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# The Impact of Project-Based Learning in the Secondary Classroom

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The Impact of Project-Based Learning in the Secondary Classroom

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For the Degree of Master of Education

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### Abstract

How to increase student engagement in the classroom and prepare the students for the future are questions that teachers have been pondering for decades. Over the years, many different student-centered teaching methods have been introduced to varying degrees of success. This literature review investigates one of the student-centered teaching methods that has been shown to have positive benefits for students in secondary classrooms, project-based learning (PBL). In a PBL unit or lesson, the students are investigating a real-world question or problem and then presenting their learning in a final project. Through the creation of the final product, the students will be gaining a deeper understanding of the learning, as well as, developing critical 21st century skills. Even though the ideas for PBL was initially theorized in the early 20th century, it has shown capable of helping students be successful today.

### The Impact of Project-Based Learning in the Secondary Classroom

Creating a highly engaging classroom environment is something that many teachers are looking to establish. The traditional teacher-centered learning approach of a teacher up front lecturing to students who are diligently taking notes, does not cause the students to be engaged with the learning. If the students are not engaging with the learning, then the students are not growing. There are many different types of student-centered learning methods out there, but project-based learning (PBL) is going to help create high levels of student engagement that teachers are looking for. PBL is not just a passing fad either. The concept of learning by doing has been around and discussed for decades now.

The idea of PBL got its foundation with three early education reformers: John Dewey, William H. Kilpatrick, and Maria Montessori. Kilpatrick, Dewey, Kilpatrick, and Montessori noticed early on that humans, especially young ones, are naturally curious and geared for investigation (Delisle, 2004; Peterson, 2012; Montessori & Claremont, 1967). This natural predisposition for curiosity and discovery is what drives the learning process in the real world. For example, individuals looking to make a career in many trades have to complete apprenticeships before they can go off by themselves. Humans do not naturally learn by reading about something or being lectured to, they learn by doing. The apprenticeships are perfect examples of learning by doing. This concept applies to learning in schools as well. Teachers, “give the pupils something to do, not something to learn; and the doing is of such a nature as to demand thinking, or the intentional noting of connections; learning naturally results” (Dewey, 1916, p.181). By having the students engage with the material, they students are not taking passive role in the learning process; the students are the ones leading it. Dewey’s, Kilpatrick’s, and Montessori’s teaching philosophies may be minutely different, but the central aspect is still

the same, students learning by doing (Delisle, 2004; Montessori & Claremont, 1967; Peterson, 2012). It would not be until the mid-1970's when another educator, Howard Barrows, would bring PBL as it exists today into the classroom.

Howard Barrows was a physician and medical educator at McMaster University in Hamilton, Ontario, Canada. Medical schools at the time had been structured much like regular classrooms that could be found in grade schools throughout the United States. The teacher-centered classrooms had students sitting in rows, being lectured to, and memorizing information. Barrows noticed that his medical students could memorize information and perform well on tests, but when the students had to actually apply the information to real-world situations, they struggled (Delisle, 2004). In the medical profession, this struggle to apply their learning could be a life-and-death situation in the future. Barrows also realized the information that the students are learning in medical school would eventually become outdated. He decided to look at the philosophies of Dewey, Kilpatrick, and Montessori and incorporated them into his own philosophy. Barrows wanted to make sure that his students would be able to confidently apply their learning beyond the classroom setting and be able to adapt to the new discoveries in the field of medicine (Delisle, 2004). PBL made the students in his classroom become actively engaged in the learning process and, in turn, could apply it to the real-world situations they faced. PBL would soon become a standard in the medical classroom, but it did not immediately spread to the secondary education classroom.

Even though the concept of PBL has been around for decades, many classrooms are still teacher-centered. Over the decades, educators like Barrows have experimented with PBL, but it did not immediately catch on with other educators. With the advent of new technology, like one-to-one student computers, being introduced into the classroom, there is a need for teachers to

transform their classrooms from being teacher-centered to student-centered. Part of this need for change also stems from the development educational standards for 21st century skills. There are many different types of student-centered teaching styles out there to select. PBL provides teachers with a style to not only engage their students, but also to help establish and reinforce 21st century skills in their students. The purpose of the following research synthesis is to examine how the use of PBL in the secondary classroom affects a student's performance. It is important for teachers to be aware of PBL as a teaching style to implement into their classrooms and how it can impact their students. This research synthesis will delve into what PBL is, what it looks like in the classroom, and the positives and negatives of implementation of PBL for both teachers and students.

### **Review of the Literature**

PBL is a teaching method that involves students investigating a topic that is based on a real-world question or challenge. PBL is a student-centered learning approach, as opposed to the traditional teacher-centered learning that takes place in many classrooms. It is changing from a guided learning process to an open learning process (D'Orio, 2018). PBL is not necessarily a new concept, but it has been gaining more and more attention from teachers and school districts as they seek to have students engage with the material deeper than ever before. With the plethora of teaching methods out there, PBL often has been overlooked because of its very nature. Many teachers are not trained in these student-centered approaches, especially PBL (D'Orio, 2018). Since this is the case, many teachers and school districts may shy away from these approaches and choose the more traditional, teacher-centered style. In the end, there may be some potential roadblocks preventing some teachers and schools from making the switch, but research has shown there are many potential benefits for students engaged in this type of learning that include

developing critical thinking skills, communication skills, and the ability for interdisciplinary learning to take place (Lattimer & Riordan, 2011).

### **Understanding Project-Based Learning**

The makeup of any PBL lesson or unit has a few key characteristics that make it effective. First, it is that real-world question or challenge that is going to “direct the activities and learning in the project” (Hovey & Ferguson, 2014, p.77). Students need to be able to clearly see the relevance of the question or challenge to life outside of the classroom walls. This real-world connection is also going to allow the students “to connect the project with people across the hall, on the other side of town, or across the world, an opportunity for students to collaborate with peers, international experts, and anybody in between, and a way for students to share their complete work” (D’Orio, 2018, p. 1). Consequently, this many levels of connections will produce essential parts of a great PBL lesson.

Another key characteristic of any effective PBL lesson is the student having the choice to decide what will be produced at the end of the lesson or unit and what they will be using in order to complete it (Lee, 2015). Giving students a choice and freedom to explore will provide the students a sense of ownership in the final product. It will also force the students to do the heavy lifting when it comes to the learning process. The teacher acts more as a facilitator for the learning, instead of the driving force. Students will have to rely on their team to make the decisions necessary to complete their project and then present their finished product.

When teachers are constructing their projects, a good guide to use to ensure that it is truly effective is to follow the six “A’s” as described by Adria Steinberg (1997). These six “A’s” include academic rigor, applied learning, assessment practices, adult connections, authenticity, and active exploration. Academic rigor is looking at how the projects align with the learning

goals or the standards (Lattimer & Riordan, 2011). Applied learning is looking at how the students are going to be using skills that will extend beyond the school walls (Lattimer & Riordan, 2011). These would be the 21st century skills that schools and future employers are really pushing to develop in the students. Assessment practices are looking into how the students will actually demonstrate their learning with their project (Lattimer & Riordan, 2011). As was mentioned earlier, the end product is ultimately up to the students, but ensuring that the project is appropriate to the learning goals is the task of the teacher. Adult connections is looking into how the students will make contact with others, outside of the classroom to supplement their learning (Lattimer & Riordan, 2011). This would include seeking out experts in the field, adults, or others from the global community. Authenticity is looking at how these projects connect to real-world situations and the importance to the students (Lattimer & Riordan, 2011). This real-world connection is a key part of developing a PBL lesson or unit. Finally, active exploration is looking into how these projects make connections to the outside world (Lattimer & Riordan, 2011). This would include having the students go on field trips, conduct internships, or anything else outside of the classroom that would help them in the discovery process.

**Project-based learning versus problem-based learning.** Project-based learning can often get confused with another PBL, problem-based learning. Ultimately, these two PBL's are the same. They both begin with an essential question that is driving the force behind the lesson or unit. In both, the students will be the ones that are doing the research to discover the potential answer to that question. The differences lie in the length, the outcomes, and the questions used during the lessons or units. For problem-based learning, the length of these lessons can be long, but they routinely are relative short, maybe a few class periods (Ceker & Ozdamli, 2016). With project-based learning, the length of these lessons or units is routinely long, a week or more at a

time (Ceker & Ozdamli, 2016). Another one of the differences between the two can be seen in the final products. With project-based learning, there is a product that is created or a performance to give, but with problem-based learning, the final product can be something physical like a paper or something non-physical like a proposed solution to the question (Ceker & Ozdamli, 2016). The biggest difference between these two PBL's comes from the types of questions that the students are investigating. With project-based learning, the questions are tied to real-world situations, where the questions for problem-based learning can be real-world or ones that are made up (Ceker & Ozdamli, 2016).

In the end, these two PBL's are almost indistinguishable from each other. The differences between the two are relatively small and to the uneducated, can be easily overlooked. They both have similar elements and are heavily student-centered. The differences, though, are important when deciding which to implement in the classroom. Understanding what project-based learning looks like in the classroom and seeing the outcomes clearly show the benefits that come with implementing project-based learning in the classroom.

### **PBL in Secondary Classrooms**

When looking into PBL, the first thing that is easy to notice is that, “no two teachers implement PBL in the same way” (Ravitz, 2010, p. 293). This is one of the great things about using PBL in the classroom. It can be adapted to fit almost any content area with ease once a teacher has an understanding of the elements that make up a good PBL lesson. A large number of teachers and school districts have already begun implementing PBL into their classrooms, so there are many examples out there for teachers who are interested to follow. All of the following examples can be used in secondary classrooms within a specific content area. There are even a few that can be used cross-curricular as well.

**Social studies.** In the social studies classroom, there are many various ways teachers can incorporate PBL. In social studies teachers are taught to develop essential questions for the students to answer that are the main ideas of the lesson or unit. These questions also serve as a way to excite and hook the students from the beginning of the lesson or unit. This sets the stage quite nicely for the teacher to implement PBL into their lessons or units. Those essential questions, as long as they are real-world questions or problems, will serve as the guide for the projects that are to follow.

For example, a real-world question or problem for students to investigate in a social studies classroom is how to properly market a political candidate (Buck Institute for Education, 2018). The students, in teams, would be given a potential candidate running for a political office. They would then have to look into several real-world issues and problems that the candidate would have to take stances on. The students would have to take into consideration how constituents have voted in the past and those individuals' stances on certain issues, so that they could market their candidate in the best way possible. Throughout the project, the teacher would introduce new scenarios and ethical dilemmas, just like real candidates would encounter. In the end, the students would be working to create some sort of advertisement for their candidate to best help them win. The end product could be campaign videos, posters, flyers, speeches, or all of the above. Through this project, the students would be learning about real-world issues and how political campaigns work in the United States, all while developing 21st century skills.

Another example of a real-world question or problem for students to investigate in a social studies classroom is how to build and design a city (Buck Institute for Education, 2018). The frame for this activity is a fictional one, a zombie apocalypse, but the problems the students are tasked with are very real ones. In this lesson, the students are lone survivors of a zombie

apocalypse and they must rebuild their community from the ground up. The teams of students have to find a suitable place for their new community to be built, create a design for their new community, set up a new government with laws, and establish an economy based on the resources available in the area they have chosen to settle. The students will have to use many different social studies skills in order to be successful at this project. The students would have to understand why areas would be better to settle in than others would, how to properly plan a new city, what types of governments exist and how they function, how to create laws, and what types of economies exist and how they function. Along the process of setting up the new communities, the teacher will introduce challenges for the groups to contend with and develop plans to deal with those problems. Ultimately, the groups will make a presentation of their new community, trying to convince other survivors to come join them. Once again, this project is going to help the students develop those 21st century skills along with developing their knowledge in social studies. This project also is going to bring in knowledge from other classes like science, with the discussion of ecosystems and natural resources when the students are choosing a place to settle.

**Science.** Just like within the social studies classroom, in the science classroom PBL can be just as effective in helping the students learn the various science concepts, as well as developing their 21st century skills. These skills are also going to be transferrable to other content areas. Science, like social studies, is based on discussing real-world questions or problems. These real-world questions or problems are also items that are going to have a strong connection to every student. Since this is the case, any teacher can effectively use PBL in any science classroom.

For example, a real-world question or problem for science students to investigate is what affects water quality, specifically in their local communities (Buck Institute for Education,

2018). This project is going to have the students working in teams investigating different areas of their local watershed for water quality. The project the students will have to take samples and test the quality of water. The groups then will apply their knowledge of what affects water quality both positively and negatively to the results of their specific water quality samples. Each group will have to contend with different potential issues as they all are investigating different areas around their local community that will have unique challenges to solve. Once the students have all of their data collected and analyzed, the final product from this project is going to be a presentation that discusses recommendations from the students to improve and maintain the water quality of the local watershed. One of the key aspects of a PBL lesson or unit is making a connection outside of the classroom walls, so these presentations can be given to local community members who would be responsible for managing the water quality of the community. These could include the local board of supervisors for the county, city council members, or members of any organization that this could apply. Making these connections to the real world is essential to PBL and the issue of water quality is something that can impact a student's life. The teacher could even have the students compare their results to results from communities around the world and even tie it to current event situations like the water quality issues in Flint, MI.

Another example of a current event and a real-world problem for the students to investigate is carbon emissions (Buck Institute for Education, 2018). With this project, the students can investigate their own community's carbon footprint. The students would have to use various available online carbon footprint calculators to see how big or little the footprint actually is. These numbers can be compared to communities around the globe as well. The students would then have to conduct research to devise a plan to make their community more Earth-

friendly and reduce its carbon footprint. The students would have to look to other communities around the world to see what they have done to reduce their carbon footprints and then decide what would work best for their own community. The end product, much like the example above, could be a presentation given to community members that could actually take these plans and enact them. Once again, it could include members of the local board of supervisors for the county, city council members, or members of any organization that this could apply. Through this project, the students would also be able to look at the impacts that carbon emissions have on the environment in their own daily lives. With this research the students will have to be doing some mathematical calculations in order determine the carbon footprints of their community and others. This also emphasizes how these PBL lessons and units have the ability to bring in skills and concepts that are being taught in other content areas like in this case, mathematics.

**Mathematics.** Mathematics seems to be the content area where students ask the question, “When will we ever use this?” the most. Students can make a little easier connection to other courses and their real-life connections by themselves, but mathematics is a bit different. Students have a hard time making those connections. With PBL being based on real-world questions or problems, the students can instantly see how this applies to themselves.

An example of this real-world connection is investigating school vending machines and which products that apply to the Healthy, Hunger-Free Kids Act of 2010 could be introduced to help make the most profit for the school to fund various school projects or activities (Buck Institute for Education, 2018). The students will work in teams to first investigate which vending machine foods fit into the Health, Hunger-Free Kids Act of 2010 and which of those is going to have the highest demand amongst the student body in their community. The students would then have to contact outside food vendors to get prices of the products that they would want to

introduce to the vending machines and analyze how much profit they could make off each product. In order to do this, the students would have to conduct some statistical analysis based on how much the average student would pay for a certain product and how much the students could purchase those products from an outside vender. The students would do this for several products, not just one. In the end, the students would create a presentation for the administration in their school to convince them which products should be introduced into those vending machines. Once again, this is a real-world issue that has an impact on the students' lives, while at the same time is bringing in outside individuals and groups.

Another real-world connection for students in mathematics would be to investigate how individuals in many different career fields use mathematics in their jobs (Buck Institute for Education, 2018). The students would select a career path of their choice and then have to conduct interviews with individuals in that career path. The students would be responsible for reaching out to individuals in the community or around the globe to discuss how mathematics is used in their career. This project would help the students see the importance of math and how it connects to life in the real-world outside of the classroom walls. The end product for this project could be a few different products like a presentation, a poster, or even an essay. The teacher could leave the choice of what the end product actually looks like to the students. Once again, student choice is an important aspect of a good PBL lesson or unit. Many of the potential PBL lessons and units out there can culminate into a presentation or an essay, which directly ties into another content area, language arts.

**Language arts.** In language arts there are ample opportunities to implement PBL. As was mentioned several times earlier, many of these projects culminate in either a presentation or an essay, which directly ties into language arts. This is one of the great things about PBL because

there are so many opportunities for cross-curricular learning. Teachers could collaborate to develop the skills in their students. Language arts skills can be brought into many different classrooms through their projects and at the same time, language arts can bring in skills from other classrooms depending on the topics of their projects.

An example of a PBL language arts lesson that brings in another content area, in this case social studies is having the students investigate the story of one of their family members growing up and then create a nonfiction book about their journey (Buck Institute for Education, 2018). This project would have the students conducting interviews with their chosen family member and chronicle their journey into young adulthood, much like the journey the student is currently going on right now. The teacher or even the students could decide to investigate just one family member more in depth level or it could even be multiple family members at a shallower level. The students would have to use their language arts skills to write the nonfiction book at the end, while at the same time making real-world connections to family members and their own personal lives. The students would also need to engage in various levels of critiques of their writing either by themselves, with peers, with the teacher, or even all of them. The end product for this project would be a nonfiction book written and then published by the students. The students could use various online story publishing websites or they could even print their books out and have them bound. Whether the end product is digital or physical would be up to the teachers and administration depending on the budget. Having a physical book for the students to show and present at the end would be the most ideal, but a digital one can accomplish the same learning objectives just as well. Having students conduct research or interviews and then writing stories about them is an easy way to incorporate PBL into the classroom, but writing essays is not the only way for students to demonstrate their learning and projects.

Instead of having the students create a final written project, the students could create a video to show their projects (Buck Institute for Education, 2018). For this example the students are creating a video describing a moment or lesson that they have learned in their own lives. In order for the students to create the video, they will first need to create a script and storyboard to tell their stories. Just like the previous example, these writing will need to go through the same various levels of critiques. Once the students have their storyboard completed and their script ready to go, it will be time to actually create the video. This would mean filming, finding photos, recording voice-overs, or anything else the students need to do to create their videos. The students would ultimately share their videos with their classmates or they could even be shared with community members and parents at an evening event. Whom the students share their videos with would ultimately be up to the teacher and the potential scheduling conflicts of planning an evening event. No matter what the end product is, the question of how exactly to grade a PBL lesson or unit is going to be a concern for any teacher looking to implement this teaching method into his or her classroom.

**Assessment.** Assessing a PBL lesson or unit is going to be different than assessing a traditional lesson or unit. With traditional lessons or units, there will be assignments that will ultimately culminate into some sort of formal assessment, usually a test of some sort. With PBL, the formal assessment at the end is going to be the project. This means that grading for PBL lessons and units are going to be unique as compared to what students, teachers, and parents are used to. Grading for PBL can be accomplished easily for both a traditional grading system and in a standards-based grading system.

**Traditional grading.** The traditional grading system has been the main system used to grade a student's performance for decades. The teacher assigns a letter grade to students based

on their scores from various assignments, tests, and quizzes. It makes things simple for everyone. The student and parents know exactly how their child is performing by looking at that letter grade and it can be easily understood. As was mentioned earlier, with PBL there are going to be fewer items for which to assign a grade. This does not mean that grading a PBL lesson or unit is impossible; it is just going to take some organization by the teacher. The teacher will need to let their students know that they will be conducting check-ins during the process to get an idea of how the students are progressing (Garran, 2008). The check-ins are going to be an essential tool for the teacher to monitor the progress of their students and help make sure they are heading in the right direction. If the teacher does not do the check-ins and wait to assess at the end, it may end up being too late to ensure the students were learning what they were supposed to (Barron et al., 1998).

One way for the teachers to collect information about the students' progress is to conduct various evaluations throughout the process. To ensure the students are staying on track, establishing target goals for the students early on is going to be essential (McGrath, 2003). This will give the students a guide to follow to plan out their work. The frequency of this feedback is going to be important as well (McGrath, 2003). Too much time in between the feedback may cause the students to take a path that is not what the teacher expects or they fall behind. These evaluations can take many forms as well.

The evaluations could be from the teacher providing the students with feedback and guidance. The evaluations could also come from their peers (Perdue, 2018). Peer evaluations are going to make the students improve not only their collaborative skills, but also their higher-level thinking skills as they help their fellow classmates improve their projects. Along the same lines, self-evaluations are going to be important as well (Hovey & Ferguson, 2014). Students are going

to have to look inward at themselves, their team, and their project to see if it is meeting the learning objectives set by the teacher. This, once again, will require the student to conduct higher-level thinking in order to properly assess the current state of their project. Ultimately, with these types of evaluations, both the self-evaluations and the peer evaluations may not be the best to use in terms of grading. The teacher, however, could use their evaluations, along with a rubric, to assign grades for the student's progress. The rubric would be aligned with the target goals that were established at the beginning of the unit with the project.

A key part of grading with a PBL lesson or unit is communication with the students and parents about what the grading looks like. As was mentioned earlier, the length of a PBL lesson or unit is going to be longer than a traditionally taught one, so there may be fewer grades in the grade book. Once again, this is due to the foreignness of PBL to both the students and parents (Garran, 2008). Once that bridge of foreignness has been crossed, grading a PBL lesson or unit with the traditional grading method is going to be relatively simple. The key for the teacher is just going to be providing timely evaluations of the learning along the way and then assess the final project at the conclusion (Hovey & Ferguson, 2014). This traditional grading method is going to be the most common method out there, but PBL can be adapted for other methods, like standards-based grading.

***Standards-based grading.*** With the implementation of various educational standards across the United States over the past couple of decades, teachers and districts have begun to look at how to properly assess a student's progress towards mastering those learning standards. With the traditional grading system, a student may have received a passing grade, but may not have fully mastered the learning standard. This is where standards-based grading comes into play. Instead of assigning the students a letter grade based on their overall performance in the

course, teachers that use standards-based grading will assign students a score on their level of achievement on that particular standard. The teacher will usually have a scale that runs from one to four, where one means has not met the standard and four means they have exceeded mastery of the standard (Miller, 2013). The scale may look different from classroom to classroom, but this is a good idea of what a basic one would look like. This level of adaptability that is found with standards-based grading fits well into the concept of PBL.

Just as the students are going to be working through the development of their project, they will be developing their mastery of the standards. As was mentioned with the traditional grading system, the check-ins by the teacher will provide a glimpse into how the students are progressing towards the mastery of the standard. The teacher would then, using their scale, give the students a score based on their current level of mastery. Along with the score, the teacher would provide feedback and guidance to help the students increase their level of understanding. It is going to be through this consistent assessment and revision process that the students will be able to increase their level of mastery of the standard (Miller, 2013). With standards-based grading, ultimately there is only going to be one score in the end. The score that is being recorded by the teacher during their check-ins is going to be fluid and changing, just as the students' mastery of the standard is fluid and changing (Miller, 2013).

The one drawback of using standards-based grading with a PBL lesson or unit is that PBL relies heavily on working with a team. This can be a problem because for standards-based grading, the teacher is worried about what each individual student knows, not the group as a whole. An easy way to deal with this is by separating out the individual from the group (Miller, 2013). What this means is assessing the students individually on those standards, separately from the group. The students will still be graded on their collaborative skills and the project as a

group, but there will be an emphasis on their individual mastery of the standards (Miller, 2013). The students will receive feedback from their peers and themselves through those similar methods that were discussed earlier. That feedback will be combined with the student's performance on those individual assessments to give a good snapshot of the student's mastery of the particular standard or standards (Miller, 2013). There is a little bit more of a challenge making PBL work in a standards-based grading system, but with some simple tweaks, it can be done. With whatever method of grading the teacher chooses to use, they will notice that PBL, just like any other teaching method, is going to have some potential drawbacks. According to research that has been done, those potential drawbacks, however, are minor in comparison to the successes that are experienced by students whose teacher implemented PBL into their classroom.

### **Potential Drawbacks and Student Successes with PBL**

Just like with any teaching method, there are going to be some potential drawbacks to implementing it. Not every teacher is going to be able to make PBL work in their classroom for any number of reasons. Teaching in PBL is not something that many teachers are taught how to do in their teacher training, so it will seem like a foreign language at first (D'Orio, 2018). The potential drawbacks are what may scare some teachers away from even attempting to implement a PBL lesson in their classroom. The research, however, shows just how beneficial PBL can be, especially with students with special needs and talented and gifted students.

**Potential Drawbacks with PBL.** As has been mentioned a few times, PBL is foreign to many teachers. Many teachers may have heard of PBL, but lack a good understanding of what it actually is and how to properly implement it (Hovey & Ferguson, 2014). In a recent study conducted by Katrina Hovey and Sarah Ferguson (2014), they discovered that a majority of the 134 teachers and administrators they studied responded that they needed more training in PBL

and that about half the participants thought that the purpose of PBL was to just create projects. Creating projects is just the means by which the students will be developing those 21st century skills. This lack of understanding of what PBL really means is what is going to create fear in teachers and prevent them from attempting to implement it. It is human nature to be afraid of things that we do not really understand. There are many literary examples that illustrate this point. With PBL, there is nothing to be afraid of, but understanding is a key aspect in properly implementing it. Once again, their teacher training or their school districts do not usually provide teachers with PBL training, so it usually remains a foreign, scary concept for many. This confusion with PBL is not only a drawback for the teachers; it can also cause problems for both students and parents.

If PBL is a foreign concept for teachers, it will certainly be a foreign concept for students and parents (Barron et al., 1998). Many parents are used to the traditional, teacher-centered classrooms that have existed for decades in education. They have a basic understanding of what is going on at school. PBL shakes all of that up. That shake up is going to lead to confusion, which is going to lead to confused and even angry parents. This is going to be especially true when it comes time for grading. Parents may look at the grade book and see a lack of grades and wonder what their child is even doing at school. This wondering of what they are actually doing also applies to the students. Brigid Barron (1998) and her colleagues gave an example of a middle school science teacher who had his students create design plans for rockets that the National Aeronautics and Space Administration (NASA) could actually use. The students in the end would actually develop the plans and build their very own rockets. The teacher found that often times the students were more concerned with the “doing” of the project and not “doing with understanding” (Barron et al., 1998. p. 274). The students were more concerned about the

launching of rockets instead of some of the learning goals the teacher had and the thought processes behind the launching of rockets. This focus on the project instead of the learning going into the project is going to plague many teachers trying PBL for the first time and this, once again, is where making sure that the teacher has a firm grasp on what PBL is and is not is going to be essential. With PBL, there is going to be a total change in the whole system and teachers need to make sure that all parties involved are informed of these changes and understand what is going to be expected out of everyone. This is even going to apply to the administration within the district as they have some other things on their minds, like standardized testing.

Another one of the potential drawbacks to implementing PBL is the idea of standardized tests. With the implementation of the No Child Left Behind (NCLB) Act of 2001 and then its successor the Every Student Succeeds Act, schools have been held accountable for student learning based on results from standardized tests. With the pressure from state governments and administrators to ensure the students are succeeding according to these standardized tests, there is not a lot of spare time to implement PBL into the classrooms (Garran, 2008). Administrations can also be controlling to ensure this success and limit a teacher's freedom to experiment within their classroom (Barron et al., 1998). This is also, where the concept of "teaching to the test" is going to hinder the teacher from being able to experiment with different teaching methods, especially PBL. This would especially be true in places that have or are thinking about adopting a merit-based pay system for their teachers. In this system, a student's performance on these standardized tests is what is going to factor into things like raises in that particular teacher's wages. Now this is not really a potential drawback of PBL itself, but more of the current system as a whole. Since there are these high-stakes standardized tests, there is not much time or opportunities to implement PBL fully.

Time is going to be another potential drawback of implementing PBL into the classroom. Even in the traditional, teacher-centered classroom, it is difficult to really get too in depth on any topic in just fifty minutes (D’Orio, 2018). Those short amounts of time flies by and once that bell rings the students are on to the next subject (D’Orio, 2018). This is where schools that have block schedules are going to fare better than those that have the traditional seven or eight period schedule. Most schools are going to fall into the category of having a traditional class schedule, and changing the whole system for a few teachers wanting to implement PBL may not seem worth it to the administration. This would mean that many of these projects might require work time outside of class (Garran, 2008). Completing work outside of class is not anything out of the ordinary, but the amount of outside of class time for PBL lessons will tend to be higher (Garran, 2008). This would also mean that the parents are going to have to help with their child’s management of the project (Garran, 2008). Once again, this may cause some friction with the parents, as they may not view that they should have to help their child in their learning journey that is the teacher’s responsibility. The parents have other things to worry about, so helping their child stay on top of their project may fall lower on the priority list and the project’s progress may suffer because of it.

With all of these potential drawbacks to implementing PBL into the classroom, none of them really applies to PBL as a teaching method itself. They all have to do with the players involved and the environment itself. Teachers are not trained, parents and students are not familiar, potentially grading, the importance of standardized testing, and time, but not PBL itself. The small amount of real research that has been done on the effectiveness of PBL has shown that there are quite a few benefits to implementing it in the classroom that will offset those potential drawbacks.

**Student Successes with PBL.** The ideas of PBL have been around for many years, but research into its effectiveness is relatively thin because not very many schools have adopted it for the above reasons. Since there are not that many schools or teachers using PBL in their classrooms there have not been too many opportunities to research just how effective PBL can be. With the studies that have been completed, however, they have universally agreed that PBL does lead to student successes in the classroom. Many of these studies rely on teacher observations and surveys to determine their conclusions.

Over a two-year period, Yee Ming Lee (2015) conducted a study to look into how effective PBL could be for the students. She had 73 students in a food science course participate in her study. The students were to complete the project and then afterwards would answer questions on a questionnaire about their experience. The students were tasked with preparing a four-course meal that would be presented to a panel of judges. This is simulating what real chefs would have to do in the real world. After the project was completed, the students would answer various questions about the project on a five point Likert scale. The results of Lee's (2015) study reinforce many of the positive benefits that PBL can provide for the students.

More than 71% of the students in the study said that the project helped "reinforce courses materials covered in the lectures" (Lee, 2015, p. 61). Many of the students felt that the project was difficult and required a lot of effort, but that it was worth it as more than half agreed that they feel more prepared to apply their learning to similar situations in the future (Lee, 2015). The students also overwhelmingly felt that their problem-solving skills, critical thinking skills, team-building skills, oral communication skills, and time management skills were greatly developed through the completion of this project (Lee, 2015). The students also positively responded to the feedback that they received from the panel of judges that analyzed their meals, but students did

also respond that it created more nervousness in them than before (Lee, 2015). Having a panel of judges critiquing their work pushed the students to give their best work, but for some students that push just created a heightened state of nervousness and anxiety (Lee, 2015).

Daniella Garran (2008) in her very own classroom completed a similar study in 2003 through 2007. In her classroom, she has two large PBL lessons for her students to complete and over this time, she has recorded her observations based on the students' work. One of the PBL lessons centered on ancient Egypt. Garran (2008) had her students create two authentic ancient Egyptian artifacts, an archaeologist's journal detailing their discovery of those artifacts, and then a newspaper article chronicling the discovery of those artifacts. The other PBL lesson centered on ancient Rome. The students had to create a journal from the Emperor's perspective, a timeline to go along with the events discussed in the journal, and a map that shows their empire. After completing these two PBL lessons a few times, Garran (2008) made some important observations about her student's learning.

One of the biggest observations that she made was in the time-management skills of her students. Since her class schedule was limited to just a regular class period, she had the students completing a large portion of the projects outside of school (Garran, 2008). From the beginning she gave the students a schedule of deadlines which would include check-ins and the final due date (Garran, 2008). The students then would have to learn how to budget their time to meet those specific deadlines. This 21st century skill will be very important for all of these students to learn for the rest of their lives. Garran (2008) also noticed that her students were increasing their abilities to make inferences and connections a lot more because they were looking into the history for themselves, instead of just relying on what others have already interpreted about the history (Garran, 2008). The ability to make inferences and connections is not only going to help

the students in the social studies classroom, but also in other content areas. Garran (2008) also noticed that as the year progressed, the students were able to thinking more abstractly and creatively. Garran (2008) helped foster this development by increasing the level of difficulty and the level of independence for the students as the year progressed.

Another teacher, named Connie, tried PBL in her classroom and shared these same sentiments. This time it was a science teacher named Connie who was implementing just two PBL lessons as a way for her to test the waters and see what happens (Ladewski, Krajcik, & Harvey, 1994). The researchers spent a lot of time looking into not only what the teacher believed about PBL after implementing it, but also her thoughts on it before and throughout the implementation process. Just like with many teachers, Connie was worried about getting through all of the content that the students were supposed to get through (Ladewski et al., 1994). She also viewed projects and hands-on activities as supplements to the learning and not a central part of the learning process (Ladewski et al., 1994). The researchers then helped provide support and resources for Connie to conduct two projects within her classroom. The researchers then conducted interviews with Connie throughout the implementation process and afterwards as well.

The results of the research found that Connie had very little knowledge of how to properly implement PBL in the beginning. With supports and collaborative opportunities, Connie reported that she became more and more comfortable with the implementation process (Ladewski et al., 1994). In the end Connie's worries that she had before and at the beginning of this implementation process faded away as she learned more about PBL. She also noticed that along with learning the content she desired the student to learn, the students were also developing other skills. As has been discovered in other studies, Connie noticed that the students

were improving on their collaborative skills as well as showed a greater enthusiasm for learning (Ladewski et al., 1994). Other teachers have also reported similar findings to Connie as well.

One teacher who implemented PBL noticed that the students became more involved in their learning. The students took ownership and cared about their learning (Thompson, 2014). Through this learning process, the students were also developing many of those 21st century skills that will help the students not only in school, but in the future as well. Teachers have reported that using PBL in their classroom, the students have shown an increase in their problem-solving skills, collaborative skills, and overall creativity (Hovey & Ferguson, 2014). These benefits have not been shown just for the general education students, but research has even been done to see how PBL can be used with various groups of students with special needs.

*Students with special needs.* Since PBL reports many benefits for general education students, research has been conducted to see if those same benefits could be applied to students with special needs. These students with special needs would include groups like gifted and talented students, English-language learners (ELLs), and students with varied cognitive, emotional, and physical disabilities. Each of these groups is going to require special attention and researchers wanted to see if PBL could be implemented and benefit these unique groups.

One such study was completed during the 2004 - 2005 school year at a middle school. The researchers helped provide supports for the teachers to implement PBL lessons into their classrooms that had the 30 students with special needs they were going to study (Belland, Ertmer, & Simons, 2006). These students were incorporated into the general education setting and were not isolated in a special education classroom. The data was collected through three different means: interviews, observations, and the final student presentations (Belland et al., 2006). The participants in the interviews were general education teachers, special education

teachers, and the students with special needs. Once the lesson concluded, all of the data was analyzed to see if there were any trends in the interview responses and observational data. Overall, all of the students and teachers said that they found tremendous value in conducting a PBL lesson (Belland et al., 2006). Many of the findings from their research echo the findings from the other studies that have been conducted with both general education students and students with special needs. Both the teachers and students noticed that the students improved their collaborative skills by helping each other complete the projects and stay on task (Belland et al., 2006). Increasing student engagement and student collaboration are key characteristics of a good PBL lesson. They are going to be essential skills for students with special needs to improve upon and PBL lessons can help accomplish that. The teachers and some of the students even noticed that students were helping those with more severe disabilities more than they had before (Belland et al., 2006). In the process of helping others with the project, the students who are acting as “teachers” are just reinforcing the learning for themselves. Through this collaboration, everyone involved is receiving the benefits. The collaboration helped develop a sense of compassion in the student that may not have been developed otherwise.

Another development that both teachers and students noticed was an increase in motivation (Belland et al., 2006). Motivation in their students is something that is concerning to all teachers. Teachers are looking for ways to engage their students. PBL provides the perfect platform for the teachers to engage the students more deeply into the material than could be done with a teacher-centered model. Students commented that the change of pace of a PBL lesson provided them with the excitement that made them want to be more engaged (Belland et al., 2006). As was discovered by other studies as well, students completing these PBL lessons developed a sense of ownership in the lesson, which led to an increase in motivation and

engagement. One of the students that was interviewed even stated that this increase in motivation in this one class even has transferred over to their other classes. The student commented that because of his increased motivation in this one course, his grades overall have been increasing (Belland et al., 2006). This once again emphasizes how these benefits of PBL lessons can be brought into other classrooms as well. Students with disabilities are not the only group that can benefit from PBL lessons.

Another one of the unique groups of students that can benefit from implementation of PBL lessons are English-language learners (ELLs). A study was conducted by interviewing 134 teachers from the Southwest part of the United States who work with ELL students (Hovey & Ferguson, 2014). The researchers were interested in what the teachers knew about PBL and how they have potentially used it in the classroom. Once again, the researchers found that about half of the participants were aware of PBL, but did not have a great understanding of what it actually was (Hovey & Ferguson, 2014). The teachers that have used PBL in their classrooms, however, did respond overwhelmingly that PBL benefited their students (Hovey & Ferguson, 2014). The main takeaway was that PBL could be used to personalize lessons for this unique group of students to ensure that they are successful. The researchers also concluded that PBL helps with social development in ELL, which is a key aspect in developing their English-language abilities (Hovey & Ferguson, 2014). In addition, the researchers during the same study took time to investigate another key group of students, the talented and gifted students.

Along the same lines as ELL students, Hovey and Ferguson (2014) also concluded, based on the teacher responses, that PBL can provide the same benefits for talented and gifted students (TAG). Amongst the teachers interviewed by Hovey and Ferguson (2014) there was a high level of belief that PBL lessons can be very effective for the TAG students. PBL lessons can be

personalized to allow TAG students to go above and beyond what the regular education students are doing. Since PBL lessons are heavily student-centered, the TAG students can take charge of their own learning and look more in depth into subjects that interest them. That is one of the things that several studies have noted. These PBL lessons can be modified and adjusted to ensure that the students will be able to complete the project at their unique ability level and be successful (Garran, 2008). Based on Garran's (2008) study in her own classroom, she discovered that collaborating closely with the special education, ELL, and TAG teachers is important to ensuring the students are receiving the benefits from the PBL lessons.

### **Analysis**

Through the research that has been conducted, PBL has been shown to be an effective teaching method that could positively affect a student in the secondary classroom. The teaching philosophy of students learning by doing may have been first written about around the turn of the 20th century, but it is still just as effective for preparing students for the 21st century. The world today is rapidly changing and students need to be prepared to handle the changes. PBL is designed to not only help the students learn the content, but also develop skills that will be with them for the rest of their lives. These skills include critical thinking, communication, collaboration, and time management; all needed to be successful in the 21st century.

Many of the studies that have been conducted have come to the same conclusion that PBL implementation in the classroom will positively impact the students. One of the positive impacts that has been shown is the increase in the engagement and motivation of the students. Students who partake in a PBL lesson or unit often take more ownership in the work, which leads to an increase in the students' engagement and motivation (Belland et al., 2006; Lee, 2015; Thompson, 2014). The teacher is providing the tools for the students to build knowledge. The

teacher is there to be a guide for the students, but ultimately it is up to the students to do the “heavy lifting” when it comes to the learning. There is an end product and a due date that will apply a little pressure to the students that motivate them to successfully complete the project. This is creating a similar environment that the students will experience in the real world after high school. This deadline for project completion would also help the students develop their time management skills as they work with their teams to ensure that they complete their project (Garran, 2008). Along with the increased sense of engagement and motivation that comes with the pressure, the students will have to work together to complete their project.

Many PBL lessons and units are going to require that students work in teams to create their projects. This teamwork aspect of PBL is going to help the students develop their collaboration and communication skills (Hovey & Ferguson, 2014). Since the students are the ones doing the heavy lifting when it comes to the learning, they will need to work together to solve the problems that they may encounter. These communication and collaborative skills are always being developed. The students will be working with teams to create the end products. The end products usually will include some sort of written portion or a presentation the students will give. Part of the process of creating the projects is the peer evaluations (Perdue, 2018). In a PBL lesson or unit, the students are usually collaborating and the opportunity to develop these skills may not always be present in other teaching methods. Once again, these skills are essential for the students to develop in order to be successful after high school in the 21st century.

The greatest strength of PBL is its adaptability. It can be changed to fit for any content area. Even within the same content area, teachers could implement PBL successfully in different ways (Ravitz, 2010). This is going to give the teacher the control over their classroom that is important for teachers to have. If the teacher does not understand or is not comfortable with their

lesson or unit, the students' learning will suffer. Even within the PBL lesson or unit, the teacher can adapt the lesson or unit for individual students or small groups. The research has shown that the benefits from PBL do not just extend to general education students. Students with special needs, English-language learners, and talented and gifted students can all receive the same benefits (Belland et al., 2006; Hovey & Ferguson, 2014). The opportunity for personalized learning that PBL presents is what makes this teaching method unique and special. It can be made to be successful in any classroom for any group of students, but this does not mean that it does not come with some potential challenges.

While implementing PBL can present some challenges to both teachers and students, the potential benefits is more than worth the trouble. Teachers may complain that they have not received training on how to properly conduct a PBL lesson or unit, but there are a plethora of resources and individuals out there to help. Just as collaboration is important for students in a PBL lesson or unit, the teacher could also collaborate with others to gain an understanding of how PBL properly works (Ladewski et al., 1994). When teachers are working together, great things can happen. Another one of the main challenges that PBL presents is time. Planning these projects is going to take time for the teacher to do and it will take time for the students to complete. Once again, collaboration with other teachers will help with the creation of the lessons or units and the development of time management skills in the students will solve these concerns (Garran, 2008; Ladewski et al., 1994). All of these potential challenges are not problems with PBL as a system itself and can be relatively easily overcome.

Based on the studies that have been completed, PBL is an effective teaching method that benefits students. One of the goals for secondary teachers is to help prepare their students to be successful in life after high school. The skills that are developed by completing a PBL lesson or

unit have been shown to be able to help students while they are still in school and will prepare them for success in the 21st century (Belland et al., 2006; Garran, 2008). The challenges presented to students and teachers during the implementation process could be easily managed. In the end, PBL is a great teaching method for teachers to implement that will positively benefit their students.

### **Application**

Developing 21st century skills in students is an essential task for every teacher. PBL is a very adaptable teaching method that ensures that is happening. With PBL, students are the ones that are doing the heavy lifting of learning, with the teacher acting as a guide. This student-centered approach forces the students to take ownership of their learning and since PBL often involves teams, the students will be responsible for the learning of their teammates as well. The skills that are developed through completing a PBL lesson or unit are going to help the students not only in grade school, but also throughout the rest of their lives. These skills are also essential for success inside of a social studies classroom.

“The primary purpose of social studies is to help young people develop the ability to make informed and reasoned decisions for the public good as citizens of a culturally diverse, democratic society in an interdependent world” (Iowa Core, 2017, p. 2). PBL certainly is going to help accomplish this purpose. Instead of just memorizing names and dates, the students are going to have to dive into the material to make their own decisions. This is where PBL is going to shine. The driving force behind a PBL lesson or unit is a real-world question or challenge and with the new Iowa Social Studies Standards, developing those questions is an essential aspect of a good lesson or unit (Iowa Core, 2017; Hovey & Ferguson, 2014). Much of the professional development that has been taking place concerning the implementation of these new standards

has centered on developing these essential questions, especially open-ended questions. The great thing about implementing PBL into the social studies classroom is the real-world aspect of the questions or challenges to be solved by the students.

In my classroom, implementing PBL would require a bit of a fundamental change in my teaching philosophy, but it would be a worthy change. As of right now, my classroom is more teacher-centered than I would truly like it to be. Social studies as a content area naturally lends itself to be a more teacher-centered than student-centered. Teachers are often the ones that are leading the discussions and developing the essential questions. This is certainly the case in my classroom right now. I am often the one that is leading the discussions and pushing them along, but this is changing. Once again, the new Iowa Social Studies Standards place more of the burden of developing questions and conducting the learning on the students (Iowa Core, 2017). As social studies teachers across Iowa are working to implement these new standards, it would be the perfect time to begin implementing student-centered teaching methods into their classrooms, especially PBL.

One of the clear benefits of using PBL in the social studies classroom is the social aspect of the teaching method. In the social studies classroom, students are tasked with learning about our world by looking through different social lenses. A key part of this learning is interacting with others and sharing their thoughts. PBL requires the students to work with in a team to solve that real-world question or challenge. By working with a team, the students will have to organize their learning and then effectively communicate that with their team members. This effective communication and collaboration is going to be necessary for those students to successfully complete their project (Hovey & Ferguson, 2014). All of this collaboration and communication is also going to help reinforce the learning that is taking place, which is the icing on the cake.

Implementing PBL into my classroom would be relatively simple. I would start with an essential question that is tied into the standard or standards that the lesson is about. To begin the lesson, the students may require some important background information to serve as a foundation for their learning. So far, this is very similar to how my lessons are structured today, but the change will come once I give up control to the students. Giving up control from the teacher to the students may come easier to some than others, but it is an essential part of a PBL lesson. This is an area that I need to improve on as well. Once the students have the background information, it is time to turn them loose to solve that real-world question or challenge. During this time, I would serve as a guide, helping the students when needed. I would provide the students with the resources necessary for them to be successful, but the learning is still ultimately up to them. Finally, the students would produce a product of their choosing to demonstrate their learning. Once again, giving the students freedom to choose what their final product will be is an important part of a good PBL lesson (Lee, 2015). This relatively simple teaching model can be implemented in any content area, but it does require some training in how to properly implement it for it to be effective.

One of the main complaints of PBL is the lack of training (Hovey & Ferguson, 2014). Many teachers have heard of PBL and understand its benefits, but may not know exactly what it looks like in action. This is where schools are going to have to provide opportunities for teachers to learn more about how to properly implement PBL in their classroom. These trainings could be offered in each individual building or even district-wide. Teacher leaders or coaches from within the district could lead the trainings or outside experts could be brought in. Many teachers throughout the world have already begun implementing PBL into their classrooms, so they could serve as examples for interested teachers to model. Student collaboration is a key aspect of a

good PBL lesson, but collaboration amongst teachers is also going to ensure proper implementation, which will lead to student success (Ladewski et al., 1994). The hope with these trainings is that many teachers would decide to implement PBL into their classrooms. Deciding to implement PBL is not something that can be forced; it has to be voluntary. PBL is not going to work for everyone. The teacher is still in charge of their own classrooms and need to be comfortable with how the learning is taking place in their classroom. It is always obvious when a teacher is teaching from someone else's lessons. Once again, one of the great aspects of PBL is the idea that “no two teachers implement PBL in the same way” (Ravitz, 2010, p. 293). PBL can be customized to fit into any classroom in any content area. The teacher just needs to gain an understanding of what it is and then dive right in.

When beginning the implementation process in the classroom it is wise to start small and build from there. It can seem very overwhelming thinking about changing an entire curriculum all at once. Instead of looking at the whole year of lessons and units, teachers should begin by looking at just one lesson. By starting small, teachers can break this change into manageable pieces. By taking it one lesson at a time, the teacher can first see if PBL is actually going to work for them. As was mentioned earlier, making sure the teacher is comfortable in his or her teaching method is extremely important and PBL may not work for everyone. The lesson that the teacher chooses to change into a PBL lesson could and should be a small one. Teachers should dip their toes into the water and see how they like it. After trying a lesson, the teachers will need to reflect. These reflections should be done with other teachers or coaches within the school. Discussions of what went well and what could be improved upon will ultimately help the teacher decide if they want to continue the implementation of PBL in their classroom or find another

teaching method to use. There are many teaching methods out there, but PBL is going to provide the teacher with the ability to help prepare their students for the 21st century.

The research that has been done into PBL may be relatively small, but the results are very promising. The studies that have been completed are coming to very similar conclusions about its benefits. PBL has shown an increase in the students' levels of collaborative skills, communication skills, engagement, and motivation that will be essential for them to be successful in the 21st century (Belland et al., 2006; Garran, 2008; Hovey & Ferguson, 2014; Lee, 2015; Thompson, 2014). Continued research into PBL's effectiveness in the classroom will be needed as the world changes. In addition, research into how different teachers implement PBL into their classrooms will be very important because, once again, everyone will do it a little bit differently (Ravitz, 2010). Conducting more research will provide a complete view of how different teachers have already implemented PBL and a more detailed report of the benefits that PBL can provide for students. This information can then be used to inspire other teachers to try PBL in their classrooms.

### **Conclusion**

Creating a highly engaging learning environment where students are the ones doing the heavy lifting when it comes to their learning is something that all teachers are looking to create. Many classrooms today are still organized the same way that they have been for decades with a teacher upfront lecturing to students who are diligently taking notes. This does not have to be the case today. One of the first changes that needs to happen is switching from a teacher-centered classroom to a student-centered classroom. There are many different student-centered approaches for teachers to choose from, but PBL is going to create the learning environment that teachers are dreaming of establishing. Students will be highly engaged in the learning because

they are the ones that are driving it. Student choice in the learning is an important aspect of PBL. The students are ultimately responsible for making the decisions and discoveries instead of the teacher spoon-feeding it to them. During this discovery process, the students are making deeper connections with the learning that may not occur otherwise.

Based on research that has been conducted on PBL implementation in the classroom, it has shown that it can provide many benefits for all groups of students. By conducting a PBL lesson, the students will be working to develop many skills like time-management, teamwork, communication, and overall motivation. The development of these skills will help make the students successful not only in that particular classroom, but other classrooms and even into the future beyond the classroom walls. These 21st century skills are what future employers are looking for in potential new employees. Understanding what PBL is, what it looks like, and the benefits it can provide for the students is important for all teachers. Teachers need to be aware of all of the teaching methods available to best serve their students. By not investigating these other methods that exist, teachers are doing a disservice to their students. The goal of teachers is to help prepare their students for the 21st century and PBL has been shown to do just that and then some.

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