6-26-2024

Student Achievement Through Project-Based Learning

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ED 590: Research and Complete the Capstone, C383

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June 15, 2024

DEDICATION

To my fiancé, Brent, thank you for supporting and encouraging me to continue my education.

To Chloe, thank you for always being by my side. You are simply the best!

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Abstract

This literature review investigated the effects project-based learning has on student achievement, with the objective of determining its value from an educational leader's perspective. A comprehensive literature review of qualitative, quantitative, mixed methods, and meta-analysis studies were conducted to provide an understanding of project-based learning's impact. Three themes were identified: student achievement, student behavior, and the teacher's role. Findings suggested project-based learning can significantly enhance student achievement by promoting critical thinking skills, problem-solving skills, and supporting a deeper understanding of subject matter. In terms of student behavior, it was found project-based learning can increase engagement, motivation, and collaboration among students. The teacher served an important role in which there needed to be a required shift from traditional instructional methods to student-centered learning. The teacher acted as a guide throughout the project-based learning experience. This transition posed challenges but proved to be critical in the successful implementation of project-based learning. Overall, the evidence indicated project-based learning is a valuable educational strategy that can lead to substantial improvements in student achievement, justifying its implementation from an educational leadership perspective.

Keywords: project-based learning (PBL), inquiry-based learning, student achievement, student-centered learning, social skills

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Chapter One: Introduction

Imagine asking an elementary student about their family's history and immigration story. Chances are that students in this age group are going to have little to no information about this topic. Educators have a tough decision on how they want to approach this complex topic, considering everybody comes from a different background with a unique story to tell. There is always the option of using resources such as textbooks or websites to conduct research. Or perhaps students interview family members to gather information about their ancestors, create a visual timeline or family tree of their family's heritage, share a traditional dish from their ancestors' homeland, create a walk-through museum to share their immigration stories and photos, invite community members to share their own stories and discuss the importance of preserving family history. Now, what could have been a disengaging and reading from a textbook topic turns into students having a sense of pride and an engaging story to share with their peers. This is just one example of how project-based learning can be used to answer a family history question with many suggestions on how a student could approach the project in hope it can be used to make student learning more relevant and meaningful.

Importance of the Topic

Project-based learning is a student-centered approach to teaching and involves students using and developing problem-solving skills, critical thinking skills, and creativity to produce a final project or presentation, with the goal of gaining deeper knowledge and understanding of a topic. In project-based learning, students are often given real-world problems to solve while the teacher acts as a guide for students throughout the process and provides support and feedback when needed (Kilic and Ozmen, 2022). Certainly, this dynamic approach not only deepens

students' understanding but also prepares them to face complex real-world issues with confidence and innovation.

Project-based learning is an important topic in education because it equips students with the essential skills and mindsets necessary for navigating life's challenges and shaping the future. Project-based learning lays the foundation for promoting teamwork and collaboration which will transfer to interactions with peers and develops future career interests. The ability for students to solve problems, collaborate with others, and communicate ideas effectively will transfer to adulthood (Buck Institute for Education, n.d.). This method is essentially setting students up for success in an ever-changing, complex world.

In addition, student engagement is heightened through the use of technology and the ability to explore and express student creativity. When students are more involved and take accountability for their learning, students are more likely to retain information and have a deeper understanding of the content. Project-based learning is a more personalized learning approach where students can apply their strengths and learn the strengths of their peers (PowerSchool, 2021). Therefore, project-based learning not only fosters a deeper connection to academic content but also cultivates a more engaging and personalized educational experience that highlights and enhances individual and collective strengths.

Research Question

Throughout the Master of Arts in Educational Leadership program at Concordia University, Saint Paul, the assigned courses revolved around the program's essential question: In light of what is known about pedagogy in the contemporary educational setting, how shall educators lead equitably and inclusively in order to positively impact student development and learning? Using this essential question as the foundation for a future educational leader, a new

question was developed, which addressed and encompassed the program's essential question and personal curiosity. In light of what is known about pedagogy in the contemporary educational setting, what effect does project-based learning have on student achievement?

This question applies to using project-based learning as a pedagogical approach because it promotes critical thinking, collaboration, communication, and problem-solving skills. Educators must provide opportunities for all students by incorporating diverse perspectives, experiences, and cultures into their project design. Educators must also provide equitable access to resources and technology to support student learning. For example, if a project is assigned as homework, then each student needs to have access to all materials needed to be successful, even if it means the materials are provided by the school. It is one thing to implement PBL, but one should also question if it is an effective method of teaching, and analyze student achievement, which is what this paper intends to do.

Scope of Research

This paper analyzed and summarized a diverse range of academic articles to investigate the impact project-based learning has on student achievement and student behavior and the role of the teacher when implementing PBL. This paper reviewed quantitative research articles, qualitative research articles, meta-analysis research articles, and mixed methods research articles. These articles were then synthesized to find common themes among the research studies. This paper focused on the effects of PBL regarding elementary and secondary students. This paper did not research or analyze the effects of project-based learning at a post-secondary level. This paper did not examine the viewpoints of administration, students, families, or the community.

Definition of Terms

Project-Based Learning (PBL) is "a teaching method in which students gain knowledge

and skills by working for an extended period of time to investigate and respond to a complex question, problem, or challenge." (Styla & Michalopoulou, 2016)

Social Skills is "socially acceptable learned behaviors that enable a person to interact with others in ways that elicit positive responses." (Styla & Michalopoulou, 2016)

Student Achievement refers to student performance in an academic or cognitive area.

Student Behavior refers to how a student acts and responds to learning.

Summary

A PBL approach contrasts traditional methods by engaging students through interviews, creating projects, and community involvement, making learning more relevant and meaningful. PBL is a student-centered teaching strategy which fosters problem-solving, critical thinking, and creativity, for students to gain a deeper understanding of the content and real-world application. In this paper, PBL was researched and analyzed through quantitative, qualitative, meta-analysis, and mixed-methods research to identify three themes. These themes are student achievement, student behavior, and the role of the teacher. The goal of this paper was to determine if PBL is an effective teaching method, specifically examining the three themes, and how educators shall lead equitably and inclusively in order to positively impact student development and learning by implementing a PBL approach.

Chapter Two: Literature Review

The purpose of this literature review was to examine PBL and its effects on student achievement. This literature review also analyzed student behavior and the teacher's role in PBL. This literature review encompasses qualitative, quantitative, mixed-methods, and meta-analysis primary research articles, all of which have been peer-reviewed. These articles explored how PBL impacts these three interconnected themes. Student achievement is analyzed in terms of

academic performance and skills acquired, while student behavior is examined regarding engagement, motivation, and classroom conduct. The role of the teacher is investigated to understand how educators facilitate a PBL environment and influence outcomes. This literature review summarized findings and aimed to find connections or disparities within the variety of research articles.

The first theme was student achievement, which is an indicator of effective educational methods. This theme was evident in research provided by Antonio & Prudente (2024), Catapano, S., & Gray, J. (2015), Chaidam & Poonputta (2022), Hugerat et al. (2020), Kalyoncu & Tepecik (2010), Ozturk et al., (2021), and Somphol et al., (2022). Student achievement encompassed both academic performance and students' ability to obtain essential skills such as critical thinking, problem-solving, and collaboration. The focus on student achievement would allow educators or educational leaders to assess the effectiveness of PBL when it comes to improving educational outcomes. If the method proves to be effective, then curriculum design and teaching strategies can be implemented to better meet the needs of diverse learners.

The second recurring theme was student behavior which influences student learning. This theme was evident in research provided by Hugerat et al. (2020), La Porte, A. (2016), Ozturk et al., (2021), Somphol et al. (2022), Styla, D. & Michalopoulou, A. (2016), and Sulaiman et al. (2023). Student behavior was identified as levels of engagement, motivation, and classroom conduct. High levels of engagement will often lead to deeper understanding and retention of content which goes hand-in-hand with the first theme, student achievement. Understanding how PBL impacts student behavior may help educators create a more engaging learning environment which would enhance the overall student learning environment.

The third recurring theme was the role of the teacher. This is important for the successful

implementation and effectiveness of PBL. This theme was evident in research provided by La Porte, A. (2016), Noble et al. (2020), Romero-Ariza et al. (2024), Shome and Natarajan (2013), Styla, D. & Michalopoulou, A. (2016), Viro et al. (2020), and Yukhymenko et al. (2014). The teacher's role was defined as a facilitator whose purpose is to guide, support, and challenge students throughout the project. Ultimately, successful PBL starts with the teacher. Teachers directly impact how students engage with the content and how students perform on the project through instruction.

Student Achievement

Analyzing and discussing student achievement in the context of PBL is the focal point of this literature review for several reasons. By examining student achievement, educational leaders, educators, and researchers can evaluate the effectiveness of PBL in enhancing students' understanding and retention of subject matter. Assessing student achievement provides evidence on how PBL impacts student learning outcomes. This data is valuable for educators or educational leaders seeking to justify the adoption of PBL over traditional methods. The following articles were chosen to assist in answering the research question: In light of what is known about pedagogy in the contemporary educational setting, what effect does project-based learning have on student achievement?

A quantitative research study conducted by Somphol et al. (2022) was analyzed. This article was chosen to evaluate the purpose of PBL in that it claims to improve communication skills, critical thinking skills, creativity skills, and collaboration skills (4Cs). This study was created to assess these project-based learning skills. The participants in this study consisted of eighteen secondary school students. The process of project-based learning was designed by the researchers who laid out the teaching steps: compose, clarify, comprehend, and come together. It

explained the meaning of these steps, the teaching activities, and the role of teachers throughout the process and how they correlate with PBL. This process was then used to create eight learning plans with a focus on extracting natural dye from plants. The learning skill assessment determined communication passed with 83.33%, critical thinking passed with 70.83%, creativity passed with 80.56%, and collaboration passed with 85.42%. The 4Cs criteria was 70% (Somphol et al., 2022). Based on this research, PBL did improve students' ability to communicate, apply critical thinking, apply creativity, and apply collaboration skills.

Quantitative research was conducted by Ozturk et al. (2021) in which they investigated PBL in teaching programming in terms of academic achievement throughout a six-week study. PBL was used in the experimental group while traditional teaching was used in the control group. The participants in this study consisted of 55 sixth graders. Twenty-nine of these students were put into an experimental group and the twenty-six remaining students were put into the control group. This study used a quasi-experimental model, and a pre-test and post-test were given to all participants to assess student achievement. When analyzing the pre-test and post-test assessments, it was determined both groups, experimental and control, scores increased. However, students in the experimental group (12.21 points) were higher than the students in the control group (7.46 points). It can be determined PBL is more effective than traditional learning when it comes to programming (Ozturk et al. 2021).

Quantitative research was conducted by Chaidam and Poonputta (2022) in which they focused on the development and evaluation of lesson plans for teaching "Weight and Measurement" in mathematics to thirty-five first grade students using PBL within Technological Pedagogical and Content Knowledge (TPACK). The study aimed to measure the efficiency of these lesson plans, compare students' learning achievements before and after the implementation

of PBL by using pretests and posttests, and assess students' satisfaction with this learning approach through questionnaires. Lesson plans were measured using TPACK MODEL in which the criteria of 75/75 (process and result) were established. The lesson plans' efficiency was 85.54/78.71, surpassing the established criteria of 75/75. In addition, students' mean scores significantly improved post-intervention, from a pretest score of 7.11 to a posttest score of 15.74. Without specific examples, it was determined "students' satisfaction was at a high level." (Chaidam and Poonputta, 2022). This study concluded the PBL approach within the TPACK framework is highly effective for teaching mathematical concepts to young students. Students showed significant improvement in learning outcomes and high levels of student satisfaction.

In a different research study, mixed methods conducted by Hugerat et al. (2020) determined the educational effectiveness of didactical games in PBL. The participants in this study consisted of 188 fifth-grade students from two elementary schools. The experimental group consisted of 92 students and the control group consisted of 96 students. A pre-test and post-test were given to students to determine achievement level. The control group was taught 11 lessons on the digestive system using frontal teaching methods, textbooks, answering questions at the end of each chapter, and reading informative passages. The data showed an average post-test grade of 71.63 for the control group. The experimental group was taught the same 11 lessons by using short frontal teaching methods, then students were placed into groups consisting of five students, followed by these groups learning relevant didactical games for each lesson such as: board games, bingo, Wheel of Fortunes, puzzles, dramatic play, and computer games. Afterwards, groups presented their conclusions. This data showed an average post-test grade of 82.89 for the experimental group (Hugerat et al., 2020). This evidence shows the control group and experimental group both demonstrated academic learning; however, the experimental

group's academic learning was significantly greater.

Ozturk et al. (2021) and Hugerat et al. (2020) had the same findings when comparing student achievement of the experimental and control groups, the experimental group performed higher than participants in the control group. Quantitative data research was conducted by Kalyoncu and Tepecik (2010) to determine the effect of PBL on students' achievement and performance in a visual arts course. A pre-test and post-test were given to students to determine achievement levels. PBL was used in the experimental group while conventional teaching was used in the control group. The participants in this study consisted of 61 eighth graders. Thirty of these students were put into an experimental group and the thirty-one remaining students were put into the control group. There was a significant increase in student achievement in the experimental group. There was an increase in student achievement in the control group; however, the increase was not as significant as those participants in the experimental group. It is also noted the experimental group exhibited "creative thinking, problem-solving skills and academic risk-taking levels." (Kalyoncu and Tepecik, 2010). Just as Somphol et al. (2022) discovered. All three quantitative articles and the one mixed methods article that were analyzed had the same findings, students have higher academic achievement when using PBL, rather than receiving teacher-centered instruction.

Meta-Analysis findings from research studies were analyzed by Antonio and Prudent (2023) in which they investigated the effects of inquiry-based approaches on students' higher-order thinking skills in science. The participants involved in the analyzed studies consisted of 1,349 students in elementary and secondary levels in which participants were exposed to both inquiry-based and conventional approaches. The meta-analysis consisted of twenty studies from January 2017 to September 2022. Antonio and Prudente (2023) found positive and substantial

effects of inquiry-based learning on students' higher -order thinking abilities compared to conventional teaching methods. Moderator analysis revealed varying results across countries, with significant differences observed based on the type of higher-order thinking skills and duration of implementation. However, educational level, scientific discipline, and inquiry level did not significantly impact the effectiveness of inquiry-based approaches. Various inquiry-based methods, including STEM, were identified as effective in enhancing students' higher-order thinking skills.

There was some discrepancy in the qualitative research that was conducted by Catapano and Gray (2015). This research was analyzed to determine the effects of implementing PBL at a magnet school in a large, urban, Mid-Western school district. The program was called Saturday School in which students attended project-based learning on Saturdays while receiving regular instruction, Monday-Friday. Saturday School was on a first-come, first-served basis. The program launched in 2005 with high attendance numbers as well as a wait list. The participants in this research study consisted of 12-14 students, first through fifth grade, grouped by their grade level, but the participants changed every semester. The program was run by pre-service teachers (student teachers) and supervised by university faculty. It should be noted Principal A was involved in Saturday School 2005-2008. Principal B took over Saturday School in 2009. All participants were asked to take part in surveys, interviews, and observations. Under Principal A's leadership, students, parents, and pre-service teachers had high remarks for the Saturday School program. The program was described as a "better alternative than other Saturday morning options, and there was carry-over of information involved in the program that allowed students to be more successful Monday through Friday." (Catapano and Gray, 2015). It was noted students looked forward to going to Saturday School because it was more fun than regular school

and it kept them entertained. Even the pre-service teachers who usually would not consider themselves working in an urban setting, could see themselves as urban educators. The discrepancy lies with Principal B. Principal B felt there was not enough rigor, and the program would be more meaningful if it focused on district curriculum. Principal B stated when it came down to test scores and Annual Yearly Progress, Principal B did not see a strong connection between PBL and student achievement. Principal B took over the leadership role in 2009 and changed the program from PBL to curriculum-based instruction and attendance dropped (Catapano and Gray, 2015).

These studies highlighted the effectiveness of PBL in different subjects and grade levels. Apart from a qualitative study by Catapano and Gray (2015), these studies suggested PBL is generally more effective than traditional methods in promoting academic achievement. The studies also supported PBL boosting essential skills such as communication, critical thinking, creativity, and collaboration skills. Overall, these studies confirm PBL is a valuable pedagogical approach which increased student achievement, although its success varied based on implementation and leadership.

Student Behavior

Through summarizing and synthesizing articles specific to student achievement, a different theme emerged. PBL shifts the focus from traditional teacher-centered methods to a student-centered learning environment, where students take an active role in their learning. This shift can influence student behavior. PBL offers more student engagement, collaboration, and independence. In addition, student motivation can play a factor in educational success and lifelong learning. PBL aims to increase motivation by making learning more meaningful and relevant through real-world applications. It is an important theme to explore because if certain

aspects of PBL consistently lead to positive behavioral outcomes, these can be emphasized and integrated into other areas. In the six research articles that were analyzed, some articles only focused on student behavior, and some were discussed when student achievement was being analyzed.

Qualitative research was conducted by Styla and Michalopoulou (2016) in which they investigated whether students with low levels of social skills can be benefited by PBL. The participants in this study consisted of 42 high school students who had low levels of social skills and 13 teachers. Data was collected through interviews and observations. The targeted student social skills that were analyzed were collaboration, empathy, self-control, and assertion. During the first observation it was noted the 42 student participants did not participate at all with their teams. After five months of literature lessons, it was observed the social skills revolving around collaboration, empathy, and assertion all increased. There was not enough evidence to evaluate self-control through observation because no conflicts arose. Students were also interviewed as a form of a post-test and the interviews concluded students found all social skills increased, including self-control, and found the most significant difference in their cooperation social skills through PBL. Based on this research, PBL enhanced the cooperation, empathy, assertion, and self-control social skills of the sample students considerably.

Qualitative research was conducted by La Porte (2016) to understand the efficacy of a modified International Baccalaureate (IB) Primary Years Program at a school with a large percentage of language and socioeconomically disadvantaged students. Participants in this study consisted of 75 fourth grade students. The student population consisted of 55 percent Latino, 37 percent White, 7 percent Pacific Islanders, and 83 percent of this population qualified for free and reduced lunch. The qualitative research was based on observations and interviews with

students, teachers, and school principals. Students were observed being enthusiastic about their learning and feeling their differences being respected. Students were involved in formative and summative assessments which increased students' interests and challenged their critical thinking skills. It was reported students looked forward to working on their summative projects because it was their choice in how they wanted to present their projects. Some examples included writing a song, creating visuals through three dimensional models or paintings, or performing a drama. It was noted through this IB approach "students feel inclusive and personally connected to issues throughout the world regardless of their culture or ethnicity." (La Porte, 2016).

In the previous study in which researchers investigated PBL in teaching programming in terms of academic achievement throughout a six-week study, Ozturk et al. (2021) asked the question, "Do students' in-class behaviors differ significantly when they are exposed to PBL or traditional teacher?" ClassDojo was used to assess the positive and negative behaviors of students throughout the six-week course. There was no significant difference between the behaviors of the experimental and control group before implementing the study. Throughout the six-week course it was determined PBL increased the positive behaviors and decreased the negative behaviors (Ozturk et al., 2021).

Quantitative research was conducted by Sulaiman et al. (2023) with the purpose of analyzing the effectiveness of STEM-PBL in physics based on the students' interest, sense-making, and effort. There was an experimental group which consisted of 44 high school students from Malaysia and 33 high school students from Korea, all who were learning physics through a STEM-PBL approach. The control group also consisted of 44 high school students from Malaysia and 33 high school students from Korea, all who were learning physics through a conventional approach. Both groups participated in a pre-survey and post-survey after the

intervention. Based on the students' perspective of personal interest, the experimental group showed a statistically significant difference increase from the pre-survey to the post-survey. The control group, however, did not show a statistical increase in personal interest from the pre-survey to the post-survey. Based on the students' perspective of sense-making and effort, the experimental group showed a statistically significant difference increase from the pre-survey to the post-survey. The control group did not show a statistically significant difference in sense-making and effort from the pre-survey to the post-survey. This data showed by using integrated STEM-PBL it improved secondary students' personal interest and sense-making and effort. This is important because it may promote students' motivation for learning.

In the previous research study by Hugerat et al. (2020) it determined the educational effectiveness of didactical games in project-based science learning. Hugerat et al. (2020) also used two questionnaires to determine motivation and the learning environment. The motivation questionnaire focused on intrinsic motivation, self-efficacy, self-determination, career motivation, and grade motivation. It was determined the overall motivation to learn science was higher than the control group in all five areas. The learning environment questionnaire looked at satisfaction and enjoyment, student-teacher relationships, gender tension and inequality, student-student relationships, and competitiveness. It was determined the experimental group reported a better learning environment than the control group (Hugerat et al., 2020).

Somphol et al. (2022) also analyzed student behavior from teacher records of students' behavior and had the same findings as Ozturk et al. (2021) and Hugerat et al. (2020). It was concluded students with creative skills were more likely to think and express themselves, add different perspectives in conversation, and have a willingness to share their opinions. Students with strong communication skills were usually first to answer teacher questions and able to show

their work through writing and speaking. Students with critical thinking skills were considered to be active listeners and well planned. Students with collaboration skills tended to assign work to others and could adapt to their surroundings (Somphol et al., 2022). It can be determined project-based learning has a positive effect on student behavior where students enjoy the work, participate, and the learning environment is more meaningful to students and teachers. (Kalyoncu and Tepecik, 2010).

These studies highlighted student behavior regarding PBL in different subjects and grade levels. These articles provided evidence in which PBL enhanced the social skills, enthusiasm, and motivation of students. Students also showed respect for peer differences. The studies used for this theme did not note any off-task behaviors. In fact, Ozturk et al. (2021) showed PBL positively influenced student behavior and reduced negative behaviors. Collectively, these studies affirm PBL positively impacts student behavior, engagement, and the overall learning environment.

Role of the Teacher

The role of the teacher can directly affect student achievement and student behavior when implementing PBL. This was a common theme when summarizing student achievement and student behavior research articles. The teacher's role is to create a classroom culture that values collaboration and respects diverse perspectives. Teachers are to act as facilitators rather than the person with all the answers. Instead, teachers need to ask questions to stimulate deeper thinking without directly providing answers. It is reasonable to say the teacher plays the most important role for effectively implementing PBL but during this literature review, this theme had the most resistance. Teachers understood the importance of PBL but argued about time constraints, lack of resources, lack of training, and fair assessments. Therefore, while the teacher's role is crucial, it

is also met with challenges.

Mixed methods research was conducted by Noble et al. (2020) in which classroom observations and teacher interviews were conducted. The purpose of this study was to gain a clear understanding of PBL implementation across schools and classrooms and observe consistencies in PBL practice. Quantitative data was collected to compare PBL experiences with non-PBL classroom practices. The participants were from twelve inclusive STEM schools located across the U.S. The interview sample consisted of 64 teachers from these twelve STEM schools chosen at random. Interviews were conducted to address instructional practices and teacher experiences at a STEM school. It was determined 67.2 percent of teachers discussed some form of student autonomy, 75 percent of teachers discussed student cooperation and teamwork, 71.9 percent of teachers discussed integration of subjects, 96.9 percent of teachers discussed real-world connections, and 70.3 percent of teachers discussed cognitive demand. This information contributes to understanding what PBL means to a STEM school. Forty-four of these interviewed teachers were also observed. The classroom observation sample was 129 tenth grade classrooms at the same twelve STEM schools and observations were scored using a three-point system. One was the behavior was not present to three, the behavior was present. Observations specifically looked for cognitive demand, student autonomy, student risk-taking, integration of concepts, real world connections, and student cooperation and teamwork. Based on this information, it was determined “PBL experiences had a higher presence of student autonomy, integration of concepts, and student cooperation and teamwork compared to non-PBL class sessions. No significant differences emerged between class sessions classified as PBL, versus non-PBL experiences for cognitive demand, student risk taking, or real-world connections.” (Noble et al., 2020). This study concludes PBL practices in inclusive STEM schools share

common elements such as student autonomy, collaboration, and interdisciplinary learning; their successful implementation relies on the flexibility to adapt these practices to specific contexts. This adaptability, coupled with the support from school leadership, gives PBL the ability to foster meaningful, rigorous, and engaging learning experiences that prepare students with essential 21st century skills.

Mixed methods research was conducted by Romero-Ariza et al. (2020) in which they investigated teachers' views of inquiry-based learning (IBL) and its enactment. The mixed methods approach combined quantitative data from surveys and qualitative data from interviews and focus group discussions. There were 1,132 teachers, pre-service and in-service, who participated in this study. Teachers believed IBL benefited students and increased student motivation. Teachers believed it is important to provide open-ended tasks and provide a classroom environment that nurtures collaboration and is a safe environment for students to take risks. Teachers also stressed providing guidance is of utmost importance when following an IBL approach. In addition, teacher collaboration was viewed as an important factor. Teachers felt alone if they were the only ones implementing IBL and were more enthusiastic about the approach if it was a team effort. Along with the positives came some negatives. Teachers "expressed frustration with their experiences, the lack of time, resources to prepare for IBL, managing group work and the demands of curriculum delivery, assessment and accountability." (Romero-Ariza et al., 2020). Teachers also expressed the need for professional development. All in all, the results found the teachers' views of IBL were generally positive in this study. The teacher's role stressed the importance of teacher collaboration, providing students with open-ended tasks, and providing the students with guidance.

Qualitative research was conducted by Yukhymenko et al. (2014), the purpose was to

analyze the instructional practices of teachers and how students responded to the PBL approach. Four middle school social science classrooms were observed for one semester. Students used GlobalEd 2, an online simulation of decision making. The assignment focused on water scarcity. Teachers attended a four-day online training on PBL and GlobalEd 2 during the summer, prior to teaching the unit. Teachers also participated in a mini PBL simulation during this time. A thematic codebook, or template, was used during observations and discovered there were four categories regarding the teacher's instructional practices. These categories were that teachers encouraged student engagement through positive communication, managed the classroom, provided precise directions, and prompted students' future actions. There were also instructional practices that were not presented in the thematic codebook. One theme was teachers were engaged with students. In observations, teachers would draw attention, agree with students, joke, move around the classroom, talk and listen with students. The second theme was teachers would restrict students. In observations, teachers would give precise directions such as when materials should be ready, where students should go, how students should split up, and when students should be quiet. Teachers would also prompt certain actions such as telling students what they should be discussing, telling students to plan, telling students to read, and telling students when to start. Teachers also had to redirect students when they were off topic. Ultimately, the teacher's role in a PBL environment is to cultivate students' independent learning, critical thinking, and problem-solving skills, while maintaining the structure and focus of the classroom activities.

Qualitative research was conducted by Shome and Natarajan (2013), in which they held semi-structured interviews with four teachers. The interviews focused on their views of PBL in terms of subject integration, assessment and learning, group work and learning, and management of classroom and resources. The four teachers ranged in age from 25 to 61 and came from

different school settings and taught middle school or high school. The Central Board of Secondary Education (CBSE) mandated projects needed to be a part of schools' formative assessment. Three of the four teachers were from schools that needed to follow the new CBSE policy. The policy did not specify the number or frequency of projects which allowed teachers some flexibility in their approach. One teacher focused on guiding students for competitions, two teachers aimed to enhance academics; however, due to time constraints projects were reduced to shorter activities or home assignments. Group work and collaboration was seen as impractical. Teachers struggled with students taking projects home because it inevitably led to parents assisting in the project. They also viewed giving each student in the group the same grade as unethical due to the variety of effort by each group member. Teachers viewed students' lack of social skills and diverse socio-economic backgrounds as barriers. They also found self and peer assessments impractical and unreliable due to the students' immaturity to grade impartially. Ultimately, these teachers did not feel empowered to implement projects as a part of their curriculum framework but agreed on the necessity of collaboration between teachers for successful implementation of PBL.

Qualitative research was conducted by Viro et al. (2020), the purpose was to use questionnaire surveys, project plans, and reports to gain insight on how mathematics and science teachers view PBL when it comes to its objectives, its characteristics, the application and situation regarding its implementation, and support and barriers to its implementation. Two surveys were given, Survey A and Survey B. Survey A focused on PBL in mathematics while Survey B focused on how PBL could be used in multidisciplinary studies. Survey A was given to 64 pre-service and in-service teachers. Survey B was given to 193 in-service teachers. Survey A found positive and negative characteristics regarding PBL in mathematics. The highest positive

characteristic was motivation and enthusiasm at 57.8 percent. The second highest positive characteristic was mathematics learning or student achievement at 46.9 percent. The highest negative characteristic was problems with organizing and scheduling at 53.1 percent. The second highest negative characteristic was problems with teamwork such as free riders, only working with friends, and competition at 50 percent. Through data analysis it was determined teachers' view PBL objectives as a method which supports students' knowledge and understanding of mathematics and science and 21st century skills. However, teachers do not feel supported for the implementation of PBL. In this study teachers felt "ready-made project institutions, ideas, tips, and examples; advice from experienced teachers; and training and guidance on basic PBL issues - would assist teachers in implementing PBL." (Viro et al., 2020). It can be concluded that for students to experience success in a PBL setting, teachers need to feel prepared, trained, and given time to implement PBL successfully.

In the previous research study by Styla and Michalopoulou (2016), they analyzed if students with low level of social skills benefited from PBL, but Styla and Michalopoulou also wanted to determine if students benefited from upgrading the teacher's role in PBL or not. Teachers were interviewed about whether they enhance the social skills of collaboration, empathy, self-control, and assertion of children with low levels of social skills. At the end of the interviews it was determined, "that teachers helped their students with low level of self-control skills, to enhance these skills, by being models of composure, by being always polite and good listeners for their students, throughout the project-literature lessons." (Styla & Michalopoulou, 2016). Teachers specifically found the most significant difference in students' self-control social skills. In the previous research study by Shome and Natarajan (2013), teachers argued students lacked the necessary social skills needed to be successful in creating projects. This perspective is

stating the opposite of Styla and Michalopoulou (2016) because it was claimed PBL assists with boosting students' social skills rather than hindering them.

In the previous research study by La Porte (2016), the efficacy of transdisciplinary learning for culturally diverse fourth graders were analyzed. It was concluded students enjoyed the IB approach and over three years of implementation there was steady progress in standardized test scores, fewer disciplinary problems, and an improved rate of student attendance. It was also suggested a successful IB approach started with the teacher. As Romero-Ariza et al. (2020) stressed the importance of teacher collaboration, so did La Porte (2016). In this study classroom teachers collaborated with specialist teachers through meeting regularly to discuss and plan ways to integrate transdisciplinary curriculum. The primary objective was to transform inquiry and deeper understanding into either a collaborative or independent project within the regular classroom. Romero-Ariza et al. (2020) and La Porte (2016) both discovered for a positive PBL or IB experiences to occur teachers were encouraged to focus on positive feedback rather than "wrong" or "right" and getting there through questions-as-suggestions to enhance student comprehension and critical thinking. In La Porte's (2016) study this positive feedback led to teachers speaking positively about their students too. The principal at this school noticed teachers would focus on what the students can do, rather than what they cannot do. In addition to teacher collaboration, guided suggestions, and positive feedback, it was also suggested for teachers to encourage self-confidence through recognizing student expertise. This allowed teachers and students to appreciate differences and recognize everyone's expertise. Ultimately the positive collaboration among teachers and the support teachers received contributed to the positive outcomes at this particular school.

It was determined that teachers across grade levels play a significant role in

implementing PBL. Effective PBL depended heavily on teacher collaboration, students receiving positive feedback from teachers, and support from school leadership. Teachers noted PBL's benefits in increasing student motivation, providing guidance, and establishing a collaborative environment, although challenges such as lack of resources and time were significant barriers. Overall, the success of PBL starts with the teacher and they need to be well-prepared and supported in their implementation.

Review of the Research Question

The educational leadership program's essential question seeks to explore how educators can lead equitably and inclusively to positively impact student development and learning, using what is known about contemporary pedagogy. The research question that was studied is: In light of what is known about pedagogy in the contemporary educational setting, what effect does project-based learning have on student achievement? This question focused on the pedagogical approach, PBL, to assess the effects on student achievement. Through investigating the effectiveness of PBL, this method fosters an equitable and inclusive learning environment that enhances student development and learning outcomes. PBL showed to be beneficial and educational leaders could advocate for its implementation.

Review of the Importance of the Topic

PBL is a crucial topic in education because it equips students with essential skills and mindsets necessary for navigating life's challenges and shaping the future. This student-centered approach involves students using and developing problem-solving skills, critical thinking, and creativity to produce a final product or presentation, with the goal of gaining deeper knowledge and understanding of a topic. By addressing real-world problems, PBL prepares students to face complex issues with confidence. It promotes teamwork and collaboration, which are transferable

to interactions with peers and future career paths, and enhances the ability to solve problems, collaborate, and communicate ideas with others. Furthermore, student engagement is heightened using technology and hands-on activities which allows students to explore their creativity, leading to better retention and understanding of content. PBL allows students to apply their strengths and learn from their peers. PBL is a method that sets students up for success through their educational journey and through their personal lives.

Summary of Findings

Reflecting on the research question: In light of what is known about pedagogy in the contemporary educational setting, what effect does project-based learning have on student achievement? It can be determined PBL positively affects student achievement. This is not to say teacher centered learning does not show academic growth but rather PBL students showed a higher level of academic growth than those students who learned the content by a teacher-centered approach. Somphol et al (2022) demonstrated PBL significantly improved secondary school students' communication, critical thinking, creativity, and collaboration skills. Ozturk et al. (2021) and Hugerat et al. (2020) found in their studies students in the experimental group receiving PBL intervention showed more academic growth than those in the control group receiving teacher-centered instruction. Meta-analysis by Antonio and Prudent (2023) confirmed the positive impact of inquiry-based learning on higher-order thinking skills in a diverse population. However, Catapano and Gray (2015) revealed mixed results; while PBL was initially well-received in a magnet school's Saturday School program under Principal A, Principal B did not see the value in PBL and did not believe students were performing any better academically. Principal B switched to a curriculum-based approach which resulted in lower attendance. Ultimately, the studies collectively support PBL as an effective method of instruction to improve

academic achievement and cognitive skills.

It was concluded positive student behavior significantly increased through the use of PBL. Ozturk et al. (2021) observed PBL increased positive behaviors and reduced negative behaviors in students during a six-week programming course. Sulaiman et al. (2023) found STEM-PBL significantly boosted students' interest, sense-making, and effort in physics, promoting motivation for learning. Additionally, Hugerat et al. (2020) determined PBL using didactical games enhanced student motivation, self-efficacy, and the overall learning environment compared to traditional methods. However, in studies by Viro et al. (2020) and Yukhymenko et al. (2014), negative student behaviors were observed. The undesirable student behaviors witnessed were off-topic conversations, not paying attention, and not contributing to group work. Overall, these studies indicate PBL positively influences student behavior and learning outcomes.

It was determined that the teacher's role in implementing PBL is crucial for influencing student achievement and student behavior in a project-based learning environment. Research indicated effective PBL requires teachers to create a classroom culture that is supportive, emphasizes collaboration, and acts as a facilitator who provokes critical thinking rather than provides answers. However, despite the acknowledged importance of the teacher's role, there were significant challenges noted. Romero-Ariza et al. (2020) highlighted the positive impact of teacher collaboration, but teachers expressed frustration over limited time, resources, and the need for professional development. Similarly, Viro et al. (2020) pointed out the need for prepared, trained teachers with adequate time to implement PBL effectively. Shome and Natarajan (2013) claimed some teachers did not feel empowered to implement PBL effectively and struggled with allowing students to bring projects home, assigning the same grade to all

members of the group, and students having a deficit in social skills. All things considered, these studies suggest while the teacher plays the most important role in effective PBL, the areas of support, resources, and time are essential to overcome challenges of implementing project-based learning.

Conclusion

In conclusion, based on the articles chosen in this literature review, PBL had a positive effect on student achievement, surpassing traditional teacher-centered approaches. While PBL enhanced student learning in academic areas, it also enhanced problem-solving skills, creativity, innovation, communication, critical thinking, collaboration skills, and leadership skills. These skills are essential because skills demand trends claim there will be a decline in jobs that require manual labor and the knowledge of common subjects, and more of a demand for analytical and critical thinking skills in job requirements (Viro et al., 2020). Additionally, PBL showed an increase in student motivation and positive student behavior. Despite some mixed results and challenges related to the teacher's role in implementation, the overall findings support PBL as an effective pedagogical strategy.

Chapter Three: Discussion and Application

By analyzing and summarizing quantitative, qualitative, meta-analysis, and mixed-methods academic research articles to investigate the impact project-based learning has on student achievement, student behavior, and the role of the teacher, three insights were gained from this research and these insights will lead to application. Furthermore, three future studies will be suggested to support this topic. It is clear PBL positively impacts student achievement, student behavior, and the significance of the teacher's role which leads to further research in this area.

Insights Gained from the Research

After summarizing and synthesizing peer-reviewed academic journals, three themes are prominent. These themes are student achievement, student behavior, and the teacher's role. Exploring these three themes to great extent led to gained insights. Insights gained from this research are the importance of the educator's role, allocating time for PBL implementation, and utilizing PBL for real-world connections. By focusing on these key takeaways from this research it will allow educational leaders to make informed decisions, improve practices, and address challenges so schools can ultimately lead with more effective and equitable learning techniques.

The teacher's role was prominent in many articles when exploring the effects of PBL and student achievement. It is the teacher's job to guide instruction into a student-centered approach. Teachers design meaningful tasks that align with curriculum standards and inspire student inquiry. They need to create a structured yet flexible learning environment which encourages students to explore their creativity and passions. Teachers are there to provide feedback and support so students can develop and build upon their critical thinking, problem-solving, and collaboration skills. All in all, the responsibility of effective PBL falls on the teacher; however, research suggests some teachers do not feel prepared or confident when attempting to implement PBL.

Traditional school schedules have inflexible class periods and sometimes fragmented time blocks. This proves to be a challenge for PBL to be implemented correctly. Research conducted by Romero-Ariza et al. (2020), Shome and Natarajan (2013), and Viro et al. (2020) discovered most teachers understand the benefits of PBL regarding student achievement and social skills; however, having the appropriate amount of time needed continued to be a topic of conversation. Teachers often find themselves struggling to balance the demands of curriculum,

state standards, assessments, much less trying to navigate open-ended, time-consuming projects. This misalignment between scheduling and the requirements for PBL negatively affects the overall learning experience.

Another noticing during this literature review was the focus on PBL being used for real-world connections. This promotes student engagement and motivation by making learning more relevant. Students become more invested and enthusiastic when they see the practical application of their projects. The integration of real-world connections in PBL strengthens its impact by providing a more authentic learning experience and helping students understand the relevance of their education. An article in this literature review used water scarcity (Yukhymenko et al., 2014) as a real-world connection; however, many articles did not dive into what real-world connections students were set out to explore. Understanding real-world connections in PBL is necessary for making learning more meaningful because it provides deeper engagement and a greater sense of purpose.

These three insights work in unison to promote effective learning experiences. Student learning starts with having a knowledgeable and prepared teacher who is confident in their ability. These teachers also need time and resources to develop curriculum aligned lessons or projects. Finally, the learning needs to be relevant to students and have purpose. However, challenges persist in each of these insights and will be addressed through suggestions of application.

Application

It is evident teachers need to be properly trained, be given an appropriate amount of time, and use real-world connections to make PBL successful. Teachers may struggle to design and facilitate PBL methods resulting in failure or dismissing the experience altogether. In addition,

time constraints can hinder students' ability to create quality projects that demonstrate their understanding. Finally, PBL needs to revolve around real-world connections because this is essential for engagement, understanding, and 21st century skills. These areas prove to be a challenge though and they need to be addressed to effectively apply PBL methods.

Due to the significance of the teacher's role and to help teachers feel successful and confident when implementing PBL methods, educators need to be well-prepared. This can be accomplished through professional development (PD). First, when focusing on the areas of concern that are present in this literature review, educators need to understand the concepts of PBL and how to design projects that align with curriculum standards. PD can focus on teachers collaborating by designing PBL units, sharing materials, and distributing the workload. Secondly, PD should cover assessment methods such as formative assessments, self-assessment, peer assessment, and summative assessments to evaluate the process and product of student projects. In addition, teachers need to see PBL first-hand. This could be accomplished through instructional coach meetings or observing colleagues who are well-versed in PBL. These suggestions will allow educators to overcome challenges, feel more comfortable, and become more knowledgeable in applying PBL in the classroom.

In addition to teachers not feeling prepared and confident in PBL, the biggest concern present in this literature review is time and resources. It is important to realize when implementing any new teaching method, it will take time and grace. One suggestion is gradually implementing PBL by starting with a pilot program before introducing the new method school-wide. This will allow for adjustments based on feedback and experience. Another way to gradually integrate PBL into the classrooms could be introducing one project per semester or focusing on one subject area would allow teachers to refine their approach without feeling

overwhelmed. Ultimately, having a flexible schedule would also be ideal in giving teachers the time they need to feel successful. This could be having block scheduling that is dedicated to PBL days. This would accommodate students being able to focus on their projects without constraints.

The purpose of PBL is to enhance student learning by engaging them in meaningful, real-world projects that require critical thinking, problem-solving, and collaboration skills. In the previous qualitative research conducted by Viro et al. (2020), it stated teachers would like ideas and examples of projects to help them understand what PBL can look like. To apply this insight to application, schools and educators could collaborate with businesses, non-profits, or community groups to ask how young students could help solve any problems they may encounter while aligning the task with state standards. An example of this could be creating a school newspaper or blog which would allow students to practice journalism while adhering to standards in writing, research, and media. Students could report local events, interview community members, and publish their work online. Furthermore, during PDs, ideas and experiences can be shared among teachers and staff as to what projects worked well and what projects need revamping. These are just some examples of how schools can provide students with real-world learning experiences that meet academic standards while using PBL as the learning platform.

All in all, by focusing on collaboration, assessment strategies, and first-had experiences, teachers can overcome challenges and feel more confident in PBL. Gradually implementing PBL or limiting the number of projects can also ease the transition into a new teaching method, as with any best practice. Collaboration with the community can make learning more meaningful and relevant. Ultimately, a supportive environment, combined with ongoing PD, will allow educators to effectively integrate PBL into their classrooms.

Future Studies

There are other themes or areas revolving around PBL that could have been explored in this literature review and would make promising future studies. These areas are professional development for teachers and administration, parental roles and community involvement, and analyzing student project creations. By addressing these areas, future research can inform instructional practices, curriculum design, and policies to enhance student-centered learning experiences and better prepare students for the future.

As PBL continues to gain attraction in education, an area of interest for future studies would be focusing on teacher PD. These studies can evaluate the effectiveness of different PD models and strategies in preparing teachers to effectively implement PBL. Research could include workshops, ongoing coaching and mentoring, professional learning communities (PLC), and online resources in supporting teachers' knowledge, instructional practices, and confidence in PBL. In addition, studies can explore the role of school leadership and what support looks like from administration. Future studies in this area could inform best practices and equip teachers with the necessary skills to deliver high-quality, student-centered instruction.

An area that was not examined in this literature review but would be a meaningful future study is the parental role and community involvement in enhancing the effectiveness of PBL. These studies could observe how active engagement from parents and community members influence student outcomes, including academic performance, motivation, and real-world skill applications. Research might explore the partnership between schools and local organizations or businesses. Parental involvement could look like volunteering in the classroom or sharing expertise as a guest speaker. Studies could examine if the relationship between a supportive home environment and school reinforce classroom learning. This study can develop frameworks

focusing on collaboration which supports a more inclusive, community-oriented approach to student learning.

Another area of interest for future studies would be focusing on real-world, student-created projects. The articles focused on in this literature review did not give explicit details about the type of projects students were creating. These studies can include student ownership on learning outcomes, the role of project choice and relevance to the topic, and students' creativity, problem-solving and critical thinking skills through project creation. Studies can also reiterate what PBL is not. PBL is not where every student is completing the same project but instead given choices in how to present their findings. PBL is not busy-work and may not work for every unit but instead embraces real-world connections. By examining the details of student-created projects within the PBL framework, future studies have the potential to inform instructional practices, curriculum design, and policies aimed at enhancing student-centered learning experiences and preparing students for the future.

PBL continues to shape educational practices and future studies focusing on professional development, parental roles and community involvement, and specific examples of student projects can help support the positive effects of PBL. Future research will contribute to refining PBL best practices as the method evolves and supports students in their learning. In conclusion, ongoing research and practical applications will further support the efficacy of PBL and foster enriched learning experiences for students.

Conclusion

Reflecting on the example of elementary students being asked to explore their family history through PBL, it is evident this approach enriches the educational experience by making learning relevant and personal. PBL not only offers students a sense of pride and engagement but

also enhances student achievement. This literature review focused on the research question: In light of what is known about pedagogy in the contemporary educational setting, what effect does project-based learning have on student achievement? Through various studies, it was revealed PBL positively impacts student achievement, improves student behavior, and recognizes teachers play a pivotal role in facilitating these projects. Future studies revolving around PD, allowing teachers more time for project-based activities, and making learning more relevant by connecting PBL to real-world problems within the curriculum will maximize the benefits of PBL. Addressing these areas will further refine PBL practices, ensuring this method continues to evolve and effectively supports student learning in the contemporary educational setting.

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Appendix

Articles	Method	Student Achievement	Student Behavior	Teacher's Role
Antonio, R.P. & Prudente M.S., 2024	Meta-Analysis	X		
Catapano, S., & Gray, J., 2015	Qualitative	X		
Chaidam, O., & Poonputta, A., 2022	Quantitative	X		
Hugerat et al. 2020	Mixed-Methods	X	X	
Kalyoncu, R., & Tepecik, A., 2010	Quantitative	X		
La Porte, A., 2016	Qualitative		X	X
Noble et al., 2020	Mixed-Methods			X
Ozturk et al., 2021	Quantitative	X	X	
Romero-Ariza et al., 2024	Mixed-Methods			X
Shome, S. & Natarajan, C.	Qualitative			X
Somphol et al., 2022	Quantitative	X	X	

Styla, D. & Michalopoulou, A., 2016	Qualitative		X	X
Sulaiman et al., 2023	Quantitative		X	
Viro et al., 2020	Qualitative			X
Yukhymenko et al., 2014	Qualitative			X