

## **Project-Based Learning**

The current pandemic has brought online learning into the spotlight. Most secondary schools are implementing some form of online learning. Considering the stay at home policy, it seems that this is adequate substitution for classroom based instruction. However, online learning has a number of challenges that must be considered when replacing classroom instruction such as: providing internet access and devices to all students, allowing students to interact with the teacher and other students, meeting the accommodations of challenged students, developing social skills and friendships. Online learning does not promote the the development of leadership skills, such as teamwork, problem-solving, communication and planning. Cooperative learning is extremely difficult and much of the learning process is focused on individual students. In general, online learning focuses on academic learning.

If the primary goal of student learning is to gain knowledge, get high test scores and “cover” the material, then online learning may work. However, if the goal is to develop real-world skills such as critical thinking, analyzing, evaluating information, working cooperatively, and communicating effectively, Project Based Learning is a more effective methodology.

Project Based Learning is a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging and complex question, problem, or challenge. Student projects are focused on student learning goals and include Essential Project Design Elements:

- Key Knowledge, Understanding, and Success Skills - The project is focused on student learning goals, including standards-based content and skills such as critical thinking/problem solving, communication, collaboration, and self-management.

- Challenging Problem or Question - The project is framed by a meaningful problem to solve or a question to answer, at the appropriate level of challenge.
- Sustained Inquiry - Students engage in a rigorous, extended process of asking questions, finding resources, and applying information.
- Authenticity - The project features real-world context, tasks and tools, quality standards, or impact – or speaks to students’ personal concerns, interests, and issues in their lives.
- Student Voice & Choice - Students make some decisions about the project, including how they work and what they create.
- Reflection - Students and teachers reflect on learning, the effectiveness of their inquiry and project activities, the quality of student work, obstacles and how to overcome them.
- Critique & Revision - Students give, receive, and use feedback to improve their process and products.
- Public Product - Students make their project work public by explaining, displaying and/or presenting it to people beyond the classroom

The following report will provide the reader with an overview of Project Based Learning and current research on its effectiveness.

## **Medford Public Schools**

### **The Center for Citizenship and Social Responsibility**

### **Project-Based Learning**

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### **Forward**

The purpose of this report is to provide a guide to the methodology of Project Based Learning which is the instructional foundation of The Center for Citizenship and Social Responsibility (CCSR) after school program for students in grades K-12 in Medford Public Schools. The primary mission of the CCSR is to develop global leaders/citizens that will be positive contributors to society and will work to make the world a better place to live. Students work with a faculty advisor on authentic projects that address a school, community or world need/problem. Students who participate in the CCSR develop important leadership skills, enhanced self-confidence and gratification from helping others. For more information on the CCSR and the many student projects, please go to [www.medfordccsr.org](http://www.medfordccsr.org)

Richard Trotta, Director

## Introduction

Project-based learning (PBL) is a teaching approach in which students gain knowledge by working together for an extended period of time to solve a complex, meaningful problem (Buck Institute of Education, n.d.). PBL utilizes authentic learning in combination with a student-centered approach to increase student engagement and interest. The process and level of engagement in PBL is what differs PBL from busywork (Larmer & Mergendoller, 2010). Busywork focuses on the resulting product, whereas PBL involves students actively working and learning throughout the process of the project. PBL not only allows for a deeper knowledge of content, but also improves cognitive functioning and social skills (Stepien, Gallagher, & Workman, 1993), including critical thinking, problem solving, collaboration, and communication (Permanasari, Firman, Riandi, & Hamidah, 2017).

The Buck Institute for Education claims there are seven essential project design elements which are necessary to have the best outcome in knowledge acquisition, understanding, and success skills. The seven elements are (1) challenging problem or question, (2) sustained inquiry, (3) authenticity, (4) student voice and choice, (5) reflection, (6) critiques and revision, (7) public product (Larmer & Mergendoller, 2015). Thus, a successful project incorporates authentic, real-world problems which are relevant to the students in order to increase engagement, independence and create self-regulated learners.

## Authenticity

A significant element of PBL is authenticity, which simply refers to realness or being genuine (Buck Institute of Education, 2019). Authentic learning is a technique which applies knowledge to real-life context and situations (Lombardi, 2007). Authentic learning permits

students to “create their own understandings of new concepts and practices by integrating their previous experience, the resources they have, their own research and their current experience” (Roach, Tillet, Mitchell, 2018, p. 496-497). Additionally, authentic learning provides relevancy for the students, which in turn creates sustained interest and engagement. Students often demonstrate their knowledge by creating a product or presentation which can be presented to an audience (Buck Institute of Education, 2019). This additional step provides further ownership for their work and increased motivation (Walker, Leary, & Hmelo-Silver, 2015). Students become invested and care about the quality of their work because they find meaning in their projects.

PBL allows students to collaborate and work together in a genuine style. Students gain social-emotional skills as well as academic skills by planning, problem-solving, creating, and reflecting together. Students gain important real-world skills such as critical thinking, analyzing and evaluating information, working cooperatively, and communicating effectively (Lombardi, 2007). By focusing on practical skills, students can generalize what they learn and improve academic and social skills.

### Student Engagement

PBL takes on a student-centered approach where the students take the lead. Instruction is based on the learners as unique individuals. Students are encouraged to work and learn independently from the teacher, gaining important skills and confidence in themselves along the way. Student-centered teaching provides opportunities for student engagement, causing increased motivation to learn, greater retention of knowledge, deeper understanding, and more positive attitudes towards the subject being taught (Collins & O'Brien, 2003; University of Washington, 2019). Furthermore, student-centered instruction can increase student's self-esteem, increase

cooperation, reduce anxiety, and encourage positive attitudes toward teachers (Laal & Ghodsi, 2012).

An authentic, student-centered approach found in PBL increases student engagement, thus increasing academic and social-emotional skills. Student engagement in PBL is multidimensional and can involve emotion, behavior, and cognition (Martin & Torres, 2016). Students take on the responsibility of learning and generalizing skills (Johnson & Delawsky, 2013). The students take ownership of their projects and are engaged in their education. Students who are involved with their learning process have shown increased attention, focus, and critical thinking skills (Martin & Torres, 2016). Furthermore, students who are engaged are more likely to do well on standardized testing and are less likely to drop out of school, (Johnson & Delawsky, 2013; Martin & Torres, 2016). Overall, PBL has the potential to increase various skills.

Motivation and engagement are key components of PBL. Students learn to focus their efforts, maintain attention, monitor and evaluate their work, and seek help with necessary (English & Kitsantas, 2013). Students develop inquiry and curiosity through asking questions and investigating. The teacher's role is no longer to lecture, but to facilitate while students take responsibility for their learning and make meaning of what they experience (English & Kitsantas, 2013). In short; the students learn by doing.

### Self-Regulated Learning

PBL creates self-regulated learners. Self-regulated learning is a fundamental framework to understand the cognitive, motivational, and emotional aspects of learning (Panadero, 2017). The concept is based on the tenant that learners are able to control their thoughts, feelings, and

actions in order to constantly enhance themselves and grow, academically and emotionally (Zimmerman, Bonner, & Kovach, 1996). “Self-regulated learners are able to monitor, regulate, and control their cognition, motivation, and behavior,” (Wolters, Pintrich, & Karabenik, 2005, p. 251). Students become motivated to learn and develop self-efficacy.

Self-regulation is a self-directed process in which educators can facilitate by utilizing PBL. PBL allows students to set goals, plan a course of action, select appropriate strategies, self-monitor, and self-evaluate their learning, thus becoming self-regulated learners (Zimmerman & Kitsantas, 2005). Self-regulated learning can be implemented to develop academic skills, including (a) planning and using study time more effectively, (b) understanding and summarizing text material better, (c) improving methods of note taking, (d) anticipating and preparing better for examinations, and (e) writing more effectively, (Zimmerman, Bonner, & Kovach, 1996). Students engage and adapt their cognitive strategies in order to enhance memory, learning, reasoning, problem solving, and thinking (Wolters, Pintrich, & Karabenik, 2005). Students learn new strategies, as well as when to use them.

### Implementation

Teachers are facilitators of projects. The students should lead and have a voice, while teachers are there to aid when necessary. There are the obvious teaching aspects including adapting designs and plans, aligning projects to education standards, and managing activities. However, teachers can also build the culture within the classroom by promoting autonomy and allowing opportunity for growth during PBL. Furthermore, we can scaffold student learning (Buck Institute of Education, n.d.). This interactive process of learning allows for modifications and growth overtime, gradually allowing the student to gain a new skill. The goal is to have

students take responsibility of their learning by setting goals, monitoring progress, reflecting, and be motivated (Enligh & Kitsantas, 2013).

Teachers can provide an environment which reinforces student engagement, supports self-regulated learning, and contributes to creative school culture (Martin & Torres, 2016). Implementing PBL can increase engagement, deeper more invested learning, exposure to adults and careers, sense of purpose, success skills, rewarding teacher relationships, and creativity (Buck Institute of Education, n.d.). Implementing PBL can be challenging for the teachers, but PBL is highly effective in motivating students and helping them become self-regulated learners.

### Social-Emotional Implications

Social and emotional learning (SEL) is the process in which people understand and manage their emotions, set goals, have empathy, establish positive relationships, and make responsible choices (Collaborative for Academic, Social, and Emotional Learning, 2019). The five core competencies of SEL are self-awareness, self-management, social awareness, relationship skills, and responsible decision making (Collaborative for Academic, Social, and Emotional Learning, 2017). SEL competencies are critical to education and can be naturally learned through PBL.

In PBL environments, students learn via a process of questioning, active learning, sharing, and reflection, thus making meaning of content (Blumenfeld et al., 1991). Students work together in groups developing skills such as collaboration, communication, and problem-solving. Classmates become coworkers and co-learners. “The learners are responsible for one another's learning as well as their own. Thus, the success of one learner helps other students to be



successful,” (Laal & Ghodsi, 2012, p. 487). Collaborative learning has been linked with higher achievement and productivity, more caring, supporting, and committed relationships, and greater psychological health, social competence, and self-esteem compared to working competitively (against others) or individualistically (Laal & Ghodsi, 2012). Collaborative learning provides opportunities to increase social awareness as students work together to achieve a common goal. As conflict, disagreements, and setbacks occur, students learn to communicate and resolve social problems. Furthermore, students are able to see and understand differences between each other, build diversity, and create a positive learning atmosphere (Laal & Ghodsi, 2012).

Reflection is final design element of PBL and can encompass SEL. Reflection allows time for students to discuss everything from how things went, what could have made their work better, and each individual's contribution. By asking group members to identify what behaviors help them work together and by asking individuals to reflect on their contribution to the group's success or failure, students are made aware of the need for healthy, positive, helping interactions (Panitz, 1996; Cohen. & Cohen, 1991 as cited in Laal & Ghodsi, 2012).

### Effectiveness

PBL increases a variety of academic skills including critical thinking, active learning, classroom grades, problem-solving, motivation, and collaboration (Laal & Ghodsi, 2012). PBL is diverse in that it can be beneficial for students ranging from preschool through 12<sup>th</sup> grade; Every age and education level can gain skills through PBL as is it individualized for each class. Furthermore, PBL can be used across a variety of disciplines, including social studies, mathematics, science, English language arts, and vocational classes (Chiang & Lee, 2016; Kingston, 2018).

Elementary students are able to increase academic achievement, cognitive, and psychomotor domains, as well improved confidence, creativity, and problem-solving skills (Alacapınar, 2008; Aral et al., 2010; Gultekein, 2005). Furthermore, students were more engaged and felt positively about their projects (Chu, Tse, & Chow, 2011; Gultekein, 2005). It is important to note that some teachers had difficulty implementing PBL; however, even with simple shifts toward student-centered activities, teachers reported greater student engagement (Hertzog, 2007).

PBL has also shown to be beneficial in middle school. PBL can improve content learning and academic achievement, particularly within 6<sup>th</sup>-8<sup>th</sup> grade math and science classes (Akinoğlu & Tandoğan, 2007; Araz & Sungur, 2007; Chen & Chen, 2012; Geirer et al., 2008; Wong and Day, 2009). Additionally, PBL allows for diversity building and individual differences to be utilized (Grant & Branch, 2005), which can be especially significant at this age.

Research indicates that student engagement declines as students' progress from upper elementary grades to middle school, reaching its lowest levels in high school. Some studies estimate that, by high school, 40 to 60 percent of youth are disengaged (Martin & Torres 2016). By utilizing PBL, student engagement and positive views on the subject can increase (Baumgartner & Zabin, 2008; Mergendoller & Maxwell, 2006). PBL also increase content knowledge, general academic skills, (Baumgartner & Zabin., 2008; Duncan & Tseng, 2010; Mergendoller & Maxwell, 2006; Mioduser & Betzer, 2007).

Research provides moderate support of PBL in short-term studies, with outcome improving further over long-term periods. PBL appears to be a superior and more effective teaching approach than the traditional methods. PBL allows for a deeper knowledge of content,

improves cognitive functioning and social skills, and teaches students how to become independent self-regulated learners.

### Case Study Examples

Beneke and Ostrosky (2008) researched how PBL effects pre-kindergarten, public classrooms. Participants consisted of seven Illinois certified early childhood teachers. The teachers attended three-day institutes on the project-based approach. The teachers were interviewed before (within 4 weeks of) and after (within 16 weeks after) attending the institutes. Teachers described positive changes in children's social development due to of an increase in meaningful activities. Themes across the teacher's responses included increased interest and motivation. Five of the seven teachers viewed planning projects with their students as positive experiences which allowed them to engage their students with more ease. Additionally, four of the seven teachers reported that implementing a project-based approach increased their ability to include diverse learners, such as children with special needs, challenging behaviors, or children at high-risk for academic failure.

Ebrecht and Ku (2014) explored how a project-based approach could be utilized among 3<sup>rd</sup>-5<sup>th</sup> grade via a case study. Three teachers across various elementary schools were included and each teacher selected five students from their classrooms to be representative samples. The teachers attempted to utilize classroom blogging to enhance literacy and technology schools. Each teacher used different sites and techniques. The first classroom chose MOODLE, a course management system for educators, which was accessed through classroom iMacs. The students investigated their favorite authors and wrote persuasive essays which were reviewed by classmates. The second classroom used Kidsblog, a secure blogging website for students, on iPads in order to discuss and showcase poetry. The third classroom utilized Google Apps on

Chromebooks to blog about non-fiction books, as well as discusses diorama projects which were also part of the project. While the teachers found it difficult to assess to what extent the projects increased literacy and technology skills in the students, the students had positive attitudes toward their projects and identified various benefits.

Students identified six literacy benefits that blogging provided to them: (1) a fun way to read, (2) a new way to write, (3) improved reading and writing skills, (4) expanded vocabulary, (5) influence of writing for an authentic audience, and (6) the enjoyment of helping each other with their writing. [...] Students were also very affirmative about the technology benefits of blogging. Four key technology benefits were identified by students: (1) a way to learn how to use social media, (2) a way to acquire technology skills necessary in their future, (3) improved keyboarding skills, and (4) electronic writing allowed students to identify and correct grammar and spelling mistakes more easily (Ebrecht and Ku, 2014, p. 10).

Teachers also agreed that having an authentic audience positively impacted the students.

Gultekin (2005) studied the effects of PBL on learning outcomes in fifth grade social studies courses. The study was conducted at a public school in Turkey over the course of three weeks and included 40 students (20 in the experimental group and 20 in the control group). An 11-stage project-based learning was used and included:

(1) identifying the objectives, (2) identifying and defining the task to perform or the problem to deal with, (3) identifying the characteristics of the conclusion report and the format of presentation, (4) identifying the evaluation criteria, (5) forming the teams, (6) identifying sub/minor questions, (7) planning the information gathering process, (8)

forming the time-frame, (9) identifying checkpoints, (10) gathering, organizing and reporting the information, and (11) presenting the results and the conclusion (Gultekin, 2005).

Assessment was based on achievement testing and semi-structured interviewing. Results showed a significant increase in academic success within the experimental group. Additionally, students found the PBL approach enjoyable and were motivated to learn.

Egul and Kargin (2014) utilized PBL to teach sixth grade students' science and technology topics. Participants included 92 (46 in the experimental group and 46 in the control group) sixth graders from two schools in Turkey. Pre- and post-test achievement tests were conducted to determine academic success. Students in the experimental group showed significant more success than the control groups. This result is attributed to the PBL approach which increased student's active participation.

Baumgartner and Zabin (2008) conducted a case study to look at project-based instruction among ninth graders. The study was conducted over a two-year period at a charter school in the United States. Participants were selected via a lottery and included ninth grade students aged 13-14 years old taking a marine science course. Each year, two classes with an average of 25 students in each were provided PBL instruction. Students were organized into teams to study specific groups of organisms. Instruction included mini-lessons, six field trips to collect data, experiments done in the classroom, and presentations. Students took on the responsibility for their learning by assisting in planning their trips, creating field collection kits, and maintaining field notebooks. Assessment of impact focused on students gains in content and skills knowledge. A concept inventory of 50 concepts were created to be scored pre- and post-project. Concept inventories showed significant increase in self-reported content knowledge and

sophistication. Skill knowledge was also assessed with essay writing which showed shifts from low to middle and high achievement. Furthermore, qualitative observations of student products (data notebook, posters, etc.) indicated a positive impact on student learning.

Summer and Dickinson (2012) created a longitudinal study investigating project-based instruction through high school. The study took place in a diverse rural district in a state where 70% of the district's students are from low income families. Two high schools with similar populations located close to each other were used. One school implemented project-based approach while the other school used traditional curriculum to teach social studies. The study followed the students for four years of high school, examining social studies achievement and college and career readiness. Results showed higher and more positive college and career readiness outcomes for students who received project-based instruction. Teachers discussed the increased planning time needed for project-based instruction, but overall felt very positive about the teaching method.

### Conclusion

PBL has various advantages over traditional teaching methods. PBL combines a student-centered approach with authentic learning which increases student motivation and engagement in the classroom. Students must utilize each other and work collaboratively to create a project that they will present to the community. PBL requires students to engage in skills such as critical thinking, collaboration, and communication. Students must learn authentically and utilize their own understanding from their experiences to place the information in the proper context. Students gain basic skills and resource knowledge allowing them to become independent, self-regulated learners. Implementing more PBL throughout Medford Public Schools can help our student's flourish, academically, socially, and emotionally.

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### Organizations

The Buck Institute of Education (<https://www.buckinstitute.org/education/k-12/>) creates programs for elementary through high schools students. The Buck Institute of Education has developed PBLworks (<https://www.pblworks.org/>), which provides free information on PBL including research, workshops, conferences, and projects.

### Resource Guide

- A user guide Designed by Panorma Education to help educators understand the social-emotional competencies of their students:  
<https://dpi.wi.gov/sites/default/files/imce/sspw/pdf/seluserguide.pdf>

- PBLworks provides workshops for teachers which are appropriate for all grade levels and all subject areas: <https://www.pblworks.org/services/teacher-workshops>
- Doing Projects versus Project Based Learning PBL  
Visual: <https://newtechnetwork.org/resources/projects-vs-project-based-learning-pbl/>  
Video tutorial: <https://newtechnetwork.org/resources/tutorial-what-is-pbl/>
- Project Ideas: <https://my.pblworks.org/projects>
- A guide to lesson plan projects and have them individualized for each class:  
<https://my.pblworks.org/planner>
- Seven Essentials of Project-Based Learning is an article by John Larmer and John R. Mergendoller which discusses the essential design elements in more detail:  
[http://www.ascd.org/publications/educational\\_leadership/sept10/vol68/num01/Seven\\_Essentials\\_for\\_Project-Based\\_Learning.aspx](http://www.ascd.org/publications/educational_leadership/sept10/vol68/num01/Seven_Essentials_for_Project-Based_Learning.aspx)
- Essential Project Element Design Checklist to ensure all design elements are included:  
[https://my.pblworks.org/resource/document/pbl\\_essential\\_elements\\_checklist](https://my.pblworks.org/resource/document/pbl_essential_elements_checklist)
- Project Design Rubric utilizes the essential project design elements as the criteria to evaluate projects: [https://my.pblworks.org/resource/document/project\\_design\\_rubric](https://my.pblworks.org/resource/document/project_design_rubric)
- It's a Project-Based World. Let's Prepare Students For it is an article by Bonnie Lathram, Bob Lenz and Tom Vander Ark which explains how PBL readies students for the real world:  
<https://www.gettingsmart.com/2016/08/its-a-project-based-world-lets-prepare-students-for-it/>