M., & Saniei, A. (2016). The Contribution of Word Webbing to Project-based Learning in Teaching Vocabulary: A Comparative Study in an EFL Context. Journal of Language Teaching & Research, 7(6), 1190–1197. https://doi-org.ezp.waldenulibrary.org/10.17507/jltr.0706.17

Riley, J., & Ward, K. (2017). Active learning, cooperative active learning, and passive learning methods in an accounting information systems course. *Issues in Accounting Education, 32*(2), 1-16. doi:10.2308/iace-51366

Ryan, T. G. (2019). Naturalistic Observation of Engagement and Disengagement within Professional Development in Education. *International Online Journal of Education and Teaching (IOJET), 6*(1), 37-54. https://publons.com/journal/92407/international-online-journal-of-education-and-teac

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. https://www.jstem.org/jstem/index.php/JSTEM

Sakulvirikitkul, P., Sintanakul, K., & Srisomphan, J. (2020). The design of a learning process for promoting teamwork using project-based learning and the concept of agile software development. *International Journal of Emerging Technologies in Learning*, *15*(3), 207–222. https://doi-org.ezp.waldenulibrary.org/10.3991/ijet.v15i03.10480

Sanaeifar, S. H., & Nafari, F. N. (2018). The Effects of Formative and Dynamic Assessments of Reading Comprehensions on Intermediate EFL Learners' Test Anxiety. *Theory & Practice in Language Studies*, *8*(5), 533–540. https://doi-org.ezp.waldenulibrary.org/10.17507/tpls.0805.12

Sánchez-Castro, O., & Strambi, A. (2017). Researching learner self-efficacy and online participation through speech functions: An exploratory study. *CALICO Journal*, *34*(2), 219-242. doi:10.1558/cj.26389

Saribas, D., Kucuk, Z. D., & Ertepinar, H. (2017). Implementation of an environmental education course to improve pre-service elementary teachers' environmental literacy and self-efficacy beliefs. *International Research in Geographical & Environmental Education*, *26*(4), 311–326. https://doi-org.ezp.waldenulibrary.org/10.1080/10382046.2016.1262512

Schrum, K., Kortecamp, K., Rosenfeld, J., Briscoe, K. & Steeves, K. (2016). Assessing the Effect of Historic Site-Based Professional Development on History Teaching and Learning. *History Teacher*, *50*(1), 33–53. https://www.thehistoryteacher.org/

Şen, Ö. F., & Sarı, U. (2017). Pre-service science teachers' beliefs about science teaching and perception of the nature of science. *Electronic Journal of Science Education, 21*(1), 1-14. http://ejse.sourthwestern.edu

Shaffer, L., & Thomas-Brown, K. (2015). Enhancing teacher competency through co-teaching and embedded professional development. *Journal of Education and Training Studies*, *3*(3), 117-125. http://redfame.com/journal/index.php/jets

Shukie, P. (2017). Let Freedom Reign: A Case Study Exploring the Extent to which H.E. Students Choose "New" Forms of Pedagogy and Technology in a Student-led Project. *Journal of Perspectives in Applied Academic Practice, 5*(1), 39–47. https://jpaap.napier.ac.uk/index.php/JPAAP

Smith, P. P., & Gibson, L. A. (2016). Project-Based Learning in Colleges of Business: Is It Enough to Develop Educated Graduates? *New Directions for Teaching & Learning*, (145), 41-47. doi:10.1002/tl.20173

Solis, A., Lamar, J., & Olabuenaga, Gina. (2015). PBL 101 workbook. Novato, California: Buck Institute of Education. www.pblworks.org

Son, J., & Lee, J. (2016). Pre-service teachers' understanding of fraction multiplication, representational knowledge, and computational skills. *Mathematics Teacher Education & Development, 18*(2), 5-28. https://mted.merga.net.au/index.php/mted

Starr, L., & Minchella, D. (2016). Learning beyond the science classroom: A roadmap to success. *Journal of STEM Education: Innovations & Research, 17*(1), 52-57. https://www.jstem.org/jstem/index.php/JSTEM

Stosich, E., Bocala, C., & Forman, M. (2018). Building coherence for instructional improvement through professional development. *Educational Management Administration & Leadership*, *46*(5), 864–880. https://doi-org.ezp.waldenulibrary.org/10.1177/1741143217711193

Stasinakas, P. K., & Athanasiou, K. (2016). Investigating Greek biology teachers' attitudes toward evolution teaching with respect to their pedagogical content knowledge: Suggestions for their professional development. *Eurasia Journal of Mathematics, Science, & Technology Education, 12*(6), 1605-1617. doi:10.12973/Eurasia.2016.1249a

Stover, S. (2014). Project-based learning in distance education classes: Oxymoron or optimizer. *Global Education Journal*, *2014*(1), 59-82. https://www.franklinpublishing.net/Frame-580555-globaleducationpage580555.html

Su, Y., Feng, L., & Hsu, C.-H. (2018). What Influences Teachers' Commitment to a Lifelong Professional Development Programme? Reflections on Teachers' Perceptions. *International Journal of Lifelong Education*, *37*(2), 184–198. https://www.tandfonline.com/loi/tled20

Svihla, V., & Reeve, R. (2016). Facilitating Problem Framing in Project-Based Learning. *Interdisciplinary Journal of Problem-Based Learning*, *10*(2), 113-130. doi:10.7771/1541-5015.1603

Taboada Barber, A., Buehl, M. M., Kidd, J. K., Sturtevant, E. G., Richey Nuland, L., & Beck, J. (2015). Reading engagement in social studies: Exploring the role of a social studies literacy intervention on reading comprehension, reading self-efficacy, and engagement in middle school students with different language backgrounds. *Reading Psychology*, *36*(1), 31-85. doi:10.1080/02702711.2013.815140

Thomas, A. A., & Sondergeld, T. (2015). Investigating the impact of feedback instruction: partnering preservice teachers with middle school students to provide digital, scaffolded feedback. *Journal of The Scholarship of Teaching & Learning*, *15*(4), 83-109. doi:10.14434/josotl.v15i4.13752

Uyar & Karakus. (2017). Social studies teachers' in-service training needs towards project tasks: A comparative case study. *Universal Journal of Educational Research, 5*(12), 2137–2148. http://www.hrpub.org/journals/jour_info.php?id=95

Urban, E., Navarro, M., & Borron, A. (2017). Long-term impacts of a faculty development program for the internationalization of curriculum in higher education. *Journal of Agricultural Education*, *58*(3), 219–238. https://doi-org.ezp.waldenulibrary.org/10.5032/jae.2017.03219

Vanhala, M. (2018). Implementation of inquiry and project-based learning in a high school chemistry classroom: An action research project. *Journal of Teacher Action Research*, *4*(3), 1–22. http://www.practicalteacherresearch.com/

Vesikivi, P., Lakkala, M., Holvikivi, J., & Muukkonen, H. (2019). Team teaching implementation in engineering education: teacher perceptions and experiences. European Journal of Engineering Education, 44(4), 519–534. https://doi-org.ezp.waldenulibrary.org/10.1080/03043797.2018.1446910

Vogel, L., Cannata, M., Rutledge, S. A., & Socol, A. R. (2016). A model of continuous improvement in high schools: A process for research, innovation design, implementation and scale. *Teachers College Record, 118*(13). https://www.tcrecord.org/

Wagner, C. J., Ossa Parra, M. M. O., & Proctor, C. P. (2019). Teacher agency in a multiyear professional development collaborative. *English Teaching: Practice & Critique (Emerald Group Publishing Limited), 18*(4), 399–414. https://doi-org.ezp.waldenulibrary.org/10.1108/ETPC-11-2018-0099

Wagner, T. & Imanel-Noy, D. (2014). Are they genuinely novice teachers? Motivations and self-efficacy of those who choose teaching as a second career. *Australian Journal of Teacher Education*, *39*(7), 31-57. https://ro.ecu.edu.au/ajte/editorialboard.html

Wallace, M., & Webb, A. W. (2016). During a Shift: Undergraduate STEM Education and "PBL" Enactment. *Journal of College Science Teaching*, *46*(2), 47-55. https://www.nsta.org/college/

Wan Husin, W., Mohamad Arsad, N., Othman, O., Halim, L., Rasul, M. S., Osman, K., & Iksan, Z. (2016). Fostering students' 21st-century skills through Project Oriented Problem Based Learning (POPBL) in integrated STEM education program. *Asia-Pacific Forum on Science Learning & Teaching*, *17*(1), 60-77. https://www.scimagojr.com/journalsearch.php?q=19700172601&tip=sid&clean=0

Watson, C. (2014). Effective professional learning communities? The possibilities for teachers as agents of change in schools. *British Educational Research Journal*, *40*(1), 18-29. https://onlinelibrary.wiley.com/journal/14693518

What is PBL? (n.d.). Retrieved February 15, 2020, from https://www.pblworks.org/what-is-pbl

Yamin-Ali, J. (2016). Facilitating factors in programme renewal: Faculty's perspectives. *Caribbean Teaching Scholar*, 43-61. https://journals.sta.uwi.edu/cts/

Yin, R. K. (1981). The Case Study Crisis: Some Answers. *Administrative Science Quarterly*, *26*(1), 58-65. https://journals.sagepub.com/home/asq

Yoon, S. Y. (2016). Principals' data-driven practice and its influence on teacher buy-in and student achievement in comprehensive school reform models. *Leadership and Policy in Schools, 15*(4), 500-523. doi:10.1080/15700763.2016.1181187

Zaccarelli, F. G., Schindler, A., Borko, H., & Osborne, J. (2018). Learning from professional development: a case study of the challenges of enacting productive science discourse in the classroom. *Professional Development in Education, 44*(5), 721-737. doi:10.1080/19415257.2017.1423368

Zadrozny, J., McClure, C., Lee, L., & Jo, I., (2016). Designs, techniques, and reporting strategies in geography education: A review of research methods. *Review of International Geographical Education Online*, *6*(3), 216-233. http://rigeo.org/

Zalles, D. R., & Manitakos, J. (2016). Strategizing teacher professional development for classroom uses of geospatial data and tools. *Contemporary Issues in Technology & Teacher Education*, *16*(3), 286–309. http://site.aace.org/pubs/cite/

Appendix A: The Project

Purpose:

The purpose of this professional development is to assist teachers in the appropriate implementation processes of project-based learning projects. The workshop will take place over three days, and the duration for each day is eight hours. This project stems from the outcome of research completed, which uncovered difficulties many teachers experienced with understanding district expectations and finding resources for implementation. Teachers will experience PD that is geared toward meeting their needs as a student to help them be more successful as a teacher.

Goals:

1. Provide teachers effective professional development extension to increase PBL implementation.

2. Meet the needs of individual teachers by providing their choice of modality and formats for learning.

3. Provide teachers with collaboration, extended PD, reflection, and coaching necessary to implement effectively.

Implementation Schedule:

Employee Professional Development Days: 8 AM – 4 PM

Three days

Session 1: What PBL is and what it is not

Proposed Time: Preplanning

Duration: 8 hours

Session 2: Creating Gold Standard PBL

Proposed Time: Preplanning

Duration: 8 hours

Session 3: Project Fine Tuning

Proposed Time: Preplanning

Duration: 8 hours

Day 1: What is PBL?

8am – 8:30am: Introduction, discuss background of research

8:30am – 9:30am: What PBL is. What PBL isn't.

Activity

Resources needed: Strips of paper with PBL and end of the unit project, headings, large paper, markers, post-it notes, tape

a. Teachers work in groups to determine whether elements listed on strips of paper belong to PBL or end of unit projects
b. Still in groups, teachers answer the following questions: 1) What was surprising to them, 2) Which statements are different from their previous thinking and 3) What is still confusing.
c. Groups will discuss the correct answers. Teachers should rearrange their results as needed so that they mirror the answers provided in the discussion. After reviewing and revising their

answers, the group should verbally reflect on their views about PBL and end of unit projects before the exercise and after.

d. Teachers will use poster size post-it paper to write down their "Aha" moments from the previous discussion about how end of unit projects differ from PBL and why this knowledge is important. Teachers will create a gallery by placing the large sheets on the wall
e. Each teacher will walk through the gallery with their team to discuss a few interesting points from other groups
f. Several groups will share their "aha" moment and what they learned from another group

9:30am – 11:30am: How do I Use BIE Resources?

Activity

Resources needed: ThinkPads, Playlist, Construction paper, printer paper, butcher paper, coloring pencils, markers, pens, pencils, scissors, glue (sticks and liquid), masking tape, scotch tape, post-it notes.

Provide a description to implement this section for the leader

a. A playlist is a collection of links for videos, articles, blogs, etc. that provide necessary information for participants who choose the way they interact with the information. This playlist is provided to help you understand why PBL is important and what it should look like in your classroom. Work in pairs or trios. You should complete this playlist, including the activities. You and your partners do not have to use the same resources from the playlist. What you use is determined by your interests, preferences, and learning styles. Resources have been provided to complete the activities. Use as many of them as needed and choose at least 2 of the 3 activities to help deepen your knowledge about PBL.
    1. Teachers will work in groups to complete the playlist
    2. Each team will work through the activities within the playlist as they learn about the BIE resources available to them

Break 10:30-10:40

11:30am-12:30pm: Lunch

12:30pm – 2:30pm: Begin with the End in Mind

Resources needed: ThinkPad, Construction paper, printer paper, butcher paper, coloring pencils, markers, pens, pencils, scissors, glue (sticks and liquid), masking tape, scotch tape, post-it notes.

Provide a description to implement this section for the leaderBreak 2:30pm-2:40pm

2:40pm – 3:20pm: Activity Presentations

Activity: One group of teachers from each subject area will present one of their activities to the large group

Resources needed: ThinkPads, projector, large poster paper, markers, tape

3:20pm – 4:00pm: Summary and Reflections

Presentation: Summary of Main Points of the Day

Resources needed: ThinkPad, projector

Provide a description to implement this section for the leader

Question and Answer Session

Day 1 Session Reflection

Day 2: Create Gold Standard PBL

8am – 8:10am: Presentation:

8:10am – 9:30am:

Activity

Resources needed: ThinkPads

Provide a description to implement this section for the leader

a. Use the BIE website (BIE.org), to create an arsenal of resources that you will use to create Gold Standard PBL. The website provides many resources to help you create a plan of action.
b. Create a list of resources from the website that will help you create your PBL project

9:30am – 10:30am: Choose Your Tools

Activity

Resources needed: ThinkPads, construction paper, printer paper, butcher paper, coloring pencils, markers, pens, pencils, scissors, glue (sticks and liquid), masking tape, scotch tape, post-it notes

c. Using the resources chosen from BIE.org, create a plan for the project. Note individual responsibilities in your plan.
d. Be sure to complete the BIE project design overview document

Break 10:30am – 10:40am

10:40am-11:30pm: Make a Plan

Activity

Resources needed: ThinkPads, Essential Project Design Elements Checklist and Project Design Overview, construction paper, printer paper, butcher paper, coloring pencils, markers, pens, pencils, scissors, glue (sticks and liquid), masking tape, scotch tape, post-it notes

a. Determine how you will include the 8 elements necessary for PBL by creating an outline using the checklist and referring to the overview

Provide a description to implement this section for the leader

12:30pm-1:30pm: Lunch

1:30pm-3:30pm: Construct Your PBL

Activity

Resources needed: ThinkPad, Construction paper, printer paper, butcher paper, coloring pencils, markers, pens, pencils, scissors, glue (sticks and liquid), masking tape, scotch tape, post-it notes.

Provide a description to implement this section for the leader

Break 3:30pm - 3:40pm

3:30pm – 4:00pm: Summary and Reflections

Presentation: Summary of Main Points of the Day

Resources needed: ThinkPad, projector

Provide a description to implement this section for the leader

Question and Answer Session

Day 2 Session Evaluation

Day 3: Project Fine Tuning

8:00am - 8:20am: Presentation/Entrance Ticket

8:20am – 9:20am: Edit and Revise

9:25am – 11:00am: Tuning Protocol

Teachers will gather in groups of 3. One person from each grade level. If there are extra persons, they can assist another grade-level team member during this process.

11:00am -11:30pm: Return projects with rubric and feedback notes. Each group will take 30 minutes to review the evaluation presented to them.

11:35pm – 12:35pm: LUNCH

12:40pm – 1:40pm: Teams will use the feedback to create a final project.

1:40pm – 2:40: Review and Feedback

Each subject area team will be divided by grade level. Each grade level will submit their project to the next grade level.

6^{th} → 7^{th} → 8^{th} (8^{th} grade will trade with 6^{th} grade)

The grade levels will review the project and provide feedback for that group.

2:45pm – 3:15pm Return to grade level teams for discussion of feedback from tuning protocol and evaluation.

3:20pm – 3:50pm: Whole Group

Teachers will have a department discussion (all grade levels)

3:50pm – 4:00pm: Evaluation of Professional Development

Materials:

A. Day 1-Strips of paper for sorting exercise

WHAT PBL IS AND WHAT IT IS NOT	
Traditional Projects VS Project-Based Learning	
An individual assignment	Must include collaboration
Focus on the project	Focus on the process

Teacher-directed	Student-directed
No real-world setting	Based on real-world problems/questions
Happens after the learning/unit	Guides students through learning process
The project is the same for everyone (closed)	Student choice brings differentiated (open)
Does not require teacher guidance	Requires teacher guidance
Is submitted	Is presented
Teacher work occurs after completion	Teacher work occurs before students begin
Teacher prescribes what students will do	Guided by student questions and research
May not be relevant to students' lives	Is relevant to student environment
Does not solve problems or answer questions	Will solve problems and/or answer questions
Process based on teacher directions	Process based on driving question
Grading includes components like "neatness"	Grading based on the process of this project
Teacher has the knowledge	Students discover the knowledge

B. Day 1-Playlist for Exploring Buck Institute of Education website

Playlist	
Use the resources below to prepare to complete the activities.	
Re	https://www.edutopia.org/project-based-learning-guide-importance
	http://www.bie.org/blog/the_importance_of_project_based_teaching

	https://www.methodschools.org/blog/the-benefits-of-project-based-learning
	https://pbleducation.wordpress.com/2013/02/09/the-importance-of-project-based-learning-for-classrooms/
	http://www.ascd.org/publications/books/114017/chapters/Why-Project-Based-Learning%C2%A2.aspx
	http://www.bie.org/about/why_pbl
Watch	http://www.bie.org/object/video/project_based_learning_explained
	https://www.youtube.com/watch?v=LMCZvGesRz8
	https://www.youtube.com/watch?v=bLA_hphhj5o
	https://www.youtube.com/watch?v=eGWqBZSFgxE
	https://www.youtube.com/watch?v=dFySmS9_y_0
	https://www.youtube.com/watch?v=sGzu-lDxgfU
	http://www.bie.org/object/video/pbl_world_2018_keynote_laura_mcbain
Activities	Create a visual or write an interesting article that examines 3 reasons we should include PBL in classrooms (Google slides, infographic, mind map, Wordle (Word Cloud), Google Docs, etc.
	Create a visual or verbal presentation that explains the role of the teacher in a PBL classroom (brief speech, skit, commercial, talk show, etc.)
	Create an interactive product that will show the different elements of Gold Standard PBL, what they are, and how they work together.

Entrance/Exit Tickets

Day	Daily Reflections
Day 1	1. What is one major difference between projects that occur at the end of a unit and project-based learning? 2. List 3 components of project-based learning that end-of-unit projects do not usually have. 3. Which components of project-based learning do you find most important? Why?
Day 2	1. How do you plan to begin the process of creating gold standard PBL? 2. Do you have a vision for the process? Briefly describe it in 2-3 sentences. 3. Which BIE tools did you use to create gold standard PBL? 4. Of the tools you used to create your project, which provided more support for you during this process?
Day 3	1. What feedback was most important to you? 2. How did that feedback change your project? 3. What did you learn from the tuning protocol? 4. Do you feel that your project is gold standard? Why?

Final Workshop Evaluation

1. Were your expectations for this professional learning experience met?

_____

_____

_____

2. What was the most impactful part of this experience?

3. What did you find the least useful during this experience?

4. When your team began this experience, did you have a specific type of project in mind? Yes No

5. How did your team decide what your project topic should be?

6. Did you find the BIE materials useful in planning your project? Why or why not?

7. Will your team use the process from this workshop in the future? Why or why not?

Miscellaneous materials needed throughout PD sessions:

Construction paper, printer paper, butcher paper, coloring pencils, markers, pens, pencils, scissors, glue (sticks and liquid), masking tape, scotch tape, post-it notes.

Project-Based Learning

Create a Team Project

by Lyndria Bland

Day 1

Basic Information About the Research

- Interests
  - I was interested in how teachers were progressing in the implementation of PBL
  - I wanted to know if there were any barriers to implementation and what things support teachers in this area
- Relevant details
  - What factors were barriers to implementation
  - What factors supported implementation
  - How well did training help; if no training, how did teachers go about implementing

Research Questions

RQ1:

- To what extent were teachers able to implement PBL?

RQ2:

- To what extent did teachers feel supported in the implementation of PBL?

Sample

- The sample for this study consists of core teachers (English, Mathematics, Science, and History/Civics and Economics) responsible for implementing PBL.
- Eleven participants were interviewed
  - 3 English teachers
  - 5 Science teachers
  - 1 Math teacher
  - 2 History teachers

Findings

- Six participants were not trained at the time of this study and reported that the lack of training negatively influenced their implementation
- Barriers to implementation included: lack of training, uncertain expectations, teachers are unsure of what PBL looks like in the classroom
- Factors that support implementation included: availability of technology, working in teams to create better projects, having the checklist

Conclusions

The fact that initial training did not provide participants with the necessary tools to complete a gold standard project prompted me to create a follow-up workshop that would answer questions teachers still had and help them move toward creating an effective project.

The workshop that is a result of the findings from this study utilizes research-based components and the incorporation of the Buck Institute of Education resources.

Professional Development

Traditional Professional Development

- Large gatherings where participants sit and listen to presentations
- The presentations impart information to everyone in the same manner
- The information is "one-size-fits-all"

Effective Professional Development

- Workshops that allow participants to choose from a variety of delivery modes
- Collaboration
- Feedback and reflection
- On-going training during implementation

Buck Institute of Education (BIE) Resources

- Resources for Gold Standard PBL can be found at BIE.org
- The book each teacher receives at training contains copies of resources and explanations
- During this workshop, you will explore these resources for use in your classroom
- The purpose of this workshop is to assist you in creating effective PBL projects

Activity: What PBL is. What PBL isn't.

- Teachers work in groups to determine whether elements listed on strips of paper belong to PBL or an end-of-the-unit project
- Each group will answer the following questions:
  - What was surprising to you?
  - Which statements are different from their previous thinking?
  - What is still confusing?
- Show the results
  - Groups will discuss the correct arrangement
  - Teachers should rearrange their results as needed so that they mirror the correct arrangement
  - Groups should take time to verbally reflect on their views about PBL and end-of-unit projects

What PBL is. What PBL isn't. Slide 2

- Teachers will use poster-sized post-it paper to write down their "Aha" moments from the previous discussion about how end-of-unit projects differ from PBL and why this knowledge is important. Teachers will create a gallery walk by placing the large sheets on the wall
- Each teacher will walk through the gallery with their teams to discuss a few interesting points from other groups
- Several groups will share their "aha" moment and what they learned from another group

Activity: How do I use BIE resources?

- A playlist is a collection of links for videos, articles, blogs, etc. that provide necessary information for participants who choose the way they interact with the information
- This playlist is provided to help you learn to use BIE resources, understand why PBL is important and what it should look like in the classroom
- Work in pairs or trios to complete this playlist, including each activity
- Choose how you interact with the information in the playlist based on your interests, preferences, or learning styles
- Use resources provided to complete the activities

Day 2

Gold Standard Project-based Learning

- Key knowledge, understanding, and success skills
  - Key knowledge
    - Content standards are taught within the project
  - Understanding
    - students learn to apply the knowledge, solve problems, answer questions and create valuable products
  - Success skills
    - Students learn to think critically, solve problems, collaborate, acquire knowledge through research, and reflect on their performance

Day 3

The Tuning Protocol

- The tuning protocol is a tool provided by the Buck Institute to help you create effective projects
- Part of collaborative effort is to provide feedback to another group as they prepare a project for classroom implementation
- The tuning protocol is a formal process for providing valuable feedback

The Tuning Process

- The following video will explain the importance of the tuning protocol and how you should use it
- You can also use the tuning protocol sheet to help you move through the process and receive the best results

- https://my.pblworks.org/resource/video/tuning_protocol_overview1

Citations

Larmer, J. (2015). Gold standard PBL: Essential project design elements. Retrieved from: https://www.pblworks.org/what-is-pbl/gold-standard-teaching-practices

Tuning Protocol Overview: MyPBLWorks. (n.d.). Retrieved from https://my.pblworks.org/resource/video/tuning_protocol_overview1

Day 1

What PBL is. What PBL isn't.

Activity: PBL vs. End-of-Unit Project

- This activity is designed to show the differences between a PBL project and one that you might use at the end of a unit

Procedures- slide 1

- Teachers work in groups to sort elements listed on strips of paper into two groups: PBL or end-of-unit project
- The same groups will answer the following questions: 1) What was surprising to them, 2) Which statements are different from their previous thinking and 3) What is still confusing.
- Display the correct results NEXT SLIDE
- Groups will discuss the correct answer making sure to rearrange their results as needed so that they mirror the answer provided. After reviewing and revising their answers, the group should verbally reflect on their views about PBL and end-of-unit projects before the exercise and after.

WHAT PBL IS AND WHAT IT IS NOT

Traditional Projects	• Project-Based Learning
• An individual assignment • Focus on the project • Teacher-directed • No real-world setting • Happens after the learning/unit • The project is the same for everyone-closed • Teacher prescribes what students will do • Is submitted • Teacher has the knowledge • May not be relevant to student lives	• Must include collaboration • Focus on the process • Student-directed • Based on real-world problems/questions • Guides students through learning process • Student choice brings differentiation (open) • Guided by student questions and research • Is presented • Students discover the knowledge • Is relevant to student environments

Back to previous slide

How do I Use BIE Resources to Provide PBL?

Activity

- A playlist is a collection of links to videos, articles, blogs, etc. that provide necessary information for participants
- This playlist is provided to help you understand why PBL is important, what it should look like in your classroom and how to use the BIE resources

Procedures

- You should complete this playlist, including each activity. What you use is determined by your interests, preferences, and learning styles.
- Resources have been provided to complete the activities. Use as many of them as needed and choose at least 2 of the 3 activities to help deepen your knowledge about PBL.
- Each grade level team will work through the activities within the playlist as they learn about the BIE resources

Break 10:30am-10:40am
Work Session 10:30am-11:30am
Lunch 11:30am-12:30pm

Presentations

One group of teachers from each subject area will present one of their activities to the large group
Resources needed: ThinkPads, projector, large poster paper, markers, tape

Closing

- 3:20pm – 4:00pm: Summary and Reflections
- Day 1 Session Reflection

Day 2

Create Gold Standard PBL

- Use the BIE website (BIE.org), to create an arsenal of resources that you will use to create Gold Standard PBL. The website provides many resources to help you create a plan of action.
- Create a list of resources from the website that will help you create your PBL project
  - Begin with the end in mind

Create Gold Standard PBL

- Using the resources chosen from BIE.org, create a plan for the project. Note individual responsibilities in your plan.
- Be sure to complete the BIE project design overview document

Make a Plan

Determine how you will include the 8 elements necessary for PBL by creating an outline using the Project Design Elements Checklist and referring to the Project Design Overview

12:30pm-1:30pm: Lunch

Construct Your PBL 12:30-2:30

Break 2:30-2:40

Closing

- 3:30pm – 4:00pm: Summary and Reflections
- Day 2 Session Evaluation

Day 3

Edit and Revise 8:20am-9:20am

Edit and revise your project before the feedback protocol begins

Tuning Protocol 9:25am-11:00am

Teachers gather in groups of 3 (one person from each grade level-6-8)

If groups of 4 are necessary, one person can assist another grade-level team member during the process

There will be three rounds (one for each person)

Each person completes a round according to the information in the tuning protocol

Tuning Protocol Procedures

- Group members sit in a circle
- Procedures
  - 3 minutes: The first presenter explains the details of the project
  - 2 minutes: The other group members may ask clarifying questions
  - 3 minutes: The presenter turns chair so that their back is facing the group; the group discusses the following about the project (the presenter is only listening and may take notes)
- The next presenter begins the second round and then the third
- When all rounds are finished, the tuning is completed

Review Feedback Notes

11:35am-12:35pm LUNCH

Address the Feedback

Use the feedback to edit and revise project again

Each grade level will review the project of another grade level
Teams will trade projects in the following order:
$6^{th} \rightarrow 7^{th} \rightarrow 8^{th}$ (8^{th} grade will trade with 6^{th} grade)

When projects are reviewed, they will be returned with feedback notes to the original group

Whole Group Discussion

- Each department (subject area teachers in grades 6-8)
  - For example, all science teachers will debrief to ask questions, clarify feedback, etc.
- The discussions are divided by subject so that questions, answers and feedback are specific

Closing

- Summary and Reflections
- Evaluation of Professional Development

Appendix B: Email Invitation for Pilot Study

Greetings,

My name is Lyndria Bland. I am a student at Walden University, and I am inviting you to participate in a pilot study of interview questions I will use in a study titled, Teacher Perspectives of Project-Based Learning Implementation in Middle Grades Classrooms. Participation in this pilot study is entirely voluntary and you may withdraw your participation from the study at any time. You may know me as a Science 7 teacher at Foster Middle School (pseudonym), but I am the principal investigator and I am completing this study as a part of an educational doctorate program at Walden University. My faculty supervisor is Dr. Heather Caldwell (heather.caldwell@mail.waldenu.edu) and you may contact her if you have questions or concerns about the pilot study.

The purpose of this pilot study is to determine whether my interview questions are appropriate to elicit the information I would like to gain about whether resources provided to teachers developed their ability to implement project-based learning (PBL). Should you agree to participate, you will be asked to meet with me after school at an appointed time to answer interview questions about project-based learning.

You have received this invitation based on your position as a core-subject teacher who has been responsible for implementing project-based learning for the last two years. Supporting staff have not been invited as they were not responsible for implementing project-based learning during the last two years at Foster Middle School.

If you agree to participate, please reply to this message with the following statement: I agree to participate in this study. A subsequent email will be sent to you containing the consent form with pertinent information.

This research is expected to benefit the district by shedding light on teacher perspectives about implementation of project-based learning. This information may provide the district with recommendations for changes to implementation requirements and resources.

The expected duration of participation in this study includes a one-hour interview.

If you have any questions, please feel free to contact me (lyndria.bland@waldenu.edu). All correspondence concerning this study should be conducted through this email address.

Thank you,

Lyndria Bland

This study has been reviewed and received ethics clearance through Walden University's Institutional Review Board 12-22-17-0242141.

Appendix C: Email Invitation for Research Study

Greetings,

My name is Lyndria Bland. I am a student at Walden University, and I am inviting you to participate in a study titled, Teacher Perspectives of Project-Based Learning Implementation in Middle Grades Classrooms. Participation in this study is entirely voluntary and you may withdraw your participation from the study at any time. You may know me as a Science 7 teacher at Foster Middle School (pseudonym), but I am the principal investigator and I am completing this study as a part of an educational doctorate program at Walden University. My faculty supervisor is Dr. Heather Caldwell (heather.caldwell@mail.waldenu.edu) and you may contact her if you have questions or concerns about the study.

The purpose of this study is to determine whether resources provided to teachers developed their ability to implement project-based learning (PBL). Should you agree to participate, you will be asked to meet with me after school at an appointed time to answer interview questions about project-based learning. You will also be asked to bring two samples of project-based learning products. The criteria for choosing these products and a few of the interview questions can be found in a subsequent email should you agree to participate in the study.

Core-subject teachers have been chosen for this study because they have been responsible for implementing project-based learning for the last two years. Supporting staff have not been invited as they were not responsible for implementing project-based learning during the last two years.

If you agree to participate, please reply to this message with the following statement: I agree to participate in this study. A subsequent email will be sent to you containing the consent form and the criteria for selecting student work.

This research is expected to benefit the district by shedding light on teacher perspectives about implementation of project-based learning. This information may provide the district with recommendations for changes to implementation requirements and resources.

The expected duration of participation in this study includes a one-hour interview, a thirty-minute session to approve the accuracy of the response transcripts, and the time it will take to prepare PBL work samples and teacher checklists (Appendix E).

If you have any questions, please feel free to contact me (lyndria.bland@waldenu.edu). All correspondence concerning this study should be conducted through this email address.

Thank you,

Lyndria Bland

This study has been reviewed and received ethics clearance through Walden University's Institutional Review Board 12-22-17-0242141.

Appendix D: Interview Protocol

1. Based on the district expectations for project-based learning, how do you feel about the implementation of your project-based learning project(s)?
2. How did the resources here at school assist you in implementing project-based learning?
3. What hindrances did you encounter as you attempted to implement PBL?
4. To what degree were you able to successfully implement project-based learning per the elements required by the district?
5. What did you expect to take away from the project-based learning professional development to help you implement project-based learning?
6. How confident were you as you implemented PBL for the first time?
7. What factors led to your level of confidence the first time?
8. How confident were you as you implemented PBL later?
9. What factors led to your level of confidence later?
10. How well were you able to provide innovative projects for students that embodied true PBL elements as the implementation process continued?

Appendix E: Essential Project Design Elements Checklist

Essential Project Design Elements Checklist

Whatever form a project takes, it must meet these criteria to be Gold Standard PBL.

Does the Project Meet These Criteria?	👍	👎	?
KEY KNOWLEDGE, UNDERSTANDING, AND SUCCESS SKILLS The project is focused on teaching students key knowledge and understanding derived from standards, and success skills including critical thinking/problem solving, collaboration, and self-management.			
CHALLENGING PROBLEM OR QUESTION The project is based on a meaningful problem to solve or a question to answer, at the appropriate level of challenge for students, which is operationalized by an open-ended, engaging driving question.			
SUSTAINED INQUIRY The project involves an active, in-depth process over time, in which students generate questions, find and use resources, ask further questions, and develop their own answers.			
AUTHENTICITY The project has a real-world context, uses real-world processes, tools, and quality standards, makes a real impact, and/or is connected to students' own concerns, interests, and identities.			
STUDENT VOICE & CHOICE The project allows students to make some choices about the products they create, how they work, and how they use their time, guided by the teacher and depending on their age and PBL experience.			
REFLECTION The project provides opportunities for students to reflect on what and how they are learning, and on the project's design and implementation.			
CRITIQUE & REVISION The project includes processes for students to give and receive feedback on their work, in order to revise their ideas and products or conduct further inquiry.			
PUBLIC PRODUCT The project requires students to demonstrate what they learn by creating a product that is presented or offered to people beyond the classroom.			

Appendix F: Permission to Use Materials

use [redacted]

JL

John Larmer <johnlarmer@bie.org>

Yesterday, 4:38 PM

Lyndria Bland

Reply

Hello Lyndria,

Yes, you have permission to use material from our website for this noncommercial purpose, as explained here in our Terms of Use. You'll find our definition of PBL on our What is PBL? page.

Please let me know if you have further questions, and best wishes for your work!

Appendix G: Confidentiality Agreement

CONFIDENTIALITY AGREEMENName of Signer:

During my activity in auditing the data analysis for this research: "Teacher Perspectives of Project-Based Learning Implementation in Middle Grades Classrooms", I will have access to information, which is confidential and should not be disclosed. I acknowledge that the information must remain confidential, and that improper disclosure of confidential information can be damaging to the participant.

By signing this Confidentiality Agreement, I acknowledge and agree that:

1. I will not disclose or discuss any confidential information with others, including friends or family.
2. I will not in any way divulge, copy, release, sell, loan, alter or destroy any confidential information except as properly authorized.
3. I will not discuss confidential information where others can overhear the conversation. I understand that it is not acceptable to discuss confidential information even if the participant's name is not used.
4. I will not make any unauthorized transmissions, inquiries, modification or purging of confidential information.
5. I agree that my obligations under this agreement will continue after termination of the job that I will perform.
6. I understand that violation of this agreement will have legal implications.
7. I will only access or use systems or devices I'm officially authorized to access, and I will not demonstrate the operation or function of systems or devices to unauthorized individuals.

Signing this document, I acknowledge that I have read the agreement and I agree to comply with all the terms and conditions stated above.

Signature: Date: