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Introduction



This book is designed to help teachers turn their gifted classroom into a project-based learning environment. There are numerous advantages associated with shifting from traditional learning to project-based learning. For instance, project-based learning:

- allows for more creativity,
- is easily differentiable for students of varying ability levels,
- motivates underachieving gifted students,
- creates a passion for learning.

Teachers often claim that they cannot incorporate project-based learning into their classrooms because they have to cover specific curriculum content, sometimes lamenting that they are bound to them. The good news is that prescribed learning content can be viewed as building blocks from which projects can be built – projects that foster student understanding, rather than rote memorisation. When planned and implemented thoughtfully, project-based learning works alongside national achievement standards and complements them. This book provides strategies for how to plan projects using existing curriculum content as guidelines, so that students approach core concepts with new depth and passion.

Chapters 1–3 of this book explain the rationale behind project-based learning. What advantages does project-based learning provide for your gifted classroom? Where, when and how is project-based learning best implemented? The rest of the book looks at the practical applications of using project-based learning in the gifted classroom. Chapter 4 deals with finding the structure that works best for you. The structure of your project-based learning classroom – how you create and run projects in a way that best fits your teaching style, your students' knowledge and abilities, and your classroom and resources – is the key to project-based learning. Once you have decided on a structure that best matches your students' situation, everything else usually falls into place. Chapter 5 discusses how to vary this structure, once you have found it, to adapt to your classroom's needs. Chapter 6



explains how to implement the structure you have chosen, which is greatly simplified after you have already considered your situation and how you might vary the structure as you are implementing it.

Because rubrics are the backbone of the project-based learning classroom, Chapter 7 is devoted to the topic of rubrics, discussing how to train students to use rubrics as a tool for self-empowerment and deeper learning. Chapter 8 addresses the importance of the classroom's physical setup, which can go a long way in terms of making projects run smoothly. The role of the teacher in a project-based classroom is covered in Chapter 9. Whereas in a traditional classroom, the teacher imparts knowledge to a passive audience of learners, in a project-based classroom, the teacher acts as a coach, enabling students to excel and supervising them as they progress. The reproducibles in Appendix A, including rubrics and learning contracts, can be used as they are or adapted to fit your classroom. The lessons in Appendix B provide samples of projects that I have used in my own classroom, with students' work included. You may use these same projects, or perhaps they will provide you with ideas for your own classroom.

Once you commit to project-based learning, you and your students will find it difficult ever to return to the traditional ways of teaching and learning. Having made my own classroom a project-based classroom, I know that I wouldn't have it any other way.

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What Is Project-Based Learning, and Why Should We Use It?

INTRODUCTION

In this chapter, project-based learning will be defined, and the elements that comprise project-based learning will be discussed. In addition, the value of using project-based learning in the gifted classroom will be explored. There are many benefits of project-based learning, among which are student independence, student empowerment and the teacher's ability to tailor projects to the deep and varied needs of gifted students.

WHAT IS PROJECT-BASED LEARNING?

Project-based learning (PBL) is exactly what its name implies: learning through the process of completing a project over a period of time. A more comprehensive definition is as follows:

Projects are complex tasks based on challenging questions or problems, that involve students in design, problem-solving, decision making, or investigative activities; give students the opportunity to work relatively autonomously over extended periods of time; and culminate in realistic products or presentations. (Jones, Rasmussen, & Moffitt, 1997)

This style of teaching and learning is different from more traditional styles, such as teacher-led lectures or reading chapters in a textbook. In the latter methods, the student is *given* the information or skills being taught. The major difference in PBL is that students *discover* for themselves the process of learning. They are provided with the structure, resources and guidance, but it is their responsibility to figure out how best to learn the material.

But what does PBL actually look like? In one project, students may be given two weeks to create presentations regarding the study of cells. The only parameters are that the topic must involve cells and that the product (a presentation) must include a visual aid. Students must determine for themselves how their time should be spent over the course of two weeks: They may allocate their time to conducting research, creating the presentation, producing the visual aid or practising. In addition, students will need to figure out how much time should be devoted to each of these activities. By completing a project such as this, students figure out how to learn independently, as well as how to be responsible.

Almost as important to understand is what project-based learning is *not*. Simply having students participate in a hands-on activity where they produce a product other than a pencil-and-paper assessment does not necessarily constitute project-based learning. For example, if a teacher has a mock trial where all of the roles and characters have been assigned and clearly defined, then it is not a project, even though the end product looks unique from what is typically seen in the classroom. Projects must involve room for the students to discover and create for themselves.

If any of the following characteristics is missing from a lesson, then it may not be project-based learning:

- student choice,
- an open-ended question,
- a real-world problem,
- a lack of teacher-prescribed activities,
- student-led constructive investigation,
- an authentic assessment,
- student-driven time management,
- student-driven learning,
- collaborative learning,
- challenge for every student,
- student autonomy,
- independent work, or
- a conclusion featuring a product fashioned after an adult or real-world model.

Although there are many variables that can be changed within PBL – from the amount of time students have, to the resources they are given, to the product and so on – what always remains the same is that students are given the majority of the responsibility for their own learning. PBL employs the old Confucian adage: Give someone a fish, and you'll feed him for a day; teach someone to fish, and he'll eat forever. We can give students information, but how enduring is that kind of learning? Like the man who has learnt to fish, if a student learns *how* to get information for their project, then that student is equipped to gather information in the future and will feel more confident and independent in their learning.

To make the mock trial assignment previously discussed into a PBL experience, a teacher could ask students to come up with a case to be argued by two teams. The students would also create the characters needed for the trial (e.g. prosecuting lawyers, defense lawyers, witnesses), hold depositions and enact the situation in a real-world manner, which would necessitate research and preparation. This way, choice has entered into the equation, along with independent, student-driven research and authentic assessment.

There are other teaching methods out there that sound and seem very similar to PBL, such as problem-based learning and inquiry-based learning. Although such terms are often used interchangeably, there are indeed differences amongst them.

Although project-based and problem-based learning have many similarities (e.g. students work to solve a problem in both styles), the biggest difference lies in where students exercise choice. In problem-based learning, the students are given a problem they have to solve. Here, they can choose the methods by which they arrive at the solution, but generally, the problem is prescribed for them. In project-based learning, there may not be a specific problem – the project may involve simply learning more about a topic – and students have a lot of control over not only the direction of the project, but also which project they choose. To put it more succinctly, project-based learning begins with the solution, and problem-based learning begins with the problem. Project-based learning says that there is a specific solution the student must produce that shows what that student has learnt, whether via a presentation, a display, a performance or a different type of product. Problem-based learning poses a problem and charges students with finding a solution. Although problem-based learning is extremely useful in some settings (such as university medicine classes), it poses issues in some classrooms, because students have to meet specific learning standards. Once a teacher begins structuring a problem-based approach to incorporate learning standards, it begins to resemble project-based learning.

Inquiry-based learning also involves a lot of choice. In fact, in this approach, learning is so open that there is usually no prescribed target toward which students are heading. They are simply letting their curiosity drive their learning and going wherever it takes them. This fosters a lot of creativity and higher level thinking, because students are not simply following a marked path – they are exploring and learning for themselves. Project-based learning definitely has an end goal in mind. This is important because it acts as the rudder to steer the student in the direction of learning. Consider the example of writing a book. If an author wrote a book with no ending in mind, the book would have chapters that meandered or went in directions that made no sense in terms of the overall story. If the author had the ending in mind, however, everything that they wrote would have a purpose, serving to deliver the reader to the conclusion. Although inquiry-based learning is valuable in some settings (the writer in this analogy would perhaps discover material for a novel that would otherwise never have been written, for instance), most classrooms require more structure in order for students to meet certain requirements and develop as learners.

Project-based learning has many aspects in common with inquiry-based learning and problem-based learning. All of these are valuable teaching and learning methods, providing students with choice and space to learn, but project-based learning provides arguably the best method of grounding learning while still allowing students to stretch their capabilities.

WHY USE PROJECT-BASED LEARNING IN THE GIFTED CLASSROOM?

There has been a big push recently for 21st-century skills. This involves students being able to do more than memorise knowledge, and instead apply this knowledge to solve problems (Stoof, Martens, Van Merriënboer, & Bastiaens, 2002). Businesses have been complaining the best and brightest the educational system is sending their way are very

intelligent, but woefully inept at figuring out problems. They argue that students know a lot of “facts”, but are not “competent” (Bastiaens & Martens, 2000).

We as educators have to do a better job in preparing students to solve these real working problems. How do we do that in the current system of reading textbooks, filling out worksheets and taking tests? How many times in your life do you have to take a test outside of an educational setting? In real life we are usually dealing with projects, either at work, at home, or in other settings. If we truly want to get students ready for the real world, we should be teaching them how to handle the real world dilemma of a project.

According to the Buck Institute for Education (2011), research studies have demonstrated that project-based learning can:

- increase academic achievement on standardised assessment tests;
- teach maths, humanities, science and health-related subjects more effectively than traditional teaching methods;
- increase long-term retention of knowledge, skill development and student and teacher satisfaction;
- prepare students to integrate and explain concepts better than traditional instructional methods;
- prove especially helpful for low-achieving students;
- present a workable model for larger school reform;
- help students to master 21st-century skills such as communication, independent and critical thinking and research.

This is why project-based learning is such a good fit for gifted education, which is charged with the difficult task of being more stimulating and comprehensive than traditional instruction. Teachers with gifted students have to do high quality work with these students precisely because gifted students are *capable* of doing more; PBL allows students to work to their full capabilities.

It is well documented that gifted students prefer to structure their own tasks and establish their own deadlines, as opposed to being assigned tasks and deadlines by teachers (Dunn, Dunn, & Price, 1984; Renzulli, Smith, & Reis, 1982; Stewart, 1981). There have been studies that showed that gifted students learnt more and retained content more accurately when allowed to work on projects where they were setting the pace (Whitener, 1989). Research has also indicated that there is an increased benefit in learning when gifted students teach each other through projects (Johnsen-Harris, 1983; Kingsley, 1986). Another benefit of PBL for gifted students is that when working in groups, students develop cooperative learning skills as they work together to solve problems (Peterson, 1997). Even in subjects for which it might seem more difficult to use project-based learning (e.g. mathematics), students engaged in PBL have performed better than those students taught using traditional methods (Grant & Branch, 2005; Horton, Hedetniemi, Wiegert, & Wagner, 2006; Johnston, 2004; Jones & Kalinowski, 2007; Ljung & Blackwell, 1996; McMiller, Lee, Saroop, Green, & Johnson, 2006; Toolin, 2004). In a study of two secondary schools, one project-based, the other more traditional,

Students at the project-based school performed as well or better than students at the traditional school on items that required rote knowledge of mathematical concepts, and three times as many students at the project-

based school as those in the traditional school attained the highest possible mark on the national examination. (Thomas, 2000, p. 31)

Based on all of this data, we might ask ourselves not why we *should* use project-based learning, but rather why we would ever *not* choose to use project-based learning, given its results and benefits.

THE NEW THREE RS

The original three Rs for education were:

- reading,
- writing,
- arithmetic.

These were already a bit of a stretch, considering that only one of them actually begins with the letter R. Contrast these educational tenets with those of project-based learning, which all start with R:

- readiness,
- responsibility,
- relevance.

Project-based learning is designed to teach students these three Rs, all valuable life skills.

READINESS

Readiness involves the level that the student is at when you introduce a project. There are three students, each at a different level of readiness. Student A is at a basic level, where he or she knows nothing and needs to grasp the initial concept. Student B has a basic understanding coming in and is ready to build on this understanding to go a little deeper. Student C has a clear understanding of the skill in question and is hitting the ground running, ready to take the project in related directions and further knowledge. Even when working with gifted students, you will run into this range of levels, although more students than in a typical classroom may already be at the level of Student C. One of the most beneficial aspects of PBL is that students at all three of these levels can work on the same project – each at the appropriate level of readiness.

According to Matthews and Foster (2005), “Project-based learning experiences ... have many benefits for diverse learners” (p. 117). PBL is inherently tiered in its design, because the students can create products at their individual skill levels. Student number one creates a product that displays a basic level, student number two creates something that shows more growth, and student number three, the student many of your gifted students likely resemble, creates a more complex product that displays deep understanding. A uniform lecture-based unit culminating in a pencil-and-paper test typically will not offer the flexibility that allows gifted students to rise above expectations. On such a test, students either respond correctly, or they do not. The natural differentiation that PBL creates allows each student to gain skills and knowledge at the pace and level that is best suited to their needs.

Differentiation and scaffolding are terms that we toss around in the gifted world, but in practice, they remain difficult for some teachers to employ. Rather than truly differentiating, some teachers simply throw more work at the gifted student, which causes that student to resent being labelled as gifted. Project-based learning allows for a fairly simple method of differentiating, wherein the student sets the level for what can be accomplished.

RESPONSIBILITY

In addition to providing opportunities for differentiation, PBL teaches the valuable skill of responsibility. Think about the vast chasm between secondary school responsibility and tertiary responsibility. For the most part, school teachers enforce responsibility with discipline: detention, phone calls to parents, oral threats, poor marks and so on. Most secondary school students are still legally children and thus are treated as such, with most of the responsibility being put upon the adults who regulate their progress. In tertiary education, the consequences of irresponsibility are bad marks and potentially being kicked out of the course. The only warnings tertiary students generally receive are letters from administrative offices. If a student misses a class, no one is there to hand the student make-up work during the following class, or to call home to see why the student was missing. Tertiary students are technically – and suddenly – adults, and are left to fend for themselves, like baby birds pushed from the nest and expected to fly.

Yet secondary school is supposed to prepare students for higher education. The problem with this is that in most cases, schools place the responsibility for learning on the teacher, whereas university places that responsibility on the student. The disparity between these philosophies can cause a lot of problems for new tertiary students trying to adjust. Switching from secondary school to university is like training someone how to drive a car using an automatic, and then switching to a manual car for the driving test. The best way to prepare somebody for a given situation is to use the same conditions that they will experience in that situation. Why not teach students the responsibility they will need at an earlier age so that their transition to higher education is a smooth one, rather than jarring? Why even wait until secondary school to do this? If we teach children in primary school to be responsible for their learning, then it will be embedded in them. Primary and secondary schools need to do a better job of teaching children how to fish for themselves, rather than just handing them fish. Students must learn responsibility in order for this shift in learning to occur.

Even for students who are not planning to go to university, responsibility will have to be learnt at some point. If somebody misses a deadline or misses too many days of work, that person may be fired. If somebody doesn't pay the bills, there are negative repercussions – the electricity gets shut off, or possessions are taken away. Responsibility is an important life skill that is often shocking to young adults when they enter the real world. If we taught students responsibility earlier, it would prepare them for the real world while also empowering them to learn independently.

Project-based learning puts the brunt of the responsibility for learning on the students. The teacher is there to guide them if they get stuck, or put them back on track if they become confused, but students must determine for themselves when to do what, how much time to spend on a given skill and where to look for what they need.

In PBL, here are some of the responsibilities given to the students: