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15. PROJECT BASED LEARNING, A CENTER FOR DESIGN CLASS AND FOXFIRE

Efforts to create successful opportunities for our students have taken many forms. This chapter will review three: Problem Based learning (PBL), a Center for Design and Technology (CDAT) high school and Foxfire. As you read this chapter, keep in mind the Core Practices and how they are connected to PBL and CDAT.

PROJECT-BASED LEARNING (PBL)

Project-based learning, or PBL, is an approach being implemented by schools across the United States (Alliance for Excellent Education, 2011; Boss, 2012; Expeditionary Learning Schools, 2009; Ravitz et al., 2010). This is not the first time PBL has had momentum in the United States and it has evolved and today is promoted by the Buck Institute of Education (BIE), a non-profit organization. It is designed as a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an engaging and complex question, problem, or challenge.

Unlike earlier implementations, PBL today is organized around state standards that students are expected to master (Barron & Darling-Hammond, 2008; Boss, 2011; Boss, 2013; Buck Institute of Education (BIE), 2015; Ravitz, 2008; Thomas, 2000). The current evolution of PBL by the BIE includes 8 Design Elements for Gold Standard PBL (2015a); as well as an added framework for Project Based Teaching Practices for Gold Standard PBL (2015b).

PBL allows teachers to differentiate instruction and assessment by allowing students to explore and show their understanding through the medium of their choice (Boss, 2013; Haddock, 2013; Thomas, 2000). It is important to note that PBL uses various instructional methods simultaneously and does not only rely only on the project phase for student learning. Students show their level of understanding of the content through projects and by allowing students to show their understanding through a medium of their choosing. Researchers have found the PBL method has the ability to help students achieve academic success (Alliance for Excellent Education, 2011; Barron & Darling-Hammond, 2008; Hernandez-Ramos & De La Paz, 2009; Holm, 2011; Moeller, 2005; Ravitz et al., 2010; Ravitz et al., 2012; Thomas, 2000). When implemented properly PBL has shown that students were able to acquire basic content knowledge with a deep understanding of concepts respective to the disciplines involved and has helped students develop 21st century skills.

H. Smith & J. C. McDermott (Eds.), The Foxfire Approach, 121–127.

Teacher resistance was found to have an influence on whether PBL would be successful (Beneke & Ostrosky, 2008; Hertzog, 2007). There are many differences between traditional education and PBL requiring teachers to shift their mindset. Teachers in PBL change from the director of information to the facilitator of learning (Boss, 2013; Thomas, 2000) and by relinquishing control, allow students to find out how they learn best and how they would like to show their understanding of the content (Boss, 2011; Thomas, 2000). Giving students a choice and making sure their voices are heard is one area where the Foxfire Approach is visible in PBL.

THE CENTER FOR DESIGN AND TECHNOLOGY (CDAT)

In 2010 the Lanier High School created a center (CDAT) which uses strategies and practices somewhat similar to Foxfire. Begun as a place for STEM support, it was designed as a model of cooperation with local participants, state industry and higher education in an environment that directly connects 21st century skills and student choice with district and state standards. Their mission states:

Students will become partners, to improve their own learning on their pace, with a focus on their creative interests as the connection to science, technology and communication.

- Entrepreneurship and creativity will be cornerstones; students today want reality, and we will support them in genuine efforts with a genuine community and business focus.
- Teachers will truly be professional educators, always evaluating and reflecting on optimizing pedagogical practices.

CDAT is based on the 3 principles of Authenticity, Creativity and Efficiency.

- Authenticity – making real connections for students, regarding skills and opportunities. We use industry-level softwares, and push students to pursue contests and entrepreneurial opportunities while developing genuine portfolios.
- Creativity – our students are encouraged to find their method of expression, and to use their dreams and visions to express their learning. The overlap of the creative and technological worlds are in high demand, and CDAT students will be very prepared for it.
- Efficiency – not every student needs an hour for every subject, so we support the student at the level they need. In addition, CDAT students learn the power of teamwork and communication in our project-based learning world, understanding that it's much more efficient to work and plan together.

This is an evolving, organic effort. There is no final answer, just good change. CDAT will evolve and continue to improve, but will always have the primary focus of maximum learning, both in subject matter and in 21st century skills (http://cdat.lanierhs.org/vision *Retrieved 2-7-16).

Connecting students to the community may be one of CDAT's greatest strengths. One of the first things CDAT did was create an advisory board made up of local businesses and community members. The board offers their expertise and connections to locate individuals who would like to come speak to students or evaluate student projects. Having community members engage in the classroom throughout the year helps make the projects authentic and gives the students a sense of purpose to their work. Some projects may even be a real project for a local business that truly provides a real audience for the students. Reading teacher feedback in conjunction with feedback from professionals helps the students reflect on their project and how to improve. The relationship with our community has grown since CDAT first started and now includes a project showcase each semester. During the project showcase, parents and members of the community come to see and evaluate student projects. Last year the project fair helped connect a group of sophomores with a businessman who helped the students get a patent for the product they created for a CDAT project. Opening the doors and involving the community has brought numerous opportunities for all the students, either through internships, field trips, resources, guest speaking, or simply connections to other individuals interested in helping our students. After they complete their project, students will take the same unit, county, and state exams as their peers.

Throughout its first four years CDAT has experienced academic success and achievement in the "real world." During the first year all but two students met or exceeded the Language Arts End of Course Test (EOCT), which was a state exam. In its second year, every CDAT freshmen passed the Language Arts EOCT with 40% exceeding. The addition of math to the freshmen program was difficult, but students still outperformed their peers in their school and county on the Math EOCT. The sophomore class had every student meet or exceed the Language Arts EOCT. The sophomore program added AP World History and had a higher passing rate on the AP Exam than the control group who were taught in a more traditional setting by the same AP World History teacher. The CDAT program did not incorporate science in its program, but despite this, CDAT students had a greater number of students pass the Science Gateway and obtain "exceeds" than their peers.

Due to the student achievement on the science exams, in CDAT's third year the freshmen program switched from math to biology and the sophomore program switched from AP world history to chemistry. The CDAT program continued its success on language arts assessments as every student passed their respective grade level's EOCT. Students had a higher passing rate on the Biology EOCT. The sophomore program saw a dramatic difference in scores as the CDAT program's failure rate on the Science Gateway, a county exam, was more than two-times less than the school's. The junior CDAT program enjoyed success on the U.S. History EOCT as all students passed the exam and had 20% more students achieve "Exceeds Standards" than the school's. CDAT Seniors set a school record for testing as they all passed the Economics EOCT and 78% of them exceeded standards! CDAT also

had their first student take the Autodesk Inventor User Certification Test and passed easily. Within the first three years CDAT students received numerous awards and recognition outside the classroom. For a detailed list please visit cdat.lanierhs.org.

Developing the CDAT program has been a learning experience for those involved. They have learned what works for them and their students. One of the biggest contributors to the success of CDAT has been student choice. Not only do students choose to be in the program, but they are given the freedom to explore and create through their interest. Allowing students to explore their interest has led to many creative solutions to real world problems (as evidenced by the patent the sophomore students received last year). Students also feel invested in the program as they have a voice in how the program functions. Students' desire to include science instead of math in the projects caused the CDAT program to switch from math to science in its third year. Designing real projects for the students has also contributed to CDAT's success as students are learning the skills necessary to work in a collaborative environment and how the attributes of each academic discipline are used together in the real world. An often overlooked role in education is that of its community. CDAT's success would not have been possible without the strong connection it has with our local community. The collaboration between students, teachers, parents, and community members has proved to be instrumental in CDAT's success.

This past semester I was reminded of the importance of the Core Practices and particularly student choice. I had several students sign up for my Digital Media & Film class because they have a passion for film. Throughout the fall semester I noticed they were not invested in the projects we were working on. They were sitting quietly and were unengaged in what we were doing. As a result I did not see the returns I expected from such talented individuals. Writing this chapter on the Foxfire approach helped me recognize what was wrong and led me to understand the difference between PBL and the Foxfire Approach. Even though the students were working on real projects and were given creative freedom with how to approach the project, they were not invested. They were not invested because the project itself was not their choice. After students returned from Christmas break I made a decision to dive into the Foxfire approach and spoke with these students to get a better idea of what they wanted to get from class and why they were not engaged during the fall semester. Their response was what I expected; the overall project was not their choice. Instead of starting with the standards and developing a project, I reversed it and started with what the students wanted to create and aligned the standards to what they wanted to produce. Although we are only a month into the semester the returns have surpassed the fall semester tenfold. Now these same students are engaged in my class and are stepping up as leaders in the classroom and have begun tutoring their peers, all without my instruction to do so. To help them maintain their momentum I have committed to my new role as collaborator. Instead of working over them, I am now working alongside them as their partner helping them develop a plan of action and only helping them when they ask and even then I do not always assist if I think it is a problem they need to solve. Collaborating with your students

is not an easy change for most, and it does not happen overnight. If you would like to scaffold your training then I recommend you follow the PBL format until you are more comfortable with the Foxfire Approach.

In the beginning of PBL the teacher takes on a more traditional role as they use various instructional strategies to introduce concepts students must understand for the county and state exams. Using pre-assessments before introducing content has proved to be a vital strategy for CDAT teachers. Pre-assessments help teachers see which key concepts they can touch on and which concepts will need a more in-depth explanation based off where each student is. This allows teachers to use their limited time more efficiently leaving more time for the project phase. After the introduction of the key concepts students are assessed just as they are in traditional classrooms. The results of these assessments are used by teachers to identify students who need more individualized instruction, because not every student needs an hour for every subject. Many times this is where you will identify your highfliers and adapt your role to more of a collaborator with those students allowing them to explore the content during the project phase. While your highfliers are working on the project you are freed up to help students who are struggling with the content. Your highfliers remain engaged as they are exploring the content, and your other students are receiving the individualized instruction they need to succeed on the assessments. When students do well on the assessments they are free to enter into the project phase. When all your students reach the project phase your role transitions into that of a facilitator, or coach, helping guide students throughout the project phase of the unit.

During this phase the teachers help students learn what it takes to become an active learner diving deep into the content. Active Learners are exploring the content by conducting further research or evaluating different ways to solve a problem. While students are focused on developing their project the teacher has time to speak with students to continuously evaluate individual progress. Any student who fails to meet the demands of the teacher is simply pulled for remediation until the student shows he understands the concept to continue. Students are also free to think for themselves as the teacher is not over their shoulder telling them exactly what to do. Throughout the project phase students are working together developing the 21st Century skills employers are looking for. While students work on the project they always need to reflect and revise on how well the product is coming along, as well as how well the group dynamics are working. Revision is often overlooked in today's education due to time; however, it is vital to the learning process. When students are given the chance to reflect and revise their work they will often see their misconceptions and can learn from their mistakes leading to a better understanding of the content. When the hard work is finished teachers, parents, and community members come see what the students developed and some groups will continue to develop their product or idea further. During the project showcase students get to experience presenting their ideas to professionals and how to handle constructive feedback of their ideas.

In order to meet the needs of a changing world, business leaders are declaring that there are not enough workers with the 21st century skills they desire (Alliance for

Excellent Education, 2011; Gallop, 2013). The strategies of increasing the rigor of the curriculum, homework, standardized testing, access to education, and increasing spending have been common throughout our educational history. Sadly, when there is a call for education reform our policy-makers have applied the same strategies with the full expectation the strategy would work this time. Schools are feeling enormous pressure to meet new demands, having their funding and resources tied to their success (Burke-Adams, 2007). Students are overwhelmed by the amount of testing they have to do and their voices are not heard. All this has created an environment where teachers and schools are afraid to implement new instructional methods to try and adapt to the modern world (Rettner, 2011).

The Foxfire Approach has been around for fifty years because it is consistent with the needs of the 21st century skill set. It has been durable because it has listened to the community it serves. If businesses choose not to listen to their customers they fade away and if politicians do not listen to their constituents they will no longer be in office. If the purpose of education is to prepare students to become democratic citizens as Thomas Jefferson intended, should we not make sure student voices are heard during their foundational years? Utilizing approaches that provide for student success is central. Foxfire's work continues to be poised to do so and PBL and CDAT both are on the road to providing choice for students as they incorporate the essential elements of Foxfire.

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