K to 8 Teachers' Experiences Using Project-Based Learning

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ABSTRACT

Kindergarten through Grade 8 teachers struggled to use project-based learning (PBL) in a local school in the Association of Independent Maryland and DC Schools (AIMS). Rooted in Kilpatrick's progressive philosophy of education and Piaget's theory of constructivism, the purpose of this basic qualitative study was to explore teachers' experiences using PBL. Research questions in this study related to teachers' experiences using PBL in private classrooms in kindergarten through Grade 8 and challenges that influenced teacher use of PBL in private classrooms. Data collected through semistructured interviews with 10 K to 8 teachers revealed that teachers believed PBL was an effective pathway to learning for all students and they would like to use PBL more often in the classroom. The principal obstacle to PBL was time. Two possible solutions to this obstacle were discussed.

Keywords: project-based learning, implementing PBL, teachers' experiences, elementary PBL

INTRODUCTION

Despite encouragement from administrators, kindergarten through Grade 8 teachers struggled to use project-based learning (PBL) in a local school belonging to the Association of Independent Maryland and DC Schools (AIMS). Pedagogically, PBL is a student-centered approach to teaching that challenges students to actively engage in learning and use critical thinking skills to solve problems (Mitry, 2021). Although teachers use PBL in kindergarten through Grade 8, they struggle with depth and consistency. The decrease in student engagement in the absence of PBL leads to concerns regarding multimodal learning. PBL, an inquiry-based instructional practice, is more effective than traditional methods in terms of eliciting favorable interest, increased engagement, and ideal achievement among students (Amo et al., 2020; Heindl, 2020).

Heindl (2020) indicated positive correlations between student motivation, engagement, and academic achievement. Because reduced engagement negatively influences students' motivation for optimal academic achievement, teachers need to use instructional methods such as PBL that boost student motivation and engagement (Duke et al., 2021). PBL keeps students actively engaged as they progress from proposing driving questions to actively exploring problems and researching potential solutions. PBL units culminate with student-led public presentations of knowledge or products demonstrating real-world knowledge that was gained throughout the unit. Reflective learning is present in each stage of PBL and informs decision-making progress.

Research demonstrated that although students prefer PBL over traditional methods (Qomariyah & Utama, 2021), teachers struggle to use PBL and related strategies, such as nature-based learning due to a lack of training, time, and funding (Christensen, 2021; DeGoede et al., 2023; Gunter & Retnawati, 2020; Primavera, 2021). Teachers understand the benefits of PBL but struggle to implement it in their classrooms (Dunbar & Yadav, 2022). To optimally support teachers in their efforts to implement PBL, school administrators and educational leaders need to fully understand challenges teachers face when using PBL (Romero-Ariza et al., 2020).

PURPOSE OF THE STUDY

The purpose of this qualitative study was to explore kindergarten through Grade 8 teachers' experiences using project-based learning in a local private school belonging to the AIMS. One of the chief considerations among teachers is how to implement the prescribed curriculum. Behaviorism posits learning occurs outwardly and is a reactive process (Agarkar, 2019). Alternatively, cognitivism involves emphasizing that learning occurs in the mind. The commonality between these learning theories is that they place learning in a passive role and lack social components (Al-Shammari et al., 2019). Constructivism involves placing students at the center of active learning. This type of learning encourages students to integrate existing with new knowledge to solve problems. The resulting schema or foundation of integrated and organized knowledge leads to innovation, reflective thinking, and relevant and concrete learning, all of which are necessary skills for students of the 21st century (Al-Shammari et al., 2019).

Life and career skills needed by students in the 21st century include flexibility, adaptability, self-discipline, and cross-cultural and interpersonal skills (Anagün, 2018). Additionally, Tandika (2022) posited collaborative thinking skills were paramount in terms of solving concrete problems in a fast-paced and increasingly globalized society. Owens and Hite (2022) stated PBL encourages developing and using critical 21st century skills and global awareness. Identifying challenges and promoters of PBL may provide understanding about how to use it consistently in the classroom. Understanding needs of teachers and how to support their efforts in using PBL in the classroom was the goal of this study. Results from the study may be used to inform decision-making in AIMS schools about best practices and support for implementing PBL.

SIGNIFICANCE OF THE STUDY

This study is significant because findings may provide insight into the necessary tools and resources teachers need to use PBL consistently in their classrooms, increasing student motivation and engagement. Addressing PBL as a highly effective teaching method in terms of increasing student engagement and meeting diverse learners and what methods are regularly used in classrooms is crucial to positively influencing student learning outcomes.

Teachers and administrators collaborate to influence student learning outcomes in different ways. The Original Systems Intelligence (OSI) scale by Törmänen can be used by learning organizations to measure teachers' perceptions of everyday tasks and interactions. The OSI "suggests developmental perspectives that highlight micro-level behavioral, informal, interactional, and accessible-to-all aspects of the learning organization as a route to improvement" (Törmänen et al., 2022, p. 249). An adapted OSI scale was used to help kindergarten through Grade 8 teachers and administrators discover what is needed to bring PBL consistently into AIMS classrooms. Additionally, because AIMS professional development has a far and wide reach that does not require participants to be currently employed at AIMS schools, knowledge and skills from the study may be used in other societal and educational communities.

REVIEW OF LITERATURE

Formal classroom education and approaches to teaching and learning within school systems have remained largely stagnant (Chigbu et al., 2023). According to Gallup (2023) 53% of Americans were satisfied with the quality of education K-12 students were receiving in the United States. Two decades later, that number has dropped to 36%. This decline has contributed to disconnected stakeholders, disengaged students, and lackluster overall school performance (Gallup, 2023). There is a collective dwindling faith in school systems' abilities to educate students effectively for future generations as indicated in Figure 1 (Appendix).

With a basis in constructivism, PBL is a student-centered pedagogical method that promotes active participation, innovative thinking, and collaborative problem-solving among learners (Lazic et al., 2021). According to Chigbu et al. (2023), PBL encourages context-specific learning. Making learning meaningful by presenting relevant topics in ways that encourage students to be enthusiastic about learning results in an engaged student body. PBL is goal-oriented learning based on active participation of learners during the learning process. Encouraging students to actively participate to solve real-world problems leads to tangible

outcomes. Finally, PBL supports knowledge sharing and understanding. Promoting authentic communities of practice during classroom learning prepares students for interpersonal success beyond the classroom.

Students are encouraged to use critical thinking while working with their peers to solve real world problems. PBL replaces inactive and rigid learning with student participation and socialization. This approach to learning enables students to play an active role in their learning that is collaborative and relevant (Lazic et al., 2021).

Formally developed in the 1960s, PBL debuted in Canada and gained wider acceptance in the 1980s and 1990s. Twenty-first century PBL aligns with K-12 state standards for learning, can be integrated into an existing curriculum, is compatible with quality performance assessments, and authentically embraces social justice and cultural responsiveness (PBLWorks, 2022). PBL incorporates modern day educational pillars including critical learning components, social environments, and tangible outcomes (Mitry, 2021). According to Sormunen et al. (2020), reflective practices within social environments that also include collaboration with others is a critical component of PBL for students and teachers.

Conceptual Framework

The conceptual frameworks for this study were Piaget's cognitive theory of constructivism and Kilpatrick's project method. Constructivism is founded on the idea that optimal learning occurs through experiences. Project method puts students at the center of their learning via hands-on approaches to active engagement that sustain inquiry and produce tangible outcomes (Wang, 2022). With students taking active roles in learning, teachers move from their traditional role as leaders to facilitators of learning (Mitry, 2021). Throughout stages of PBL, teachers guide students as they work to problem-solve through brainstorming, collaboration, planning, designing, reviewing, and producing a solution or public product.

Rooted in constructivism, PBL is a student-centered pedagogical method that promotes active participation, innovative thinking, and collaborative problem-solving among learners (Lazic et al., 2021). PBL also incorporates social environment and tangible outcomes (Mitry, 2021). Because of these positive qualities, PBL effectively engages students with different types of learning modalities and helps teachers meet standards-based on Common Core State Standards (CCSS). Despite a politically turbulent nationwide rollout in 2010, CCSS has been adopted by all but four states (World Population Review, 2023). AIMS schools consider CCSS guidelines for their comprehensive approaches to implementing educational standards that are consistent with their mission. During divisional team meetings and town hall-style discussions, local AIMS administrators and constituents have expressed the hope that PBL is a primary method of instruction for kindergarten through Grade 8.

Student Success

PBL improved epistemic beliefs by helping construct meaningful and relevant associations with more complex problem-based learning (Belland et al., 2019). Increased participation can be attributed to the fact that PBL affords teachers opportunities to increase students' self-efficacy (Kim et al., 2019). These positive qualities have a lasting influence on students' approaches to learning.

Learning occurs on a continuum and is therefore ongoing. Improved metacognitive skills and greater learning independence are beneficial to students' long-term learning (Saputri & Kesumawardani, 2021). PBL resulted in significant gains in terms of student metacognition, learning independence, and metacognition and learning independence simultaneously (Saputri & Kesumawardani, 2021). Recapitulation rates for metacognitive skills and learning independence were 81% and 55% percent, respectively. These percentages were 20% higher than students in the control group who were not exposed to PBL (Saputri & Kesumawardani, 2021). These and similar findings can be used to inform school curriculum frameworks and enhance teachers' instructional practices.

Revell (2019) noted teachers believed PBL contributed to students' greater understanding of their own and surrounding communities. Duke et al., (2021) found PBL increases student motivation, engagement, and creativity. Additionally, PBL improved growth in social studies and informational reading. Consistency in implementing PBL is a driving factor for overall success (Duke et al., 2021). One possible reason for lack of consistency in implementing PBL, and therefore rising and falling rates of student success, is lack of training and understanding among teachers (Du & Chaaban, 2020).

In addition to improved motivation, engagement, and growth in social studies and informational reading, PBL positively influences elementary students' mathematics achievement. Lazic et al. (2021) demonstrated PBL's positive influence on third grade math students' mastery of mathematical concepts of measurement. Lazic et al. that students' test scores improved by just over five points post-PBL whereas students in the control group had gains of less than half a point.

The scientific method involves employing strategies to acquire information about a theoretical, experimental, or statistical problem. This process includes an analysis of literature, conducting experiments and observations, and processing results respectively (Vazquez-Villegas et al., 2023). Scientific and engineering practices helps elementary students understand multidisciplinary concepts of science and embedding students' practices and knowledge authentically into their everyday lives (Awad, 2023; Miller & Krajcik, 2019).

Miller and Krajcik (2019) showed that making PBL-driven adjustments to curricula resulted in an increase in students' interest, self-efficacy, and desire to learn. This increase was due to enthusiasm generated by driving questions. Coherence across units and an intentional focus on community positively influenced students' learning. Culmination of learning that includes creation of publicly shared artifacts promoted sustained inquiry of complex problems (Miller & Krajcik, 2019).

Awad (2023) demonstrated the effectiveness of a teaching approach that mirrors the scientific method as PBL does. The author found that when teachers chunked students' tasks into steps and gradually introduced increasing complexity while releasing greater responsibility, students were engaged and productive. they displayed increased efficacy and were able to demonstrate understanding of challenging concepts. Similarly, Zhang and Ma (2023) conducted an in-depth quantitative analysis and showed that project-based learning significantly improved students' learning outcomes compared to traditional teaching models and positively contributed to overall academic achievement and success. These positive contributions were evidenced by students' affective attitudes and thinking skills.

\ PBL enables even younger students to find enjoyment in problem solving and to demonstrate learning at each step of the process. Using the Dayton Regional STEM Center's

Quality STEM framework (Pinnell et al., 2013), John et al. (2018) developed a PBL-based curriculum for young learners. They adapted eight principles set forth by Dubosarsky et al (2018) for high-quality early childhood STEM experiences. These principles were developmental appropriateness, cultural responsiveness, integrity of academic content, quality of technology integration, connections to non-STEM disciplines, real world connections, curriculum-embedded, performance-based assessment, and applications of the engineering design process, (Dubosarsky et al., 2018). The engineering design process, throughout which learning was demonstrated, was defined as 1) identifying a problem and setting forth problem-solving criteria, 2) brainstorming possible solutions, 3) experimenting with proposed solutions, 4) enacting potentially successful solutions, 5) adjusting and improving the solutions, and 6) sharing the solutions with peers (John et al., 2018).

Similar findings were shown in a correlational study of eleven project-based learning charter schools. Wurdinger et al. (2020) examined the relationship between feelings of hope and four other variables. The five identified variables were hope, self-direction, collaboration, reading and math. The authors examined eight schools over two years and an additional 3 schools over a one-year period. Growth was observed in all five variables in each school. Life skills scores, or hope, self-direction, and collaboration all increased by more than one point. Reading and math skills increased by more than four and five points respectively (Wurdinger et al., 2020). These increases provided evidence that PBL positively influences students' academic achievement and success.

The favorable evidence-based outcomes noted above regarding PBL and its relationship to students' academic motivation, engagement, and academic underscored the importance of using PBL in the classroom success (Miller & Kracjik, (2019); Awad, (2023); Zhang & Ma, 2023; Wurdinger et al., 2020). Although perceptions of enacting PBL in the classroom vary significantly, teachers agree that PBL positively influences students' success (Duke et al, 2021; John et al, 2018). Teachers understand the need to use PBL to increase student engagement and success, but they struggle with the feasibility of implementing it in the classroom (Revelle, 2019). Because classrooms are experiencing growth in diversity, it is important to understand how PBL impacts diverse learners and what supports are needed by teachers to ensure that all students benefit from PBL.

Diverse Learners

Variety in learning modalities among students and the need to teach to those differences was made evident in CT and PM. Racial diversity in learning has exploded since the height of desegregation (USDE, 2023). The scope of understanding about learning diversity and learning styles has significantly widened since the advent of CT and PM (Zhang, 2022). Acknowledging that motivated students are engaged students, Piaget and Kilpatrick's agreed that a student-centered approach is the most effective method of instruction. The validity of this perspective is evidenced by Talbert et al. (2019) and Shah (2020),

In a three-level modeling approach Talbert et al. (2019) examined the ways in which student-centered instruction and engagement differed from teacher centered instructional practices. The authors assessed student centered instruction with a six-item rubric focused on student involvement. The rubric included, but was not limited to, conceptual understanding, feedback, and intellectual authority. Teachers were assessed with a six-item rubric focused on

levels of teacher involvement. Rubric topics included level of teacher guidance and student autonomy. Data analyses showed that the positive relationship between student centered instruction and self-efficacy is influenced by students' perception of or experience with that instruction.

Also confirming the importance of learner centered teaching, Shah's (2020) in-depth exploration of the history of learner centered teaching demonstrated that the earliest recognition of its importance dated back to Confucius and Socrates. Thousands of years later, the author posited, the concept of learner centered teaching has taken root under the well-crafted theories of 20th century sociologists, psychologists, and educators. Learner centered teaching approaches, the author demonstrated, have significantly differently focal points than teacher centered learning and lead to improved learner outcomes as indicated in Table 1 (Appendix).

Demonstrating a relationship between students' experiences of learner centered teaching and self-efficacy, literature also shows that learning preferences and motivation influence students' critical thinking skills Talbert et al. (2020). In a quasi-experimental 2x2x2 factorial design, Fajari et al. (2020) examined data from 292 students from 10 different schools. Data received from open essays and questionnaires were computed using a three-way ANOVA. Results showed that learning motivation and learning styles influence critical thinking skills. Additionally, students' critical thinking scores prior to and post PBL averaged 92 and 100, respectively. (Fajari, et al. 2020).

Additionally, a positive correlation was observed between teaching to learning preferences and reading skills improvement (Bhatti et al., 2021). Teaching to learning preferences and increased mathematical ability was also observed (Ndia et al., 2020). These researchers shared a common interest in how multiple intelligence-based instructional methods (MIBI) and PBL supported learning at each stage of the process and what role they played in students' success.

Bhatti et al. (2021) investigated the differences in reading comprehension achievements of K to 12 students with and without MIBI. Students' scores on the TerraNova and IOWA achievement tests indicated that students receiving MIBI scored 4.73 points higher than students who had not received MIBI (Bhatti, 2021). Similar findings were demonstrated in Ndia's (2020) quasi-experimental design. The author sought to determine what effect learning models and multiple intelligences had on students' mathematics achievement. Multiple choice tests focused on mathematics achievement, mathematical logic, and spatial intelligence were administered to Grade 8 students. Data collected from these multiple-choice tests were subjected to a two-way ANOVA. Ndia (2020) showed that mathematic achievement and mathematical logic scores were significantly higher for students who had received PBL and MIBI than for students who had received traditional direct learning instruction as indicated in Table 2 (Appendix).

The interrelatedness of critical thinking, curiosity, and social intelligence further underscores the link between PBL and a healthy future for diverse learners (Suhirman et al., 2021). Suhirman et al. (2021) sought to understand the effects of PBL with an emphasis on personal character (PBL-CE) on students' critical thinking skills, naturalist intelligence, and curiosity. An essay test was used to measure students' critical thinking skills and curiosity was measured by self-assessments. Instruments were also developed to distinguish students with high and low natural intelligence. Descriptive and inferential statistics with a MANOVA were employed. Data analysis showed that students' scores were significantly higher with PBL-CE instruction than they were with traditional instruction or PBL alone (Suhirman et al., 2021).

The positive influence of PBL on students' long-term academic and social emotional learning and is demonstrated in its tenets for success. Social interactions within groups during PBL influence student learning and build an appreciation for perspectives (Kim & Kim, 2021). In their qualitative case study of eight Grade 6 students, four female and 4 male, Kim and Kim analyzed the interactions between students and their motivation levels during math-based PBL assignments that presented students with problems they may encounter in their everyday lives. Keller's (1979) Attention, Relevance, Confidence, and Satisfaction (ARCS) motivation model was used to interpret data. Kim and Kim identified specific self-selected student characteristics regarding math pre and post PBL exposure. These characteristics included pleasure, fun, interest, parent-driven, and grade performance. Results showed that students who possessed different characteristics demonstrated improved perspective-sharing when learning roles within a group were flexible, such as during PBL, which led to increased collaboration (Kim & Kim, 2021).

In addition to perspective-sharing, tailored learning experiences may assist older students in academic and future career decision-making relating to an individual's strengths and opportunities (Yazicki et al., 2023). In their mixed methods study, Yazicki et al. employed the 6E Learning by design™ model (6E) to investigate the relationship between a Science, Technology, Engineering, and Math (STEM) education and students' entrepreneurial skills and professional interests. The 6E is based on Biological Sciences Curriculum Study's 5E model which is rooted in constructivist learning. The 6E's student-centered framework is focused on design and inquiry with an emphasis on technology and engineering (Burke, 2014).

Yazicki et al. (2023) demonstrated increased total values in students' attitudes, interest levels, and entrepreneurship after participating in tailored 6E instruction. Students' attitude scores increased from 3.58 to 3.91. Interest level scores improved from 3.26 to 3.78. With a gain of over 22 points, entrepreneurship scores experienced the largest increase, going from 87.34 to 110.08 (Yazicki et al., 2023). The interrelatedness of CT, PM, and PBL supports the idea that all children may learn the same content, but each child will use that knowledge in their own way based on their perceptions and prior knowledge Zhang (2022). Piaget's constructivism understood this way of thinking about learning and set the framework for student centered approaches to teaching and learning. New knowledge combined with existing knowledge leads to ongoing cognitive growth. (Zhang, 2022).

RESEARCH DESIGN AND APPROACH

Semi-structured interviews were the primary source of data collection I this study. Open-ended questions focused on gaining understanding of teachers' experiences using PBL in the classroom. This justified a basic qualitative research design instead of the quantitative design, which involves numerical statistics rather than experiences and perceptions. A mixed methods approach was not appropriate because quantitative data were not collected.

The interpretive descriptive approach was used. This involves how participants construct meaning and how researchers interpret that meaning (Merriam & Grenier, 2019). Twenty-six teachers in the school met inclusion criteria for participation, and the goal was to have 10 who agreed to participate. Using the interpretive descriptive approach and inductive coding, data were analyzed via researcher-designed semi-structured interviews with 10 kindergarten through Grade 8 teachers. Inductive coding involved deriving codes from data and looking for emerging patterns or themes. Themes are derived from data (Braun & Clarke, 2006). This type of analysis

can inform decision-making in AIMS schools about how to best support teachers in terms of use of PBL in the classroom, especially as it relates to evolving learner variability.

In this basic qualitative study, interview data of 10 AIMS teachers provided insights regarding teachers' experiences using PBL in kindergarten through Grade 8. This is important because PBL plays a critical role in fulfilling the schools' commitment to educational excellence. AIMS schools, which are part of the National Association for Independent Schools, maintain foundational learning PGPs. AIMS schools meet this mission by encouraging students to challenge their assumptions in learning environments that welcome intellectual risk-taking and creates good stewards for a sustainable future (NAIS, n.d.b). The inquiry-based nature of PBL is designed to meet these PGPs and aligns with CCSS. For these reasons, AIMS administrators agree that PBL should be used more consistently in the classroom. AIMS administrators monitoring the use of PBL have observed its positive influence on student engagement and learning as well as its support of schools' PGPs, resulting in quality work that is highly visible to constituents.

Data Collection and Analysis

The site of this study was a local kindergarten through Grade 8 AIMS school with approximately 350 students. Participants were recruited through an email request for voluntary participation to all kindergarten through Grade 8 teachers in the local setting who met inclusion criteria. Qualitative data were collected through teacher interviews with 10 kindergarten through Grade 8 teachers at the study site. A researcher-designed and expert-verified interview protocol was carefully followed. This protocol included selecting appropriate meeting times and places for interviews, listening to participants, maintaining a neutral tone, and keeping the interview productive through open-ended and relevant questions.

Data analysis began with the first interview. The method of qualitative data analysis used was thematic analysis. Thematic analysis helped identify and extract themes and word patterns in the data (Saldaña, 2021) collected from researcher-designed interview questions. The six-phase process identified by Braun and Clarke (2006) was used as a guide to gain familiarity with the data, create initial codes, identify, review, and name themes, and include findings in the final project study.

Manual coding was the primary method of data analysis. A priori coding, or defining codes prior to data analysis (Saldaña, 2021), was used in conjunction with in vivo coding. In vivo coding, or the exact wording of participants' (Saldaña, 2021), helped ensure the most accurate analysis of spoken data. Additionally, software programs were used secondarily to help organize qualitative data analysis and make it more efficient (Cacuci & Ionescu-Bujor, 2010). Because qualitative data are subjective in nature, the possibility of two or more misaligned data sets cannot be definitively eliminated. Validity of data was accepted in the presence of discrepant data. Purposeful sampling helped minimize deviation.

RESULTS

This study was limited to one local study site in the mid-Atlantic region of the United States. Teachers in kindergarten to Grade 8 were participants in this study. The inclusion criteria were a) teachers who had at least three years of teaching experience b) teachers who were

currently employed by the study site and c) teachers who had completed two or more PBL units served as the participants. The study site employed a total of 51 faculty and staff. Of this number, 28 teachers met the inclusion criteria, and 10 teachers agreed to participate.

Prior to the interviews, a priori coding was used to create a theory-driven list of words that would aid in understanding participants' level of knowledge about PBL and the conceptual frameworks grounding this study. During the 20-30-minute interviews, participants were asked 10 questions in addition to relevant follow-up questions. Participants were also asked to share any additional thoughts or perspectives on using project-based learning in the classroom. PBL was viewed positively by all participants, and they generally understood why schools want to use PBL. Teachers talked about their experiences and their perspectives on the challenges and promoters of using PBL in their classrooms at the study site.

Data were coded by reviewing 10 interview transcripts and logged on an excel sheet. Three cycles of coding were conducted for each transcript to ensure a thorough review of the data and demonstrate respect for the quality of data provided by the participants. In the first coding cycle, in vivo coding was applied. Focusing on participants' explicit responses provided an emic perspective, or one that offers insight from where the project is taking place (Peters, n.d.). In the second cycle of coding, a deductive approach with a focus on meaning, or participants' beliefs, attitudes, perceptions, and assumptions was used. Participants' explicit words were linked to codes. This approach aligned with RQ 2 because it sought to uncover possible challenges to using PBL. Angus et al. (2017) described a positive relationship between increased productive discussion of challenges and improved outcomes. The codes described the emotion behind the data related to how teachers felt about PBL as indicated in Table 3 (Appendix). The third and final pass focused on repetition. Repetitive phrases can reveal strong positive or negative emotions (Dennison, 2024). Specifically, participants' repeated words could indicate promotors or challenges. This approach aligned with RQ 1 and RQ 2 because it sought to uncover promoters and challenges within teachers' experiences using PBL.

Overall, 23 codes were identified. Codes ranged from teachers' understanding of PBL to stakeholders' perceptions of PBL. Of the 23 codes, eight were mentioned most frequently and affectively. Participants mentioned time, administration and school support, and curriculum more often than other codes. The bottom fifty percent of mentions were training, parent perceptions, resources, and learning standards and assessments as indicated in Table 4 (Appendix).

Framing Data Analysis Through Research Questions

The interview questions were designed to elicit authentic responses that yielded useful information. By identifying codes in participants' responses, three categories were established as a) promotors of using PBL in the classroom; b) challenges to using PBL in the classroom; and c) teachers' expressed emotions surrounding PBL. From these categories, five themes emerged. The analysis was framed through the research questions.

After three coding cycles, commonalities and differences were sought within the coding. The coding characteristics allowed data to be grouped into three categories. These three categories also included two sub-categories. First, a priori coding provided insight into participants' experiences using PBL. Next, affective coding highlighted how participants felt about PBL. Finally, repetition coding uncovered those things that participants were most

passionate about individually and collectively. The commonalities from each coding cycle were used to create a web of understanding for teachers' experiences using PBL. Five themes, and two sub-themes, emerged from the categories and sub-categories.

RQ1

The first research question asked the following: What are teachers' experiences using PBL in private classrooms in kindergarten through Grade 8? Through the researcher-designed questions during the interview process, information was gleaned about teachers' experiences using PBL in the classroom. Much of what was shared related to teachers' understanding of PBL and what their role is as teachers during PBL.

Theme 1

Theme 1 established a basis for teachers' levels of understanding of PBL. Primary grade level teachers believed their role was more challenging during PBL than was their intermediate grade counterparts. Teachers in intermediate grades recognized the complexities felt by primary grade teachers and indicated that intermediate students were more independent than younger students. Middle school teachers acknowledged that they had substantial workloads during PBL but also thought that students were able to do so much more independently that it evened out. Teachers in all grades recognized that students' ages contribute to specific strengths and needs during PBL. Participant A stated,

We engage the young learners to be able to do, of course not gonna be on the same caliber as what the middle school or intermediate grades do, but there's got to be a way that we can get those children to be able to demonstrate it.

Similarly, Participant G shared, "Now I teach very young children so sometimes, to me it seems tricky as they are not able to, you know, read on their own, gather their own information." Comparing younger and older students, Participant E stated, "Obviously with non-readers, with the much younger children, PBL could still be used with guidance, possibly with older students." Teachers who work with older students noted they feel they are "teaching students who are socially younger than middle school" and especially since the Covid pandemic "do not know how to work with one another" (Participant C).

Although teachers' sentiments were that young students are still figuring out how to read which means the teacher is doing a lot of the *legwork* just to get PBL off the ground, their energy and enthusiasm was worth the teacher's extra effort. Additionally, Participant F stated,

I think that students actually come to a high level of thinking because they have been given that creativity and that independence to expand in areas that you might not be able to tap into if you are working within the traditional framework.

Participants discussed their experiences of PBL from the lens of their own understanding. Teachers mentioned that because PBL is an inquiry-based instructional approach to teaching and learning, "Sustained inquiry means ongoing work and it would take a lot of planning and intentionality to meet all of that criteria" (Participant J). Moreover, teachers spoke about the need to focus on the collaborative process of learning as much as on the finished public product. Participant D shared, "It's nice to have the presentation at the end, but it's the journey."

Teachers used common language to describe their experiences with PBL such as student driven, high-interest, flexible, and active. These commonalities were evidence of their understanding of PBL as a constructivist instructional method. Overall teachers understood that their role in PBL was to be a partner in learning and not a leader of learning. Theme 1 solidified the presence of a basic understanding among participants, which is required to implement PBL.

Theme 2

Another factor that RQ 1 sought to gauge was teachers' willingness to use PBL in the classroom.). All participants confirmed that each experience using PBL was helpful in planning for the next attempt. Teachers were able to use what worked and what did not work to inform future final products. Additionally, all participants agreed that feeling better prepared made them feel more optimistic about using PBL in the future. When asked how likely they were to use PBL in the future, Participant C stated, "I'm really into PBL. I think it's a great resource for students. I enjoy doing it." Similarly, Participant D talked about feeling a renewed enthusiasm for PBL while recounting their experiences with it to me. They mentioned that they have always been supportive of PBL and enjoy using it, but that they were "really excited to get back to it [now that] we have been talking about it."

Possessing a solid understanding of PBL and an expressed willingness to use it, teachers are seemingly well prepared to implement PBL. Although teachers at the study site have used PBL in their classrooms, most are not using it regularly. Participant C mentioned that this could be due in part to Covid and the amount of time it is taking to bring students back up to grade level upon return to in-person learning. Participant D said that they had not completed a PBL unit approximately three years ago, but "didn't do any anything else with it, just little things here and there." Thus, RQ 2 sought to uncover those factors that were perceived as challenges or barriers to using PBL.

RQ2

The second research question asked the following: What challenges influence teacher use of PBL in private classrooms in kindergarten through Grade 8? Through the researcher-designed questions during the interview process, more was learned more about teachers' challenges and barriers to using PBL in the classroom. All teachers agreed that overall, the school was supportive of PBL as an instructional approach and encouraged teachers to use it in their classrooms. This was especially true of the lower school. Three themes pointing to perceived challenges or barriers to PBL were identified.

Theme 3

Most AIMS schools, includes a lower school and a middle school. These divisions are led by assistant heads of school. The consensus shared among participants was that the lower school head firmly believes in and strongly encourages PBL. For example, Participant H said. "Our lower school head has been really promoting project-based learning since he came to our school, I believe it's been 5 years now." Additionally, participants agreed that the middle school head seemed supportive of PBL but was not as outwardly encouraging teachers to use it in middle

school. For example, Participant H said, "[The lower school head] sort of was the one who introduced many of the faculty members to it and is always sharing resources with us." Participant G further reiterated school administrators' support as "supportive, especially our lower school head."

Several participants mentioned that having an administration that is supportive of PBL as an instructional approach is not the same as supporting teachers' use of PBL. The differing perspectives of the assistant heads likely influences the inconsistent use of PBL. Specifically, Participant G said of PBL, "Not everyone has jumped, sort of in, and it does feel as though like [*sic*] it's been presented as, like sort of a lower school thing." Participant E stated, "Our administrations strongly support PBL, particularly in the lower school. I don't always know that we are afforded the planning, time collaboration time, or have the scheduling down to necessarily see some of these projects through."

Others shared these sentiments citing ambiguity in the approval of supplies purchases, inconsistent support for the use of physical space dedicated to PBL, and a realistic understanding of how much is needed in terms of time, space, planning, and resources to consistently implement PBL. Participant F mentioned that because of the school's understandable but confining physical space constraints, the homerooms are the only spaces that can offer "freedom for an open space for PBL." One teacher described PBL as moving up and down the list of priorities according to what else was happening in the school at a given time. Another teacher mentioned that PBL seems to be encouraged but is not necessarily a priority, saying, "In my particular division, there hasn't been a lot of talk about how to do this" and "PBL is an umbrella term, but it's institution specific and I'm still really unclear with what that means at this current institution" (Participant C). Two teachers thought that inconsistency in support among administrators was driven by their own levels of understanding of PBL. Lastly, teachers believed that administrative support of PBL somewhat depends on the overall interest in PBL among stakeholders, saying, "I do think many, many parents are more traditional in some of their ways that they view how we should educate children … I do think some would be opposed [to PBL]" (Participant H). Similarly, Participant D said, "I think that they're more focused on the end results like the presentation piece rather than the process, because really it's the showcase part that everyone sees." Teachers were also quick to point out several things.

First, lower school administration is very knowledgeable about PBL. Participant A shared, "Our lower school head used it in other schools." Also shared was the statement, "Our assistant head enjoys that, and they give us reading on it, and they've spoken about it and he's shown us how to do it" (Participant I). Also, teachers believe there is an honest desire on the part of the administration in trying to provide teachers with what they need to use PBL in the classroom. Participant J stated, "I can submit a request for [supplies] and I have never had a request denied, so I feel fairly confident that if I wanted something reasonable that it would be approved and provided." In similar fashion, Participant H shared, "It does help to have a variety of resources available." Additionally, two teachers shared their thoughts about technology related resources specifically saying, "We do have the iPads, and each child is given an iPad at the beginning of the year so that really does help" (Participant H) and they were able to use all of their skills with technology, reading and presenting (Participant F).

Finally, although teachers know that administrators encourage the use of PBL, they do not feel undue pressure to use it. Teachers also do not receive negative feedback for not using PBL. Teachers are grateful for these realities but also feel that expectations for daily and ongoing

achievement were high. "I feel like sometimes the expectations are a little higher, so … in some ways like [sic]we have to move through units at a certain pace, and grasping how PBL works … it feels like we don't have the time to [do that]" (Participant H).

Theme 4

The participants reported that core subjects like math, science, social studies, and language arts are taught most or all days of the week. Teachers must accommodate and prepare for other school-wide efforts. Daily or semi-regularly scheduled events include *give and get help,* which is akin to study hall, student council, spirit weeks, assemblies, early dismissals due to sports, and parent teacher conferences. Speaking about feeling pressed for time and trying to add PBL to the school day, Participant D said, "We just didn't have time built into our schedule to do PBL the justice it deserved."

Several participants mentioned that although these events are viewed with optimism and recalled fondly, they disrupt the daily schedule and further take away time that, in theory, could be devoted to PBL. Participant F shared, "If you're restricted with your schedule, it makes it extremely complicated because then you're providing students with little bits of time for PBL." In addition to school-specific events that require planning and participation from students and staff, there are also events and activities provided by outside vendors that use up blocks of time that could be devoted to PBL. Regularly scheduled assemblies were mentioned by several participants. For example, Participant D said, "For instance, tomorrow we have the weather assembly and that cuts into core curriculum time" and "those are just a few off the top of my head that disrupts the typical classroom routine. They're all good things in themselves. However, when you're trying to accomplish and meet deadlines, it can be tricky." These assemblies do not necessarily need planning time, but they typically occur in the early morning or near the end of the day. Participants agreed these times would be the ideal window for PBL to occur during the school day (Participant D; Participant F).

Theme 5

In addition to *extra* events, participants mentioned numerous required academic happenings or events related to curriculum that act as barriers to their ability to implement PBL. The chief obstacle to implementing PBL was the lack of time. A rigorous curriculum demands that teachers spend their time focused on what matters most. Specifically, in private, tuition-driven schools, stakeholders' focus is on academic achievement and testing results (Hunt et al., 2023). Participant H described their experience in the classroom as a "fast pace moving curriculum." In similar fashion, Participant I stated, "Well, I think students are held to a high standard" and "they give us so much that the children have to do."

School is in session each day for a required minimum of six hours and includes asynchronous periods such as lunch, snack, and recess (Maryland State Education Association, 2020). "You do sort of worry about, like, [*sic*] the pace at which you teach the things that you need to cover" (Participant G). Participant D said, "Core subjects take time, and we have to cover certain core content with our students and…we make sure we fit all that in and we have been told to do that." This tight schedule caused concern for participants who expressed that "Scheduling issues sometimes present the biggest hurdle to PBL" (Participant E).

Additionally, teachers feel pressure to focus their time and efforts on high stakeholder-visibility areas. Because the study site is tuition driven, parent perceptions in particular, influence what school administration and teachers highlight (Participant I). Legacy schools are strongly supported in the AIMS geographic area. Enrollment is selective and attrition rates are consistent (Hunt et al., 2023).

DISCUSSION

Teachers agreed that PBL was an excellent instructional approach for increasing student engagement and motivation. In addition, each of the participants expressed a willingness to use PBL in the classroom. Participants agreed that PBL was especially helpful in reaching different learning styles. They also felt that this trait was of high importance due to the rising inclusivity of neurodivergent students in classrooms. Participants were also united in their belief that PBL provides leadership opportunities for students that may not otherwise have them. The necessary collaborative teamwork of PBL was viewed favorably by all participants. Additionally, participants believed that PBL supports students' growth in emotional intelligence which leads to a more peacefully tolerant if not accepting culture. Five themes emerged from the data. These themes included 1) teachers' understanding of PBL; 2) teachers' willingness to use PBL; 3) perceived support from school administration; 4) teachers' schedules; and 5) time constraints.

There were several similarities across the sample of K to Grade 8 teachers who participated in the study. Although teachers were unified in their beliefs about PBL being a positive path to student success, all expressed doubt about their ability to effectively use PBL regularly in the classroom given the time constraints of their schedule and the amount of material to be covered each day. Some teachers chose to implement parts of PBL to provide exposure for students without being as time-consuming as doing a full PBL unit. Others felt that partial PBL was not worth the added effort. Despite these different perspectives on implementing PBL amidst time constraints, all teachers recognized their responsibility to adhere to the principles of the living curriculum. The living curriculum, through an independent scope and sequence, is designed to cultivate the intellectual, social, emotional, spiritual, and physical skills and development of students (Grotzer et al., 2019). The instructional flexibility offered by independence schools that follow this curriculum brings both rewards and challenges.

Research showed that teachers who completed adequate training were better at planning lessons and managing the classroom (Resch et al., 2020). This finding is significant because daily lesson planning was found to be teachers' most time consuming non-instructional practice (McShane, 2022). Additionally, 77% of teachers indicated that behavioral or disciplinary issues consumed as much as three hours each week (McShane, 2022). Teachers who were exposed to more PBL training were able to learn more PBL methods and change their pedagogy and practice (Nxasana, 2023). Brito et al. (2020) found that training helped teachers more clearly articulate and define project goals. Deyasi et al. (2021) reiterated the significance of this finding by demonstrating that authentic pedagogy improves academic performance and equitability. Exposure to increased quantity and quality of training improves student and teacher success (Li et al., 2023).

McGraw-Hill (2023), a global education publishing company, noted time as one the biggest obstacles to PBL, but also offered solutions to this dilemma. Fester & Starkey (2022) shared similar views saying that time has always been a problem and that nearly 20 minutes of

instructional time is lost each day to common issues. If PBL improves the overall dynamics and function of the classroom, then the issue of time must be addressed (Fester & Starkey, 2022). Some of the literature considered professional development and training as a factor of time (Chaya, 2023). In the current study, professional development was not found to be an obstacle to PBL and participants indicated that without time, training could be irrelevant (Participant A; Participant D).

The NAIS (n.d.b.) defines PGPs for member schools that hold them to high standards and a code of ethics. These PGPS reflect the longstanding commitment to quality that is synonymous with independent schools. These high standards are respected by teachers. They feel a sense of pride in meeting them, but also feel the pressure to perform. Participant D said "If [PBL] makes school look good, I think they're totally into it." Participant I spoke about the importance of a finished product *making the cut* with parents. Concern about how parents would view the effectiveness of the teacher and students' learning through PBL since it is not part of the RC was shared by several participants. Literature corroborates these concerns.

Schools and teachers focus their efforts on what they believe stakeholders view as academic success (Brown et al., 2021; Ergin et al., 2021). Assessing and communicating student learning using PBL is important to stakeholders (Chaya, 2023). Teachers and parents prefer clear communications about the needs and progress of students (Amerstorfer von Münster-Kistner, 2021). The current study participants agreed that focus, assessment, and communication is important. Moreover, AIMS teachers are keenly aware of being an integral part of a supportive community with high expectations. These expectations are evidenced by keywords found in the mission statements of independent schools such as life-altering, global, and empowering.

Evidence suggested that block scheduling reduces teacher stress, provides continuity, and allows for efficient planning (Buck & Tyrrell, 2022; Labak et al., 2021). Furthermore, PBL, when implemented effectively, allows for deeper learning through sustained inquiry and promotes student engagement and confidence (Ramlah et al., 2023). Ramlah reinforced the benefits of PBL and its connection to Kilpatrick's project methodology and Piaget's constructivism. These benefits were supported in the current study when Participant I stated, "You don't have any[thing] you have to really worry about [with] behavior management because they are so excited about their learning." Student outcomes during the PBL process and in the finished product support study participants' sentiments of this instructional approach to teaching and learning (Doles, 2012). Additionally, when block scheduling is instituted for PBL, there is no negative impact to other content or subject areas (Century et al., 2020). These ideas were explored in detail in the data analysis through Themes 4 and 5, which focused on teachers' feelings about their daily schedules and the perceived lack of time for PBL.

School Schedules

Academically, master scheduling considerations focus on several key areas. First, the strengths, needs, and opportunities of staff and students are considered. Master schedules take into consideration the number of remedial to advanced classes being offered (Morita-Mullaney et al., 2020). Stakeholders' concerns for academic management, and showcasing learning and achievement are also factored in during master scheduling. Non-academic considerations include less fluctuating factors such as building hours of operation, internal instructional and support staff hours, external staff hours, and classroom capacity (Morita-Mulaney et al., 2020).

Although master schedules in AIMS schools have less variability than in other schools, they do change. Literature suggests that workers' motivation levels are influenced by their work schedule (Daniels, 2016; Giurge & Woolley, 2022). For example, Daniels (2016) found that teachers who got reassigned from one subject matter to the next in successive years experienced increased stress levels and lack of motivation. Additionally, teachers who felt the master schedules were not shared timely felt less motivated to prepare ahead of time. Organizationally, high levels of motivation among workers are generally desired. Intrinsic motivation is particularly desirable as shown by Van den Broeck et al., (2021). Study participants agreed that PBL requires extra effort on the part of teachers saying, they need to be creative and "think outside the box" (Participant G). A positive correlation was found between increased worker motivation and greater creativity and innovation (Schooley, n.d.).

Daily schedules differ from their master schedule counterparts in several ways. First, they cover the approximately 7 hours of instructional time each day providing structure to each classroom or teacher whereas master schedules cover the building's operating hours and seek to provide a systems framework. Daily schedules, although narrow in reach individually, have a substantial impact collectively on school operations. The goals of a daily schedule are to provide quality instructional time, foster a positive school climate, and allow for varied learning times (Canady & Rettig, 2015). Two major types of daily schedules were identified in the literature. These were referred to as traditional schedules and block schedules.

Traditional daily school schedules cover approximately 7 hours. A traditional schedule allows for lunch, snack, and in many cases a recess period. Content classes are scheduled every day of the week in roughly 45-minute increments. Specials classes like art, music, library and physical education usually occur once or twice each week and can be 30 to 45 minutes. In primary grades, two recess periods may be scheduled on one or more days of the week. Labak et al., (2021) describe this traditional model as single scheduling (SS).

Block schedules (BS) also cover the instructional time during the approximately 7-hour school day. In contrast to SS, block schedules (BS) allocate 60 to 90 minutes of instruction per class period. Because of this extended time, the number of class meetings for the given subject each week is reduced. Literature demonstrates that BS is an effective model across grade levels (Labak et al., 2021; Konjarski et al., 2023). Renewed interest in BS surfaced amidst the Covid-19 pandemic as teachers and administrators were compelled to use the most effective teaching methods (McKie, 2022; McMurtrie, 2021). Evidence suggests that BS is conducive to PBL (Labak, 2021; Konjarski et al., 2023; Kwan et al., 2022).

First, the extended class duration of BS, Labak (2021) found, allows for completion of the class teaching cycle. The teaching cycle progresses from initiating teaching and learning to assessing student learning. Moreover, a greater variety of activities could be built into BS classes (Labak, 2021). Next, curriculum design in a BS framework is more flexible and can be tailored to meet students' needs and the specific area of study (Konjarski et al., 2023). Lastly, student satisfaction indicators are improved overall in a BS framework (Kwan et al., 2022).

Reporting Student Achievement

Student learning evaluations, or report cards (RC), are a critical tool in communicating students' strengths, needs, learning, and academic progress (Guskey, 2004). Some schools operate on a trimester schedule providing RCs three times each school year. Others have a

quarterly schedule with RCs being distributed four times during the school year. Although schools may have different timetables, the information contained in RCs is roughly the same. The way data are perceived is crucial to any educational program, but even more so to high-profile, tuition-driven schools (VanTassel-Baska & Brown, 2022). The Elementary and Secondary Education Act of 1965 made RCs mandatory in all states that receive public funding. Although the style can be different, the RC must be accessible to all pertinent parties and be written in a clear and concise manner. The state and local education agencies ask schools to consider the following information from the United States Department of Education (USDE, 2019) when designing a school's RC:

- Does the RC reflect feedback based on different presentation formats to improve clarity and conciseness of information?
- Are the data presented in graph or chart form and do they make the information easier to read and understand?
- Are relative narrative summaries included that are clear and use plain language?
- Can parents easily share information via social media embedded features?
- Is the RC linked to longitudinal data supplied in previous years?
- Is the RC presented in a mobile-ready format?
- Does the RC format support assistive devices for stakeholders that have learning differences or physical limitations?

Evans (2019) explained traditional RCs as a culmination of mostly teacher-driven grading. This type of reporting reflects the average of a student's total. Classwork, homework, quizzes, and tests make up the grade reflected on the RC. Traditional reporting is described as compensatory in that the highest and lowest grades balance each other out and one high grade compensates for one low grade. Averages can sometimes be weighted, and letter grades A through F are assigned based on the school's formula (Evans, 2019).

Standards-based grading typically focuses on a student's progress in 3 to 5 key grade or course standards (Link & Guskey, 2022). A predetermined set of skills is used to measure student achievement (Knight & Cooper, 2019). On standards-based RCs, academic achievement and behavioral feedback are addressed separately (Link & Guskey, 2022). Additionally, the focus is more on progress than on the result. Although Welsh (2019) depicted a landscape of industry confusion about what standards-based grading is, this form of reporting is increasingly available and accepted in schools (Knowledge Works, 2023).

Competency-based reporting is an alternative to traditional and standards-based reporting. Defined as the ability to complete a task successfully (Machts et al., 2020), competencies are transferrable. In contrast to standards-based reporting, which is organized by time, competency-based reporting is focused on the evidence of learning (South Carolina Department of Education, n.d.). Competency-based RCs communicate not only what students know, but what they do with that knowledge (Evans, 2019).

Limitations

Limitations of this study were mostly due to the single-site design. Although participants represented AIMS teachers in kindergarten to Grade 8, the sample size was small in comparison to existing number of teachers in all AIMS schools. Many more teachers have used PBL. The

sample was limited to a small radius of neighborhoods with easy accessibility to the school. Additionally, socioeconomic demographics are notably homogenous. Additionally, although precautions were taken to mitigate potential researcher bias, the possibility cannot be eliminated.

CONCLUSION

Through this study, several conclusions can be made about teachers' experiences using PBL and challenges and barriers to implementing PBL in the classroom. Most significant was the finding that lack of time was overwhelmingly cited as the reason for the identified gap in practice. Regarding teachers' experiences, school culture and administrative views regarding PBL influence the use of PBL.

Through data analysis, it can be concluded that the school culture and climate generally supported PBL and teacher autonomy in terms of implementing curriculum. Flexibility of the living curriculum affords teachers generous latitude in terms of the scope and sequence of their work. This led to the conclusion that the classroom environment at the study site was supportive of interest-driven and sustained inquiry. Participants mentioned that in addition to students being more motivated and engaged, they also experienced increased curiosity and an interest in complex problem solving. Participants described feeling appropriately challenged and more excited than during traditional teaching.

Teachers enjoyed being stimulated by what they teach, were willing to put forth efforts required by PBL, and students and teachers alike seemed positively influenced by their experiences with PBL. Participants did suggest PBL takes a lot of planning and mental and physical energy. The sustained process, they claimed, could be exhausting at times, and increased activity levels in the classroom could sometimes feel overwhelming. Despite this, participants claimed benefits of PBL outweighed challenges they experienced when using it in the classroom.

Time was the most frequently mentioned factor during interviews. All 10 participants in this study mentioned time or lack thereof repeatedly. When asked what the number one obstacle to using PBL was, all 10 participants answered they needed more time. Time was discussed from the perspective of needing additional planning time for PBL and not having enough time to effectively implement PBL. Teachers spoke about time constraints as both individual and collective concerns.

They also expressed frustrations with lack of time in terms of daily and longitudinal limitations. Participant A said grade-specific training would be helpful but clarified that without the time needed to implement PBL, training would be nearly useless. Participant D shared they felt most teachers spend the time they do have on what matters most. Several participants pointed out they must make sure students' learning is visible to parents and stakeholders.

The chief obstacle to PBL at the study site is not training or development and the administration was supportive of PBL but needs to move toward more concrete demonstration of this support. Teachers would use PBL more regularly if student progress was measured in terms of PBL successes. Teachers feel overwhelmed by the quantity and quality of tasks that are expected of them each day. At the conclusion of each interview, participants were asked if they had anything else to share about using PBL. Answers to this question, along with data collected from all 10 interviews, confirmed the need for a plan of actionable change at the study site.

One possible direction for future research would be to build on the findings of this study by expanding research to a Title I school. Because the demographics of Title I schools are vastly different than those of the study site, there may be new insight about perceived challenges to using PBL. Topics and questions to be explored could include how public funding influences teachers' experiences using PBL and what can be done to help Title I schools implement PBL.
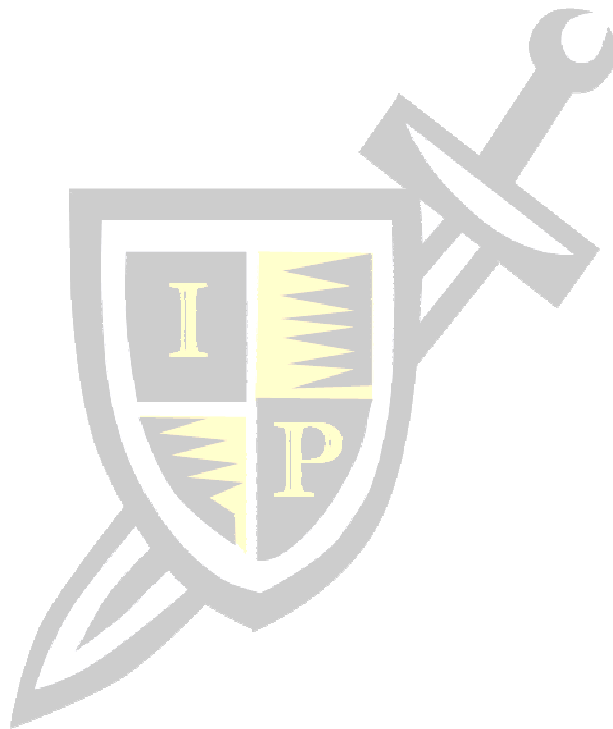
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APPENDIX

Figure 1

Percent of People Expressing Confidence in K-12 Education

Note. Adapted from Gallup. Gallup (2022). *Satisfaction With K-12 Education in US*. Gallup. https://news.gallup.com/poll/1612/education.aspx

Table 1

Learner Centered Teaching	Teacher Centered Teaching
Driven by student interest	Driven by standards and work
Learning through discovery	Learning through lecture
Active learning	Passive learning
Creativity is encouraged	Rigid or inflexible
Interdisciplinary learning	Blocks of learning
Collaborative spirit; teamwork	Competitive edge; good grades
Varied assessment strategies	Fixed assessment strategies
Teacher as facilitator	Teacher as leader

Adapted from Shah, R. K. (2020). Concepts of Learner-Centered Teaching. *Shanlax International Journal of Education*, *8*(3), 45–60.

Table 2

	PBL and MIBI Instruction	Traditional Instruction
Average mathematical achievement score of a possible 100	78.46	65.14
Average mathematical logic score of a possible 100	79.49	70.32

Table 3

Emotion or Perception	Positive Connotation	Negative Connotation	Participant's Response
Complicated		✓	"I've had to do a lot of team building activities and rapport building…make sure that they have the social skills to work in a group" (Participant I).
Conflict		✓	"I think that [administration is] more focused on the end results like the presentation piece rather than the process, because really we show it's the showcase part that everyone sees. The process is not always apparent and that's really the meat and potatoes of PBL" (Participant D).
Confusion		✓	"Our administration strongly supports PBL, particularly in the lower school. I don't always know that we are afforded [what we really need] to necessarily see some of these projects through" (Participant E).
Ease	✓		"I feel like I've always been the type of teacher that has the children actively participating" (Participant A).
Enjoyment	✓		"I'm really into PBL. I think it's a great resource for students. I enjoy doing it" (Participant C).
Excitement	✓		"I just feel like it is a valuable thing, but hoping to get more and more grades involved and it's exciting too" (Participant H).
Fulfillment	✓		"I felt like it was a really good experience" (Participant I).
Fun	✓		"It's a fun, fun way to approach learning" (Participant H).
Motivated	✓		"I feel strongly that there's that support, you know, and I'm excited to try and do more and more over time" (Participant F).
Overstimulated		✓	"We can't squeeze it in. We could not squeeze it in like we have our meetings now. There's no way you could do that once the school year kicks off, you're just sometimes trying to keep your head above water" (Participant D).
Overwhelmed		✓	"Sometimes it seems overwhelming, but you know to do for all the whole process" (Participant H).
Rushed		✓	I just feel like they give us so much that the children have to do. That it doesn't leave us enough time for PBL" (Participant I).
Stressful		✓	"Well, I think [students are] held to a high standard and PBL does show that standard because you get all different levels with PBL, but there's always improvement with the next project" (Participant I).
Supported	✓		"They support project-based learning I believe because they'll buy the materials that I need for success" (Participant I).
Unsupported		✓	"But I think it's the lack of support and practice, that is not been helping in the school" (Participant A).
Untrained		✓	"But like I said, I just feel at least for in the school here that there has not been enough training and I think that that really that is needed first before we can implement it even into more areas" (Participant A).

Time consuming	✓	"It would just take a lot of time and most teachers I know I do not have you know as much planning time as I would like to have. So I think that would be the biggest obstacle" (Participant J).
Unwilling	✓	"Not everyone has jumped, sort of in. It's been presented as, like sort of a lower school thing. Some teachers maybe struggle with the you know, if it's not continuing in middle school and or their high school learning [then] what's the continuation of teaching these kids how to learn that way if they're not going to be asked to do it" (Participant G).
Willingness	✓	"It's nice to talk about it and be able to remember the ideas that I have had and that I hope to use in the future and just making sure that it's on the forefront of the teaching" (Participant D).

Table 4

Codes Identified	A	B	C	D	E	F	G	H	I	J	Total Participant Mentions
1. Admin/school support	2	2	4	3	4	4	3	2	1	1	26
2. Curriculum	6	1	1	7	0	0	0	2	2	3	22
3. Standards/assessments	0	0	0	1	0	7	0	1	5	3	17
4. Resources	0	1	0	3	1	0	0	5	0	1	12
5. Parent perceptions	0	2	0	0	0	1	0	8	0	0	11
6. Student skill level	0	0	3	2	1	6	4	0	1	1	18
7. Time	8	8	4	31	6	6	11	7	13	8	102
8. Training/Development	3	0	1	5	0	1	0	1	0	0	11

Table 5

Theme	Category	TC Teacher controllable	TX Not teacher controllable	RQ1	RQ2
Theme 1: Teachers demonstrated a solid understanding of PBL as an instructional approach.	Promotors of using PBL	✓		✓	
Theme 2: Teachers expressed willingness to use PBL in their classrooms.	Promotors of using PBL	✓			✓
Theme 3: Teachers generally feel conflicted about the support they receive from administration surrounding PBL.	Teachers' emotions surrounding PBL		✓		✓
Theme 4: Teachers feel stretched by the quantity and depth of tasks they are expected to accomplish.	Teachers' emotions surrounding PBL		✓	✓	✓
Theme 5: Lack of time is the leading obstacle to using PBL in the classroom.	Challenges of using PBL		✓	✓	✓