# Supporting Students with ADHD in Project-Based Learning

by

**Dawn Flister Smith**

Bachelor of Science in Education, Edinboro University, 2001

Master of Education, Edinboro University, 2002

Submitted to the Graduate Faculty of the

School of Education in partial fulfillment

of the requirements for the degree of

Doctor of Education

University of Pittsburgh

2022

UNIVERSITY OF PITTSBURGH

SCHOOL OF EDUCATION

This dissertation was presented

by

**Dawn Flister Smith**

It was defended on

July 7, 2022

and approved by

Joanna M. Newlin, Falk Laboratory School

Emily C. Rainey, Assistant Professor, Department of Teaching, Learning, and Leading

Rachel E. Robertson, Associate Professor, Department of Teaching, Learning, and Leading

**Supporting Students with ADHD in Project-Based Learning**

Dawn Flister Smith, EdD

University of Pittsburgh, 2022

Working through and successfully completing a project-based learning assignment requires the coordination of many skills; including focus, creativity, self-regulation, and executive functioning. A deficit in these skill areas can lead to incomplete or missing elements in the project, an inability to pull all the components together, frustration, and low self-efficacy toward extended projects that require stamina. Students with Attention Deficit Hyperactivity Disorder (ADHD) typically have lagging skills in areas such as, concentration, sustained attention, planning, organizing, time-management, and task completion. The intention of this research study is to examine how students with ADHD perform in a project-based learning environment.

## Table of Contents

## List of Tables

## List of Figures

## Acknowledgements

To my best friend and husband, Steve, for your unwavering love and respect, and your constant support. For always encouraging me to follow my dreams and for reassuringly saying, "we will make it work, we always do" during the many times when we would close our eyes, hold hands, and take a leap, not knowing where we will land, but trusting in that, we *will* land together.

To you and our three children, Xander, Carter, and Emerson. Thank you for your patience, understanding, and grace.

To Xander for always knowing what is right and having the integrity to do it. For managing all you have been dealt, for never complaining, and for walking onto that field and playing each game with all of your heart.

To Carter for being that one guy, who is always looking out for and putting others' needs before your own. For willingly staying at school with me so many extra hours so that I could get work done, and each time saying, "It's okay, mom. Its fine, I don't mind". My favorite book club member and the best walking buddy.

To Emerson, so wise beyond your years. For seeing in me, what I cannot always see. For having the strength and intelligence to know when to fight and when to fall silent. For living fearlessly, unapologetically, without regrets, and for your fierce loyalty to those you love.

You all are my inspiration.

## 1.0 Supporting Students with ADHD in Project-Based Learning

Imagine standing in front of a beautiful, open path that leads you on a journey to a place of your choice, where you will learn, create, grow and have fun along the way, only to discover an enormous obstacle, preventing you from succeeding on your journey. To add to this frustration a little more, you are able to see that others around you have a much easier journey with a clear path in front of them. As a teacher, this is a comparison of what I observe happening to students with Attention Deficit Hyperactivity Disorder (ADHD) during project-based learning. While they struggle to overcome barriers such as focusing during instructions, knowing how to begin, organizing their space and materials, avoiding distractions, and allocating time, their peers are forging ahead without hurdles.

I have noticed a correlation between the students who are unsuccessful at completing project-based learning (PBL) assignments and students with a diagnosis of ADHD or generally speaking, have poor executive functioning skills. The difficulty these students have is *not* due to their lack of creative thinking, level of intelligence, insufficient time, technology, or materials. Noticeably, these students lack in skills that completing PBL assignments require.

Project-based learning is a type of learning where students are empowered to research, create, and design their own work. Ideally, all students are engaged because they are following their own line of inquiry, and have the freedom to direct their own learning. Upon initially learning of the high occurrence of PBL at my place of work, it sounded like a perfect fit for students who have trouble focusing throughout a more traditional school day. It did not take too long to notice that was not the case, and a number of students were unsuccessful. The students who appeared to

struggle to complete the PBL assignments, and had low scores on project rubrics, were students with disabilities, and in specific, many of the students had a diagnosis of ADHD.

## 1.1 The System

My role is a Learning Specialist at a school with grades Kindergarten through Grade 8. As a Learning Specialist, I am responsible for providing academic and behavioral support to students in their classroom, and in some cases, I work with students one-on-one or small group setting in a resource room. I consult with the general education teachers to determine that students' needs are being met and that students are making overall gains. In addition, I assist in screening students in reading, with intent to modify their programming depending on their progress.

I am employed at a nonprofit, private, independent school with a mission and philosophy aligned with student-centered learning. A large majority of the families at my school pay the hefty tuition, but a small percentage of students are on scholarship. During the 2019-2020 school year, 435 students were enrolled in Grades K-8, 38% of the students identify themselves as students of color, and gender was represented fairly evenly. More than half of the students at our school have successful parents whom are either medical doctors, researchers, professors, or other giants in their perspective field. Students attending this school are from 35 zip code areas.

Highlighted in the school's philosophy are the terms "experimental education", "imagination and creativity", "constructivism", and "critical thinking". This school prides itself values of "progressivism". Inquiry has been adopted as the defining characteristic in its educational philosophy. Upon wishes for the students at this school are "to have a deepening relationship with something that arises out of their own personal interests" and "any learning

endeavor depends primarily on them". Of these two goals for the children at our school, it is obvious that students do have a lot of freedom and flexibility in their learning.

In my place of work, students are typically not evaluated on daily assignments, worksheets, or tests, but more commonly on project-based learning assignments. Depending on the grade level of the student, they will have numerous PBL assignments each school year, at my place of employment. I have observed students with ADHD to have success with assignments that are short, straight-forward, and have a limited number of directions, quite unlike the characteristics of PBL.

A recurring problem for the students with ADHD at my place of employment is while many students love the flexibility and choices afforded to them with PBL assignments, students with ADHD cringe at the thought of a new and overwhelming assignment. How can teachers help these creative and innovative thinkers capitalize on their talents and complete an exceptional product? Ultimately, can students with ADHD learn how to maximize their strengths, and establish individualized guidelines to apply to other scenarios or lengthy tasks in life?

All students, but particularly students with ADHD, benefit from having supports, guidance, and appropriate scaffolding for assignments. I am interested in determining which specific supports are most beneficial. By implementing supports such as; graphic organizers, time lines, checklists, visual reminders, check-ins with their teacher, and rubrics, I have noticed a large increase in my students' productivity. These supports will not decrease the workload or reduce the expectations of the assignment, they will simply organize the components and simplify the directives.

Before accepting my current teaching role, my experiences were only in public education. Rarely did my students have PBL assignments. It seems almost as though the only students who

were assigned PBL were students who were gifted, and I did not work directly with gifted and talented students. Upon arriving at this school, I quickly noticed a pattern emerging of students on my caseload sinking under the pressure of PBL assignments. I could see a common theme of managing their time poorly, an inability to carve a path for their projects, and basically, students were shutting down. I know how bright and capable these students are, but their level of confidence was really taking a hit. I started to realize a commonality among the students who had great difficulty with PBL having a diagnosis of ADHD and/or known deficits in executive function. It has become very important for me to find out what will help my students succeed. I want them to have the confidence in themselves that I have in them.

## 1.2 Stakeholders

I identified the stakeholders in my problem of practice to be; students with ADHD, special education teachers, general education teachers, and parents with children having an ADHD diagnosis.

### 1.2.1 Students with ADHD

The stakeholders that I want to gain the most insight from are students with ADHD. With permission from parents, I was able to speak to three middle school students, each with a diagnosis of ADHD. This interview (Appendix A) was my first experience listening to individuals with the deepest understanding of the disability. The students interviewed were either 11 or 12 years in age. All of these students have attended the school I work at for at least two years, and are

accustomed to project-based learning assignments. (To be noted: none of the three students interviewed are participants in this study. They were interviewed in the early stages of my research before my PDSA cycle was planned.)

Generally speaking, I was remarkably impressed with their ability to answer my questions so thoughtfully. It seemed as though they were each very educated about ADHD and the challenges they face in school. The students answered openly and honestly. It was quite clear that the students are well-versed in project-based learning assignments and that they each had a few strategies that they used to have success. Two of the three students admitted that they complete the majority of the work on the assignments at home. They added that it is very difficult to focus in school and talked of how much their parents had to help by laying out a timeline, setting small goals, chunking work, and by frequently checking in on them.

### 1.2.2 Parents of Students with ADHD

After listening to the students, it became clear how often these students had to work on their PBL assignments at home. A couple of the students mentioned their parents helping them at home. Parents hear the struggles from the child while at home, and see their child's progress notes regarding their PBL assignments. They also have great insight into what does or does not work for the child based on the work that they bring home. Frequently, PBL assignments are completed at home and at school.

### 1.2.3 Special Education Teachers

Special education teachers or learning specialists, are responsible for knowing the students' evaluation reports, including their diagnosis and should implement specially designed instruction and develop modifications to the school program to allow the child with ADHD to be on an even playing field as non-disabled peers. The special education teacher needs to coordinate the modifications and services, making adjustments as necessary. They should also ensure that the general education teacher is aware of this specially designed instruction. The learning specialist could also support the general education teachers in their classroom and with developing assignments while keeping the needs of all students in mind.

### 1.2.4 General Education Teachers

Likely, every classroom in America will have at least one student diagnosed with ADHD. The Centers for Disease Control reports, in the United States, the prevalence of ADHD is climbing steadily (2021), and this is the cases of ADHD where students have a diagnosis. In an average classroom of 24 students, 2.3% of the students will have a diagnosis of ADHD.

General education teachers of students with ADHD are typically the teachers that create the assignments. It is imperative that they know their students' individualized needs and work to provide the modifications given in their support plans. When creating the assignments, they should develop the lesson with modifications in mind. General education teachers and special education teachers should collaborate to support student needs.

Among stakeholders for my problem of practice, the power distribution is dependent upon relationships; the relationship between student & teacher, general education teacher & special

education teacher, and teacher & parent. In each school, and in each classroom, there are beautiful working relationships built on trust and achieving the same goal, and there are the toxic relationships of students/teachers/parents who have differing opinions and are unable to work together well.

Likely, without scaffolding in place, the students with ADHD cannot successfully implement all of the PBL steps on their own. Parents of students with ADHD naturally want their child to have success, but unless they teachers reach out to parents for assistance, they will not have much power in contributing to success for their child.

When reading Bryson's (2011) approach for working with stakeholders, and considering the stakeholders I identified in my problem of practice, it is very apparent to me how much each of my stakeholders need to be invested and work collaboratively to ensure success in project-based learning for students with ADHD. If stakeholders have a positive relationship, trust each other, and understand the difficulties of students with ADHD, the rate of success will increase.

## 1.3 Statement of the Problem of Practice

Students with Attention Deficit Hyperactivity Disorder (ADHD) at my school need support with the multiple demands required in successfully completing a project-based learning (PBL) assignment. Tasks that are specifically challenging for students with ADHD when assigned a lengthy project are: focusing through the instructions, establishing goals, task initiation, organizing materials, meeting short-term goals, managing their time wisely, tuning out distractions, visualizing their whole project in small attainable pieces, and remaining productive during work

time. I seek to explore how students with ADHD and poor executive functioning skills could be supported to be successful in lengthy PBL assignments.

## 1.4 Review of Supporting Research

The purpose of this review is to identify why students with poor executive functioning and ADHD show so much difficulty with project-based learning assignments? While looking at strategies and learning techniques, I wish to gain insight on how students can successfully learn from and complete PBL assignments even with a deficit in executive function and/or ADHD. I would like to determine specifically how teacher check-ins and purposeful supports could benefit students throughout project-based learning assignment cycles. Before I can determine what supports are needed, I analyzed the factors that were contributing to the unsatisfactory results of the PBL. A fishbone diagram (Appendix B) was used to visually represent root causes to my problem. This is especially helpful when, much like in my problem, there is not just one single reason that is contributing to poor PBL assignment scores for all students. Likely, I will discover multiple factors contributing to student difficulty.

Equipped with a better understanding of root causes, next, I examine what is known about Attention Deficit Hyperactivity Disorder and gain a better understanding of executive functioning skills for school students. In considering that this school is deeply rooted in progressive teaching, and likely, there will not be a shift in the school philosophy; my angle of focus is supporting students throughout their PBL cycles. I identified a place to start at learning more about the symptoms of ADHD. Then by comparing commonalities and skill deficits among students with ADHD to the skillset needed for completing a successful project-based learning assignment, I will

be able to better support these struggling learners. Finally, I would like clarity around how the role of a special education teacher or a learning specialist can best be utilized for supporting students through project-based learning that is typically done in their classroom.

The following information is collected from a variety of sources. I intend to include information found that explains not only the deficits, but also the strengths that individuals with ADHD possess. The sources that I have chosen are books, case studies, and journal articles written by psychologists and educators who are experts in the field of ADHD and executive function. I also chose journal articles that specifically detail the value of PBL assignments and help with knowing the learning objectives and desired outcome of where my students should end up. One specific case study that I found to be of particular value details the struggle of an adult with ADHD and his difficulties with independent learning, due to the amount of self-directed work and time management skills he needed to complete his assignments. Other articles of interest to me describe the ideal learning environment that leads to success for students with ADHD. I have found in my research thus far about students with ADHD in the classroom, that in specific, their executive function is what seems to rely heavily on their ability to carry out lengthy assignments. With expanding my search field to include "executive function" I have found more useful sources. Also, other terminology used to describe PBL, such as "research projects" or "self-selected projects", have led me to more resources.

My research is broken down into three basic categories, and then further into sub-categories. First, I will explore what empirical data is currently known about students with ADHD. Next, I will specify key challenges that students with ADHD encounter in the classroom with project-based learning. Finally, I will outline how students with ADHD can be supported to thrive

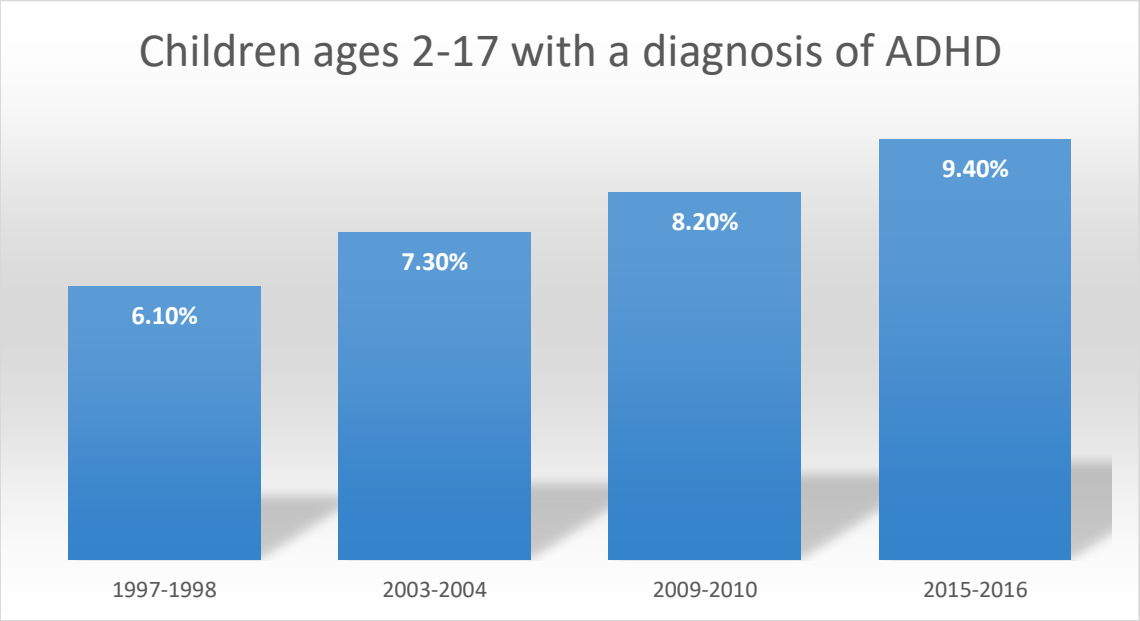
in a general education classroom with project-based learning. Also included is research on how general education teachers and special education teachers can support students with ADHD.

### 1.4.1 Prevalence and Available Treatments

The diagnostic criteria provided in the DSM-5 for Attention Deficit Hyperactivity Disorder is having six or more symptoms, of criteria listed in the categories of Inattention, Hyperactivity, and Impulsivity, lasting at least six months, that have a negative effect on a child's social and academic activities (2013). Individuals who meet the DSM-V criteria for ADHD have some or all the following deficits; failure to pay close attention to details, have trouble sustaining attention, fail to follow through on instructions, difficulty completing schoolwork, trouble getting and staying organized, and avoid or dislike doing things that require sustained focus/thinking (2013).

According to the Centers for Disease Control and Prevention (CDC), 9.4% of children in the United States ages 2-17 have ADHD (2021). Table 1 shows the increasing prevalence of ADHD.

**Table 1: ADHD Prevalence**




Boys are more likely have ever been diagnosed with ADHD (12.9%), compared to 5.6% of girls who will receive that same diagnosis. Students living in poverty are also more likely to be diagnosed with ADHD than children who do not live below the poverty line.

As for a breakdown of diagnoses based on race, a study that was conducted in 2013, with more than 17,000 U.S. children determined that of the 9.5% of children diagnosed with ADHD, children who are white are diagnosed at a rate of 11.5% while children who are black and Latino are diagnosed at 8.9% and 6.3% (Morgan, 2013).

The treatment of ADHD is ultimately decided upon by the individual, the family, and medical provider. The most common treatment for ADHD is stimulant medication. With regard to treatments, it is reported that "nearly two thirds of children with ADHD are prescribed medication (62.0%) and slightly less than half (46.7%) had received behavioral treatment for ADHD in the past year; nearly one fourth (23.0%) had received neither treatment" (Danielson et al., 2018).

Stimulant medications work by targeting the area of the brain where the neurotransmitters are. According to *The Instruction of Children with ADHD*, medication does not seem to have any effect on assisting individuals in the area of organization or time management (2008). Although stimulant medication in not proven to directly help with organization or time management, by stimulating the neurotransmitters, individuals are able to focus on tasks more clearly and perform these basic functions better overall. The science behind the stimulant medication is "neurotransmitters are chemical agents at nerve endings that help electrical impulses travel among nerve cells" (2008, p. 11). Therefore, the neurotransmitters will help people attend to important aspects of their life and work. The appropriate medication helps to trigger the under-functioning chemicals to "produce extra neurotransmitters, thus increasing the child's capacity to pay attention, control impulses, and reduce hyperactivity" (2008, p. 11). A study by Keilow, Holm, and Fallesen looks at whether medication for individuals with ADHD affects academic performance. By comparing students' grade point average (GPA) after stimulant medications are discontinued, the researchers were able to determine an overall increase of .07 in GPA while appropriately medicated (Keilow, et al., 2018).

Medication is not the only treatment option for individuals with ADHD. Other options include training, counseling, or behavioral therapy. One quantitative review of organizational skills interventions for ADHD looks at students and their organization of materials, time, and tasks. Researchers looked at the result of whether students with ADHD showed improvements after having Organizational Skills Training (OST). Overall the outcome was very positive and showed "significant effects of large to moderate magnitude where found for organizational skills outcomes for children when assessed by teacher-rated ($g = 0.54$) or parent-rated ($g = 0.83$) measures" (Bikic

et al., 2017). Teachers report moderate improvements of organization skills and parents report large improvements.

Most experts agree that a combination of medication with counseling or therapy is best. Dendy explains that "the ideal treatment plan should be tailored to their needs and be comprehensive- designed to help them at home, at school, and in the community" (Dendy, 2006, p. 75). The research efforts by Bikic, et al., and the experiences that Dendy wrote about will help with designing and implementing my own research study, and with supporting students with project based learning assignments.

### 1.4.2 Key Challenges that Students with ADHD May Experience in Project Based Classrooms

Although no research was found that directly connects how students with ADHD progress throughout project based learning assignments, there is research that describes general challenges that students with ADHD may experience in school. Next, I offer key categories of challenge for students with ADHD, then in the following section, I turn to promising approaches for supporting students with ADHD in project-based classrooms.

#### 1.4.2.1 Inattention

ADHD is a disorder with many characteristics and individuals who carry the diagnosis are not all alike. There are varying degrees of the symptoms that individuals with ADHD possess. In the DSM-V (2013) the first criteria listed for ADHD is *Inattention.* Inattention is described as; failing to pay close attention to details, having trouble sustaining attention, failure to follow through on instructions, failure to finish schoolwork, having trouble getting organized, avoidance

of things that require sustained focus/attention, losing things, being easily distracted, and forgetful. These characteristics will certainly make starting and completing schoolwork, remembering necessary materials, and focusing in class a challenge.

Attention challenges may make completing a project based learning (PBL) assignment more difficult. Dendy (2006) recommends that for students with ADHD, "assignments must be shortened or extended time must be given" (p. 30). Shortening a PBL assignment would take away from the end product and would result in an incomplete project. PBL assignments are difficult to shorten, as by the nature of the assignment, they are quite extensive.

#### 1.4.2.2 Impulsivity and Hyperactivity

Impulsivity is another feature of ADHD. In the report by the Department of Education, impulsivity contributes to "common behaviors that may include blurting out answers to questions instead of waiting to be called and flitting from one task to another without finishing" (2008). The majority of teachers at my school permit students to move to any area of the room or even the hallway to begin their PBL assignment, but a student with ADHD looks at this opportunity to move, as an invitation to break from the controlled classroom atmosphere. Dr. Ross Greene (2014) theorizes in his book that students with ADHD "have lagging skills in the areas of handling transitions, doing things in a logical sequence, persisting on challenging or tedious tasks, maintaining focus, and have a poor sense of time" (p. 34). Similar to Greene's descriptions, Dendy (2006) offers that "getting started is a huge challenge for them." Dendy continues by telling how students with ADHD have an "impaired sense of time that may contribute to their procrastination; they believe the task will take forever, so why bother to start? (p. 179). This avoidance is often linked to aspects of an executive skills deficit.

#### 1.4.2.3 Executive Function Deficits

Reduced ability to regulate executive function is a third major challenge for students with ADHD. Executive Function (EF) are the set of skills that enable us to learn and manage ourselves in order to reach our goals. Dawson & Guare (2018) describe executive function skills as enabling us to "manage our emotions and monitor our thoughts in order to work more efficiently and effectively". Broken down into simplest form, executive function skills include planning, organization, time management, working memory, metacognition, response inhibition, emotional control, sustained attention, task-initiation, flexibility, and goal-directed persistence. Brown describes executive function by comparing the job of a conductor with an orchestra; no matter how great the level of talent each musician has, without the coordination of music led by the conductor, there would be no harmony (2006).

When students have Executive Function Deficits (EFD), they can create challenges in the classroom. One study tests the association between EFD and academic and psychosocial impairments among children with ADHD and control participants at the individual level. The researchers offered that executive functioning deficits would be more common in children with ADHD compared to control participants in the study who do not have ADHD. The results of the study show that "children with ADHD and comorbid EFDs have significantly worse academic deficits compared with children and adolescents with ADHD without EFDs" (Biederman et al., 2004).

#### 1.4.2.4 Disorganization

A compilation of studies on ADHD and organization related to classroom interventions was completed specifically looking at; checklists and self-monitoring, personal digital assistants, and organizational skills interventions. Organizational problems in children with ADHD manifest

clinically as forgetting to complete or losing homework assignments, difficulties planning for the completion of long-term projects, studying for tests and problems keeping materials organized. (Langberg, Epstein, & Graham, 2008).

### 1.4.3 Supports for Students with ADHD During Project-Based Learning

Although there is not a hearty research base yet, there are a few studies that describe particular approaches that students with ADHD may benefit from while in project-based classrooms. In what follows, I layout the examples of what I found to be relevant regarding best practice for students with ADHD.

In one study, Forness and Kavale compare how students with ADHD respond to interventions whether in a general education classroom or in the special education setting. The specific interventions are based off of recommendations of a previous study's suggested interventions for supporting students with ADHD. The specific interventions measured were; preferential seating, behavior modification, shortened assignments, one-to-one instruction, special consultation, peer tutoring, frequent breaks, and assignment format. Both general education and special education teachers were asked to report which interventions they use for students with ADHD. Forness's and Kavale's study made comparisons between "interventions done in special education (ES= 1.24) verses those used in general education classes (ES= .49) suggested a clear advantage for interventions done in special education settings" (2001). In this same study, Forness and Kavale reference a meta-analysis study that they were part of with colleagues, and state that for ADHD, "psychopharmacologic treatment is both statistically and clinically more effective than comprehensive behavioral interventions" (2001).

#### 1.4.3.1 Shortening Assignments

Attention challenges may make completing a project based learning (PBL) assignment more difficult. Dendy (2006) recommends that for students with ADHD, "assignments must be shortened or extended time must be given" (p. 30). Shortening a PBL assignment would take away from the end product and would result in an incomplete project. PBL assignments are difficult to shorten, as by the nature of the assignment, they are quite extensive.

#### 1.4.3.2 Minimizing Disruptions

Upon discussing assignments with students that have ADHD, nearly every student will mention the difficulty they have with being able to concentrate in their classroom. Having a classroom environment that is favorable to the needs of students with ADHD is essential. Obviously, a classroom cannot be 100% quiet, still, and disruption-free, but attempts to provide a calm place that allows for students to concentrate and feel at ease would benefit all students. Once a student does understand the assignment and is able to start working, that concentration they worked so hard to attain, can be broken easily if they are in an environment that is disorderly. Disruptions can be detrimental to learners "during complex, multiple-step or unfamiliar/ newly introduced tasks, as students are noticed to produce inattention and increased errors (Carbone, 2001).

#### 1.4.3.3 Schedules and Consistent Routines

One would be hard-pressed to locate a source on ADHD that does not adamantly support the use of schedules and consistent routines to support learners with ADHD and/or executive functioning difficulties. Dendy suggests the importance of both a daily routine and basic rules with consequences. Students with ADHD have "problems with organization, awareness of time,

and time management, having a schedule and routine will help them cope better with schoolwork" (Dendy, 2006). Greene explains in his book, *The Explosive Child* how children can be quite literal thinkers and are still making sense of the world, adding that they have "extreme difficulty approaching the world in a flexible, adaptive way" (2014). Dr. Greene continues "more specifically, these children have a strong preference for predictability and routines, and struggle when events are unpredictable, uncertain, or ambiguous (Greene, 2014). Not only do children with ADHD perform best with routines in place, but all students feel a sense of security and belonging when they know what to expect in class. Having a routine in place in the classroom helps students by reducing frustration and setting students up to "work efficiently and remember everything that needs to be done" (Dawson & Guare, 2018).

A classroom that has consistent routines in place generally has clear student expectations that allow for fairness and dependability to students. Antecedent strategies such as; posted classroom rules, frequent and on-going feedback, choice-making interventions, and strategically grouping students are a few ways to set students up for success (Dupaul, et al, 2011).

#### 1.4.3.4 Role of the General Education Teacher

Nearly every classroom in America will have a student with a diagnosis of ADHD. Loughran's article specifically discusses how general education teachers should be prepared to support students with ADHD. Teachers can assist students with ADHD by "keeping things as simple as possible, focus on positives, not negatives, give frequent feedback, and act quickly and firmly, but with kindness" (2006). It is essential that the classroom teacher is knowledgeable on ADHD and has been trained to support students with ADHD.

Although PBL assignments are purposely designed to allow for learning initiated by the individual and plenty of room for independence, when teachers scaffold student support, based on

their deficits, students then have what they need to find their forte, and successfully pull off this feat.

In an article about PBLs, an educator informed that this type of learning is beneficial due to the project's ability to tie in real-world problems that influence students in and outside of the classroom. Both Weber (2015) and Parsons, et al, (2010) highlight the important role of the teacher throughout PBL. The researchers determined that for "students to successfully complete challenging and meaningful tasks, they needed effective and multi-faceted instructional support" (Parsons, et al, 2010). Weber adds "the teacher's role is to guide and advise" (2015). Barkley, however, does advise that for students with ADHD, "time limits for getting work done should be short" (2020). Although PBL does not have a short time limit, teachers can help students by streamlining student ideas and breaking PBL assignments up into small pieces with a short time limit per piece.

Teachers may already have set the stage for PBL. Some classroom management styles and antecedent strategies play a large part in supporting all students, but particularly support the needs of students with ADHD. Simple strategies in a general education classroom that support students with ADHD are; incorporating movement, frequent teacher monitoring, the general arrangement of the classroom, seating a child with ADHD away from possible distractions and in close proximity to the teacher, clear organization, and a token economy (Carbone, 2001). Carbone's strategies are similar to the antecedent strategies and consequence-based strategies recommended in the article *ADHD in the Classroom: Effective Intervention Strategies*; both articles highlight the importance of teachers taking proactive approaches of managing classrooms to prevent distractions from taking away from instruction (Dupaul, et al, 2011).

#### 1.4.3.5 Role of the Special Education Teacher

For special education teachers with students with ADHD who spend the majority of their time in their general education classroom, their role is complex. It can be very tricky to diagnose the needs of the student and put the supports they need in place when they are in another teacher's classroom. Based on my experience as a special education teacher, the key to the successful implementation of supports will rely in the effectiveness of the collaboration between the two teachers.

When students are assigned a PBL assignment from their general education teacher, the special education teacher should already be aware of the assignment; knowing the specific pieces, all deadlines, each requirement, and the teacher's expectations. The special education teacher should now work with the student to establish a plan. As suggested in the journal article, teachers and students should "frame the project together, create a deadline, outline the steps to completion, and talk about teacher responsibilities verses student responsibilities" (Parsons, et al, 2010).

## 1.5 Study Aim and Theory Of Improvement

### 1.5.1 Aim Statement

My aim is for students with ADHD to be successful at completing a project-based learning assignment. In specific, by addressing deficit skill areas relative to having ADHD, students will be able to perform at the same level as their peers, allowing them to successfully complete a PBL assignment in its entirety, and by the due date. By collecting graded rubrics from a previous PBL assignment, I aim to see a 10% increase in score on the rubric for this project. In addition to using

rubrics to attain data, I have asked both the teacher and student to complete a survey on student skill areas before the assignment. The teacher survey data will be added to the student survey for a combined possible score of 100 points. The pre-intervention survey data will be compared to post-intervention surveys, from the teacher and student. My aim is to see an increase of at least 10 points on the post-intervention surveys.

### 1.5.2 Theory of Improvement

My theory of improvement is centered on the hypothesis that with supports in place, a prescribed intervention based on specific areas of need, and on-going teacher check-ins throughout the PBL cycle, individuals with ADHD will show growth in their ability to successfully complete a project-based learning assignment. It is necessary to determine what specifically is contributing to the inability of students with ADHD and deficits in executive function from successfully completing project-based learning assignments. By determining the precise skill(s) where students are stuck and/or inept, I will provide specific interventions to build up this skill deficit. By collecting baseline information and from the on-going check-ins with the student, interventions will be skill specific and ongoing throughout the project. Several change ideas, developed from specific drivers, could contribute to the realization of this aim, student's ability to focus, the topic of the PBL assignment, and executive functioning skills.

#### 1.5.2.1 Student Ability to Focus

The classroom environment will have a large impact on productivity on their PBL assignment. If students are provided a working space that is calm and quiet with minimal disruptions of noise and movement, the student will have an opportunity to complete their

thoughts. It is imperative that teachers have the student's full attention from the very beginning, for clearly understanding the entire assignment, and through the duration of the project, preventing them from missing any project updates. Prior to work time on projects, teachers should establish how students know the following things without interrupting their learning, upcoming transitions, where needed materials are located, and how to ask for help when needed. Teachers must provide the optimum working conditions, careful not to pull focused workers out of their zone, unless necessary. Their working space, i.e. desk or table, should be clear of other assignments, unrelated materials, and free from any extras or trinkets that would interrupt thinking. Any preventative management strategies are helpful for reducing distractions of chatter and movement during work time.

#### 1.5.2.2 Topic of PBL

One piece of the success a student will have on a PBL assignment depends on the actual topic of the assignment, and how motivated the student is to complete the project. Frequently, PBL assignments do allow the student to choose a topic that they are able to connect with. Students will be spending a great deal of time and effort on this assignment. Guidance from teachers about whether the scope of their ideas are too grand or too small, is greatly helpful before they invest too much into the project, or become locked into one topic area.

#### 1.5.2.3 Executive Function Skills

Executive function skills include the ability to plan, coordinate, manage, and carryout our goals. Throughout a PBL cycle, students benefit from teachers modeling ways to attack these skills, for example, breaking work down into manageable pieces. Although some students are able

to do this on their own, and some teachers build these skills into their classroom management, there are still students who will need these skills explicitly taught to them.

### 1.5.3 PDSA Cycle

**Plan.** I recruited two students with a diagnosis of ADHD for the study and obtained parent consent. I met with their general education teacher before the project-based learning assignment was introduced to the class. The class assignment is a Self-Selected Project (SSP) that requires two parts: a research paper and an aesthetic piece to complement their research topic. The SSP was projected to take a month and run from March 31 through the end of April. The interventions occurred throughout the duration of the project. For each student, baseline data included a rubric from a previous project-based learning assignment, a survey completed by the teacher, and a similar self-survey.

The intervention included an instructional session with the two participants, organizational materials to break-up the project into small parts, check-ins with students 3-5 times per week, individualized work sessions in a quiet distraction-free place, and ongoing monitoring, feedback, and coaching by researcher. For each student, baseline data will include the rubric scores from their prior PBL assignment and the two surveys; one student self-evaluation, and one survey completed by their teacher. The guiding question leading the intervention is:

- With supports in place, a prescribed intervention based on specific areas of need, and on-going teacher check-ins throughout the PBL cycle, will individuals with ADHD show growth in their ability to complete a project-based learning assignment?

Post-intervention, I predicted that the sum of teacher and student survey scores for each student's will increase by 10 points overall, and their graded rubric will increase in score by 10% as compared to their previous PBL rubric score.

**Do**. For baseline data, I collected scored rubrics from each student's previous PBL assignment. I administered the initial teacher surveys and the initial student surveys. Then compared the surveys to find the skill deficit areas and identified interventions specific to the deficit area. I combined the point value on the teacher and student surveys for each student, receiving a numbered score out of a possible 100 points. (The surveys were created so that each question gave a point value of 1-5 with a score of one (1) being a skill deficit to a score of five (5) being a strength of that student, and not requiring an intervention.) I also read over the rubrics and comments from the students' previous PBL rubrics to give general information regarding areas of struggle throughout the assignment. I was present in their classroom as their teacher introduced the project and all necessary components. The initial instructional session with the students was centered on how to be focused and productive throughout a lengthy project. The following skills were a focus of discussion: ways to remain focused, being productive during work time, monitor your focus, make changes if distracted, don't stay stuck- ask for help, and what to do at the end of every work session (Appendix D). Throughout the duration of the PBL assignment and during check-ins with researcher, students were provided with simple graphic organizers, checklists, short-term goals, a quiet work space, project timeline, tips for organizing research, help with streamlining, and reminders of work strategies.

**Study.** Upon completion of the PBL assignment, teacher and students completed their surveys again, the point values tabulated, and the results compared to the initial survey scores. In specific, I was comparing scores in noted skill deficit areas to determine if the interventions made

a difference. In addition to the survey data, student rubrics were compared to the rubrics from their previous PBL assignments. Collectively, this information would tell me if my predictions were correct and if the interventions made over the duration of this project was successful in helping students to complete a PBL assignment. Essentially, if the added supports were successful in improving the rubric scores, and if the survey information is clear on specifically what interventions were most helpful, these supports can be implemented in a general education class.

**Act.** After reflecting on the data, I noted areas of strength in the intervention, and areas that could be improved on in another PDSA cycle. I followed up with the students to discuss what I learned and ways that they could use this information to help them on future assignments. I also met with the teacher afterwards to thank her for allowing me to be part of her classroom during this project and to share my findings.

## 1.6 Methods and Measures

The methods and measures used in this study aimed to show how two students with ADHD could successfully complete a project-based learning assignment, knowing that students with ADHD generally have poor skills in the areas necessary to complete a lengthy, multi-step, independent-learning assignment. The following subsections describe the project timeline, participants of the study, their classroom setting, their identified areas of skill deficits, the methods through which data was collected, and observations throughout the duration of the project length.

### 1.6.1 Participants, Setting, and Timeline

Two students participated in this study. Both students are in the same fifth grade class, with the same general education classroom teacher, both have a diagnosis of ADHD, and both students were assigned the same project-based learning assignment. There are 24 students total in the class.

At the time of the study, one student was 10 years old and the other was 11 years old. The participants are both non-white and for both participants, English is their primary language, although one of the participants is tri-lingual and the other is bi-lingual. One of the participants is male and he is an only child, residing in a two-parent home. The other participant is female, and she resides in a home with two parents and one younger sibling. As disclosed to the researcher, one of the participants is diagnosed with ADHD, while that other participant has a duel diagnosis of ADHD and Autism Spectrum Disorder. Both participants are considered by the classroom teacher and researcher to be students with above average academic abilities, but are impacted in the classroom by their ADHD. To generalize, the participants do not have any behavioral challenges outside of what is typical for fifth grade students and students with ADHD.

The project-based learning assignment was a self-selected project, affording students the ability to select nearly any topic to research and write about. Students were required to have their project topic approved by the teacher, but the topics were nearly boundless. This PBL assignment was introduced to the entire class on March 31, 2022 and when introduced to the class, had a projected due date of Friday, April 29. The project was delayed several times, due to general class-wide and COVID-era complications, and ended up having a final due date of Friday, May 27, 2022, essentially becoming a 2-month long project.

The pre-intervention surveys were given to the students and teacher to identify specific deficit areas that impact students with ADHD, and could set students with ADHD apart from their peers in project-based learning assignments. In addition to the surveys, graded rubrics from a previous PBL assignment were used to identify deficit areas. Once deficit areas were identified, interventions were put in place, to prevent the student from having a roadblock or heading down the wrong path at that juncture in their project. These interventions are described in detail in the *Interventions* section below.

### 1.6.2 Surveys

Students and their teacher were asked to complete a short researcher-created survey about their work habits and skills pertaining to known areas of difficulty for persons with ADHD and skills necessary during project-based learning. The surveys included a set of questions that are each specific to a skill required for project-based learning. The model of these questions was a 5-point Likert scale that gauges the student's self-image on items such as the ability to understand the teacher's directions, the ability to manage their time, their personal organizational skills, etc. The student self-survey was worded in child-friendly language and the answer choices are on a continuum (linear scale). The answers provided information regarding their ability to perform skills necessary for success in PBL assignments in their general education class, and assigned by their 5$^{th}$ grade teacher. The surveys were created in Google Forms. Sample survey statements include "When the teacher gives instructions, I am focused and listening", "During work sessions, I get started immediately on my project", and "I get behind on assignments and have to rush at the end." Students and their teacher were asked to choose a number between one (1) and five (5) for each survey statement. A low answer score, i.e., 1 or 2, indicates an area of skill deficit, where a

high answer, i.e., 4 or 5 indicates a strength. The Likert scale surveys for the students will have a possible point value of 50 points, added to the similar teacher survey that also has a possible point total of 50 points; for a possible total of 100 points. When totaling the two surveys (student and teacher), they are equally weighted at with a possibility of 50 points. Each survey question has an equal point range of between 1 and 5 points. When designing the surveys, I intentionally developed them so that the number score coincides with the areas of need and areas where a student is already strong. The survey responses will express low-achieving skills where the student and teacher indicate a score of 1 or 2, and areas where the student and teacher feel are a strength will be scored a higher number (score of 4 or 5). The sum point value of the pre-intervention survey completed by the student and the teacher will be compared to the sum of the scores of the post-surveys. Scores of specific survey questions where the student and teacher scored low, determined what intervention strategy or tool is needed to build up that skill area.

Once I received the baseline information from the student and teacher, I combined the scores for a total out of 100 points as shown below per student in Table 2 and Table 3.

**Table 2: Student 1 Baseline 1**

| Baseline Survey Scores for Student 1 | | |
|---|---|---|
| **Skill Area** | **Student Survey** | **Teacher** |
| Focus during instructions | 3 | 3 |
| Comprehend instructions | 4 | 4 |
| Task initiation | 3 | 3 |
| Makes good use of work session | 2 | 2 |
| Materials/Supplies are organized | 4 | 3 |
| Loses parts, has to re-start | 3 | 2 |
| During work time, avoids distractions | 2 | 3 |
| Allocates time wisely on sections of project | 2 | 2 |
| Rushes at end to complete project | 2 | 2 |
| Project completed and turned in on-time | 2 | 2 |
| Total Points | **27** | **26** |
| Total points when combining student self-survey and teacher survey: **53** | | |

**Table 3: Student 2 Baseline 1**

| Baseline Survey Scores for Student 2 | | |
|---|---|---|
| **Skill Area** | **Self-Survey** | **Teacher** |
| Focus during instructions | 2 | 2 |
| Comprehend instructions | 1 | 1 |
| Task initiation | 1 | 2 |
| Makes good use of work session | 3 | 2 |
| Materials/Supplies are organized | 5 | 2 |
| Loses parts, has to re-start | 5 | 4 |
| During work time, avoids distractions | 1 | 2 |
| Allocates time wisely on sections of project | 3 | 2 |
| Rushes at end to complete project | 3 | 2 |
| Project completed and turned in on-time | 3 | 3 |
| Total Points | **27** | **22** |
| Total points when combining student self-survey and teacher survey: **49** | | |

### 1.6.3 Rubrics

I used information from the rubric of a previous PBL assignment to gauge the participants' skills in the areas of time management, organization, task management, and ability to streamline. The previous PBL assignment was different from the SSP for many reasons, but especially for the

reasons: students were assigned one section of a group project to research, they were provided the resource to pull facts from, and from start to finish it took two weeks (compared to nearly two months). I still found value in using the rubric to identify skill areas of need. Table 4 shows the rubric categories and the score each student received out of a possible 24 total points. In each category, the highest score possible is 4, and the lowest is 1. Appendix G shows the baseline rubric the teacher used for this PBL assignment.

**Table 4: Baseline Rubric 1**

| Baseline PBL Rubric Data | | |
|---|---|---|
| **Category** | **Student 1** | **Student 2** |
| Ideas/Content | 3 | 2 |
| Organization/Research | 2 | 3 |
| Sentence Fluency/Word Choice | 4 | 4 |
| Voice/Creativity | 3 | 3 |
| Conventions of Written Component | 3 | 2 |
| Final Project Neatness & Presentation | 1 | 1 |
| **Total Points** | **16/24 points** | **15/24 points** |
| **Percentage** | **66.7%** | **62.5%** |

. Information gained from the baseline teacher and student-self surveys was compared to the baseline rubrics from the students' previous PBL assignment. This information allowed me to form a learning profile for each student and identify areas to target before and throughout their next assignment, the Self-Selected Project (SSP).

Student 1's survey information did show that they are able to focus well during instructions and they seem to comprehend instructions well. They showed skill deficits in their ability to make good use of work time, locating and managing their project pieces, their ability to avoid distractions, allocate time wisely on sections of the project, they have to rush at the end, and they do not always complete projects by the due-date and turn all pieces in on time. Student 1's survey

data indicates low marks in the areas of thoroughness of written and visual components and final project neatness and organization.

Student 2's profile looks a little different. The first couple questions in the survey indicate that Student 2 is has difficulty focusing during instructions, comprehending the instructions, and when it is time to get to work after the teacher's directions, they are unable to start work independently. The survey has an open-ended response space at the end, asking the teacher to tell any specifics that could help the researcher to help the student. The teacher commented that every time that she gives the class instructions, immediately after, when the class is getting to work, she has to go to Student 2 and repeat the instructions to them, ask them to repeat the instructions back, and then ask them what they will do first, to basically get them started on the task. In addition to Student 2's focus and task initiation being a problem, they also have skill deficits in the areas of: making good use of work time, avoiding distractions during work time, allocating time wisely on sections of the project, and sometimes they have to rush at the end in order to complete the project. On Student 2's previous PBL rubric, they scored low in the areas of research process and final project neatness and organization.

### 1.6.4 Interventions

The aim is for students to increase the score of their post-intervention rubric by 10% and to increase the teacher and self-survey score by 10 points. I have identified skill deficit areas in each student and I targeted my interventions at improving student's skills in those areas. Basically, after noticing students with ADHD struggling to complete PBL assignments, scoring low marks, and frequently, getting lost somewhere along the way in the massive project cycle, I set out to

determine what to equip students with, to improve their PBL experience and ultimately their ending score.

**Learning sessions and folder.** I met with the students for brief (10-15 minutes) sessions to talk about skill areas that I identified as difficult. The Slides (Appendix D) were shown to the students to give a visual, but the sessions were very much discussion-based and informal. I wanted the students to have an awareness of my interpretation of baseline data, and the plan I had to see improvements. I wanted them to begin to identify trouble spots in their work process and learn how not to get stuck. I also did not want to take up too much of this precious class time, so my focus was brief and direct. Each student was given a 2-pocket plastic folder with grommets. All of their project resources, notes, checklists, calendar, etc. would live in this one folder.

**Check-ins.** I checked in on the students during their SSP classwork time between two and four times each week. These check-ins were imperative to be sure they were on the right track, were not wasting time, not headed down a rabbit-hole, had organized notes, had a quiet learning environment, were able to remain focused, were prioritizing time wisely, were setting small goals and reaching them, and were on track to complete the project by the due date.

**Notes (Appendix H).** In their nature, PBL assignments typically have many instructions and numerous specifics that teachers have to explain in depth. Sitting in a classroom, listening at length, extracting necessary details, holding onto questions until it is time for clarification, tuning out the noises and movements around, remaining still; is all quite complicated and seemingly impossible for students with ADHD. I will introduce a strategy of note-taking to students with the goal of sustaining attention and having a solid understanding of the project and what is being asked of them. This researcher developed Note Page was derived from Cornell Notes. It is a child's version of notes to be added to their folders, used when the project is introduced, and for on-going

updates/instructions from the teacher. Dawson and Guare suggest that taking notes is a way to help students pay attention (2018). These notes are concise, logical, to the point, and help to organize thoughts and remember key points.

**Organizing content.** Once student decides on their topic, they are faced with having to sort the material, find out what can be grouped together, and choose a place to start. Categorizing the information, creating topic headings, and deciding on details to support the topics requires a lot of skill and focus. Students may just need a little guidance with organizing their content, or they could need a structured outline and step-by-step assistance.

**Work environment.** Although students will be given ample amount of time in-class to work on their SSP, if the classroom environment is not conducive to allowing for them to concentrate, they will not be productive. This is not only detrimental to students because they are unable to efficiently move throughout their project, but it also contributes to feelings of frustration and failure. During the skill sessions, students were asked to be very aware of whether they were being productive, and if they are not, identify what is causing this disruption and advocate for themselves to get to a space where they are able to concentrate; whether physically or metaphorically.

**Calendar**. Personalized calendars were placed in each students' folder. These were used to establish short-term goals, to write out a sequence for project pieces, and to help manage the overall project timeframe. The calendar was also helpful in determining if they had fallen behind on one of their daily goals and that they should take something home for homework tonight.

**Set yourself up.** One of the most necessary interventions taught to both students was what I called "set yourself up". This skill was taught to the students in a learning session with researcher, one week into the SSP. After observing that both struggled with task initiation and knowing where

to begin work at the next work session, we met to discuss how *not* waste time. Their classroom teacher was fantastic about setting a "work timer" that gave a 5-minute warning before transitioning to recess, which was next on their schedule. Students 1 and 2 were given specific instructions at that 5-minute warning including: 1. Finish the sentence or thought you are presently on. 2. On a post-it note (supplied by researcher and in their folders), write, in a few words, what they were doing, or where to pick-up next session. 3. Place the post-it note on the page that you are currently using so that you see it sticking out. (If you were typing on Chromebook, record on the post-it note where in the document you are. i.e. "at the end of paragraph two"). 4. Neatly place all materials back into your folder, and put your folder in your locker.

**Checklist (Appendix I).** After meeting with the students to teach strategies, I printed two checklists and taped them into their folders, one on each pocket. One checklist is for the participants to refer to if they are stuck in class, and cannot think of what they should do next. The second checklist indicated what to do at the conclusion of a class session so that they would remember what to do at the beginning of each work session. This checklist tells what to do when the 5-minute warning timer sounds. In addition to these two, a project checklist was provided by the teacher, for all students in the class. This was one intervention that I planned to do, but I did not need to implement separate from what all the students in the class received.

## 1.7 Post-Intervention Data and Analysis

### 1.7.1 Survey Data

Upon completion of the project, the students and the teacher completed the survey. This time, the surveys were completed based on their performance and SSP results with the interventions. The tables in Table 5 and Table 6 show the results of the post-intervention student and teacher surveys.

**Table 5: Student 1 Post-Survey 1**

| Post-Intervention Survey Scores for Student 1 | | |
|---|---|---|
| **Skill Area** | **Self-Survey** | **Teacher** |
| Focus during instructions | 4 | 3 |
| Comprehend instructions | 4 | 4 |
| Task initiation | 5 | 4 |
| Makes good use of work session | 4 | 4 |
| Materials/Supplies are organized | 5 | 3 |
| Loses parts, has to re-start | 4 | 3 |
| During work time, avoids distractions | 4 | 2 |
| Allocates time wisely on sections of project | 3 | 4 |
| Rushes at end to complete project | 3 | 3 |
| Project completed and turned in on-time | 4 | 4 |
| Total Points | 40/50 | 34/50 |
| Total points when combining student survey and teacher survey: **74 points** | | |

**Table 6: Student 2 Post-Survey 1**

| Post-Intervention Survey Scores for Student 2 | | |
|---|---|---|
| **Skill Area** | **Self-Survey** | **Teacher** |
| Focus during instructions | 4 | 4 |
| Comprehend instructions | 4 | 4 |
| Task initiation | 4 | 3 |
| Makes good use of work session | 4 | 4 |
| Materials/Supplies are organized | 3 | 3 |
| Loses parts, has to re-start | 5 | 4 |
| During work time, avoids distractions | 5 | 5 |
| Allocates time wisely on sections of project | 4 | 4 |
| Rushes at end to complete project | 5 | 5 |
| Project completed and turned in on-time | 5 | 5 |
| Total Points | 43/50 | 41/50 |
| Total points when combining student survey and teacher survey: **84 points** | | |

Prior to the SSP assignment and the interventions, the students and their teacher were asked to complete a survey regarding PBL and their general habits and skills, in the areas of: focusing, initiating tasks in class, organization, time management, and use of work time. The students and their teacher were asked to complete another survey at the completion of the SSP, regarding the students' work skills in those same areas. Table 7 shows the comparison of Student 1's self-survey responses on the pre-survey (baseline) compared to the post-intervention self-survey.

**Table 7: Self-Survey Responses 1**

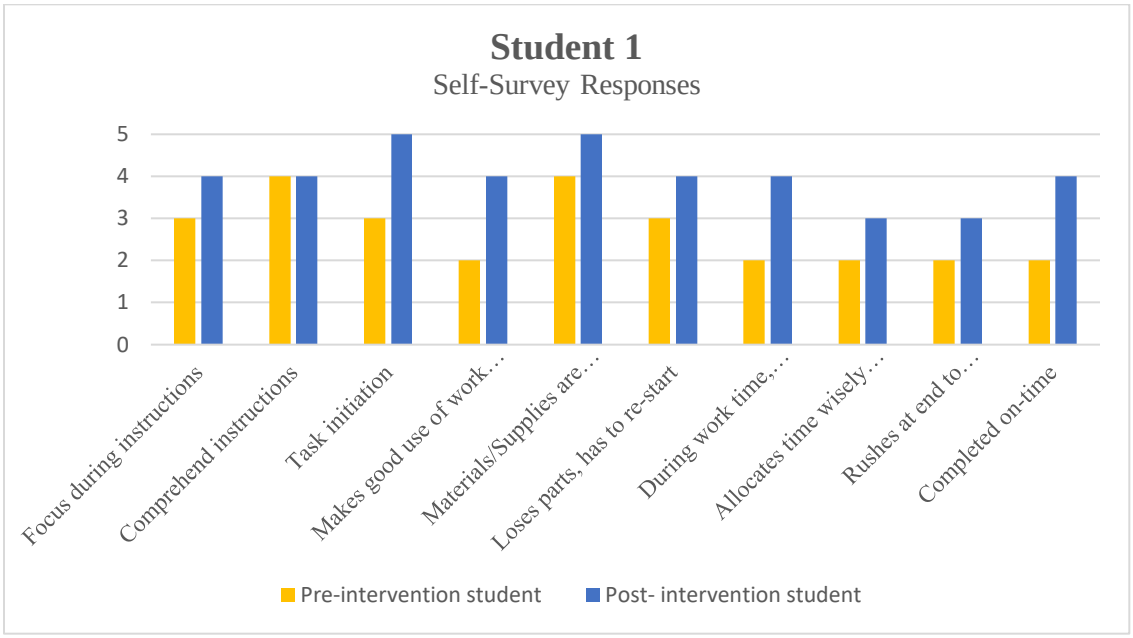
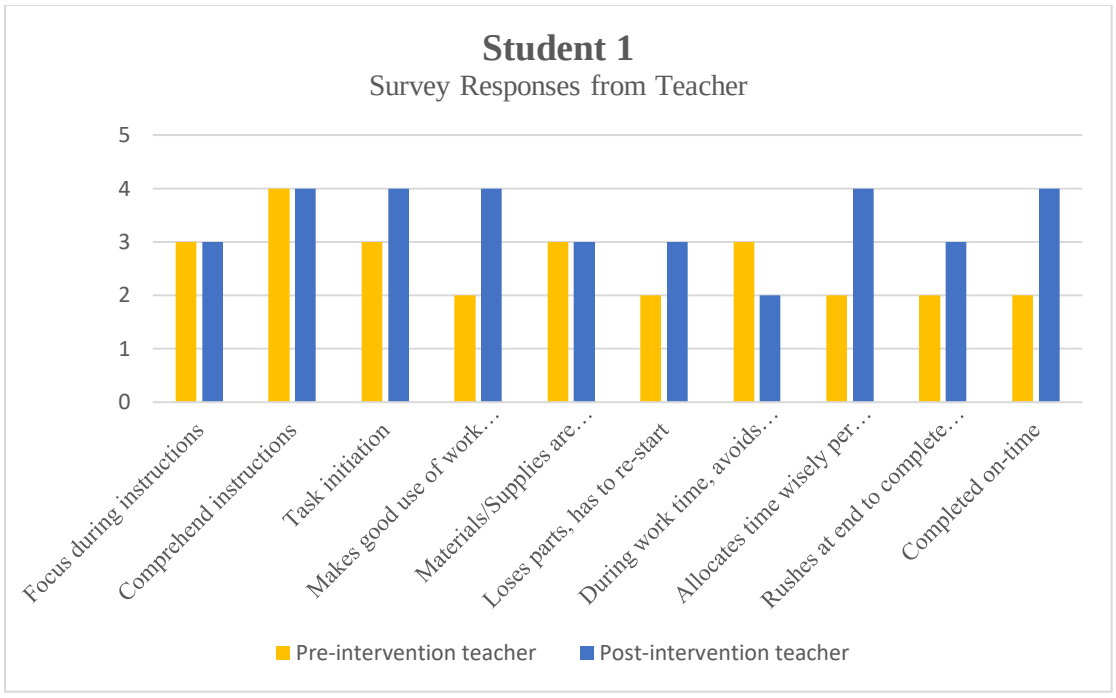



**Table 8: Teacher Responses 1**



Similar to the survey results for Student 1, there was an increase in post-survey responses on both the student self-survey (Table 9), as well as the teacher survey responses (Table 10) for Student 2.

**Table 9: Self-Survey Responses 1**

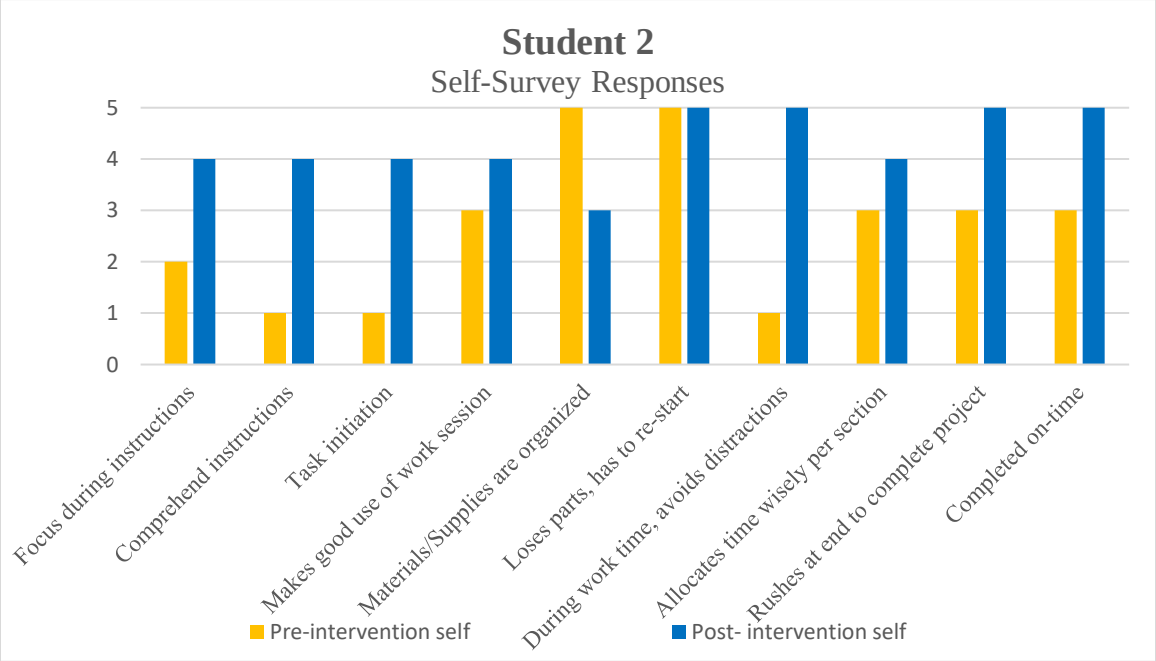
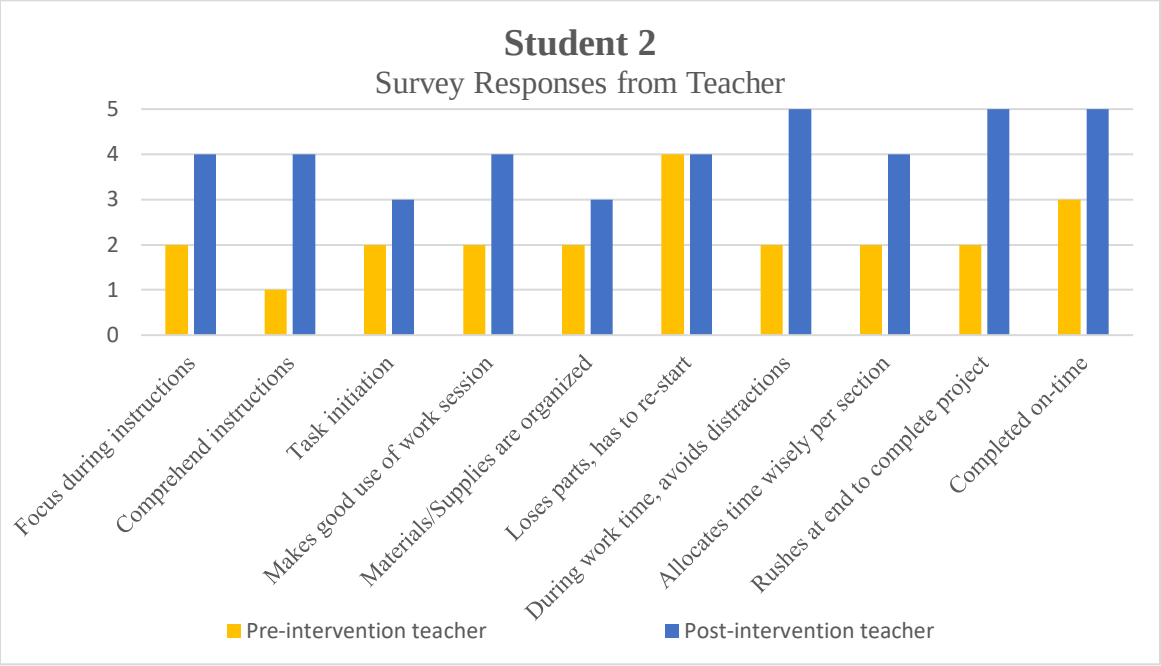


**Table 10: Teacher Responses 1**




My aim for the surveys was to see an overall combined (self + teacher) score increase of 10 points for each student. The highest possible score for the student self-survey is 50 points and the highest possible score for the teacher survey is 50 points, for a combined total of 100 points. My aim was met (Table 11). Student 1 survey scores had a student and teacher combined score increase of 21 points, while Student 2 had a survey score total point increase of 35 points.

**Table 11: Survey Results 1**

| | Baseline Survey Response Scores | Post-intervention Survey Response Scores | Difference of Point Value |
|---|---|---|---|
| | Self + Teacher = Total | Self + Teacher = Total | |
| **Student 1** | 27+26 = 53 | 43+41 = 84 | +21 points (+28.4%) |
| **Student 2** | 27+22 = 49 | 40+34 = 74 | +35 points (+41.6%) |

### 1.7.2 Rubric Data

The score of the teacher-graded rubric from the SSP (Appendix J) was measured against the baseline rubric from their previous PBL assignment. Table 12 includes the rubric categories and scores assigned by the 5th grade teacher.

**Table 12: Rubric Results 1**

| Post-Intervention Data from SSP Rubric | | |
|---|---|---|
| **Category** | **Student 1** | **Student 2** |
| **Ideas/Content** | 2.7 | 3.9 |
| **Organization and Project Research** | 3.5 | 3 |
| **Sentence Fluency/Word Choice** | 3 | 4 |
| **Conventions** | 4 | 4 |
| **Presentation & Final Project** | 3.5 | 3.5 |
| **Total Points** | 16.7 / 20 points | 18.4 / 20 points |
| **Percentage** | **83.5%** | **92%** |

The baseline rubric used and the post-intervention rubric used for this SSP are not the same rubric, as the two PBL assignments were not the same. Each rubric was created by the classroom teacher and was specific to the assignment. Therefore, the rubrics are not a like for like comparison, and for this reason, my aim was to see a rubric score percentage increase of 10% from the baseline to the post-intervention. As shown in Table 13, both students increased their post

rubric score; Student 1 had an increase of 17% and Student 2 scored 29% higher on the SSP (post-intervention) rubric.

**Table 13: Rubric Scores Comparison 1**

| | Baseline Rubric Score | | Post-intervention Rubric Score | | % Difference |
|---|---|---|---|---|---|
| | points | percentage | points | percentage | |
| **Student 1** | 16 / 24 | 67% | 16.7 / 20 | 84% | + 17% |
| **Student 2** | 15 / 24 | 63% | 18.4 / 20 | 92% | + 29% |

### 1.8 Observations and Field Notes

**Student 1**. The baseline surveys for Student 1 (Table 2) showed strengths in the areas: being able to focus for instructions, and comprehending what is being asked. Their score for task initiation was neutral (scored a 3) by both the student and the teacher. This student also felt as though they were organized (scored themselves at a 4), and the teacher scored them in the middle (3) for organization. These areas were not specifically targeted, although many of these skills did show growth in the post-intervention survey.

Student 1 had lacking skills in the areas of: making good use of work time, losing parts & having to start over, getting distracted, allocating time wisely per project pieces, having to rush at the end, and has had to turn assignments in late or incomplete. While described in detail in the Interventions, Table 14 tells how each skill deficit area was targeted.

**Table 14: Deficits and Interventions 1**

| Student 1 | |
|---|---|
| **Skill Deficit Identified** | **Targeted Intervention** |
| Makes good use of classroom work time | •Skill sessions<br>•Check-ins<br>•Set yourself up<br>•Checklists |
| Lost parts of a project, had to start over | •Skill sessions<br>•Folder<br>•Organizing content |
| Is distracted by a busy environment, unable to concentrate | •Skill sessions<br>•Check-ins<br>•Work environment |
| Allocating time wisely, not spending too much time on one piece | •Check-ins<br>•Organizing content<br>•Calendar<br>•Set yourself up |
| Has to rush at the end to finish | •Check-ins<br>•Organizing content<br>•Calendar |
| Has turned in assignments late and/or incomplete | •Check-ins<br>•Calendar<br>•Checklists |

Although Student 1 did not need strategies for focusing through and comprehending the initial project instructions, they needed a significant amount of help throughout the middle of the project cycle. Student 1 decided on a research topic immediately. They started to research and find trustworthy resources. This student chose one specific ancient dynasty as their topic. (To protect the student's identity, researcher is choosing not to disclose the exact dynasty.) Beyond knowing they wanted to explore and write about this dynasty, they could not determine a way to piece out their information and begin to write. The feelings of being completely overwhelmed were making it impossible for this student to have productive work sessions, which is one of the skill deficit areas indicated on the surveys.

During the second week of the project cycle, Student 1 had gathered a decent amount of research, but then when I checked-in, I found that they started to derail and were headed down a rabbit hole of information that was not specific to their topic. This student and I went to a separate classroom, spread all of their research materials out, and divided all the resources into categories to establish subtopics for their paper. We used a large open table and the student wrote ideas for subtopics on the board. Once the subtopics were established, they began to comb through their resources and using a highlighter, color-code the resources based on topic area. The highlighter color matched the dry-erase marker color on the board, indicating and categorizing sections of research, i.e. "early years", "government and rulers", "trade and economy", "arts and creativity", and "late years". A little guidance was still needed for extracting the key concepts, and note taking, but Student 1 had a good plan in place and was able to work independently for the rest of that week.

Generally, Student 1 became locked-in during work time in class and they were able to focus in the classroom environment with one accommodation. Most days, they would choose to use sound-cancelling headphones to tune out their classmates and classroom noise.

When it was time to begin writing their research paper, Student 1 had difficulty finding words to start, within the categories. We used an empty classroom space again to make an outline of the subtopics; writing bullet points on the board so that they were able to visualize and sequence info. Once I helped with the topic sentence, they were able to write the rest of each paragraph.

Student 1 had difficulty beginning each class work session. A couple interventions helped to reduce time that they were "stuck". I reviewed strategies on the Slides (Appendix C) and they began to set up for the next session by heeding the 5-minute warning at the end of the class to get to a good stopping point and write a note about where they are and what to do first, next class.

During the next session, students were observed to look for their post-it note and get to work. I did remind them to throw that post-it away so as not to get confused the next day. An improvement in task initiation was observed, as well as an increase in a positive use of work time.

Although the calendar was beneficial for student 1through their project cycle, we really started using the calendar. Student 1 and I worked to lay out the remaining pieces of the project and set small goals on their calendar to be sure they stay on track. Image 1 is a photo of the calendar clipped into the student's folder. We discussed the importance of breaking up pieces of a large project and how important it is to set small goals, and to give the goals a timeframe.

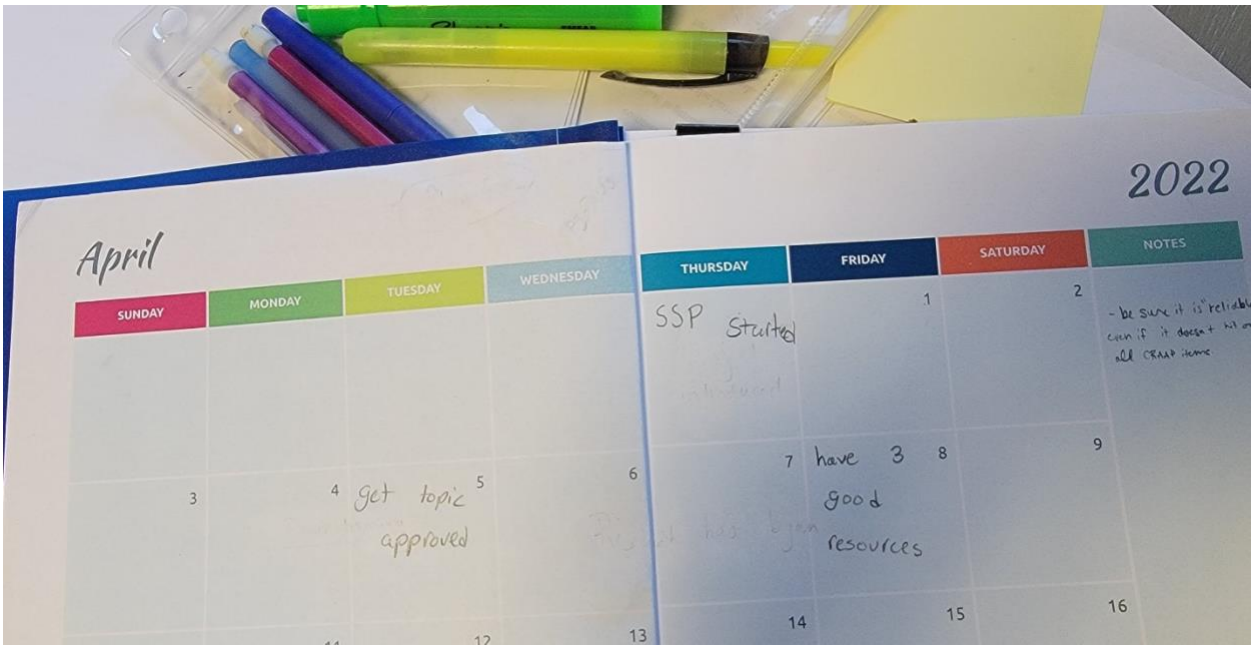



**Figure 1: Student Calendar 1**

For the reason of accountability, continued check-ins were helpful to Student 1. Although they are a very motivated student, they still benefit from check-ins and help with adjusting their small goals to stay on-track to finish on time. The due date was moved back a number of times,

mainly to adjust for changes in the classroom schedule, other subject area content, school-wide events, etc. These changes caused us to make ongoing adjustments to this student's calendar throughout. If the student's work session was not as productive as planned, they were willing to work on sections at home, and this work always returned completed. Student 1 commented on how well they are able to focus and be productive at home when working. Although they knew this to be true, they still preferred to spend the majority of their work sessions in class and with peers. Their final project was turned in on time and complete.

**Student 2**. The baseline surveys for Student 2 (Table 3) indicated a strength in the area: loses parts, has to start over, indicating they have not previously lost parts of their PBL assignments, nor have they had to start a part of the assignment over. The largest response discrepancy on surveys was the discrepancy for the skill of organization of supplies/materials for Student 2; the student gave their self a high score (5), while the teacher scored this same skill in the deficit area (2). Many of the skills I am targeting do overlap, and due to the nature of all the interventions, I knew this area would be addressed by happenstance.

Student 2 scored as neutral, while the teacher indicated the area as a skill deficit for the following categories: makes good use of work time, allocates time wisely on sections of the project, and has to rush at the end to complete the project. With taking into account this student's previous rubric score, I decided to target these skill areas as well as the low scoring areas indicated by both the student and the teacher. The skill areas identified by the student and the teacher as deficit areas were: ability to focus during instructions, ability to comprehend the teacher instructions, task initiation, and the ability to avoid classroom distractions. While described in detail in the Interventions, Table 15 tells how each skill deficit area was targeted for Student 2.

**Table 15: Deficits and Interventions 1**

| Student 2 | |
|---|---|
| Skill Deficit Identified | Targeted Intervention |
| Unable to focus during instructions | Skill sessions<br>Notes |
| Does not comprehend teacher instructions | Skill sessions<br>Notes<br>Check-ins |
| Is unable to begin work right away, task initiation | Skill sessions<br>Check-ins<br>Checklists<br>Set yourself up |
| Makes good use of classroom work time | Skill sessions<br>Check-ins<br>Set yourself up<br>Checklists |
| Is distracted by a busy environment, unable to concentrate | Skill sessions<br>Check-ins<br>Work environment |
| Allocates time wisely, not spending too much time on one piece | Check-ins<br>Organizing content<br>Calendar<br>Set yourself up |
| Has to rush at the end to finish | Check-ins<br>Organizing content<br>Calendar |

Having identified that Student 2 showed a deficit in their ability to focus during instructions and in the ability to comprehend the teacher's instructions, I wanted to meet with this student immediately and teach a strategy that would help them at the very start of their SSP. I met with this student for a learning session and presented them with a note-taking strategy that is similar to Cornell Notes. These notes are concise, logical, to the point, and help to organize thoughts and help with remembering key points. During this first learning session, Student 2 and I went over strategies and the student practiced taking notes on a fresh notes page while I went through my slides. This student was supplied a folder with note pages for use during instruction of a new project (the SSP) the next day. A photo of their notes is shown in Figure 2.

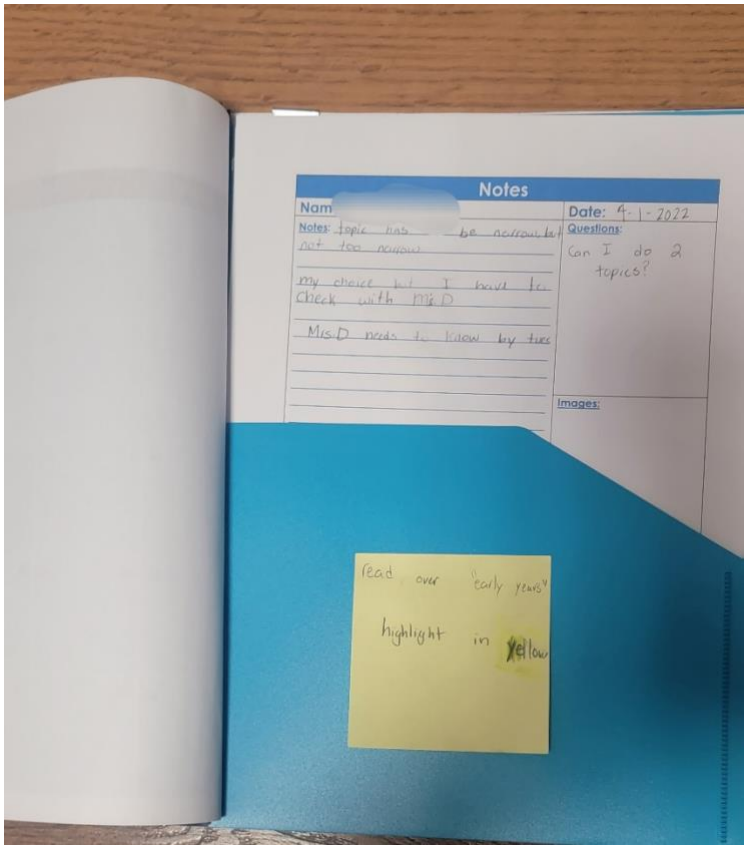



**Figure 2: Student Notebook**

As the teacher introduced and explained the SSP at length, the student took notes on the notes page. This student has a habit of calling out questions as soon as they pop into their head. The teacher asked all students to just listen for now, and hold off on questions until the end of her explanation; explaining that she will likely answer their question as she describes the project. Student 2 used the "questions" section in the notes to record questions so as not to forget them. By taking notes, it did seem that this student was able to sustain attention throughout the instructions. Once the project was described at length, this student was beginning to brainstorm ideas for a topic and had a good sense of what was expected. They had terrific ideas, and ultimately decided on a topic by the next day. The teacher and I both felt this topic was perfect; not too broad, nor too narrow.

Student 2 was excited to begin researching and started out quite strong with locating valuable resources. By the second week, it was observed that this student was not making the best use of class time and was very distracted by the busyness, chatter, movement, other students receiving teacher help, and the hallway noise that streamed in from the open classroom door. . They used noise-cancelling headphones twice, but it was clear that Student 2 was having trouble concentrating. The fact that all classmates were at different stages of their work, seemed to really impact Student 2, causing stress and anxiety. This made it practically impossible to clear their mind, and focus on their project. I asked Student 2 if they would rather work in the quiet space of my empty classroom and they jumped on the idea.

Nearly each class work session beyond that, Student 2 chose to work in a separate space from their peers. Having a large, cleared-off table to work at, the silent and calm room, and all their materials in one space allowed them to plow through their research and writing. They needed a small amount of guidance in finding five good resources (as assigned by teacher) and a bit of help to organize their content. Student 2 was ahead of schedule for the majority of this project cycle, due to being much more focused and productive in the quiet space of an empty classroom. Aside from being more productive and able to complete a significant more work in a given time while in a quiet space, Student 2 was noticeably less anxious and appeared to have no frustration.

It did take a little time each work session for Student 2 to get back to where they left off previously and to improve the use of work time, Student 2 was shown the strategy of setting yourself up for success. Although we were generally in a separate space from the classroom, we also set a 5-minute timer to stop, clean up all materials, and write a post-it, noting where to start tomorrow. Periodically, throughout the project cycle, we would look at the slides and talk about strategies that have been helpful.

Student 2 was able to complete their SSP before the due date, and it was turned in on time. During the last week of the project cycle, we were walking to my classroom to work and in the hall, Student 2 said "I do not think that I would have ever been able to get this all done if it weren't for you helping me, and letting me work in your room". I explained that I actually did not think I did too much to help, because they really did to the bulk of the work independently, but that it was crucial to identify early on, working in the classroom was not productive. I further explained the importance of recognizing any roadblocks in learning, and explained to advocate for a viable working space.

## 1.9 Discussion

### 1.9.1 Relevance of Impact of Problem of Practice

The PDSA cycle was designed to add supports in the areas where students with ADHD were faltering In PBL. There was never a question of the student's intelligence level, amount of creativity, ability to problem solve, nor the ability to work hard, but since these student's with ADHD were scoring poorly and barely completing their PBL assignments, what exactly *was* missing and preventing them from success? Why was I noticing this to be a trend for students in my school who have ADHD?

The school system that I am a part of is nontraditional in comparison to the majority of schools. It is a private school, proudly calling their methods "progressive", affording children the ability to have a choice in their learning. One key difference in this school, compared to public schools and other traditional private school systems, is that students only take a small fraction of

paper/pencil tests, but more typically demonstrate knowledge by working on a problem with a small group of peers, by indicating their understanding in class discussions, and when presenting their findings to the class. In specific, project-based learning is very common at this school. Aside from the SSP in fifth grade, recently in a second grade class, students worked in small groups to build a bridge from popsicle sticks and tape. The bridge had to meet specific length requirements and hold a specific weight for a specified amount of time. When a group had their bridge ready, the whole class would come to their area and watch the team demonstrate adding weights to their structure. Achievements is PBL are celebrated, but imagine the frustration in constantly seeing others make it to the end of their project, while you are unable to put all the pieces together.

At this school, students in grades Kindergarten through Grade 5, do not receive letter grades or percentages. They do not receive report cards every 6 weeks, nor every 9 weeks, but instead, their parents receive one narrative-style report of progress outlining the projects they have worked on throughout the school year. While eliminating traditional grading systems may help to alleviate a competitive culture among classmates, students who do prefer the structure and simplicity of worksheets and short tasks that can be completed in one sitting, rarely have a sense of accomplishment. Students are not assigned homework in grades K-3, and in fourth and fifth grade, generally homework is only given when students are unable to complete their work within the class time. Therefore, strong students who have the ability to buckle down and productively work in-class, nearly never have work to take home. Students who are unable to tune out distractions are the ones who have work left at the end of the school day.

To take a deeper look at what makes a "good student" in this non-traditional school environment, it is a student who is 1.) able to work well independently and carve their own learning

path, 2.) a student skilled in planning and organization, and 3.) a creative student who is a focused problem-solver, and 4.). a student who does not require frequent and on-going feedback.

In refusing to believe that students with ADHD could not have success with PBL in their classrooms, my PDSA cycle was aimed to learn more about what specifically could be done to support students who do not innately have the skills of a successful student, by this school's standards. Research suggested that students with ADHD have several characteristics that contribute to difficulties at school including "inattention, distractibility, impulsivity, disorganization, forgetfulness, and for some, hyperactivity" (Zeiger Dandy, 2006).

### 1.9.2 Primary Drivers

On my Driver Diagram (Appendix C), the primary drivers are: focusing strategies and to improve sustained attention, improved executive functioning (time management, setting goals, accountability), and identifying distractions to create a positive work space. By identifying skill deficits in these areas, then targeting interventions to develop these skills and scaffold supports in the deficit areas, students were able to significantly improve their SSP rubric score by over 10% and show a growth in skills on their teacher and self-survey of skills.

**Focusing strategies and sustained attention.** When creating the slides used for discussion points during the learning sessions, the first two skills targeted, were to focus during instructions, and how to sustain attention. The teacher noted specifically at the end of the baseline survey for Student 2 that each time she gave any instructions, as the class started their work, she immediately walked over to Student 2 to repeat all that she had just told the class, again to the student. This reminded me of a quote that is completely common sense, but so true, "Information cannot be understood or remembered if it is not attended to in the first place" (Dawson & Guare,

2018). Student 2 significantly improved on their ability to attend to, and comprehend the assignment instructions during the SSP after provided with note-taking strategies and note pages. Survey question numbers 1, 2, 4, and 8 all aimed to gain insight on the student's ability to focus and ability to keep focused throughout the work session. Of a possible total 40 points (teacher and self) from these four question responses, Student 2 had a baseline score of 16 points and doubled their score (32 points) on the post-intervention survey.

Although Student 1 did not score in a deficit area for needing to focus better during instructions, they too had difficulty with sustaining attention on a task, and did not always make the most of their work time. On the two survey questions regarding sustained attention, Student 1 showed an increase from 8 points (out of 20) to 15 points (out of 20).

**Improved executive functioning (time management, setting goals, organization).** The majority of the survey questions fell into the category of executive functioning. Executive function encompasses a range of skills that allow us to organize, plan, monitor, and persist to complete a task. "We don't need executive skills, for the most part, to manage our day-to-day habits and routines. We do need them when we face a new challenge or resolve to pursue a goal" (Dawson & Guare, 2018).

In order to hone in on the specific deficit, five survey questions gauged skills such as task initiation (question 3), organization of materials and supplies (question 5), lost pieces/parts of project (question 6), rushes at the end/time management (question 9), and completing project on-time (question 10). Both participants in this study displayed skill deficits in executive function. Which aligns with the research by Dr. Barkley, who states that "ADHD is fundamentally a deficit in executive skills" (2020). When looking at the combined scores of these 5 questions related to executive function, the post-intervention survey scores climbed significantly. In Student 1, their

baseline survey score (sum of teacher and self-survey responses) was 26 points out of a possible score of 50 points. The post-intervention score for the same 5 questions rose to 38 points of a possible 50. Student 2 had a combined teacher and self-score of 30 points for their baseline points on the five survey questions pertaining to executive function skills. On the same five question responses, the post-intervention sum of the responses climbed to 42 points out of 50 points.

**Identifying distractions to create a positive work space.** As a life-long special education teacher, devoting my career, and spending every school day observing students to identify what is needed to have success in the classroom; I view the classroom environment to be crucial to learning. Although I feel so strongly about the environment, intentionally, only one question on my survey was directed toward student distractibility in their work environment. The reason for this is students frequently do not have too much control over this; the classroom teacher does. Student 1 had (teacher plus self) score of 5 on the baseline surveys and only increased to a combined score of 6 on the post-intervention. This student did utilize a separate classroom a few times, but spent a large majority of their project work time *in* their classroom. They chose to use sound-reducing headphones to minimize the classroom noise, and they did seem to be fairly productive, by my observations. The teacher scored them lower on the post-intervention survey, giving a baseline score of 3 and a post-intervention score of 2. The student recognized their ability to focus as a challenge and scored a 2 at baseline, then a 4 for post-intervention. In hindsight, I do think that it would have made a difference overall for this student if they would have left their peers and spent more time in the separate classroom. I left it up to the student to choose, always wanting students to be in their least restrictive environment.

One the baseline data, Student 2 chose a self-score of 1 and the teacher scored them as a 2 in the area of avoiding distractions during work time. The post-intervention scores were a 5 for

both self and teacher; showing an overall increase from 3 points to 10 points on this question. The student and the teacher both recognized the need for this student to have a quiet, calm space for working. I believe that this one intervention made an enormous difference for Student 2 in not only their survey scores, but their overall rubric score too.

For a student with ADHD, the classroom environment has a tremendous impact on their ability to succeed. Although the impact is remarkable, and a student may or may not recognize the toll the environment takes on their access to education, the student does not have control over the classroom environment. Is it feasible for a student with ADHD to focus on their project, despite their classmates simultaneously working on completely different topics with, at times, completely different materials, in a shared classroom space?

I had a goal of bringing an awareness to the participants, of whether they are distracted in class and if this was taking away from their learning. I hoped to empower them to advocate for a separate learning space if they notice they are unable to concentrate or be their best selves in class. Student 1 felt that they could work in that environment, but I am curious if they would have done better outside of the room. Student 2 knew from the start that they needed a different space to work. If a resource room or another quiet space is not available for students, a few in-class alterations that would make an impact are, the seating arrangement, approximation of the student to the teacher, and a well-organized and predictable classroom routine (Barkley, 2020).

### 1.9.3 Strengths of the Change

Identifying learning challenges is extremely powerful for an individual. I do believe that both of these students are walking away from this project with a better understanding of how they learn, what they need from a learning environment, how to attack a large task, and to advocate for

the accommodations and modifications they need to be successful. Many students do not realize that one small modification or tiny support can make a huge impact. The teacher who so kindly welcomed me into her classroom also noticed the impact of simple accommodations. She and I spoke afterwards of not only the effect of the separate, quiet learning space, but also of the importance of frequent and on-going check-ins with students. The 1:1 check-ins are critical to ensure that students are on the right path, allocating time wisely, and have a solid timeframe for their project. It was heart-warming to see students who typically do not have success in PBL, a very common teaching method at this school, have the success that they did.

### 1.9.4 Limitations

A limitation is that this PDSA cycle took place in one classroom and followed two students. In a practical sense, the plan and design of the PDSA cycle did not allow for a larger sample size while maintaining my position as a learning specialist and supporting students on my caseload throughout the school day.

Another limitation was the time of the school year that this project took place. I initially intended to be able to spend more time with the students to coach them, check-in, and have learning sessions, they were simultaneously working on many PBL assignments for different subject areas. All of their extra time, for example during student arrival and dismissal, was used to work on other projects. Although I was thankful to the teacher for rearranging her class schedule to allow work on SSP during my planning period, I envisioned having other time for short lessons on improving skills. Both students had a great deal of stress with wrapping up multiple projects all at once. This is likely the reason for the nearly one month extension on the project, and I do wonder if these fifth graders would have done better on all PBL assignments, and likely would have learned more, and

enjoyed the journey more if so many assignments were not overlapping. The SSP was supposed to be for one month, finishing up at the end of April, it continued through all of May too. Two full months feels like a long period for fifth graders to persist and remain engaged through.

Another reflection, when considering the results of this research, the previous PBL assignment rubric that was used as a baseline for comparing the final project rubric had such a low score, the teacher could have made changes during the SSP, to help account for the increase of the SSP rubric scores. For example, the teacher could have improved the delivery of the SSP, in the classroom environment, or possibly added supports such as providing a project checklist, that had not occurred in the previous PBL assignment. The researcher was not in the classroom throughout the previous assignment to have noticed or reported any increase in classroom supports, nor was an increase in interventions by the classroom teacher reported to researcher. If the teacher increased supports, the researcher did not consider this impact on the SSP rubric scores, which is now recognized as a limitation.

Lastly, the surveys used as a measure in this study were created by the researcher, and therefore the validity of this measure could be questioned.

## 1.10 Next Steps and Implications

### 1.10.1 Ideas to Spread Change

The frequency of PBL at this school will not decrease, as it is an important aspect of the school's philosophy. Equally important to the school's philosophy is that students are included in the general education setting. In order for students with ADHD to have success in the general

education setting with their peers, classroom teachers will have to implement changes to their classroom management and classroom environment to meet the diverse needs of all learners. Proactive management strategies, such as assigned seating, building a solid routine, creating a quiet workspace, staggering large projects throughout the school year, and breaking large assignments into pieces, would not only benefit students with ADHD, but all students would benefit to these universal accommodations. In general, teachers should plan their assignments with their students in mind, anticipate their need, and know in advance what supports they will need.

Learning specialists (this is the position I hold) are available at our school, and our schedules are created based on the needs of the students. Classroom teachers, depending on their class make-up, may not be able to support all of their students learning needs throughout a PBL assignment. Typically learning specialists spend their time building simple skills, re-teaching to small groups, or working with students who have an alternative curriculum due to individual student needs, but by aligning schedules, learning specialists can support students with their projects. If classroom teachers and learning specialists coordinate in the way that the teacher and I just did throughout this PDSA cycle, more students would have the check-ins, a separate working space, and help in the areas of executive function.

The change does not only fall on the shoulders of the teachers, administrators play an important role as well. If we really do want to be a school that meets that needs of all learners, we have work to do. Equity and diversity are concepts that embody who this school is; we accept, and even celebrate differences in race, gender, religion, and sexual orientation better than any school that I have ever been to. However, I do not see an understanding of our diverse learning needs, or any proof that we provide equitable access toward education for individuals who deviate

from a typical learner's profile. Although I have worked in this school for years, and have advocated for students who are atypical learners, there is still a tremendous amount of growth needed around this concept. This will require a change in our system, and will take buy-in from our administration for meaningful change to occur. All students cannot thrive given the same environment, and although our school has very aesthetically pleasing spaces, one is hard-pressed to find a quiet, clear, and calm location when needed. Even if a child expresses that they need a space without clutter, noise, and chaos, depending on the time of day, there may not be any space available. In addition to no calm space being available, there is not always another teacher available to monitor a student who chooses to separate from the class because they are unable to focus. I do plan to use this research and data to prove the importance of protecting the space of my classroom as a designated clutter-free, calm, quiet workspace as opposed to a break space for students who need an outlet for movement and or play; we have plenty of those spaces already.

At the start of next school year, and in future years, I intend to set up my schedule in a way that coincides with the classroom schedules, allowing for more time to collaborate with classroom teachers, and the ability to support students throughout PBL. With a clear understanding of the significance of PBL at this school and the extensive time students will spend on PBL assignments, coupled with the knowledge gained from this PDSA cycle, students with ADHD will have increased success.

### 1.10.2 Future Research

Future research on this topic should address the limitations of this study. First, a larger sample size of students would provide not only more information but also, different information.

All students with ADHD are have unique learning needs and their needs may emerge from specifics in the teacher's approach or their current learning environment.

In addition to an increased sample size, should extend to students of a variety of ages, in a variety of classrooms, and in multiple schools. The current study was on two fifth graders who were in the same classroom and school.

Finally, this study was on a PBL assignment that offered a large range of flexibility in the student's ability to choose a topic based solely on their interests. Although many PBL assignments offer flexibility for students, more commonly students have to choose within the confines of subject area, specific standards, or even working with a partner or in a group. These boundaries could influence the student's motivation, work ethic, and therefore end results.

### 1.10.3 Reflection

Upon entering the Doctor of Education program, the 2019 cohort of professionals was told early on, that we would all learn to become an "agent of change" and to "trust the process". Admittedly, I did not think too much about what this meant, nor did I notice the changes that were taking place in me. As I reflect back now, over the last 3+ years, these two ideas are finally quite clear. My clarity likely emerged, from not only progressing through a doctoral program, but that my years as a doctoral student overlapped with a global pandemic. A pandemic that has forced every human being to be challenged in ways we could have never prepared for.

What I have come to learn, is that an "agent of change" is the catalyst of improvement science. Improvement science focuses on "the specific tasks that people do, the processes and tools they use, and how prevailing policies, organizational structures, and norms affect this" (Bryk et al., 2017). The ability to make an improvement requires a clear understanding of the entire

system, knowledge of the history, understanding of the stakeholders, an identification of the root of the problem, and finally, an idea of how to implement change. Even with all of those things in place, making a systems change, is never easy or without complications along the way. As a practitioner, I am on the ground each day, and although the problem can be right in front of me, the cause and solution are not plainly visible. Along this journey of improvement science, I frequently referred to the following steps to guide me: define an actionable problem of practice, engage literature, develop a theory of improvement, develop measures, test the theory or change, write-up and reflect (Perry et al., 2020).

**Defining an actionable problem of practice.** Although I began to notice a trend in my students struggling to complete these months-long projects, the impact on students of their repeated failures took some time to realize. Although this may not have been too large of an issue in some schools, at a school where project-based learning takes priority over other forms of assessments, tests, quizzes, or homework, it makes a giant impact on a student who lacks the skills required. While I was framing my problem of practice, I really wanted to keep the focus on the student with ADHD, not on what teachers should change, or even on how to change the system for the student. In recognizing that this particular system would not shift its focus from their philosophy on "inquiry-based" and "experimental education", I decided it was best to center the change and improvement *on* the student. I was not too sure if the students had the maturity to know their learning needs or identify deficit areas, so I decided to survey them and their classroom teacher to define skill deficit areas.

In knowing if a problem is actionable, taking a close look at the system is helpful. The best way to know the system (the school) and understand how it contributes to this problem of practice is to dive deep into the school's mission and philosophy. The school's values are

unabashedly progressive, and proud that this sets the school apart from traditional schools. With a major focus of this school being "solving real problems and asking real questions" and learning that is "initiated and directed by the learner", students who attend this school have to have strong skills in independent learning to have success in the classroom. Student participation, successes and challenges in regards to the PBL assignments are what makes up the narrative on their report cards at the end of the school year.

**Engaging Literature.** The first thing that I needed to do was to go all the way back to the basics and learn more about both project-based learning, and Attention Deficit Hyperactivity Disorder. What facts could I gather from the research and then how could I intersect this disability with known deficits in focus and executive function, with a teaching methodology rooted in solving real problems and independent learning?

**Development of my theory of improvement.** All students with ADHD have a range of skills and needs, that may or may not overlap, it was important that I prepare for a variety of skill deficits that lead to trouble spots in PBL. To cast a wide net, I decided the survey questions should each target a different skill, on a continuum, to gauge self-awareness and teacher insight. At the start, all I knew was that students with ADHD were scoring low and struggling to complete all the components of a PBL assignment. I did not know where the breakdown was for each individual. After selecting specific skill areas, for example, ability to focus during instructions, task initiation, time management, etc., I then decided on interventions that would target the skill deficits.

There is a wide range of assignments that fall under the umbrella term "project-based learning". To account for this variation, the interventions planned to address the skill deficits are general enough to apply to a variety of assignments.

**Developing measures.** Although a large aspect of teaching is trying a method, observing, reflecting, and shifting supports to help students, learning methods and measures helped me to think of the problem in a way that I could measure performance before and after an intervention. This study measures the growth of a student's skills based off lessons and teacher guidance throughout the duration of an open-ended, student-directed independent learning assignment. Data from the baseline rubric provided a measured description of teacher feedback for the researcher to use in explaining the low-achieving area to the student during the learning sessions. The rubric also gave a quantitative score for use in comparison for the final rubric. In choosing to gather baseline, survey information from both the teacher and the student, it was like looking through a window to see the typical performance of the student, in their eyes and in the eyes of their teacher, to lead to the necessary interventions to build the deficit areas. With really wanting to keep the focus of this study on the student, using the student self-survey as a tool allowed the student to have a voice in what skills *they* felt were areas of strength, and where *they* felt they needed to grow.

**Test my theory and my write-up.** This is essentially what I had been planning and learning about for years. When the students were introduced to their SSP and provided with all the instructions, I was practically giddy with excitement. I could not wait to kick-start the interventions and support these two each step of the way. After the first class session working on their SSP, I realized that this is the same as what I do every day, and for all of my students. Improvement science is exactly what good teachers spend every single day doing, identifying a problem, implementing a change, reflecting on what worked, and what could be improved, then trying again.

I plan to share the results of this study with the teacher who welcomed me into her classroom and my other wonderful colleagues who are doing their best each day to guide children along their paths. The interventions used in this study could be offered universally to students in general education. Ideally, the skills taught and the interventions should be fully given to students with the intent of scaling back, on an individualized needs basis, to grow each student's level of independence.

In addition to sharing the results of this study, now that I have a better sense of the improvement process, I intend to lead others through the improvement process. The step-by-step skills that I learned will be set into place countless more times throughout the rest of my career as an educator.

## 1.11 Conclusion

Circling back to one of the things my cohort was told over, and over again: "trust the process". The process has been a wonderful learning experience for me, not only as a practitioner, but also as a mom, a wife, a friend, and a human. This was a years-long process, and many times along the way, I was confused, or wanted to doubt the usefulness of a step, but now looking back, I am able to make sense of each step. I have learned countless lessons along the way, many of which fit into an idea of: have patience, remain open-minded, learn from the source, and lastly, but possibly the most important lesson, be a listener.

To elaborate, making improvements to anything, whether big or small, will likely never be easy. There will always be reasons to keep things as is, and there will always be people who do not see the value in the change. Being patient and keeping an open-mind are crucial for when

hitting roadblocks along the way. When others do not agree with the change or see its value, stop and listen. Listen to others' perspectives, learn why this has worked in the past and together evaluate if it is still working, and the reasons it may not be working. Having an understanding of the system and the stakeholders is imperative for making a change. Ask questions, and really listen to others to have a deep understanding to how they arrived at their thinking. Throughout this journey, I frequently thought of these words by Ruth Bader Ginsburg, "Real change, enduring change, happens one step at a time."

## Appendix A : Transcription of Interviews

As stakeholders for my Problem of Practice, I interviewed three middle school students. Each of these students has a diagnosis of ADHD. Their parents each gave permission to the interviews. The interviews took place individually with only the student and me over a private zoom.

Upon starting each interview, I explained to the student that I want to learn about what makes school tough when you have ADHD. We talked about ADHD and some of the advantages, such as; being very creative, seeing things differently than others, and also the ability to hyper-focus on tasks that are super interesting to us. We also discussed famous people who have ADHD; Michael Phelps, Justin Timberlake, Simone Biles, Adam Levine, and Jim Carrey.

**Question 1:**

**Dawn- When you are in class, what is hard or frustrating for you?**

Student S: I really don't like when teachers say to “get busy” and “you know what you should do”…. I like guided learning a lot more so….the kind of work with more structure. Like for example, if I am asked to write an essay, I would say “about what? What are some guidelines?” “What are some rules?” or I would be just like walking around.

Student A: Cold-calling. I really hate if a teacher calls on me in the middle of class. Sometimes I am zoning and I do really try to focus, but if I am not paying attention and

the teacher calls on me, then it is like pointing out to everyone that I was not paying attention.

Student C: When teachers keep going on and on. Some teachers explain things and they keep talking and talking….then halfway through, I drift off and lose focus. It would really help me if they explained things by just uh ….just get to the point. When I lost my way and then have to ask a friend what to do….they can quickly explain it and….then I got it.

**Question 2:**

**Dawn- When schoolwork is hard, what is something that makes it easier? Can you think of a time that something was hard and you were able to complete it anyway? What or who helped?**

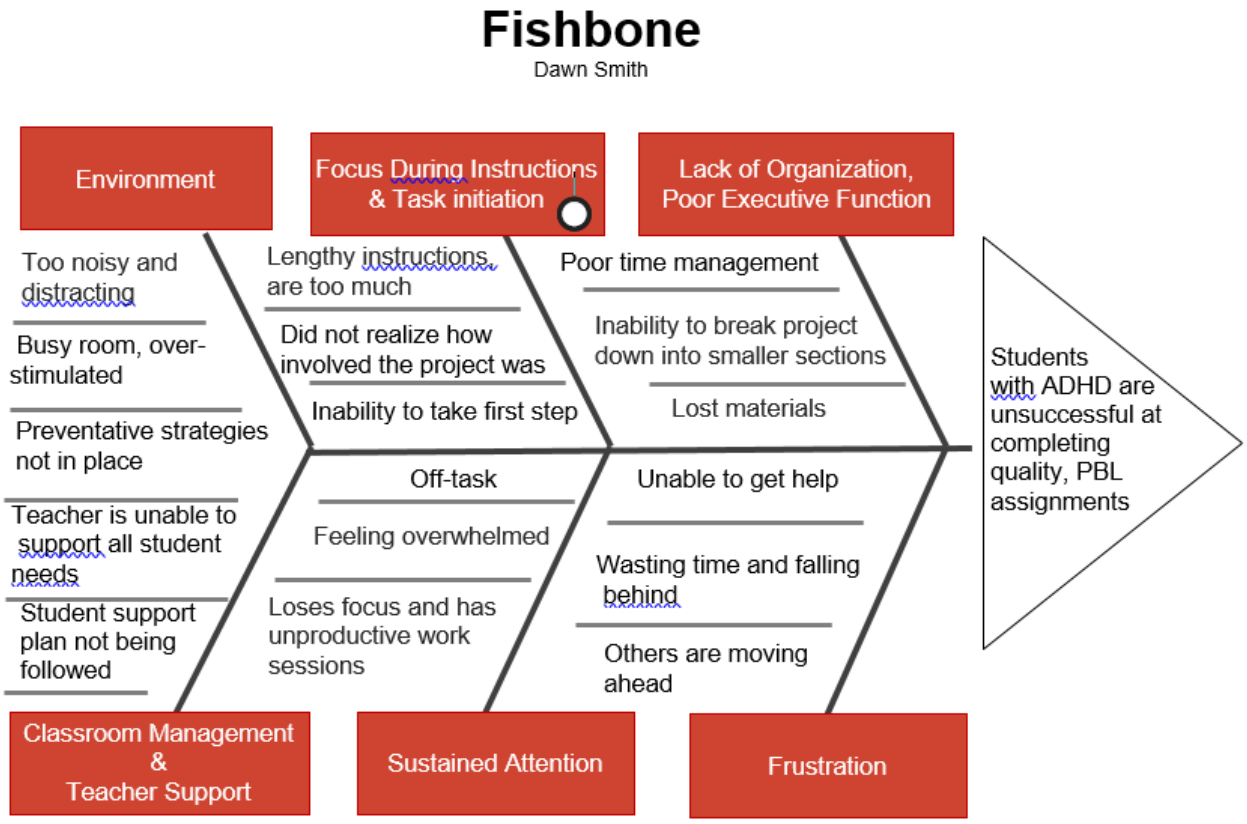
Student S: Well one thing is, when I am at home we have a trampoline, but like when I'm working sometimes if the work is too hard…. I um…..I like 15 minutes of work, then like take five minute intervals and jump on the trampoline to get a little energy out of my body because one of the things with ADHD, is that on anything like physical feedback or just like feedback at all is really…… good for the brain.

Student A: For me, due dates are hard. Teachers are always….uh….I never remember when things are due, and then I go to class and I don't have it with me….or it is not done. It is stressful….and by the end of the year, I am missing things. **(I asked- Have you found something or someone to help you with knowing due dates?)** My

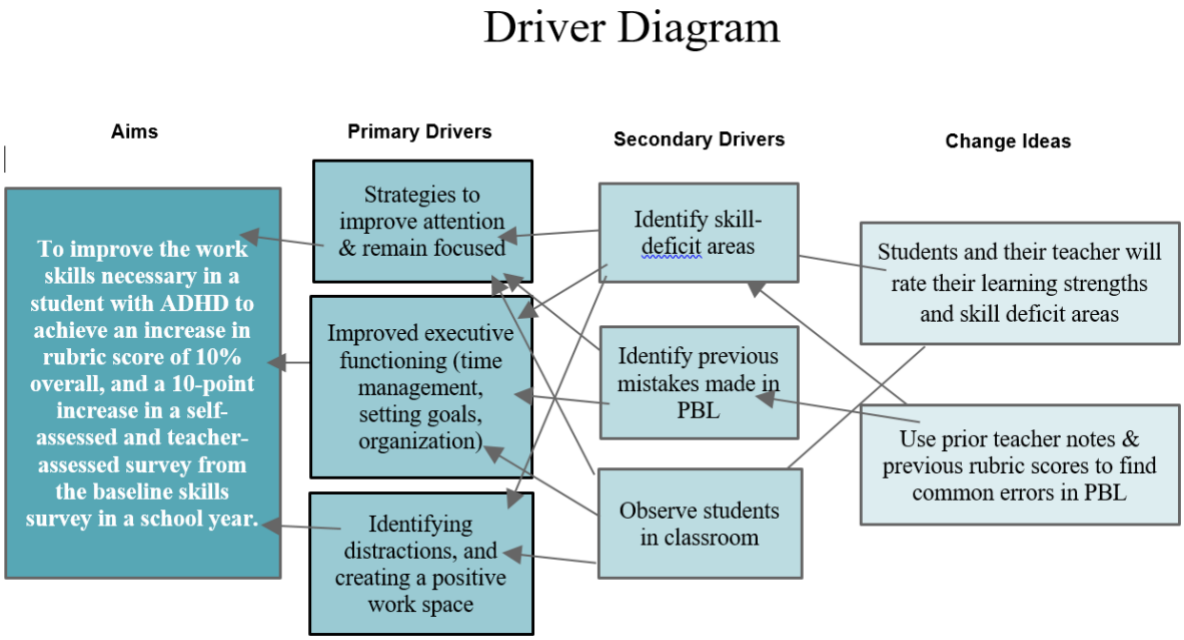
mom helps me. She remembers everything…..and…somethings though….I cannot find what I need to turn in…or sometimes I have it…but I forget to take it with me and turn it in.

Student C: When my teacher talks, I say every word over in my head…because it sinks in and I remember it. **(Dawn- That is a great strategy. What about when schoolwork is hard? Can you think of a time that your work was hard? How did you get it done anyway? What helps you?)** Oh. When I am working, and I want to get up and be done working, I commit to completing some work, and then ask to take a walk…and then come back to it. **Dawn- Oh, can you explain more of that?)** I find a place in my work and tell myself that after that one…once I get to it…then I will ask to go to the bathroom….then I do more of it and ask to go to a different place…I have to take walks

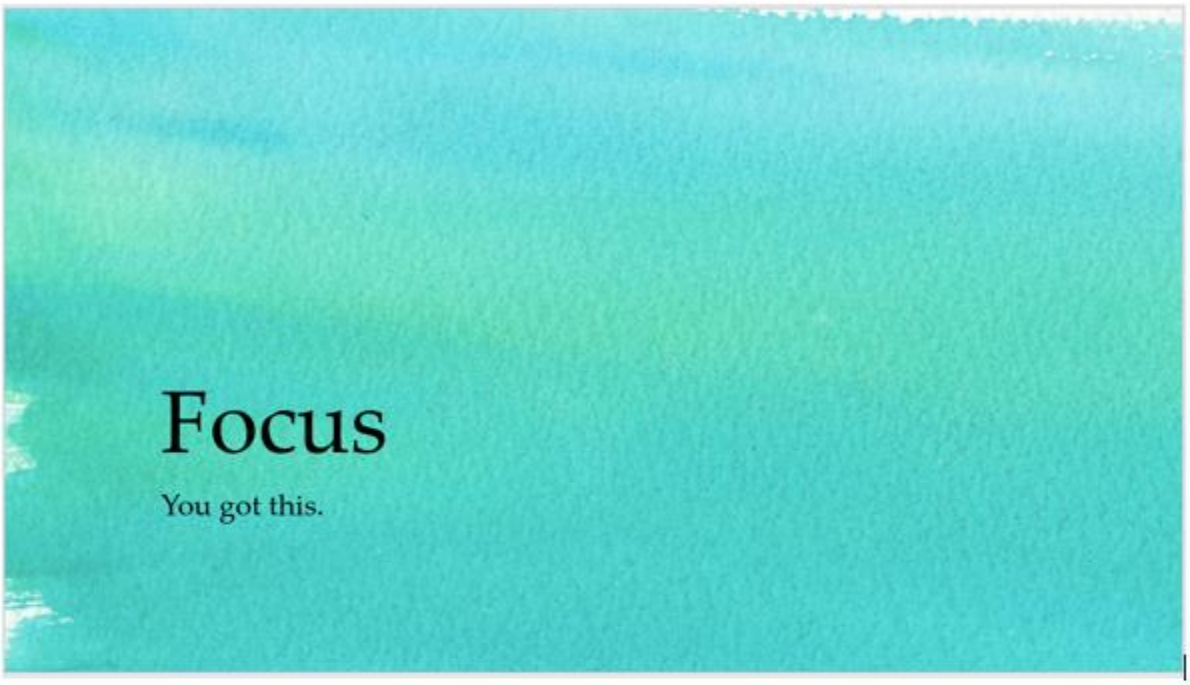
## Appendix B : Fishbone

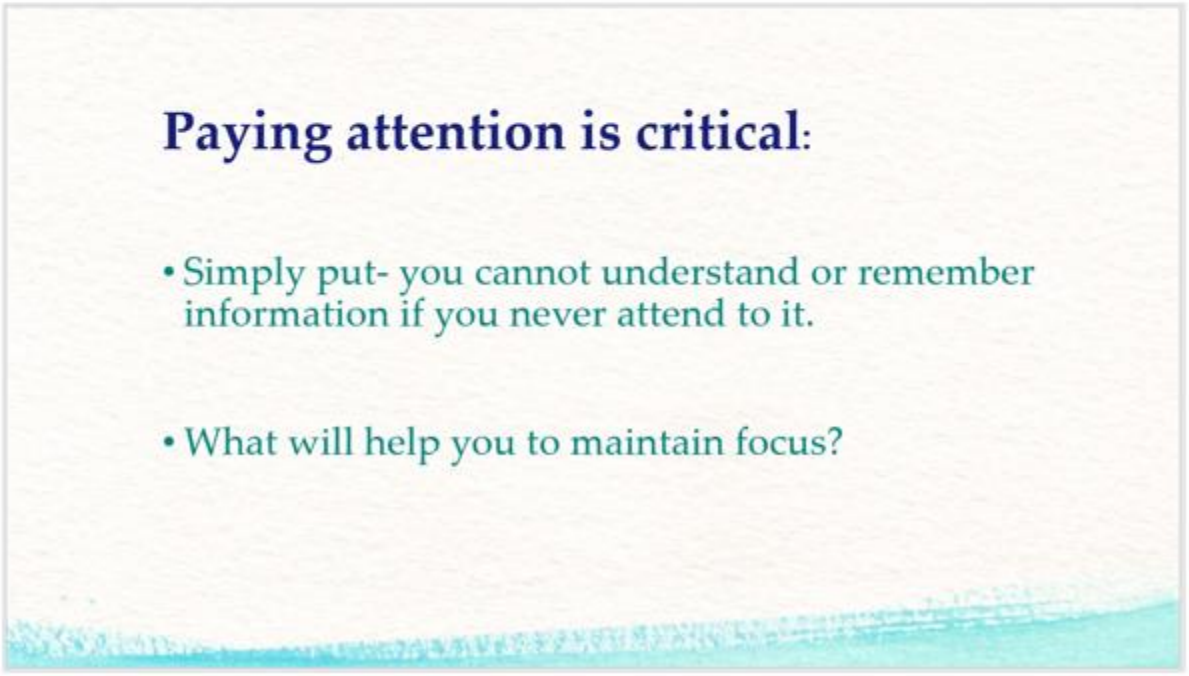


## Appendix C : Driver Diagram



**Appendix D : Slides from Learning Sessions**



## Take notes and start brainstorming

- Be an active listener
- If you do not understand, ask
- As others ask questions, pay close attention, THE ANSWERS HELP YOU TOO
- Write this information down
  - You want to be listening and writing at the same time.
  - When you see it written down, it will help you to know and remember
- Let's Practice
  - Start taking notes now on my next slide

## What do YOU look like when YOU are paying attention?

- Looking at the person talking
- Turn my body toward the person who is talking
- Quiet mouth
- Sitting or standing in my space

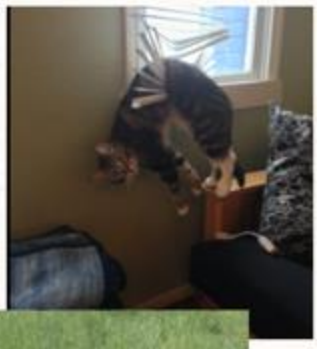
## We are going to focus on just ONE class, and you are going to give your full attention to Ms. D

- During LA- fully focused
- What helps YOU to pay attention?
- Monitor your focus
  –If distracted, fix it!

## Strategies to increase productivity

- Refer to your checklist
- If you need a break, take a quick break and return to work.
- If you are still stuck, ask for help right away

# Don't stay stuck



## Streamline

- Recognize when to simplify
- Eliminate unnecessary steps or tasks

## This helps to:

- Reduce frustration
- Improve efficiency
- Helps manage time
- Focus on goal
- Improve productivity

## Set yourself up-
**(Don't waste time finding where you left off)**

**When the 5-minute times goes off:**

1. Get to a good stopping place

2. Write a quick post-it note to yourself about where you left off or where to pick-up next class

3. Put all materials in folder with post-it note on top

## Appendix E : Student Self-Survey

### Self-reflection on completing projects

Even when you are very smart, it can be difficult to complete school projects, because there are so many skills required. Some of these skills are easy for you, but some of them are hard. When you answer these questions, be as honest as you can. It will help your teacher know how to support you while you work. All of us work and learn differently, and you know YOU best.
Please take your time and really think about what you are good at and what you usually need help with.

Student number as assigned by researcher:

Short answer text

When the teacher gives instructions, I am focused and listening.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Never, Not at all | ○ | ○ | ○ | ○ | ○ | Always |

I comprehend (listen, understand, & remember) all that my teacher says.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Not at all | ○ | ○ | ○ | ○ | ○ | Always |

When it is time to start my project, I know exactly what to do.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| No, I need my teacher to tell me again. | ○ | ○ | ○ | ○ | ○ | Yes, I cannot wait to start |

I get started immediately.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| No, starting something new is hard | ○ | ○ | ○ | ○ | ○ | Yes, I know exactly what to do |

I make good use of work time.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| No, I got nothing done and am frustrated | ○ | ○ | ○ | ○ | ○ | Yes, I am done and pleased with my work |

All project items (pencils, notes, materials, papers, etc.) are in one place and ready for when I need them.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Not at all together | ○ | ○ | ○ | ○ | ○ | Yes, all neatly put away together |

I have lost parts of my work and have had to start over.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Yes, this is true | ○ | ○ | ○ | ○ | ○ | No, I am very organized |

I get behind on assignments and have to rush at the end.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Yes, I always feel rushed at the last minute | ○ | ○ | ○ | ○ | ○ | No, I am usually ahead on projects |

I turn assignments in unfinished or late.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Yes, always | ○ | ○ | ○ | ○ | ○ | No, never |

I get distracted in class by: others' talking, annoying noises, people coming into or leaving the room, students in the hall, when the room seems too busy, etc.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| YES! I am very distracted | ○ | ○ | ○ | ○ | ○ | No, I am never distracted |

## Appendix F : Teacher Survey

PBL Teacher Information Form

Please answer questions based on your observations, knowledge, and understanding of this student in your classroom.

dfs21@pitt.edu (not shared) Switch account

Student number assigned by researcher

Your answer

When giving instructions, student appears focused and to be listening.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Strongly disagree | ○ | ○ | ○ | ○ | ○ | Strongly agree |

Student seems to comprehend directions. (Based on their ability to get right to work and work independently throughout work session.)

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Strongly disagree | ○ | ○ | ○ | ○ | ○ | Strongly agree |

Student gets to work immediately, having great task initiation.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Strongly disagree | ○ | ○ | ○ | ○ | ○ | Strongly agree |

Student makes good use of work time. (Is engaged, prepared for class, stays in work space, does not distract peers, doesn't overuse bathroom, or excessively sharpen pencil, etc.)

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Uses class time poorly | ○ | ○ | ○ | ○ | ○ | Uses class time wisely |

Student's supplies, project materials, and work space are orderly and functional based on assignment. After work time, their supplies are neatly placed together so as not to waste time at the start of the next work session.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Strongly disagree (unorganized and messy) | ○ | ○ | ○ | ○ | ○ | Strongly agree (organized and functional) |

Student has lost items or parts of project and has had to start something over or waste an entire class time searching.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Yes, started over or used up a whole class period searching | ○ | ○ | ○ | ○ | ○ | No, Student wastes no time. Picks up where they left off previous day |

Student manages time well, wisely allocates where time should be spent, and does not have to rush at the very end to complete it.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Strongly disagree | ○ | ○ | ○ | ○ | ○ | Strongly agree |

Student's assignments are turned in on-time and are completed.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Strongly disagree | ○ | ○ | ○ | ○ | ○ | Strongly agree |

During work time, student appears distracted (by noise, peers, people coming/going, etc.) and seems unable to concentrate.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| Strongly agree | ○ | ○ | ○ | ○ | ○ | Disagree or never observed frustration |

Lastly, is there something you notice about this student's work habits, ability to focus, behaviors, social skills, communication skills, or anything else that would help me to help them better?

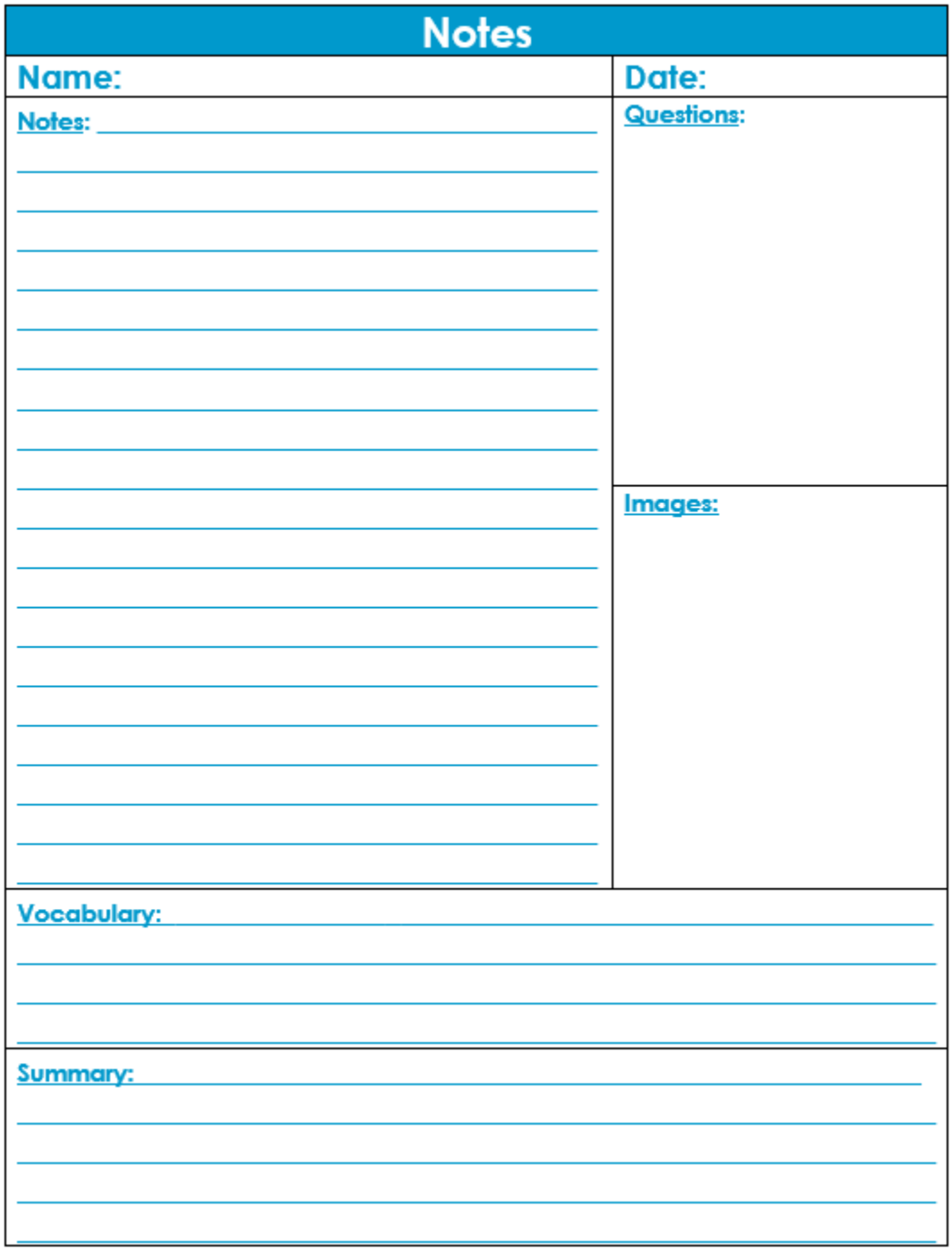
Your answer

# Appendix G : PBL Baseline Rubric

**Project Rubric**

| | Project Category | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|
| **Ideas** | **Content** | • **All** parts of my project show an **excellent understanding** of my topic.<br>• I stay **focused on my question throughout the paper.**<br>• It is clear I have **researched my topic thoroughly.** | • **Most** parts of my project show **understanding** of my topic.<br>• **I address my focus question but also stray from the main idea at times**.<br>• It is clear I have **deeply researched my topic.** | • **Some** parts of my project show **understanding** of my topic.<br>• Answering my **focus question is only one part of the project.**<br>• It is clear I have **done some research about my topic but there is more I could do.** | • My project shows **a developing understanding** of my topic.<br>• It is clear that I have more **research I should do** about my topic to answer my focus question thoroughly. |
| **Organization** | **Research Process** | • I wrote **more than 20 clear and organized notes** and used them for my project.<br>• I used & cited **more than 4 resources.** | • I wrote **15-20 clear and organized notes** and used them for my project.<br>• I used & cited **3-4 resources.** | • I wrote **10-15 clear or organized notes** to use for my project.<br>• I used and/or cited **2 resources.** | • **I wrote less than 5 clear notes** to use for my project.<br>• **I used and/or cited only 1 resource**. |
| **Sentence Fluency & Word Choice** | **Language Usage** | • My written component shows **thoughtful use of language and sentence structure throughout.**<br>• **My vocabulary is vivid and specific.**<br>• **I vary my sentences.**<br>• My choices support the reader's **comprehension and enjoyment** of the piece. | • My written component shows some attention to **language and sentence structure**.<br>• I use **some specific and vivid vocabulary**, but I sometimes use vague or "workhorse" words.<br>• Some of my sentences could be **made more interesting or clear.**<br>• My writing is clear. | • My written component has **some really strong sentences and use of vivid/clear vocabulary, but also has places that rely on simple sentences and "workhorse" vocabulary.**<br>• My language usage **does not confuse the reader, but doesn't draw them in or add to their enjoyment.** | • My written component uses **simple writing and vague or boring language most of the time.**<br>• My language usage does not help the piece be more clear or interesting to the reader.<br>• **I need to do some more revising to make the piece feel polished.** |
| **Voice** | **Component Creativity** (Written & Aesthetic) | • My final written and aesthetic components show **creativity and engage the reader.**<br>• My ideas and details are presented in a **unique and thoughtful way.**<br>• My aesthetic component **adds to or expands on my paper in ways that engage the reader.** | • My final written and aesthetic components show **creativity.**<br>• My ideas and details are **interesting and thoughtful**.<br>• My aesthetic component **adds to the reader's understanding of the topic** | • My final project shows **some creativity**.<br>• My aesthetic component **connects to my main topic in a clear way.** | • My written and aesthetic components **seem disconnected.**<br>• I could use **more creativity and detail in how I present my research.** |
| **Conventions** | **Conventions of Written Component** | • My writing contains **less than 5 errors** (spelling, grammar, punctuation).<br>• The errors **do not make it hard to read.** | • My writing contains **more than 5 errors** (spelling, grammar, punctuation).<br>• The errors **do not make it that hard to read or understand.** | • My writing component is full of errors.<br>• The errors make it **a challenge to read or understand** (spelling, grammar, punctuation). | |
| **Presentation** | **Final Project** (Neatness & Organization) | • My final project is **very neat and organized**.<br>• My ideas & details are **very easy to understand.** | • My final is **somewhat neat and organized**.<br>• My ideas & details are a **little difficult to understand**. | • My final project is **not neat or organized**.<br>• My ideas & details are **difficult to understand**. | |

**Appendix H : Notes Page**



## Appendix I : Checklists for Student Folders

Getting started:

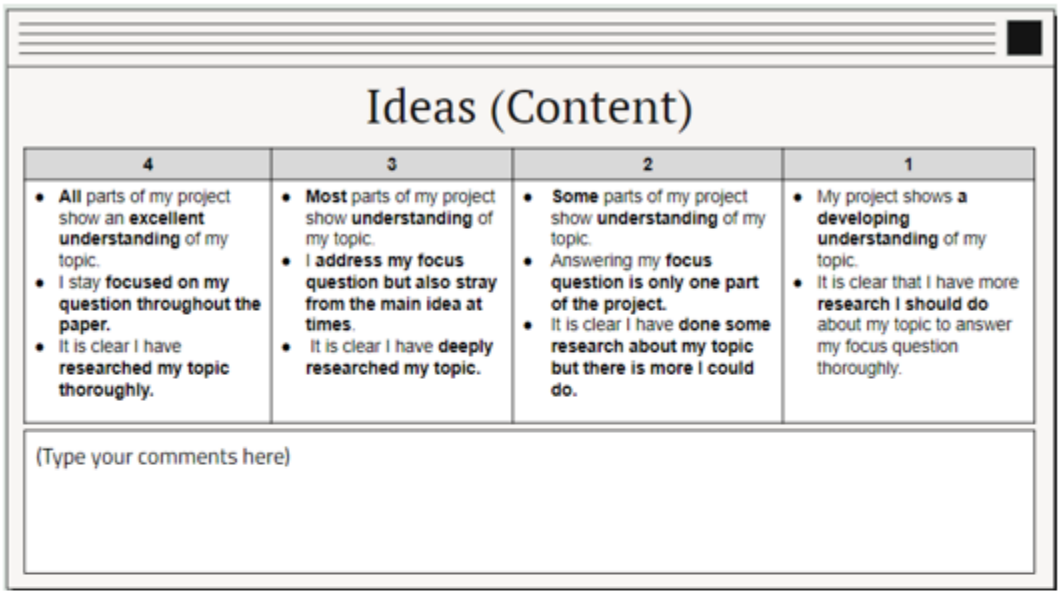
- ✓ Review what you did last class (Did you leave yourself a post-it note?)
- ✓ If distracted, move to quiet space
- ✓ Clear space of any materials that you do not need
- ✓ Take 3 deep breaths
- ✓ Work for 15 minutes
- ✓ If you need a quick break, take one
- ✓ Work for the rest of class

**If you are stuck, raise your hand and ask for help, do not stay stuck.**

When timer goes off:

- ✓ Find a good stopping point
- ✓ Use a post-it to remind yourself where to pick-up at
- ✓ Put all materials in folder
- ✓ Post-it on top

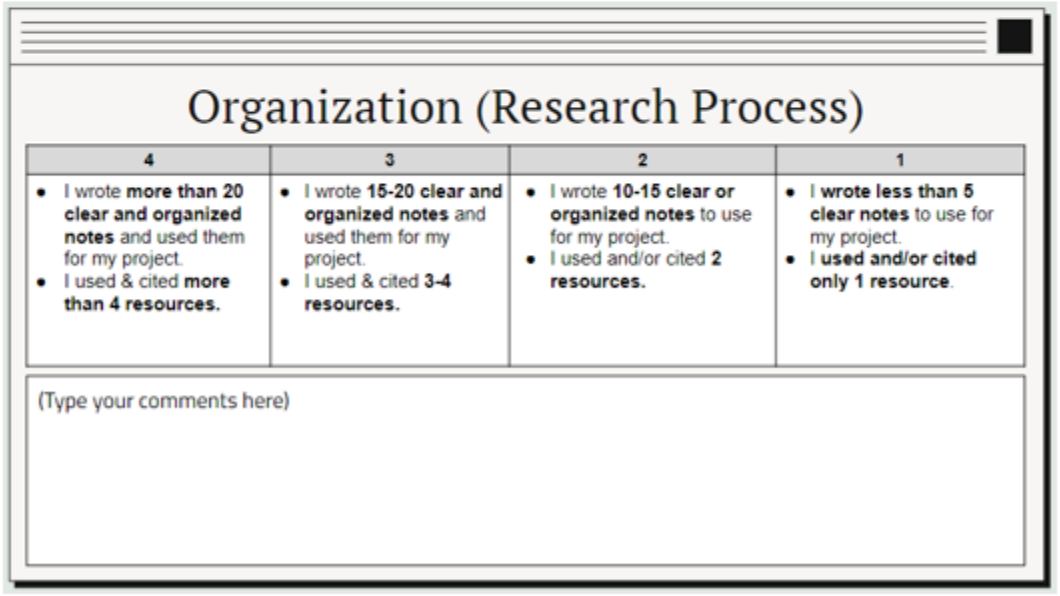
## Appendix J : SSP Rubric



### Ideas (Content)

| 4 | 3 | 2 | 1 |
|---|---|---|---|
| • **All** parts of my project show an **excellent understanding** of my topic.<br>• I stay **focused on my question throughout the paper.**<br>• It is clear I have **researched my topic thoroughly.** | • **Most** parts of my project show **understanding** of my topic.<br>• I **address my focus question but also stray from the main idea at times**.<br>• It is clear I have **deeply researched my topic.** | • **Some** parts of my project show **understanding** of my topic.<br>• Answering my **focus question is only one part of the project.**<br>• It is clear I have **done some research about my topic but there is more I could do.** | • My project shows **a developing understanding** of my topic.<br>• It is clear that I have more **research I should do** about my topic to answer my focus question thoroughly. |

(Type your comments here)



### Organization (Research Process)

| 4 | 3 | 2 | 1 |
|---|---|---|---|
| • I wrote **more than 20 clear and organized notes** and used them for my project.<br>• I used & cited **more than 4 resources.** | • I wrote **15-20 clear and organized notes** and used them for my project.<br>• I used & cited **3-4 resources.** | • I wrote **10-15 clear or organized notes** to use for my project.<br>• I used and/or cited **2 resources.** | • I **wrote less than 5 clear notes** to use for my project.<br>• I **used and/or cited only 1 resource**. |

(Type your comments here)

## Sentence Fluency & Word Choice

| 4 | 3 | 2 | 1 |
|---|---|---|---|
| • My written component shows **thoughtful use of language and sentence structure throughout.**<br>• **My vocabulary is vivid and specific.**<br>• **I vary my sentences.**<br>• My choices support the reader's **comprehension and enjoyment** of the piece. | • My written component shows some attention to **language and sentence structure**.<br>• I use **some specific and vivid vocabulary**, but I sometimes use vague or "workhorse" words.<br>• Some of my sentences could be **made more interesting or clear.**<br>• My writing is clear. | • My written component has **some really strong sentences and use of vivid/clear vocabulary, but also has places that rely on simple sentences and "workhorse" vocabulary.**<br>• My language usage **does not confuse the reader, but doesn't draw them in or add to their enjoyment.** | • My written component uses **simple writing and vague or boring language most of the time.**<br>• My language usage does not help the piece be more clear or interesting to the reader.<br>• **I need to do some more revising to make the piece feel polished.** |

(Type your comments here)

## Conventions

| 4 | 3 | 2 | 1 |
|---|---|---|---|
| • My writing contains **less than 5 errors** (spelling, grammar, punctuation).<br>• The errors **do not make it hard to read.** | • My writing contains **more than 5 errors** (spelling, grammar, punctuation).<br>• The errors **do not make it that hard to read or understand.** | • My writing component is full of errors.<br>• The errors make it **a challenge to read or understand** (spelling, grammar, punctuation). | |

(Type your comments here)

# Presentation (Final Project)

| 4 | 3 | 2 | 1 |
|---|---|---|---|
| • My final project is **very neat and organized**.<br>• My ideas & details are **very easy to understand.** | • My final is **somewhat neat and organized**.<br>• My ideas & details are a **little difficult to understand**. | • My final project is **not neat or organized**.<br>• My ideas & details are **difficult to understand**. | |

(Type your comments here)

## Bibliography


ADHD Editorial Board Medically reviewed by Sharon Saline, Board, A., & Saline, S. (2020, May 22). ADHD Statistics. Retrieved July 17, 2020, from https://www.additudemag.com/statistics-of-adhd/

Attention Deficit Hyperactivity Disorder (ADHD) - The Instruction of Children with ADHD. (2008). Retrieved June 1, 2020, from https://www2.ed.gov/rschstat/research/pubs/adhd

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. Arlington, VA.

Barkley, R. A. (2020). *Taking charge of Adhd: The complete, authoritative guide for parents*. The Guilford Press.

Biederman, J., Monuteaux, M. C., Doyle, A. E., Seidman, L. J., Wilens, T. E., Ferrero, F., . . . Faraone, S. V. (2004). Impact of Executive Function Deficits and Attention-Deficit/Hyperactivity Disorder (ADHD) on Academic Outcomes in Children. *Journal of Consulting and Clinical Psychology*, *72*(5), 757-766.

Bikic, A., Reichow, B., McCauley, S. A., Ibrahim, K., & Sukhodolsky, D. G. (2017). Meta-analysis of Organizational Skills Interventions for Children and adolescents with attention-deficit/hyperactivity disorder. *Clinical Psychology Review*, *52*, 108–123.

Brown, T. E. (2006). Executive Functions and Attention Deficit Hyperactivity Disorder: Implications of two conflicting views. *International Journal of Disability, Development and Education*, *53*(1), 35-46.

Bryson, J. M., Patton, M. Q., & Bowman, R. A. (2011). Working with evaluation stakeholders: A rationale, step-wise approach and toolkit. *Evaluation and Program Planning*, *34*(1), 1-12.

Bryk, A. S., Gomez, L. M., Grunow, A., & LeMahieu, P. G. (2017). *Learning to improve: How America's schools can get better at getting better*. Harvard Education Press.

Carbone, E. (2001). Arranging the Classroom with an Eye (and Ear) to Students with ADHD. *TEACHING Exceptional Children*, *34*(2), 72–82.

Centers for Disease Control and Prevention. (2021, September 23). *Data and statistics about adhd*. Centers for Disease Control and Prevention. Retrieved September 26, 2021, from https://www.cdc.gov/ncbddd/adhd/data.html.

Danielson, M. L., Bitsko, R. H., Ghandour, R. M., Holbrook, J. R., Kogan, M. D., & Blumberg, S. J. (2018). Prevalence of Parent-Reported ADHD Diagnosis and Associated Treatment

Among U.S. Children and Adolescents, 2016. *Journal of Clinical Child & Adolescent Psychology, 47*(2), 199-212.

Data and Statistics About ADHD. (2019, October 15). Retrieved July 9, 2020, from https://www.cdc.gov/ncbddd/adhd/data.html

Dawson, P., & Guare, R. (2018). *Executive skills in children and adolescents: A practical guide to assessment and Intervention*. Guilford Press.

Dawson, P., & Guare, R. (2009). *Smart but scattered: the revolutionary "executive skills" approach to helping kids reach their potential*. Guilford Press.

Dendy, C. Z., ADHD Editorial Board, ADHD Editorial Board, & ADHD Medical Review Panel. (2006). Teaching Strategies for Students with ADHD: Ideas to Help Every Child Shine.

Retrieved from https://www.additudemag.com/teaching-strategies-for-students-with-adhd/

Dupaul, G. J., Weyandt, L. L., & Janusis, G. M. (2011). ADHD in the Classroom: Effective Intervention Strategies. *Theory Into Practice, 50*(1), 35–42.

Forness, S. R., & Kavale, K. A. (2001). ADHD and a return to the medical model of special education. *Education & Treatment of Children, 24*(3), 224-247.

Greene, R. W. (2014). *The explosive child: A new approach for understanding and parenting easily frustrated, chronically inflexible children*. New York: Harper.

Keilow, M., Holm, A., & Fallesen, P. (2018). Medical treatment of Attention Deficit/Hyperactivity Disorder (ADHD) and children's academic performance. *Plos One, 13*(11), 1-17.

Krish, N. (2017, March 31). Project-Based Learning: Taking Students to a Deeper Level. Retrieved from https://www.gettingsmart.com/2017/04/project-based-learning-deeper-level.

Kryza, K. (2013). Practical Strategies for Developing Executive Functioning Skills for ALL Learners in the Differentiated Classroom. *Handbook of Executive Functioning*, 523–554.

Langberg, J. M., Epstein, J. N., & Graham, A. J. (2008). Organizational-skills interventions in the treatment of ADHD. *Expert Review of Neurotherapeutics,8*(10), 1549-1561.

Larmer, J., Mergendoller, J. R., & Boss, S. (2015). *Setting the standard for project based learning: a proven approach to rigorous classroom instruction*. ASCD.

Loughran, S. B. (2011). Preparing General Education Teacher To Meet The Challenges Of ADHD In The Classroom. *Journal of College Teaching & Learning (TLC),3*(10), 27-34.

Meyers, C. A., & Bagnall, R. G. (2015). A case study of an adult learner with ASD and ADHD in an undergraduate online learning environment. *Australasian Journal of Educational Technology, 31*(2), 208-219.

*Mission and philosophy*. Falk Laboratory School. (2016, December 7). Retrieved September 21, 2021, from https://falkschool.pitt.edu/about-falk/mission-and-philosophy

Montague, M., & Warger, C. (1997). Helping Students with Attention Deficit Hyperactivity Disorder Succeed in the Classroom. *Focus on Exceptional Children*, *30*(4), 1-16.

Morgan, P. (2013). Racial and ethnic disparities in ADHD diagnosis from kindergarten to eighth grade. *PEDIATRICS*, *132*(1).

Parsons, S. A., Metzger, S. R., Askew, J., & Carswell, A. R. (2010). Teaching Against the Grain: One Title I Schools Journey Toward Project-Based Literacy Instruction. *Literacy Research and Instruction*, *50*(1), 1–14.

Perry, J. A., Zambo, D., & Crow, R. (2020). *The improvement science dissertation in Practice: A guide for faculty, committee members, and their students*. Myers Education Press.

Report Reveals Link Between Poverty, ADHD. (n.d.). Retrieved July 2, 2020, from https://www.usnews.com/news/health-news/articles/2020-03-04/report-reveals-link-between-poverty-adhd

Weber, Benjamin Aaron, "The Effectiveness of Participation in a Project-based Learning Project on At-risk Student Self-Efficacy" (2016). Dissertations and Theses. Paper 3363.

Zablotsky, B., & Alford, J. M., Racial and ethnic differences in the prevalence of attention-deficit/hyperactivity disorder and learning disabilities among U.S. children aged 3-17 years. (2020). NCHS Data Brief, no 358. Hyattsville, MD: National Center for Health Statistics.

Zeigler Dendy, C. A. (2017). *Teenagers with Add and Adhd: A guide for parents and professionals*. Woodbine House.