Increasing Student Outcomes with Project-Based Learning

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Introduction:

There has been a major shift in education in recent years away from direct, teacher-centered instruction to more constructive student-centered teaching methods as more and more research supports the implementation of teaching pedagogies that actively involve students in the learning process. Project-based Learning, or PBL, is one of the progressive teaching methods gaining in popularity.

PBL is a student-centered approach that utilizes real-world problems or challenges in an effort to increase student motivation and engagement based on the theory that students will have a deeper connection to curriculum that directly impacts them and their community.

Teachers are viewed as guides or facilitators of learning rather than the main source of knowledge, which shifts responsibility for learning from the educator to the student. As its name suggests, project-based learning involves student projects, but the projects in PBL classrooms are much more complex and intentional than a simple book report or Microsoft Powerpoint presentation. Projects in an authentic project-based learning classroom are formed around students' interests and intended to highlight or resolve real-world issues.

Studies show that when implemented correctly, the benefits of project-based learning are endless. Students who are actively engaged in the learning process are more likely to view learning as a positive experience and retain important knowledge and skills.

Not only does PBL promote student engagement and capitalize on natural student curiosities, it also fosters the development of important cognitive skills, including critical thinking, planning, and reasoning. Learners in PBL classrooms are also engaged in collaborative learning, which promotes the development of critical social skills, including empathy, communication, and cross-cultural understanding.

Classrooms that support the PBL approach foster learners who feel empowered, capable, and prepared to make a difference in the world. Yet another merit of project-based learning is that it lends itself to natural, authentic assessment.

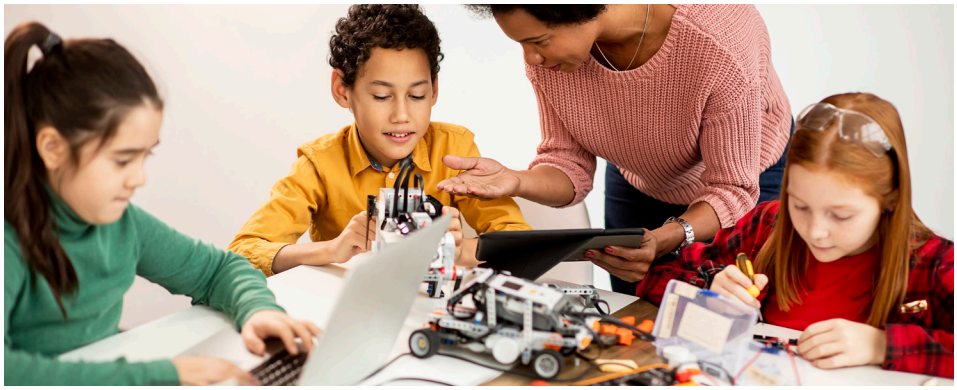
Rather than simply memorize facts for a teacher-created, pencil-and-paper-test, students are demonstrating mastery of knowledge in an authentic, organic manner throughout the learning process. Project-based learning provides students of all backgrounds and ability levels with the opportunity to create meaningful inquiry-based projects while simultaneously developing important cognitive and life skills.

What is Project Based Learning?

Project Based-Learning is a constructivist, student-centered teaching pedagogy that promotes learning by identifying and solving real-world problems using research and evidence-based solutions (Gawron, 2015). Learners then present their solutions using a variety of methods, such as visual presentations, videos, reports, or experiments.

One of the key components of project-based learning and all other constructivist teaching methods is that teachers are seen as guides or facilitators, rather than the main source of knowledge. The teacher in a PBL classroom should guide students and encourage them to think critically by establishing clear objectives, engaging in effective questioning techniques, and promoting a safe and accepting classroom environment (Arundel, 2021).

A project-based classroom encourages students to take collective responsibility for their learning and partner with their teachers to act as co-constructors of knowledge throughout the learning experience. Students involved in PBL study authentic problems or issues that have real-world applications, which results in increased student motivation and interest. This form of inquiry-based learning allows students to consider real challenges in their own communities, which leads to a deeper, more meaningful connection to their learning ("Why is Project-Based Learning Important?").



The "project" part of project-based learning comes from the end task, or project that students create or present to demonstrate their mastery and problem-solving abilities. The project possibilities are endless, from skits to dioramas, but the purpose of each project is always the same-to provide students with an open-ended, engaging way to demonstrate new understanding or proficiency of target objectives, standards, and skills. Although the project is the culmination of a predefined unit, the entire project-based approach from start to finish is a learning journey that requires students to continually question, reassess, and revise their ideas, leading to deeper understanding and the development of important life skills.

Components of Project Based Learning

True, effective Project-based learning is identified using several key elements.

Content Knowledge and Skills

The first of these components is content knowledge and skills (Wolpert-Gawron, 2015). This means that students engaged in project-based learning must have knowledge related to specific content areas or subjects of learning as well as important content-related skills. In order for students to address issues in their community, there must be a certain amount of background knowledge related to the content being taught in addition to the writing, speaking, and planning skills necessary to demonstrate their knowledge and ideas. Teachers in a PBL classroom are still targeting specific state and national standards, but project-based learning provides them with a more holistic, coherent vehicle for teaching, practicing, and assessing these standards and the related content knowledge.

Authenticity and Relevance

Another component is authenticity and relevance (Wolpert-Gawron, 2015). This means that PBL curriculum must address a real-world challenge, need, problem or concern. Authenticity and relevancy are important elements in project-based learning because real-world applications increase student engagement and the likelihood that learners will have a deeper connection to the content (Parker, 2020). When students are addressing real issues that affect their own communities, they are more motivated to put forth their best effort throughout the project-based learning process as they feel a personal connection to the project.

Inquiry

The next component of project-based learning is inquiry (Wolpert-Gawron, 2015). PBL is a form of inquiry-based learning because it is built around students' natural curiosities and encourages students to play an active role in the learning process. Inquiry-based learning is more complex than simply answering a question. It involves digging deep into a variety of sources, researching the topic, and constructing new understandings.

Collaboration

The sixth element of PBL is collaboration (Wolpert-Gawron, 2015). One of the benefits of project-based learning is the development of important social skills as students learn to work together and collaborate on their projects. Effective collaboration requires learners to listen, communicate effectively, and both give and take constructive feedback. Students of all backgrounds and ability levels are seen as essential members of the group and understand the importance of being collectively responsible for their learning tasks.

Twenty-First Century Skills

The next component is employability, or twenty-first century skills (Wolpert-Gawron, 2015). The primary goal of all teaching methods is to help students one day become knowledgeable, productive adults. Project-based learning naturally promotes the development of important twenty-first century skills required for today's fast-paced, technologically-based global workforce. Throughout the PBL process, students are learning how to work as a team, utilize technology, and identify and solve real-world problems, all of which are essential skills in the twenty-first century work environment.

Community Partnerships

Another element of project-based learning is community partnerships (Wolpert-Gawron, 2015). True project-based learning involves students' community and its members because it is built around finding solutions to real-world, community-based issues or challenges. The community is involved throughout the PBL process to provide feedback to learners and ideally contribute to the final assessment or evaluation.

Feedback and Revision

Feedback and revision are the next components of PBL (Wolpert-Gawron, 2015). Project-based learning is a process, and there are learning opportunities during every step of this process. Students' ideas are constantly changing as they gain more knowledge, experiment with new information, and receive constructive feedback from both peers and teachers. In PBL, feedback does not only occur at the end of the unit, but rather is incorporated throughout the process so that students are continuously revising and improving their ideas (Miller, 2011).

Publicly-Presented Product

The tenth element is publicly-presented product (Wolpert-Gawron, 2015). One of the main features that differentiates project-based learning from other constructive teaching methods is the culminating project at the end of a unit. Once an effective solution to a community-based challenge is produced, students decide on the best way to present this solution or product to their peers, teachers, and community-members who were involved along the way. Publicly presenting a project increases student engagement and also contributes to the development of important communication and presentation skills.

Reflection

The final component of project-based learning is reflection (Wolpert-Gawron, 2015). Learning is not over once students present their findings. In project-based learning classrooms, students are encouraged to reflect upon their learning and the entire process, from identifying the problem to presenting the solution. True understanding occurs when students “learn about learning” or think metacognitively.

History of Project Based Learning

Although the idea of student-centered, constructive teaching methods didn't become popular until relatively recently, active learning is not a new concept. Even famous philosophers such as Aristotle, Socrates, and Confucius understood the importance of "learning by doing" (Boss, 2011). These philosophers promoted skills that are considered vital in project-based learning classrooms, such as thinking critically, asking questions, and revising ideas based on new information or feedback.

More recent education philosophers, including Piaget, Dewey, Vygotsky, and Montessori also contributed to the foundations of project-based learning (Boss, 2011). Dewey specifically introduced the concept that students are active, co-constructors of knowledge rather than passive learners that simply receive information from more knowledgeable teachers.

Project-based learning is based on the idea that students should have control over their learning in order to increase engagement and motivation, which ultimately leads to better retention and understanding.

Lev Vygotsky is best known for his socio-cultural theory of cognitive development, which states that learning is a collaborative, socially-mediated process rather than an isolated activity. He also understood the vital role that community plays in the learning process. Project-based learning is deep-rooted in collaborative learning and emphasizes the importance of community involvement, which supports Vygotsky's theory that learning is a collaborative effort.

Maria Montessori changed the way we think about early childhood learning through her ideas and theories that children learn naturally in well-prepared and intentional environments (Boss, 2011). Through years of research and observations, Montessori concluded that given the right materials and with minimal adult guidance, children essentially teach themselves based on their own curiosities and desire to learn. Similarly, project-based learning shifts responsibility for learning from the teacher to the student after first ensuring that students have adequate materials and background knowledge to master a task. Two of the main elements of problem-based learning are student choice and inquiry, which means that students have a say in what and how they learn and allow their natural curiosities to guide the learning process.

The educational theorists and philosophers of the past, as well the improvement of brain research, have all contributed to today's version of project-based learning. Modern day project-based learning began with medical students who needed a more hands-on, experiential way to learn about medical issues and how to solve them most effectively (Boss, 2011). It was discovered that when medical students were given real-life medical issue and asked to diagnose or treat the problem, they performed better than if they were simply reading about the same issue in a medical book (Ferreira & Trudel, p. 23). These same results were then applied to other areas of studies and classrooms, leading to more modern teaching methods, including project-based learning.

Modern day cognitive research has also changed the way we understand how students learn, which therefore changed the way we teach and present new concepts and skills. Recent advances in neuroscience support the theory that students learn best when they are actively engaged and are provided with opportunities for real-world application and personal choice (Boss, 2011). As project and problem-based learning gain popularity, more and more schools are incorporating the model into their curriculum and school culture.

How to Implement Project-Based Learning in the Classroom

Research shows that project-based learning has many benefits for students, teachers, and communities, but implementing true project-based learning teaching methods is no easy feat. A true PBL program possesses all of the aforementioned elements, but also follows a specific implementation protocol in order to be most effective.

PBL requires thoughtful planning and preparation. The project begins with a single question, challenge, or issue relevant to students' lives and communities. This problem, identified by either the teacher or the student, is the first step to teaching students a designated set of learning goals (Ferreira & Trudel, p. 23).

Teachers implementing PBL must first ensure that students have the appropriate background knowledge and skills necessary to complete the process and specific state-based standards should be supported as well. These skills should extend beyond typical curriculum-based academic skills to include life skills such as flexibility, technology, public speaking, and collaborating (Duke, p. 18).

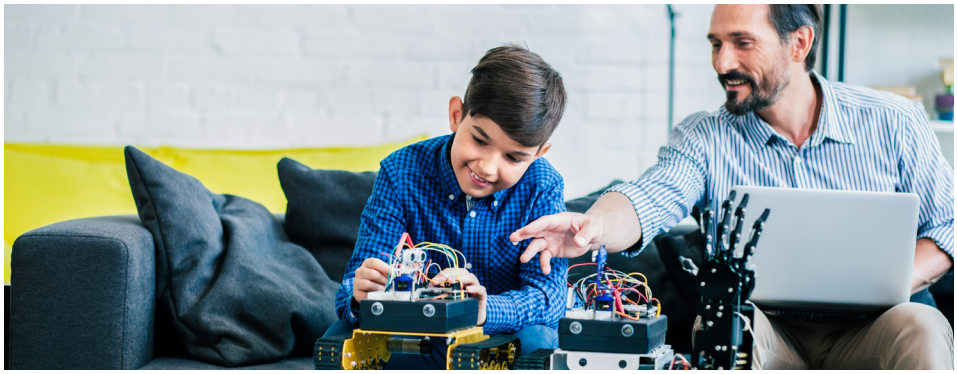
Once teachers decide on an authentic, real-world problem, teachers' main role is to act as a guide by ensuring that students have all of the necessary materials and technology and by posing challenging questions that encourage students to think deeply and critically. As students become more involved in their project, teachers in PBL classrooms should make sure that students are actively exploring solutions using a variety of methods, media-types, and critical sources. As teachers observe students during the PBL process, they are constantly creating and redesigning lessons that reflect students' needs and interests in an effort to provide students with the skills and knowledge needed to complete their projects.

In addition, effective project-based learning extends across all discipline areas so that students are immersed in the project throughout the school day. There isn't just a specific time-block set aside for PBL, but rather the entire school day is spent engrossed in the challenge, no matter the subject (Nell, p.16). In a PBL classroom, it is not unusual for students to work on writing in math or communication skills in history. This seamless integration of knowledge and skills across discipline areas results in a more authentic learning environment and allows students who may struggle in specific subjects to experience success by utilizing their personal strengths.

Because project-based learning is a collaborative effort, the classroom must also be one that promotes teamwork, acceptance, and diversity of backgrounds and ideas. Students should feel as if they have collective responsibility and have a sense of genuine control of their own learning through choice (Vega, 2012). PBL teachers must make an intentional effort to establish a classroom environment based on acceptance and

cross-cultural understanding so that learners of all kinds feel valued and empowered to make a difference.

Another important role of the PBL educator is that of community liaison, as community involvement is an important component of project-based learning. Teachers must ensure that students have access to community members who support their learning journey. These adults should be active members of the community and willing to work with students as they develop ideas and solutions regarding community issues.



Assessment in a PBL classroom looks very different than assessment in a traditional classroom. Assessment should be authentic and implemented throughout the PBL process. Teachers must ensure that students are meeting the standards that PBL is designed to address and gaining targeted content knowledge and skills, and the best way to do this is through a series of both formative and summative assessments that demonstrate student progress and achievement (Miller, 2011).

Although the end project serves as the students' main demonstration of learning and mastery, teachers are continually observing and informally assessing students through each stage of PBL, resulting in a better, more accurate picture of students' progress and abilities.

Teachers implementing PBL must understand the importance of providing continuous feedback and engaging in evaluation strategies that serve the purpose of helping students grow and improve. This culminating project is the main source of assessment and evaluation as students integrate all of what they've learned throughout the PBL process and present it using a variety of methods and media. Because the development of twenty-first century skills is one of the primary goals of project-based learning, teachers should also be teaching and assessing skills such as collaboration, critical thinking, and problem-solving in order to ensure that students are actively practicing and demonstrating mastery of these skills (Miller, 2011). Assessment in a PBL classroom looks very different than it does in a teacher-centered, traditional classroom, but if implemented correctly, project-based learning assessment techniques are more authentic and informative.

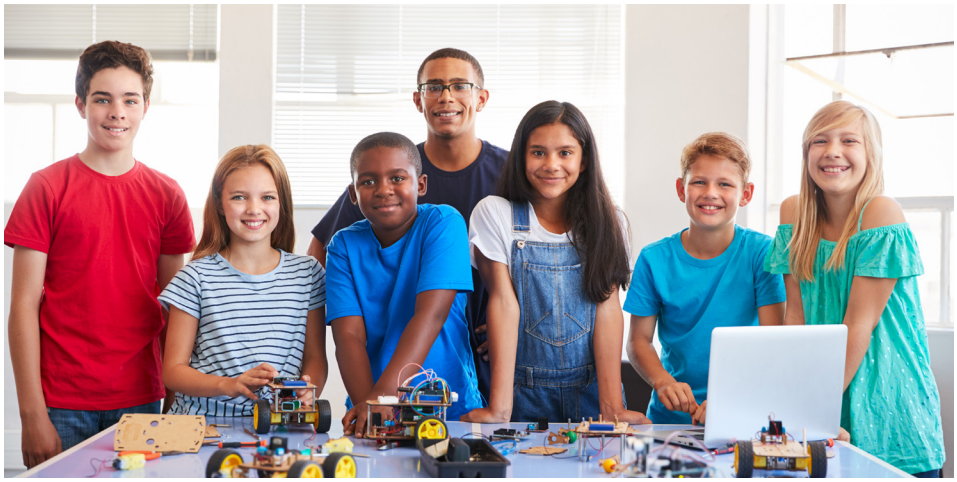
Benefits of Project Based Learning

Traditional teaching methods and assessment strategies often result in students memorizing facts for paper and pencil tests and subsequently forgetting the material after the assessment. The facts and information aren't retained and students often don't develop important cognitive or life skills. Project-based learning, on the other hand, aims to engage and motivate learners in an effort to develop lifelong learners. Richard Parker, in his article "Using Project-Based Learning in the Classroom," states, "Educators that have adopted PBL into their classrooms have found a higher level of participation and engagement, and in some cases, increased scores on standardized testing."

When teachers base classroom content and lessons around real-world issues that are important to students, students care more deeply about their learning and naturally put in more effort knowing that the content affects them on a personal level. Increased engagement leads to more meaningful learning experiences and higher rates of retention. Several 2021 research studies proved that when project-based learning is implemented in classrooms, it results in increased student engagement, retention of important information, and has an overall positive effect on students of all demographics (Arundel, 2021).

Project-based learning is applied across all discipline levels, which means students are truly immersed in authentic learning throughout the school day. Project-based learning is not taking the place of regular content- it is simply an effective, authentic way to present the content. In PBL classrooms, students are developing and practicing important cognitive and social skills, such as writing, communication, and critical

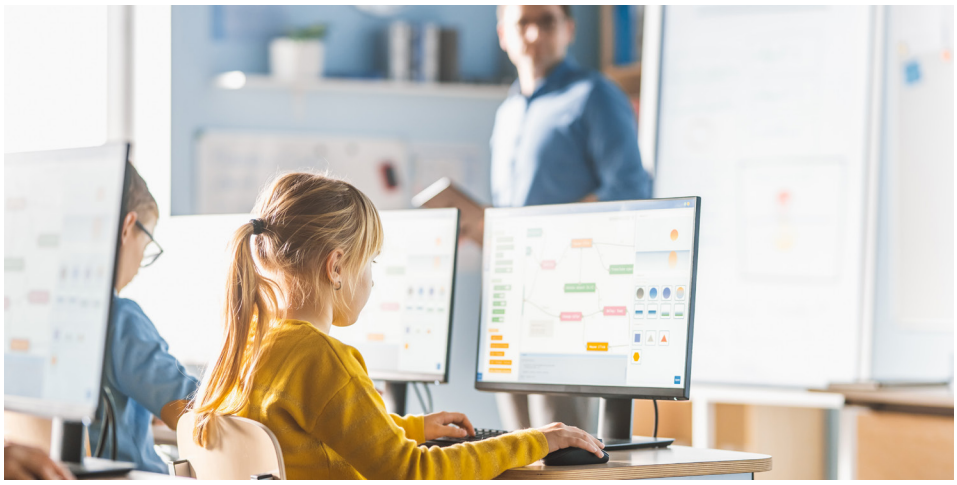
thinking in all subject areas (Vega, 2015). When subject-specific skills are blended seamlessly across the disciplines, the result is a more authentic, real-world environment that encourages the development of important life skills.



One of the most important benefits of implementing project-based learning is that it naturally lends itself to instructional differentiation. Teachers must be able to accommodate a wide range of learners from a wide range of backgrounds, including ESL learners, gifted and talented learners, and students who are performing below grade level. PBL allows teachers to naturally adjust expectations for each student at every step of the process (Parker, 2020). This differentiation means that students of all levels can experience success and demonstrate individual progress.

Motivation and engagement also increase in project-based learning due to student choice and voice. In effective PBL classrooms, students are encouraged to take control of their learning and choose how to analyze, create, and share their knowledge. PBL supports students' natural curiosities and encourages learners to share their individual strengths

and expertise to contribute to the knowledge of the group, which leads to positive school experiences and attitudes towards learning (Arundel, 2021). Because PBL lends itself to authentic assessment, students are evaluated based on personal progress in a variety of discipline areas, both academically and socially.



Students who may not perform well on traditional, summative assessments, are given multiple opportunities to demonstrate their knowledge and mastery in a natural, organic setting (“Why is Project-Based Learning Important?”). Students of varying abilities and learners of all types can participate in PBL and make vital contributions to the group because project-based learning provides learners from all backgrounds and ability levels to utilize individual strengths and demonstrate mastery.

One of the main tenets and benefits of project-based learning is twenty-first century skills. It is becoming increasingly important in today’s global workforce for students to have twenty-first century skills, such as public speaking, critical thinking and questioning, communication, and basic technology skills (“What is Project-Based Learning?”).

Project-based learning requires students to identify and solve real-world problems, and each step in the process promotes the development of important life skills. For example, students must understand how to compare multiple sources and synthesize information as well as how to draw conclusions based on a variety of data sources.

Project-based learners must be able to express themselves and convey their understanding using a variety of multimedia methods, a very in demand twenty-first century skill. In today's increasingly technology-driven world, communication and public-speaking skills are even more important, and in a PBL classroom, learners are asked to communicate with peers, community members, and educators in addition to presenting their final project to an audience at the end of the unit. Throughout the PBL process, students are given multiple opportunities to gain and improve upon vital communication and public-speaking skills that will continue to benefit them into adulthood.

As with any group project, conflicts inevitably occur, and students must be able to engage in important conflict resolution skills to reach a mutual understanding and move forward as a group.

Perhaps the most important benefit of project-based learning is the development of interpersonal skills, such as listening, empathy, and conflict-resolution. Project-based learning is a collaborative effort, which requires students to work with others to accomplish their end goal. Students must learn how to listen to others' ideas and both give and take constructive feedback in order to ensure that the best, most relevant ideas are being considered.

Each phase of the project-based learning process provides students with opportunities to engage with their peers and other members of the communities and practice interpersonal skills. According to Ferreira and Trudel, "…group collaboration can help promote creative problem-solving and higher-order thinking skills as well as develop an appreciation of individual differences and teamwork" (p. 29). In addition, as students work and interact with peers of different races and ethnicities, they gain cross-cultural understanding- another important life skill in today's global economy and workforce.

In recent years, there has been an emphasis on engaging in teaching methods that are evidence-based, or founded on the results of peer-reviewed research studies. As we discover new technology and testing methods, the demand for evidence-based teaching grows (Hunter, p.3). There should be a clear connection between research and what is happening in the classroom. Educators, administrators, and parents want to know that their children and students are taught using methods that are proven to actually work and promote cognitive and social development, thus one of the main benefits of project-based learning is that it is evidence-based and backed by research. Several independent research

studies proved that PBL increases student engagement as well as retention for students of all backgrounds (Arundel, 2021). Another study showed that students performed better on AP tests when engaged in collaborative learning techniques, such as PBL (Duke, p.16). According to some of the latest research, PBL and all it encompasses, has a positive impact on both student achievement and social development. According to William J. Hunter, teaching methods should be based on data and well-established research, and project-based learning is an excellent example of research driving instruction (p. 5).

Conclusion

In recent years, many schools have moved towards a more constructivist teaching approach in which students and teachers act as co-constructors of knowledge. As students become increasingly responsible for their own learning, engagement and retention increase as well.

Project-based learning allows teachers and students to work together to construct knowledge and understanding of important concepts and skills while also providing students with the opportunity to solve or address real-world, authentic community issues. Project-based learning is an educational journey that promotes the development of vital cognitive and life skills each step of the way. Through this evidence-based practice, students learn to work collaboratively and utilize their personal strengths to contribute to the overall success of the group.

Essential content knowledge and skills are seamlessly woven throughout multiple discipline areas to ensure that students are actively engaged in the PBL process while simultaneously meeting targeted standards. The culminating project provides learners with the important opportunity to share their new knowledge with their peers, educators, and community members while practicing vital twenty-first century communication and public speaking skills. Students participating in project-based learning have the rare opportunity to learn in an authentic, student-centered environment that promotes active, lifelong learners who are prepared to make a real difference.

Bibliography

1. Arundel, Kara. “Project-Based Learning Boosts Achievement Across Demographics.” https://www.k12dive.com/news/studies-give-more-proof-that-pbl-increases-academic-achievement/595631/. 24 Feb. 2021, Accessed 25 April 2021.

2. Boss, Suzie. “Project-Based Learning: A Short History.” https://edutopia.org/project-based-learning-history. Accessed 14 April 2021.

3. Duke, Nell K. et al. “Project Based Learning Not Just for STEM Anymore.” The Phi Delta Kappan, vol. 98, no. 1, 2016, pp. 14-19.

4. Ferreira, Maria M., Trudel, Anthony R. “The Impact of Problem-Based Learning (PBL)on Student Attitudes Toward Science, Problem-Solving Skills, and Sense of Community in the Classroom.” The Journal of Classroom Interaction, vol. 47, no. 1, 2012, pp. 23-30.

5. Gawron-Wolpert, Heather. “What the Heck is Project-based Learning?” https://www.edutopia.org/blog/what-heck-project-based-learning-heather-wolpert-gawron. Accessed 20 April, 2021.

6. Hunter, William J. “Evidence-Based Teaching in the 21st Century: The Missing Link.” Canadian Journal of Education, vol. 40, no. 2, 2017, pp. 1-6.

Bibliography

7. Parker, Richard. “Using Project-Based Learning in the Classroom.” https://www.idatschool.ca/project-based-learning/. Accessed 17 April 2021.

8. Vega, Vanessa. “Project-Based Learning Research Review.” https://www.edutopia.org/pbl-research-learning-outcomes. Accessed 4 April 2021.

9. “Why Is Project-Based Learning Important?” https://www.edutopia.org/project-based-learning-guide-importance. Accessed 4 April 2021.

10. “What is Project Based Learning?” https://www.pblsimplified.com. Accessed 17 April 2021.

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