

The Effect of Project-based Learning on Student Motivation and Collaboration in Science

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Abstract: Project-based learning (PBL) is a fairly new teaching strategy that is being used today. This strategy includes the use of projects to create an immersive environment for students to learn. Students are involved in the material and are required to use critical thinking skills to solve the problems given by the teacher. Students in the science classroom can often become disengaged in the material and project-based learning can be used to help increase motivation. This article discusses the positives to incorporate project-based learning in the classroom and how project-based learning increases student motivation and collaboration in the classroom.

Introduction

The science curriculum is full of opportunities for teachers to immerse students in the material through hands-on and interactive projects. So why are teachers so afraid to use projects in the classroom? As long as education has been around, the form of lecturing to students has been a standard way to teach material; but if you look around the classroom at students during a lecture in science, engagement in the material is the last thing you will notice. I have seen students use lecture time to work on other assignments for other classes, scroll through their Instagram feed, or catch up with their best friend about what their plans are for the weekend. I do not think lectures should be ruled out entirely, but there is so much more to learning than watching a teacher stand at the front of the room and talk while the students are forced to sit and listen especially in a junior high classroom, I noticed these activities because students had a hard time focusing on what the teacher was saying. Junior high students are at an age where they are still excited to come to school, until they get into a class where the teacher is lecturing every day, and then the boredom is written all over their faces. Project-based learning can be used to keep our junior high kids excited in the classroom, and ready to take on the day.

So, what exactly is project-based learning? Project-based learning is a type of immersive teaching style that involves students in their own learning. Students are encouraged to ask their own questions about the material and then find the answers through immersive activities that promote collaboration and deep-thinking skills. Through the use of labs in a science classroom, we as teachers can submerge the students into the material by allowing them to perform the labs themselves. Project-based learning fosters critical-thinking skills and uses group work to strengthen communication and collaboration skills between students. I have seen this teaching style work in my own classroom experience, and I encourage every science teacher I meet to use this type of learning in their own classroom. Through the use of project-based learning, students show more motivation to learn and become stronger in their collaboration skills in a junior high science classroom.

Project-based Learning and Motivation to Learn Science

Student motivation to learn is an important aspect of teaching. When students come to class prepared and excited about the material, their motivation to learn might increase. Teachers can incorporate activities that promote motivation in the classroom. Through the use of project-based learning, students show an increase in motivation to learn and engage in the material because they have a voice in how they work with the material and choose what questions they want to answer. There is an abundance of literature that supports this idea. In a study performed by Bartscher et al. (1995), the goal was to see how project-based learning impacted student motivation. They found that intervention positively impacted student motivation to complete homework (Bartscher et al., 1995). The students in the study were more willing to complete the homework because they enjoyed what they were doing in the classroom and took that enjoyment home when working on the homework assignments.

Looking forward, it is important to see whether students' motivation increases when they are having a higher sense of interest. Project-based learning gives students a higher sense of autonomy because they are the ones asking the critical-thinking questions and then answering them through the research they perform throughout the project. According to another study, PBL group's "sense of interest" median scores increased showing that PBL produces a more positive view of the subject matter" (Selcuk, n.d.). The researchers from this study looked at classrooms of teachers that were veteran teachers. These teachers had been teaching for a long time and as a veteran teacher, most times the teachers have tried various ways to increase motivation and student engagement. It is interesting that the students continued to increase their motivation to learn after trying this new learning style. This shows that project-based learning can be a positive source to increase student motivation.

How Student Motivation Changed When I Used PBL In My Student Teaching Classroom

In my student teaching experience, I worked with a student who was initially very quiet in the classroom. We can call this student Sally. Sally would typically sit in the back of the classroom and would become easily distracted while taking notes and during the lecture portion of classes. This case reminded me a lot of what I have seen in junior high science classrooms. Even though I was new to education and teaching in the classroom, I knew I wanted to try project-based learning to see if it would have a positive impact on Sally.

I used project-based learning to teach a unit in my student-teaching classroom, and after a few days of working in groups, I saw Sally really come out of her shell. She started working with the other students more, was more engaged in the material, and was participating more in class. Sally would come to class with questions about what we were learning about, and occasionally the questions were off topic, but I did not mind answering them because she was on topic more than before. She worked well in groups and was volunteering herself to help with certain aspects of the project. She would dive into the project without instruction from her other group members. I started to see Sally take initiative for her learning experience. I be-

lieve project-based learning helped Sally become more motivated in the classroom and helped her connect with the material. Before project-based learning, Sally would come into class quietly and take her seat, then get ready for the class. When we were doing project-days, she came into class excited and asking, “When can we start?” I saw project-based learning transform the learning experience for Sally. Lastly, not only did her motivation increase, her achievement scores increased as well.

Project-based Learning and Its Effect on Collaboration Among Students

A second aspect of teaching that is important is the fundamental idea of collaboration. Collaboration might not deal directly with the science curriculum, but it is a core principle that is important for students to learn and become familiar with. Students will use collaboration in their everyday lives and to teach this skill is very important. Project-based learning encourages group-work and therefore fosters an environment that is productive in teaching good collaboration skills. In a study by Tamim and Grant (2013) used PBL to teach their students how to function in a group setting, communicate, and resolve conflict effectively. The teachers invested in the knowledge building process and also spent time cultivating skills that helped their students become successful team members (Tamim & Grant, 2013). Teaching the curriculum is important, but also teaching students life skills is important. As teachers, we are helping students find themselves and learn how to work cooperatively with their peers. Project-based learning enforces this life skill by pressing students towards a group setting.

There is overwhelming support for collaboration through the use of project-based learning in the literature. Asghar et al. (2012) noted that PBL encourages collaborative problem-solving and interdependence in group work (Asghar et al., 2012). When students work in groups, they have to learn to rely on each other. Working together is imminent and if the students do not work as a group and come together to solve the problem together, they will have a hard time achieving the goal the teacher is wanting them to achieve. This study shows that project-based learning encourages the interdependence between the students and teaches the life skill that it is important that other students know they can count on you. As teachers, we can use project-based learning to achieve the higher-level of learning while also teaching the students very valuable life skills.

How Collaboration Among Students Changed When I Used PBL In My Student Teaching Classroom

During my experience student-teaching I encountered another time when project-based learning positively impacted a student. We can call this student Sam. Sam was another student I worked with that was quiet and did not interact with many other students. I noticed he tried to make friends with other students a few times, but he was often left out of the group. He was a very good student who worked hard and applied himself to class often, but when it came to group work, he was always coming to me saying he did not have a partner. Collaboration skills are important and the

ability to work effectively in a group setting will help students as productive citizens in their future careers.

When I decided to use project-based learning in the classroom, I put the students in groups and strategically placed Sam in a group that I felt was a good fit for him. Interacting with the other students was tough at first for Sam but he came around more towards the middle of the time they were working in groups. After assigning him to a group, I noticed that the students started to work really well together. I saw the students collaborating well, solving problems together, and Sam was becoming friends with the other students. Sam started to speak up more towards the end of the project and I saw the other students listening to his ideas. Sam learned how to communicate his ideas to the other students and his communication skills improved. I have seen first-hand project-based learning can influence a sense of community in the classroom and encourage collaboration among the students.

Reservations to Using Project-based Learning

Project-based learning is a great tool for teachers to use but it is important to note that it may not be the right tool for every classroom. There are many classrooms where project-based learning just does not work and is not the best way to engage and motivate students. There are also downfalls to project-based learning that I would like to discuss. The first downfall is that project-based learning takes a lot of time and effort for teachers to plan. This style is not a style I would suggest implementing halfway through the year. This style takes a lot of planning and outside-of-class time to prepare. The teacher must give themselves enough time to plan this style of learning.

A second downfall for project-based learning is that it takes a lot of support from other teachers, administrators, and parents. Teachers should be trained on project-based learning before they implement it in their own classroom (Sage, 1996). Project-based learning is a fairly new style of teaching and there can be hesitation from parents and administrators when using this style of learning. The teacher needs to be confident in their style of teaching and know that this is the best style for them to use with their students. It is important that teachers can back up their claim for the use of project-based learning, and they can do this by referring to the literature on the topic as well as assessment scores.

Conclusion

Although there are reservations against the use of project-based learning, there are far more positives to using this style of learning in the classroom. Although, I have only touched on two reasons to use project-based learning, there are many more. There is an abundance of literature to support project-based learning and the influence it has on student motivation and collaboration among students. Motivation increases when students have individual choice in their learning and can see why the material is important to them. When students are immersed in the material through hands-on learning instead of sitting and listening to a lecture, the students are more likely to remain engaged. Students want class to be “fun” while they learn, and project-based learning can make this happen. The influence project-based learning has

on collaboration is also important to remember. Collaboration and interdependence are life skills that will be important for students to learn for the future. These are skills that students will use in a future career and project-based learning addresses these skills by encouraging group work. Does project-based learning make sense for science? Yes, because students can work together to solve problems and find results through labs and activities. Junior high science classrooms should be full of project-based learning activities to promote motivation and collaboration.

References

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