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The Impact Project-Based Learning has on Student Motivation and Academics

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THE IMPACT PROJECT-BASED LEARNING HAS ON STUDENT MOTIVATION AND ACADEMICS

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Abstract

In an effort to find new ways of motivating and engaging students this literature review aims to understand the main concepts of Project-Based Learning (PBL), what motivation is, and how it affects student academics. PBL is a teaching method that uses inquiry, collaboration, real-world scenarios, and community involvement through the use of projects. PBL is a student-driven method in which teachers help facilitate discussion while students create and drive the projects. Teachers assist and guide students in the right direction as they ask questions and find solutions. Many researchers found higher levels of student motivation with PBL classroom environments based on surveys and academic results. Studies show students at a variety of learning abilities thriving with the PBL teaching method. Student surveys showed that students prefer working on projects of their choice and they felt higher motivation when the work was tied to real-life scenarios and their communities. Research showed that some students and teachers had concerns about PBL. Not all students enjoyed working collaboratively and struggled to work with their peers. Additionally, teachers struggled to implement all the concepts of PBL at once. They found the process challenging to fit all projects within a specific time frame and all curriculum materials within the projects. This literature review suggests further studies in specialized classes and academic results from a range of learning abilities and socioeconomic status factors.

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CHAPTER I: INTRODUCTION

Introduction

Education is home to a wide variety of ever-changing instructional practices and strategies. Throughout history, theorists, psychologists, and educators have worked to find new ways in which students learn best. One of the first major theorists and contributors to change education was John Dewey. He believed that students learn best when they take a social, hands-on approach to learning (Williams, 2017). Dewey thought classrooms should represent places of exploration and real life scenarios (Williams, 2017). Since Dewey, there have been numerous changes in education, some centered around student learning and hands-on approaches and others towards content-centered classrooms. Theorist, William Kilpatrick agreed with Dewey and took his teachings to the next level by narrowing in on the concept of projects. Kilpatrick believed that projects helped bring students together with passion and purpose (Pecore, 2015). Years after Dewey and Kilpatrick's studies, projects continue to be a subject of focus in education. To understand the impact of project learning, I set out to find different approaches to learning in order to help motivate students and raise their academics success. This paper will specifically focus on the Project-Based Learning (PBL) instructional strategy. The PBL teaching method is a student-centered approach to learning that consists of collaboration, exploration, and real-world scenarios with the use of projects.

As an Art Educator, my students are constantly working on project after project. The majority of the students dive right into their project assignments. However, during the process of creating their artwork, some students lose sight of their motivation to finish their work and struggle to complete even the smallest assignment. After teaching for three years, I've found similar patterns in which students "give up" on their work first. Many of the students who "gave

up" on their projects would talk about their disinterest in the current project, lack-of connection they had, difficulties they had with certain art techniques, and their attention span. As a goal to find new ways of engaging and motivating my students, I came across the PBL teaching method. This past year, I focused on trying new ways of beginning and implementing projects based on PBL research. Throughout my experiences, I've found PBL to be both challenging and beneficial for my students and myself. After learning many different techniques, one of my Drawing I classes were given an assignment based on the core principles of PBL, and they flourished. Not one student turned-in a project late. When using components of PBL, I found that students were more engaged in the process, interactive with their peers, and excited about their completed work of art.

In an effort to understand the impact of PBL, this paper will address the history of project learning, the main components of PBL, the differences between PBL and Project-based service learning (PBSL), and how PBL affects student motivation and academics in the classroom. In order to understand how and why students are motivated by PBL, research based on motivation in education and how it affects students will be reviewed. Additionally, student and teacher surveys, quantitative and qualitative data will be discussed to further understand the relationship between PBL and student academics. In addition to the data, this literature review will explore the concerns teachers and students have, along with suggested future research.

Definitions of Terms

Important definitions used throughout this paper are:

Components of Project-Based Learning: According to the Sciences and Center for Learning Technologies, the key factors of PBL can be grouped into five main concepts: driving questions, relevance, inquiry, collaboration, and presentation (Kracjcik & Blumenfeld, 2006).

These main concepts are used to implement PBL within the classroom and guide teachers and students through the process.

Student Engagement: According to the Great Schools Partnership (2016), "student engagement refers to the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education (Student Engagement section, para. 1)."

English as a Second Language (ESL): ESL is a language program designed to help students who immigrated to the United States learn English while they attend school. Usually, students work in small groups with an ESL teacher to help break down assignments into more understanding phrases. Other terms similarly used are, Second Language (L2) and English Language Learners (ELL).

Extrinsic Motivation: Ryan and Deci (2000) define extrinsic motivation as the opposite of intrinsic motivation. "Extrinsic motivation is a construct that pertains whenever an activity is done in order to attain some separable outcome" (p. 60). When someone is doing something because of an external pressure, whether positive or negative, it is considered extrinsic motivation.

Intrinsic Motivation: Ryan and Deci (2000) define intrinsic motivation as "The doing of an activity for its inherent satisfactions rather than for some separable consequence" (p. 56). Intrinsically motivated people are doing an activity for the joy or curiosity rather than a reward.

Inquiry: an investigative process of learning. The inquiry process in PBL is the time where students are encouraged to ask questions, test theories, and research to find solutions to different problems.

Motivation: According to Ryan and Deci (2000), "To be motivated, means to be moved to do something...Someone who is energized or activated toward an end is considered motivated" (p.54). People vary in how much they are motivated and what type of motivation they have. The two main types of motivation discussed in this literature review are: Intrinsic Motivation and Extrinsic Motivation.

Project-Based Learning (PBL): Kalyoncv and Tepecik (2010) describe PBL as a constructivist-based approach on and educational practice in which students explore answers, questions, and challenges through the use of projects and collaboration in order to gain knowledge and solve real-world problems.

Project-Based Service Learning (PBSL): According to Miller (2000), PBSL is the product of PBL combined with a community service need. PBSL is when students projects are linked to a community need or service. For Example: students partnering with the local fire department to help build a system that find arson patterns in the area.

Socioeconomic Status (SES): the social standing of individuals or groups that can be measured by income, work experience, education, and social standing in relation to others ("Education & SES," n.d.).

Teacher Modeling: whenever the teacher is demonstrating new ideas and concepts they are modeling new ways of doing something or ways in which they expect something to be done.

Traditional Classroom: the traditional classroom is a teacher-centered with a focus on basics and memorization. Teacher instruction usually consists of lecture based instruction with expectations of mastery in core subjects (math, science, social studies, and English).

Guiding Question

The guiding question for my research presented in Chapter II: What impact does Project-Based Learning have on student motivation and Student academics? The goal of this thesis is to understand how and why PBL has an effect on student motivation. Throughout this literature review, I will focus on what PBL and motivation are and how they connect in an educational setting. I will also look at contributing factors such as, the history of project learning, and how PBL is implemented in different classroom settings and age groups. Additionally, I will review empirical studies to learn from data and surveys by teachers and students using PBL in their classrooms. This thesis takes a deeper looks at student motivation based on different socioeconomic status, academics levels, special education, and English language learners to explore the impact PBL has on student motivation with specific student demographics.

CHAPTER II: LITERATURE REVIEW

This literature review was conducted based on searches from Education Journals, Scholarly Articles, ERIC, Academic Search Premier, and EBSCO MegaFILE. Publications from 1918 to 2018 were researched and used throughout this paper. The key words used were "Project-Based Learning," "motivation," "PBL and student engagement," "Project-Based Service Learing," and "PBL classroom implementation." The majority of the articles studied were empirical studies, journals, and case studies. This chapter will discuss the history of PBL, the main components of PBL, and how PBL is implemented within the classroom, all of which are to gain understanding of the impact PBL has on student motivation. In order to understand the impact of PBL, what motivation is, the effect it has with PBL classroom implementation, and the outcome it has on student success will be addressed. Additionally, the relationship PBL and student motivation has with diverse groups of learners and their academic success will be studied. Lastly, this section will explore teacher concerns that arose from PBL implementation and the inconsistency in PBL definitions.

Project-Based Learning History

In order to find new approaches for higher level thinking and student motivation, schools around the world have put time and resources into implementing differentiated versions of Project-Based Learning. Former teacher, principal, and professor William Kilpatrick helped lead the project movement in education (Pecore, 2015). He spent his early years studying and taking courses from theorists such as John Dewey and Charles DeGarmo (Pecore, 2015). Through his studies, Kilpatrick had the realization that student interest was a vital part of learning and can be seen when students lead their own projects (Kilpatrick, 1918). Kilpatrick learned about different teaching styles that eventually led him to write his famous 18 page essay titled "The Project

Method" (Pecore, 2015). Kilpatrick wrote to clarify what the word 'project' meant in terms of education (Kilpatrick, 1918). Throughout Kilpatrick's essay, he describes the word project as an activity designed by students who have a purpose to their actions (Kilpatrick, 1918). For projects to be successful in terms of education, Kilpatrick believed students must be the leaders and have a passion and purpose to what they are doing (Kilpatrick, 1918). Though Kilpatrick didn't coin the term 'project', his essay became one of the most influential curriculums in the 20th century (Pecore, 2015).

Howard Gardner

The traditional, conventional classroom environment typically involves teachers standing at the front of the room, lecturing, and students taking notes. This type of learning environment is starting to transition into a more hands-on approach. Educational research, such as Howard Gardner's (2011) theory of multiple intelligences shows that students need more than lecture to retain information and spark their imagination. Students learn in various ways and flourish from differentiation within the classroom. The essence of Gardner's Theory of Multiple Intelligences revolves around the concept that all people have a mix of intelligences: linguistic, spatial, logical, kinesthetic, musical, interpersonal, intrapersonal, naturalistic, and existential (Tamilselvi & Geetha, 2015). In regards to education, schools mainly focus on logical and linguistic intelligences, even though students have a wider range of intelligences (Tamilselvi & Geetha, 2015).

Lecture based classrooms are teacher and curriculum centered with minimal student choice. Gardner's theory suggests that when given the chance, students will likely be more motivated and succeed at a higher rate when offered an education that caters to their specific intelligences, not only logical and linguistic (Tamilselvi & Geetha, 2015).This literature review

will further define PBL, review components of Project-Based Learning, explore aspects of Project-Based Learning in an art classroom, Project-based Service Learning, teacher and student engagement in terms of motivation, student academics, and Project-Based Learning concerns.

Project-Based Learning

PBL is a teaching method in which students explore answers, questions, and challenges through the use of projects and collaboration in order to gain knowledge and solve real-world problems (Kalyoncv & Tepecik, 2010). PBL is an educational practice where the classroom is centered around students' interests. This type of pedagogy encourages collaboration, student voice, and community involvement. This methodology of teaching takes on a constructivist-based approach that helps students solve real-life scenarios with research and hands-on experience (Kalyoncv & Tepecik, 2010). In addition to PBL, Project-Based Service Learning (PBSL) is another widely used version of PBL with many similarities. PBSL is one-way in which PBL is operationalized in real life. PBSL is PBL with the addition of community service involvement. This literature review will cover both versions and incorporate examples of each.

According to research by Bell (2010), PBL students learn how to communicate effectively, solve real-world problems, and increase deeper learning and critical thinking. Students drive PBL projects by going through multiple steps and phases of inquiry, collaboration, presentation, organization, and goal setting. Each project is run by students with guidance and support from teachers on the sidelines. As students are guided through different phases of PBL, they keep each other accountable and on track with the use of collaboration and self-assessments (Bell, 2010).

Components of Project-Based Learning

The Cambridge Learning Sciences and the Center for Learning Technologies concluded that the key factors of PBL can be grouped into five main concepts: driving questions, relevance, inquiry, collaboration, and presentation (Kracjcik & Blumenfeld, 2006). PBL implementation among research varies among a few of the key factors, some included technology as another contributing element when using PBL. Not all five of the concepts are needed to implement PBL successfully within a classroom environment.

Driving Questions

Research found that when starting a unit using PBL there must be a meaningful and feasible question to solve (Kracjcik & Blumenfeld, 2006). Students can assist in creating the main question, however, research showed that teacher guidance is necessary to make sure curriculum hits all major concepts (Kracjcik & Blumenfeld, 2006). When creating the driving question it should be relevant to the students and to real-world situations. This will help spark interest for students and engage them to start thinking of their own questions to solve (Kracjcik & Blumenfeld, 2006). In order for students to relate to the question and become involved they create "anchoring questions" (Kracjcik & Blumenfeld, 2006). Anchoring questions are their ideas and thoughts that help students relate to the material. Creating the driving questions and anchoring questions direct the path for student learning throughout the project (Hovey & Ferguson, 2009).

Relevance

Relevance is one of the ways in which students start to take on their own responsibilities and involvement in the learning process (Harada, Kirio, & Yamamoto, 2008). The PBL structure encourages students to relate to their work by providing choice among driving questions, and topics of interest that are personally relevant to themselves and their communities (Harada,

Kirio, & Yamamoto, 2008). Furthermore, PBL projects focus on real world challenges and relatable topics to increase student engagement (Hovey & Ferguson, 2009). According to educator Wolk (1994), when students are given choices for their learning, they work harder and with more pleasure towards their goals. Within Wolk's classroom, fifth grade students were given time to choose what they wanted to explore at least once per day. After surveying his students, Wolk discovered that his students favored project time because they got to make their own choices. Their learning reached beyond classroom walls and into the real world when students wrote letters, interviewed people, observed aquariums, and tracked down information to further their studies (Wolk, 1994).

Inquiry

Inquiry is another key component of PBL. PBL is an inquiry-based teaching method driven by investigation, questioning, and solving problems (Galindo & Lee, 2018). After a driving question is introduced and decided upon, students begin the inquiry process. This process is an extended amount of time that happens at the beginning of the unit where students work together to come up with Need-to-Knows (NTKs) (Galindo & Lee, 2018). NTKs are a list of questions students generate in order to answer their initial driving question (Galindo & Lee, 2018). The inquiry stage encourages students to use this time for problem-solving before moving on to testing their theories. Teachers are there to guide and inform students on how to investigate properly and use different techniques throughout their research. Providing students with the knowledge to make their own questions and do their own inquiry.

Collaboration

According to the learning sciences research, the collaboration in PBL can be the most challenging part (Kracjcik & Blumenfeld, 2006). Students are used to being told the answers

and/or finding them on their own. Collaboration strategies are needed to help guide students through their inquiry questions (Kracjcik & Blumenfeld, 2006). According to Bell (2010), students who collaborate learn how to negotiate, communicate, make group choices, and be listeners. PBL specifically uses collaboration to enhance social learning among peers. Additionally, students are constantly working together for a common goal; these are qualities that students will use for the rest of their lives (Bell, 2010).

Furthermore, collaboration can also be seen with the use of technology. Though not all PBL implementation requires technology, many educators use it to promote 21st century skills (Lee, 2017). Technology provides extra ways in which students can research, communicate, and find meaning through inquiry. Students use technology to make models, test theories, and learn new skills. PBL Classrooms have used technology programing to help local fire and police departments, along with GPS technology when solving problems (Bradford, 2005). Furthermore, technology can be helpful during the final stages of their projects to present their findings (Kracjcik & Blumenfeld, 2006).

Presentation

Presentation is the last component of PBL in which students present their final ideas, products, and summarize their learning to an audience (Harada et al., 2008). Due to student choice, presentations may come in many different shapes and sizes. Posters, drawings, games, websites, plays, reports, models, artwork, are just a few examples of what students have used to present their work (Wolk, 1994). When students present their findings to an audience, it encourages them to self-asses, revise, and challenge their learning (Kracjcik & Blumenfeld, 2006). Furthermore, it provides a platform for students to showcase their success and take pride in their work (Wolk, 1994).

In addition to what students use to present their work, who they present to also matters. Within PBL curriculums, students are asked to present to a wider, public audience (Harada et al., 2008). Students pay more attention to their final product when they are creating something that will be seen by more people than their teacher (Larmer & Mergendoller, 2012). Presenting work to a real audience creates an environment where student work is more meaningful and higher quality (Larmer & Mergendoller, 2012).

Project-Based Learning in an Art Classroom

Walter (2005), a K-12 Art Educator, wrote about her experience with PBL in an art classroom. She walks the reader through one of her PBL lessons and explains the key factors of PBL and implementation in an art classroom. One of the key factors Walter felt crucial to PBL was developing art opportunities around real-world situations. Within an art classroom this could be setting up a gallery space, having students participate in online artwork submissions, art contests and more. In doing so, students gained skills for the workplace, real life application, research, collaboration, and new skills (Walter, 2005). Relating projects to the real-world gave students an opportunity to display their work to a real audience.

In order to implement PBL in an art classroom there needs to be multiple aspects previously set up and planned by the educator. Students are presented with clear guidelines, project organization and expectations. An educator provides the connections, essential questions, technology, process, and evaluation (Walter, 2005). However, students are the ones who create the final product on their own, researching and looking for ways to present their findings. In Walter's classroom, she used a statewide baseball poster contest to connect the art project to a real opportunity. She related the project process to how a graphic designer would work on any given day. Students had specific deadlines and criteria for their poster, much like a graphic

designer would. The essential question was based on illustrating, developing a theme, and communicating a message visually through artwork. They were to create a poster bringing awareness to skin cancer and using the Diamondback baseball team as a theme (Walter, 2005).

Creating a poster to be submitted for a contest relates directly to the PBL foundation of relevance and real-life application. Further implementing PBL into the assignment, students helped create the criteria for their posters; they were in charge of the process and students collaborated to make guidelines. Walter provided demonstrations on cartooning, shading techniques, and resources to help students build new skills for the project. As the educator, she stepped back after providing students with the resources needed to succeed and allowed them time to individualize their ideas while supporting from a distance (Walter, 2005). Students used research, their newly taught skills, and collaboration to push their ideas further.

Towards the end of the project, students used a pre-made evaluation sheet/rubric to assess their artwork before having it sent off to the competition. According to previously stated studies, it has been shown that when students showcase their work to a real audience, they are more likely to be motivated to succeed (Krajcik & Blumenfeld 2006). In Walter's middle school classroom, five of her students went onto the poster finals, and one was awarded the state winner. The state winner threw the first pitch of the game and went on to have prints made for multiple companies in the community (Walter, 2005). Students witnessed success in a larger scale. Walter's PBL lesson plan, created student motivation through choice, relatedness, and collaboration.

Project-Based Service Learning

Project-Based Service Learning (PBSL) is commonly intertwined in PBL conversations due to their similarities in classroom implementation. It is important to note the difference and

the implications that both have on student motivation. Both PBL and PBSL rely heavily on collaboration, real-world relevance, and student-driven project. However, PBSL happens when PBL projects are combined with a community service need (Miller, 2011). For example: the previous article about PBL in art classrooms focuses on students designing a project in which they will later apply for a local art contest. Students are being linked to the community through a real world scenario, however, they aren't filling a community need or service. Students in PBSL classrooms are working on projects that partner with the community. Students are being challenged to use their skills learned in the classroom and to apply them to real world situations to extend their knowledge, to learn new skills, and to heighten student motivation (Cooper et al., 2011).

PBSL High School Classroom Implementation

Three different studies in California high schools used PBSL to drive student motivation within their classrooms. These schools used technology and community connections to make projects come to life. The PBSL projects connected students with opportunities in their local communities; police stations, fire departments, hospitals, archaeologists, and The Trust for Historic Preservation (Bradford, 2005).

In Sacramento, CA, high school students worked with local police and fire departments to track arsonists within the area. Students worked in collaborative teams to track arsonists by creating a mapping program to plot fires by jurisdiction (Bradford, 2005). They used their mapping program to design a visual layout of data for the fire department to find arson patterns in the community (Bradford, 2005). Additionally, students changed the course of the fire department by planning to train personnel to find patterns in their mapping program, they used

technology to provide their final presentation. These students made a lasting impact in the community using the PBSL approach.

Student involved in PBSL in Riverside County, created a film for their project. They used their project to bring awareness to gang life, and to prevent others from joining (Bradford, 2005). Throughout the process of creating their film, they collaborated with hospital technicians for special effects, the sheriff's department for data on gang-related shootings, and other students affects by gang life (Bradford, 2005). The PBSL approach provided opportunities for students to connect with their community, gain communication skills, and personally relate to their learning. The benefits of PBSL went beyond the classroom in more than a few ways, their film, "For Life", was entered into the Panasonic KWN contest and won four awards (Bradford, 2005). Their film reached more people in a community than many in-class projects would.

Students in Santa Barbara, took on the challenging task of solving how the nearby mission and mill complex received their constant supply of water (Bradford, 2005). After researching archives, analyzing data, and environmental impact reports, students used GPS technology to track four different aqueducts (Bradford, 2005). Two of the four aqueducts had not yet been discovered. They submitted their findings to the Santa Barbara Trust for Historic Preservation, presentenced their information in multiple conferences, and received California's 2004 Historic Preservation Award (Bradford, 2005).

PBSL College Classroom Implementation

Professor Ball (2016) at San Diego City College used the PBSL approach in her curriculum with what she calls "Passion Projects." The Passion Projects were a way for students to become more motivated and integrated into the curriculum. She wanted to create a curriculum that followed learning objects and gave students the opportunity to shine with their own learning

styles. Passion Projects is presented to the students through open ended questions to help them find their passions. Professor Ball (2016) focused on one main question, "How can we have a student-centered classroom and how can we have culturally-responsive curriculum if we design it *before* we meet our students" (p. 4). The Passion Projects started with students identifying an issue that they care about and using research techniques to learn more about it and the community. Throughout this process, students had great amounts of choice, small guidelines, and constant help from their instructor (Ball, 2016). They choose a variety of presentation methods such as, poetry, posters, PowerPoints, public service, and performances. Some students chose to make Tiny Homes to create awareness about Homelessness in San Diego. Professor Ball's Passion Projects focused on student driven themes and opportunities for collaboration within the community and real life situations (2016).

Robinson (2013) a professor at Indiana University, observed lower performing chemistry students during her laboratory course and sought out to find new teaching strategies. In order to improve student engagement and performance in the laboratory course, Robinson implement a project-based learning pedagogy as a possible solution. During the duration of the course, students had two major projects spanning anywhere from several weeks to an entire semester. The final project of the semester was The Upland Brewing project. The goal of this project was to measure the concentration of various substances of beer. Students were given a driving question and topics for analysis by consulting with the brew-master and conducting quality control tests (Robinson, 2013).

At the end of their final, students participated in a two-question survey and self-assessment. The first question was: "How did you feel working on an experiment that did not have a known outcome and involved problem solving?" (Robinson, 2013, p. 12). The majority of

students responded positively with 84% of students enjoyed working on real-world problems with no solution (Robinson, 2013). Students found the work refreshing, relevant, and worth it. However, 16% of students felt as though they needed more time and assistance. They had no way to check if they were doing something right, and found it confusing and frustrating not knowing the answers. The second questions were: "Did you approach laboratory work differently because the class was working on a project for Baxter BioPharma Solutions?" (Robinson, 2013). The student survey concluded that 77% of students approached the project with more care. They felt as though they had more responsibility to be careful in the lab and give extra attention to details because they were working for a real-world company (2013). The other 23% of students stated that they always are careful working in lab settings and that there wasn't a different for them (Robinson, 2013).

Overall, the pressure of working with a real company gave students motivation to work more carefully, plan and prepare longer, and be more involved in the process. Furthermore, the PBSL approach helped students gain additional skills with the scientific process, learn to collaborate with their peers, and work with local companies (Robinson, 2013). PBSL in both high school and college courses directly connected students to challenges within their communities. Students helped track arsonists, bring awareness to gang life, discover new aqueducts, create tiny homes, and collaborate with brewing and pharmaceutical companies. With each example, students worked together to problem solve in and outside the classroom.

Motivation: Teacher and Student Engagement

One of the main struggles teachers face within the classroom is student engagement, or lack thereof (Newmann et al., 1992). According to Gardner (2011), students are more likely to be engaged when the learning process is differentiated to fit their specific learning styles. In order to

amplify student engagement and motivation, educators have implemented PBL into their classrooms to promote student driven collaborative learning. The previously mentioned PBL studies provided insight into how PBL has positively affected student engagement by motivating students with collaborative, student driven learning (Ball, 2016; Bradford, 2005; Robinson, 2013). In order to further understand how the PBL classrooms have enhanced engagement and motivation, it's important to note where motivation stems from and what students need to be motivated.

The two main types of motivation in education are intrinsic and extrinsic. "Motivation is the theoretical construct to explain the reason or reasons we engage in a particular behavior" (Cooper et al., 2011, p. 2). According to Cooper (2011), students are motivated when they are engaged in activities with the intent of accomplishing a goal or mastering a skill they are intrigued in. PBL projects elicit both types of motivation, which is crucial for ensuring student success. The PBL curriculum approach provides students with many opportunities of choice and differentiation to elicit motivation. In order to understand how PBL elicits higher motivation, it is important to understand the types of motivation and how they affect students in the classroom. Though intrinsic motivation is known as a key ingredient for student success, extrinsic motivation is also needed within education (Ryan & Deci, 2000). Research led by Ryan and Deci (2000) provides insight into how both types of motivation can be important in the context of education.

Intrinsic Motivation

Intrinsic motivation sparks creative ideas, critical thinking, and long-term memory of concepts. "Intrinsic motivation is defined as the doing of an activity for its inherent satisfaction rather than for some separable consequence" (Ryan & Deci, 2000, p. 60). Students learn at their

own pace and choose resources they are interested in (Bell, 2010). This approach is known to ignite intrinsic motivation. Students reach higher and dive deeper into their own learning process when they are focusing on projects that have meaning and interest to themselves (Bell, 2010; p. 42).

According to a study by Ryan and Deci (2000), "people have not only different amounts, but also different kinds of motivation" (p. 54). Students can have the same level of motivation to finish their homework or project but they may differ on the focus of why they are motivated. Some may want to finish their project based off of curiosity and others purely for the grade. Intrinsic motivation refers to the student who finishes based off of curiosity and enjoyment of their own and extrinsic motivation relates to the student who is finishing their project because of the outcome; the grade (Ryan & Deci, 2000).

Intrinsic motivation proves important for students to be actively engaged in learning. Based on classroom observations, studies proved that students with larger autonomy driven teachers, produce more curiosity and willingness for challenge and creative risk within the classroom (Ryan & Deci, 2000). Driving off of student choice and direction, this instructional strategy has the potential to create more intrinsically motivated students than a conventional lecture environment (Ryan & Deci, 2000).

Previously mentioned research from both the San Diego City College Passion Projects and Robinson's laboratory course showed an increase in student motivation due to collaboration and student choice, both of which are key components in PBL curriculum (Ball, 2016). Students work together to solve real-world problems, using each other as resources, and defining specific guidelines and goals to reach in order to contribute to the whole. Holmes and Hwang (2016) conducted student surveys and interviews in a PBL mathematics classroom over the course of a

year to find out if students became more intrinsically motivated. Research showed an increase in percentages for five out of six of the intrinsically motivated survey questions. Students responded to questions about their peer learning, study time and environment, control of their learning, critical thinking, and metacognitive self-regulation (Holmes & Hwang 2016).

Extrinsic Motivation

Though intrinsic motivation is strived for in education, Ryan and Deci (2000) state that not all external motivation in education is bad, some is necessary. Extrinsic motivation relates to a specific outcome with an external factor, such as a grade for an assignment. Extrinsic motivation can vary based on the internalization and integration of values. "Internalization is the process of taking in a value or regulation, and integration is the process by which individuals more fully transform the regulation into their own so that it will emanate from their sense of self" (Ryan & Deci, 2000, p. 60). Ryan and Deci (2000) research ways in which extrinsic motivation has autonomy and room for personal choice, or the feeling of personal choice.

Ryan and Deci (2000) outline that not all of the information educators are presenting will intrinsically motivate students, but it still needs to be taught. There are two different ways in which "students can perform extrinsically motivated actions", (p. 55) resentment/resistance or willingness. Knowing the difference between what sparks extrinsic motivation of resentment versus willingness is a great strategy for educators.

Ryan and Deci (2000) focus on the psychological needs that humans need to feel successful in the work they have done and to do so freely with autonomy. Both competence and autonomy are needed within the environment for a person to become intrinsically motivated. Much of Ryan and Deci's work was done in classroom environments to test out autonomy and competence with intrinsic motivation. They found that deadlines, threats, and pressure halted

intrinsic motivation (Ryan & Deci, 2000). Not all projects and assignments elicit intrinsic motivation. Ryan and Deci's (2000) research upholds the idea that if assignments or projects have some sort of autonomy and success rate about them, students will likely have extrinsic motivation based on willingness instead of resistance.

Teacher and Student Motivation

Many of the PBL studies involve working hands on, in collaborative teams, and aim to foster intrinsic motivation of students. Lam and Cheng's (2009) research presented a new, innovative approach of PBL research where both students and educators were asked about their motivation. During a semester-long program, 126 Hong Kong secondary teachers and 631 students participated in a PBL program (Lam & Cheng, 2009). Teachers and students were asked to fill out questionnaires related to their motivation and support within the classroom. The results indicated that when teachers were intrinsically motivated, students felt more support and intrinsic motivation.

This study aimed to understand more about the relationship between student and teacher motivation. This study also examined whether or not teacher intrinsic motivation and student motivation were indirectly or directly related. An indirect relationship would be based on instructional practices between the student and teacher, while a direct relationship would be based on teacher modeling and student reflections (Lam & Cheng, 2009). Studies showed that external factors such as testing and reaching externally imposed standards, constrained teachers ability to educate through their preferred teaching style (Lam & Cheng, 2009). In these situations, teachers tended to instruct a controlling and pressure-driven classroom with less choice. This type of classroom, led students to feel angry and frustrated towards teachers and diminished their motivation and engagement (Lam & Cheng, 2009). Studies where students had

more support for choice and autonomy from their teachers showed a higher level of motivation and academics (Lam & Cheng, 2009). Therefore, Lam and Cheng (2009) state that, external factors, out of the teacher's control, can directly impact the teaching style and more importantly, students' ability to learn.

Another way in which students' motivation is affected is tied to the direct relationship of learning and teacher modeling. Teacher modeling is whenever the teacher is demonstrating new ideas a concepts (Haston, 2007). Teachers who effectively model new concepts, add in minimal verbal directions to accompany their demonstrations and further help student learn on their implicit knowledge (Haston, 2007). Modeling shows that the task is important to the teacher and the success of the students. If teachers do not enjoy what they are teaching, it can affect student engagement (Lam & Cheng, 2009). Students motivation can change based on how modeling is done by the teacher. If the teacher exhibits intrinsic motivation towards the task versus if they don't. Students will pick up on subtle clues about the task. According to Lam and Cheng's (2009) studies, if there is more motivation shown from the teacher, students have a higher chance of being motivated themselves.

Student Academics

In addition to increasing student motivation, PBL has been implemented across the United States in many schools in order to increase student academics. Using standardized testing as an academic measurement, PBL students have shown higher grades than traditional schools, along with an increase in scores among racially diverse schools (Bell, 2010). Furthermore, PBL has increased academic opportunities for students with a range of abilities; high-achieving students and struggling students (Smith & Pastor, 2016), students with different socioeconomic status (Holmes & Hwang, 2016), special education students, and English language learners.

Academic research including, control and experimental groups, pre-and post surveys, standardized testing, and teacher observations are used to determine academic comparisons within PBL (Smith & Pastor, 2016).

Socioeconomic Status

Socioeconomic status (SES) is one of many variables that can have an effect in a child's education. SES is the social standing of individuals or groups that can be measured by income, work experience, education, and social standing in relation to others ("Education & SES," n.d.). According to the American Psychological Association (2019), classroom environments play a role in children's academic success in terms of SES. Low-income students are less likely to succeed than students in middle and top income brackets (APA, 2019). The Department of Mathematics at Hope college, Michigan aimed to find out how and if PBL has an effect on SES students' academic success and motivation (Holmes & Hwang 2016).

Holmes and Hwang (2016), conducted an exploratory, empirical study about PBL in secondary mathematics and the effects it has on student academics and student motivation. Holmes and Hwang (2016) conducted two years of research with eighth and ninth-grade students in a PBL centered school and a control group with conventional teaching methods. The study focused on three main research questions to conclude whether or not there is a relationship between PBL and academic skill, if PBL enhanced motivation in the classroom, and lastly, if the PBL approach affects minority students, and/or underachieving students in mathematics (Holmes & Hwang, 2016).

Research through standardized testing showed that students' academic achievements in terms of mathematics, were overall similar between the control group and PBL group. However, there was significant differences in data when looked at through the lens of SES factors (students

with free and reduced lunch) (Holmes & Hwang, 2016) . The achievement gap between the eighth and ninth-grade students by SES factors was significantly smaller in the PBL group. The PBL group had less of an academic gap between low-SES and mid/upper SES students than the control group taught with conventional methods (Holmes & Hwang, 2016). Standardized testing also showed that while the gap between the majority White students and minority students (Latino and other minority groups) in the control group stayed significantly high, it diminished within the PBL group (Holmes & Hwang, 2016). Holmes and Hwang (2016), speculate that the reduced achievement gap in the PBL group was partly due to PBL's format of collaboration.

In order to gain understanding of student motivation, student surveys were conducted every semester. Research revealed an increase in internal motivation, peer learning, organizational skills, intrinsic goals, and study environments when PBL was implemented (Holmes & Hwang, 2016). Minority and underachieving students thrived under the PBL instructional method. Research showed that students who have access to teachers with higher quality classrooms that focus on community, creating, and involvement, are more likely to have academic success (Chetty, 2011).

High-achieving and Struggling Students

According to a two-year long study at Stedwick Elementary School MD, both high-flyer students and struggling students thrived under PBL instruction (Smith & Pastor, 2016). Smith and Pastor (2016) followed two students (Mario & Megan) throughout the year with the goal of gaining information on their achievements and struggles with the implementation of PBL. Both students were entering 4th grade with different needs. Mario is described as a struggling special education student, English Language Learner, low academics skills, behavior problems, and in

possible need for higher special education support (Smith & Pastor, 2016). Megan has excelled throughout her elementary years and received nearly perfect grades (Smith & Pastor, 2016).

During the first year of PBL implementation in the 4th grade classroom, Mario excelled. Smith and Pastor (2016) quickly found out that Mario could speak English at higher levels than previously thought, he learned how to read, and had a positive behavior shift. On the other hand, Megan was challenged in new ways with PBL assignments. She was used to always having a correct answer to be guided to, and learned new ways in which to reach conclusions creatively. Megan struggled at first, but eventually these challenges enhanced her capability to problem solve (Smith & Pastor, 2007).

To remain a constant, both Mario and Megan's 4th grade teacher, traveled with them to 5th grade as their teacher. The PBL curriculum continued throughout the second year of implementation (Smith & Pastor, 2007). Throughout their 5th grade year, Mario and Megan led their class science projects, created life size models of their ideas, and amplified student motivation within their classroom. The focus of their projects revolved around space, Mars, and Earth. Students were taught lessons, had guest speakers, took field trips to museums, and watched videos about space to engage them in learning and spark ideas for their projects (Smith & Pastor, 2007). The PBL curriculum created a space for students to lead their own conversations and learning. Mario and Megan pushed the projects further than teachers expected. They created life size models of their own version of a living Pod in space (Smith & Pastor, 2007). The two-year PBL implementation, paved way for new ways to meet the needs of students at different levels of academic achievement. At the end of 5th grade, Mario was still testing below grade level in reading and math, but he had made large strides in his academics and behavior from where he started when he entered 4th grade (Smith & Pastor, 2007). Furthermore,

Megan gained new skills in problem solving and approached learning as creative challenge instead of repeating information and memorizing. Smith and Pastor's (2007) studies, concluded that PBL supported both the high-achieving student and the struggling students' needs.

Special Education

According to research by Filippatou and Kaldi (2010), students with learning difficulties excelled with the use of group interactions during PBL instruction. Filippatou and Kaldi (2010) studied a group of six different fourth-grade mainstream classrooms with a range of student learning abilities to find out if PBL implementation was an asset in the classroom in terms of academics, self-efficacy, task value, group work, and teaching methods. Out of the six classrooms, twenty-four of the students had a mix of learning difficulties (Filippatou & Kaldi, 2010). Students received pre and post-tests to assess their knowledge in environmental studies and took a range of multiple choice tests, attitude scales, and individual interviews (Filippatou & Kaldi, 2010). Student interviews provided positive reviews of PBL instruction from the majority of students (22 out of 24) (Filippatou & Kaldi, 2010). However, not all of the students (5 out of 24) felt their involvement in the learning was heightened within groups. Though the students enjoyed the group work and benefitted from the information/discussions, they had a more passive role in the learning process by mainly listening while other students discussed.

Overall, Filippatou and Kalidi's (2010) research showed that working in groups had a positive impact with mainstreamed students with learning disabilities in multiple ways, such as, the feeling of social acceptance among peers, helpful explanations from peers, and involvement in the learning process.

English as a Second Language

According to research by Peterson and Nassaji (2016), both teachers and students within a second language (L2) classroom agreed on many positive attributes to PBL. Peterson and Nassaji conducted a study to find out if students and teachers shared similar beliefs about PBL and classroom strategies within an adult English as a Second Language (ESL) class (Peterson & Nassaji, 2016). Their research consisted of questionnaires, open-ended questions, and one-on-one interviews with teachers and students. The questionnaire had teachers and students answer questions within a range from strongly disagree to strongly agree. The quantitative data from the questionnaire showed that both teacher and students agreed similarly on the main aspects of PBL, such as, choosing their own topics, experiencing real-life activities, and producing final projects (Peterson & Nassaji, 2016). Based on qualitative research from open-ended questions, ESL teachers agreed strongly that project based learning helped language learners interact verbally with one-another and gave multiple ways of learning.

In addition to the benefits of PBL, there were a few concerns regarding group work and cultural differences. Students and teachers had differences in their opinions on group work, some teachers favored group work more than the students (Peterson & Nassaji, 2016). Additionally, teachers felt there were constraints on allowing student input in curriculum, time, and choosing partners. ESL students had a similar concern with partner work, many found it difficult if group members didn't participate (Peterson & Nassaji, 2016). Cultural differences in education and past experiences also had an effect on student opinions. Students coming from different backgrounds may feel uncomfortable in collaborative work and might not be used to project learning (Peterson & Nassaji, 2016).

Overall, Peterson and Nassaji's study provided positive feedback for the academic side of PBL along with social concerns of collaboration and cultural differences. The majority of

students described PBL work with words such as - interesting, confident to speak, helps with English skills, and motivating (Peterson & Nassaji, 2016).

Concerns of Project-Based Learning

The majority of research throughout this literature review has shown positive feedback towards PBL student academics and motivation. Though success is happening with the students and end results, teachers are faced with many challenges. Not all teachers have been able to relate to the PBL teaching style and found it difficult to jump onboard. Additionally, some teachers struggled to balance the loose structure of PBL with classroom management. Lastly, the inconsistence definitions of PBL make it difficult to find comparable data.

Teacher Perspectives

The push towards student-centered approaches led many educators to PBL. However, not all educators were quick to jump on board (Lam & Cheng, 2009). Though there are many studies that outline the benefits, PBL originates from Western countries and doesn't relate to all teachers and all cultural backgrounds. According to Lam and Cheng (2009) there are many educators that were hesitant to shift from the traditional classroom practices due to personal beliefs and traditions. Some educators found the PBL structure too loose, and choose to follow the more traditional ways of the classroom from their own upbringing (Lam & Cheng 2009). Educators hesitant to PBL, may not successfully implement it within their classroom, due to lack of acceptance and intrinsic motivation towards teaching practice.

Hovey and Ferguson's (2009) research study provided insight into what teachers are more likely to support PBL within their classroom. They conducted surveys to see what teachers already knew about PBL, if they used it in their classroom, and how effective the PBL teaching method is (Hovey & Ferguson, 2009). Each survey helped determine if the educators understood

what PBL is and used it properly within their classrooms, along with if the educators preferred PBL. Their research found that Special Education teachers and English Language Learner (ELL) teachers are more likely to use PBL within their classroom. Surveys suggested that Special Education teachers and ELL teachers are more likely to have previous experience using similar instructional strategies within their classroom and therefore, more likely to support PBL and use effective PBL strategies in contrast to general education classrooms (Hovey & Ferguson, 2009).

Research by Marx, Blumenfeld, Krajcik, and Soloway showed many challenges from teacher perspectives in project-based science classrooms (Thomas, 2000). The common challenges that teachers faced were, time, meeting district curriculum guidelines, classroom management, supporting independent student learning, technology, and designing assessments to correctly measure student understanding (Thomas, 2000). Their research provided insight into the struggles that teachers were facing when working to implement PBL. Teachers struggled to find balance when giving students the freedom to research while monitoring students activities. When using the PBL approach, teachers were giving students too much freedom without accurately giving feedback to assure they are on the right track (Thomas, 2000). Teachers struggled to master all the aspects of PBL implementation all at once. However, research showed that teachers slowly mastered different parts of PBL instruction based on their challenges (Thomas, 2000). Overall, it took teachers around three years to confidently and accurately implement PBL within their classrooms (Thomas, 2000).

Inconsistent Definitions

Another concern with PBL is the lack of consistency with its definition (Hovey & Ferguson, 2009). The definition of PBL is seen interchangeably with a range of other instructional methods, such as; problem-based learning, inquiry-based learning, project method,

and problem learning (Hovey & Ferguson, 2009). These methods have many similarities with their student-based approaches, however a clear definition for PBL should be used in order to administer it as an instructional method consistently across schools. As noted previously, there are key components for PBL, but not all are used with the same terminology throughout every article. Different PBL terminology may make it harder to relate data from one PBL project to another.

The main challenges and concerns for PBL were faced by the teachers when they tried implementing the new instructional strategy into their classroom. Teachers' experience and cultural backgrounds were cited as variables regarding PBL implementation. Furthermore, teachers felt pressed to fit PBL into the curriculum and fit projects into specific timelines (Thomas, 2000). Teachers struggled to find balance between classroom management and giving students the freedom to choose and lead their own projects. Research showed that though most teachers struggled at the beginning, with time they started to adjust their curriculum to PBL and gain more control in the classroom (Thomas, 2000).

Though there have been struggles while working to implement PBL. The overall research has shown that the idea of project learning in the classroom has many benefits. From the beginning, Kilpatrick's studies on project learning paved way for new curriculums in the 20th century (Pecore, 2015). The PBL teaching method flourished as a way to provide students with meaningful, collaborative, and exploratory paths of learning while promoting higher rates of student engagement and motivation. The components of PBL and PSBL guide students and teachers through a more hands-on approach to learning. The studies throughout this review showed a range of students exceeding academic expectations with the use of PBL curriculums. Additionally, teachers gained higher student motivation through the use of real-world projects. In

a range of studies, students worked collaboratively with numerous local departments and community companies to solve problems and implement new ideas using PBL (Bradford, 2005). Research by Ryan and Deci (2000), provided insight as to why hands-on projects and the PBL teaching method is crucial to intrinsically motivating students in the classroom. Overall, PBL has had a lasting impact in education as an instructional strategy and beneficial tool to help raise student engagement and motivation in the classroom.

CHAPTER III: DISCUSSION AND CONCLUSION

Summary of Literature

Learning through the use of projects and collaboration dated back to the 1900's. Educational theorists John Dewey, Howard Gardner, and William Kilpatrick all researched ways in which students learn in different classroom settings and instructional methods (Pecore, 2015). Kilpatrick started the project learning revolution in education by researching and studying students working with projects. He concluded that in order for students to succeed and be engaged, students need to be passionate about their work and their learning should have a personal connection (Kilpatrick, 1918). Kilpatrick's (1918) essay on project learning has made a lasting impact in curriculum and teaching strategies, including Project-Based Learning and Project-Based Service Learning.

Numerous studies found that the basics components of PBL motivate students due to their collaborative nature and the focus on real world challenges and relatable topics (Hovey & Ferguson, 2009). Additionally, students are learning the basics of communicating and making choices while working in their groups (Kracjcik & Blumenfeld, 2006). Out of the five main components of PBL, the last one, presentation, is an important factor in motivation. When students present their findings for a larger audience besides the teacher, they are given a higher responsibilities to produce an adequate product and in turn, students have more motivation to carefully plan and approach their work. In one study, students had to measure the concentration of various substances in beer and present their findings to the Upland Brewing Company (Robinson, 2013). Student surveys stated that 84% of the students positively responded to this type of real-world project (Robinson, 2013). Students felt more responsibility in lab to double check their work and plan carefully because they had a larger responsibility to get their work done accurately (Robinson, 2013).

Throughout this literature review, the PBL research ranged from elementary to adult education. These studies provide insight into how PBL affects student motivation and engagement within the classroom in regards to socioeconomic status, high and low achieving students, special education students, and students with English as a second language (Filippatou & Kaldi, 2010; Holmes & Hwang, 2016; Peterson & Nassaji, 2016; Smith & Pastro, 2016). Each study provided ways in which PBL positively affected their motivation and engagement. Elementary students in Walter's classroom created posters for a local competition and were provided project options with choice, relatedness, and collaboration (Walter, 2005). High school PBSL classrooms connected to communities by helping fire departments with arsenic tracking, police departments bring awareness to gang-related shootings, and solving aqueduct problems by teaming up with local historic preservations (Bradford, 2005). College classrooms used PBSL to help motivated students by integrating projects into the curriculum. From the previously researched studies, college classrooms created tiny homes, worked with local breweries, and pharmaceutical companies (Robinson, 2013). This PBL approach to learning taught students the realities of working with companies and local departments.

The range of studies from elementary to college courses implemented PBL into their classrooms to promotive and amplify student motivation and engagement (Ball, 2016; Robinson, 2013). PBL promotes motivation through collaboration, personal choice, and relatedness. The two main types of motivation are extrinsic and intrinsic motivation. Students who are intrinsically motivated are working due to the satisfaction of the action and students who are extrinsically motivated, are going through the motions in order to fill an external factor of a grade or assignment (Ryan & Deci, 2000). PBL paved way for students to be more intrinsically motivated due to PBL factors of choice and relevance. Students who focus on

projects they are interested in for the sake of discovery have a higher chance of being motivated intrinsically (Bell, 2010). Furthermore, research has shown that students supported by their teachers and teachers who were more intrinsically motivated during projects paved way for higher success and motivation among students (Lam & Cheng, 2009).

Additionally, student academics in PBL settings have increased along with motivation and engagement. Studies of students with different socioeconomic status, special education students, and English language learners using PBL have shown increased motivation and academics. Research by Holmes and Hwang (2016) showed an increase in internal motivation with PBL implementation along with a smaller achievement gap. Mario and Megan proved that both high-flyer students and struggling students can achieve success with PBL. Mario gained new academics skills and enhanced positive behavior and Megan was challenged to think more creatively and learn new problem solving (Smith & Pastor, 2007). In addition to struggling students, special education students have excelled in PBL classrooms. Filippatou and Kalidi's (2010) research has shown that special education students were positively impacted by the peer work, and involvement in the learning process.

Lastly, there have been a few concerns with implementation of PBL and student collaboration. Some students found difficulty working in groups due to cultural differences and paste experiences (Peterson & Nassaji, 2016). Additionally, not all teachers were interested in implementing PBL because of the lengthy projects, class management, and fitting PBL accurately into their curriculum (Peterson & Nassaji, 2016). In addition, there is a lack of consistency with PBL definitions making it difficult to compare data (Hovey & Ferguson, 2009). Overall, the main concerns are based on PBL implementation, time management, and inconsistent definitions. Though some of these concerns were present throughout the research,

many of the studies found that given time, teachers were able to slowly master the implementation of PBL within their classrooms (Peterson & Nassaji, 2016).

Professional Application

Research has shown that PBL, when implemented accurately, positively impacts students motivation, engagement, and social skills. Though students benefit from PBL, not all teachers felt immediate positive impacts. The majority of research within this literature review revealed that most educators were faced with challenges during the beginning stages of PBL implementation. Teachers found it hard to master all of the concepts at one time, while adding in new content to the curriculum and allowing students to make more choices in their learning (Thomas, 2000). When implementing PBL, it would be beneficial to start small, either with a small group of students, upper level classes, or with a small project in order to learn the challenges and master different concepts of PBL at a time. Furthermore, planning a PBL project might take more work on the front end from teachers and less work during the actual project once students start to take control of their learning (Thomas, 2000). Before students are able to drive their own learning, teachers would need to reach out to local departments and companies in order to make connections to plan projects. This would be a great way to learn about the possibilities for students to make real-world connections within different content areas.

PBL Implementation in an Art Classroom

Art classrooms are filled with different types of projects and mediums that students can work in. However, this doesn't make art classrooms part of project-based learning. In order for PBL to be implemented within an art classroom, the five main concepts should be considered within the planning and more specifically the art projects should be connected to the real-world

and have a larger audience. It would be beneficial to reach out to other PBL art teachers to learn how different art mediums and grade-levels implement PBL. One way of setting up PBL in an art classroom would start with educators reaching out to local galleries, art competitions, local companies, and researching ways for students to connect their art to the community. From there, art educators would need to prepare students by teaching different techniques required in curriculum and/or needed for the project. In Walter's (2005) art classroom, she used the poster contest to help motivate students and give opportunities outside the classroom walls. Before having students dive into their projects, Walter went over cartooning techniques, shading, and research for their poster subject. Teaching techniques helped prepare students before they were let loose to collaborate and begin their posters. Art classrooms access to variety of materials would be beneficial in helping students branch out with their projects and ways of presentation.

Overall, research has shown that when implementing PBL it is best to start slowly with smaller groups of students and to be ready for new challenges. Teachers time and classroom management are challenged along with fitting projects accurately into the curriculum. Educators should start with a clear plan before jumping into PBL. After implementation, students take the reins and opportunities start to flourish.

Limitations of the Research

The limitations in this literature review are similar to common limitations found within PBLreserach. One limitation of research in this literature review is the various range in PBL studies across grade levels and subjects. The majority of research found within PBL was centered around upper-level math and science courses in high-school and college courses. Studies with academic data in other subjects and lower grade-levels need further research.

Additionally, research on specific groups of students, ELL, Special Education, high-achievers, and struggling students were all separate studies. These studies were added to provide insight into how PBL affects different groups of students. However, these studies range from class sizes, subjects, and grade levels. Additionally, most research about PBL consists of different definitions and specifications (Hovey & Ferguson, 2009). This literature review focused on the common concepts from each study to create a consistent definition. Each study had main concepts of PBL that slightly differed from each other. Some studies agree on the use of technology to implement PBL, while others don't use technology at all. These irregularities have the possibility of making data results between studies inconsistent.

Implications for Further Research

This literature review covered PBL in a variety of classroom settings and content areas. However, the majority of PBL articles were based in science, math, and general education classrooms. Very few articles gave insight to what PBL looks like in a specials class, such as, art, physical science, technical education, and family consumer science (FACS). These specials are all based around the principle of using projects, however, that doesn't necessarily mean they are implementing PBL. Using PBL in a specials class could open up a wider range of opportunities for students to pursue in their communities. For example, students in FACS could partner with local restaurants to come up with a small menu, or try out ideas for a new dish in their foods courses. Additionally, they could work with local designers to learn about the fashion process. Further research in specialized classes would provide great insight into a class already designed around projects and how taking it a step further and implementing PBL would affect student motivation.

In addition, it would be beneficial to take a further look into the effects that PBL had from academic results. Holmes and Hwang's (2016) study tackled a few concerns throughout their research related to academic data. Though data concluded that PBL and minority students achieved higher academic success than the non-PBL control group, the data suggests that not every student benefited from PBL instruction. The PBL group had a higher number of White students from low SES than within the control group. The data showed White PBL students academics were significantly lower than the control group (Holmes & Hwang, 2016). Holmes and Hwang's (2016) research suggest further studying SES factors and their relationship to PBL and academics to provide a more precise analysis. Not only would it be beneficial to study the academic results for SES, it would be beneficial to see academic results for students at different learning abilities, ELL, Special Education, and academic results for gender. All of these factors may play a part in student motivation and could be shown through quantitative data. Overall, further research is needed to in different content areas, and academically to further assess the relationship between PBL and student motivation.

Conclusion

What is the relationship between project-based learning and student motivation? Research has shown that students with a broad range of academic abilities have positively responded to PBL implementation within their classrooms. Students responded well to the PBL concepts of choice, collaboration, and real-world relatability. Both students and teachers felt the connection to communities and companies helped with motivation and engagement within the classroom. Additionally, teachers have seen great amounts of academic improvement among high achieving students, struggling students, special education students, and students with English as a second language. Within some studies, students found PBL as a refreshing

way to work within a classroom. Overall, the findings of PBL studies provided great insight into increased students engagement through the use of collaboration, personal choice, real-world relevance, and the use of presentation with larger audiences.

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