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Benjamin M. Prohl

Northwestern College - Orange City

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Project-Based Learning as a Tool for Improved Student Engagement

Benjamin M. Prohl

Education Department, Northwestern College

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Dr. Pedersen

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in Partial Fulfillment of the Requirements
For the Degree of Master of Education

Abstract

Timberline School has found success within the rapidly growing school district of Waukee Community Schools. However, with the increase of students so is there an increase in student needs. Educators are being challenged daily with IEPs, ELPs, ELL, and numerous other student accommodations. Projected-Based Learning offers a methodology which will increase student engagement while maintaining academic rigor. Soft skills, also known as 21st-Century Skills, help prepare the students for a post-education life. Project-Based Learning is by nature a methodology of student-driven course work with built-in differentiation. This includes content integration such as STEM classrooms and Humanities. With the implementation of Project-Based Learning, Timberline School should expect to see increased student engagement. This will be observed by increased attendance rates, decreased classroom management issues, and growth in academic rigor.

Keywords

21st-Century Skills, Academic Rigor, Classroom Management, Integrated Coursework, Project-Based Learning, and STEM.

Contents

Introduction _____ 5

Review of Literature _____ 7

School Profile & Baseline _____ 18

Needs Assessment _____ 21

Student Data & Analysis _____ 23

Implementation of the Plan _____ 26

References _____ 29

Project-Based Learning as a Tool for Improved Student Engagement

Like any industry, education needs to grow and adapt to the current times and meet the needs of the students and professionals associated with education. As far back as 1800, education has been argued over. What we now see as standard practice in publicly provided education, when Horace Mann introduced the concept of free public education, he was met with controversy and disagreements with his concept of free public education. There is a concerted effort to increase educational efforts in the sciences globally. “The share of STEM graduates has been estimated below 26% of the total number of tertiary education graduates in Europe.” (Drymiotou, Constantinou, & Avraamidou, 2021, p. 717) As we work our way into the 21st century, there is a greater emphasis on providing equal opportunities for girls in the STEM fields. “Before the first of the (STEMinist) program, only 25 percent of girls said they had heard of engineers.” (Nation, Harlow, Arya, & Longtin, 2018, p. 41) Changes in our education system need to match societal norms such as women’s role in the sciences. Rote memorization and traditional tests and quizzes do not fit the needs of 21st-century education. Advancing technology provides opportunities for this growth. “Lastly, the integration of Twitter also influenced the affective qualities of literacy learning.” (Hunter, Silvestri, & Ackerman, 2018, p. 43) The problem is, how can we provide authentic learning experiences for students to prepare them for 21st-century citizenship? While there are numerous studies regarding STEM, fewer studies investigate the integration of other courses, specifically in a project-based environment.

This school improvement plan aims to implement integrated coursework for the students in a project-based learning environment to connect the students of Timberline to their community. In building this community partnership, the goal is to see increased academic success and decrease negative behavior such as truancy and Documented Behaviors (demerits).

The research was conducted with the DeWitt Library of Northwestern College, Education Resources Information Center of the U.S. Department of Education, the International Journal of Education & Literacy Studies, and Google Scholar. This research provided little evidence of integrated coursework; much was found regarding STEM practices. All the studies were conducted recently, in 2017 or newer, and originated across the United States and internationally. Beyond the STEM focus, several studies investigated the various methods of providing authentic learning environments for the students, specifically, student-focused authentic learning. While not all studies directly address project-based learning, these all do support the PBL pedagogical approach.

“PBL is a collaborative, self-directed approach to learning which makes use of language learners’ cognitive and metacognitive thinking skills. PBL tasks aim at mimicking real-life problems in learning.” (as cited in Mohammadi, 2017, p. 35) Project-based learning provides the students with the best chance for academic success and generates positive community involvement. By integrating the courses, not just math and science, academic rigor is authentic and engaging. This provides a framework for a curriculum shift from stand-alone classes focused solely on content knowledge to content-enriched learning experiences for the students.

Starting with a deep dive into the studies focusing on STEM, an analysis of varying methodologies will highlight the success and drawbacks of integrating math and science. The analysis will also reveal successful student motivation as well as highlight traditional school environments with a loss in student engagement. Student engagement will be examined in greater detail beyond the STEM classroom. Various techniques, including physical location, technology use, and pop-culture simulation, were studied, looking for effective means to increase student engagement.

Review of the Literature

The most commonly found example of a PBL (Project-Based Learning) environment is STEM (Science Technology Engineering Mathematics) courses. With so much focus in the U.S. on math and science, this methodology emerged as a standard for PBL. This style of curriculum promotes a variety of positive student behavior. “Teachers valued students’ development of independence, and they reported that PBL experiences served as a mechanism by which students could become ‘more independent’” (Noble, Ferris, LaForce, and Zuo, 2020, p. 5). In their study, Noble, Ferris, LaForce, and Zuo (2020) found over 67% of teachers interviewed noted student autonomy as an observable behavior in the PBL model. The behavior included student-led learning. As the students became more immersed in PBL, they took on more leadership responsibilities. Additionally, it is noted students began making more decisions which led to a conflict for the teachers. “Though teachers reported that stepping back to take on the ‘facilitator’ role can be difficult at first, they also said that they ‘never having a problem with letting them [the students] choose.’” (Noble, Ferris, LaForce, and Zuo, 2020, p. 6). Navy and Kaya (2020) systematically reviewed numerous studies regarding the pedagogy of integrated STEM. They found numerous valuable student outcomes related to implementing integrated STEM coursework, including student ownership of their educational experiences. Navy and Kaya (2020) found student engagement and interest in STEM coursework increased. Arís and Orcos (2019) studied the use of LEGO robotics as a medium for teaching STEM. They found over 70% of participating teachers saw students encouraged to search for solutions. (Arís and Orcos, 2019, p. 7) This student-centered approach allows students to build self-efficacy and gain tools for challenges they may face. Arís and Orcos (2019) found over 75% of teachers reported student autonomy when using technology such as the software for LEGO robotics. This is another

indication of the student-centered approach. A study conducted by Drymiotou et al. presented a methodology into the science class in which different disciplines were integrated. Students found value in this curriculum, reporting high affect levels on multiple categories. These categories included finding societal value on a topic (3 – 4 on a 5-point scale), finding the topic enjoyable (3 – 4), and gaining skills related to career readiness (3). (Drymiotou, Constantinou, and Avraamidou, 2021, p. 723)

Noble, Ferris, LaForce, and Zuo (2020) found teachers noted an elevated level of teamwork and collaboration in the PBL model. One manifestation of the increased collaboration allowed students to form their groups when needed. When investigating the integration of a STEM curriculum, Thibaut et al. found “The fifth category entails the promotion of teamwork and collaboration with others.” (Thibaut, Ceuppens, De Loof, Meester, Goovaerts, Struyf, Boeve-de Pauw, Dehaene, De Cock, Hellinckx, Knipprath, Langie, Struyven, Van de Velde, Van Petegem, and Depaepe, 2018, p. 7) The study found the need for students to have ample time and opportunities to grow skills for proper teamwork. Not only does practice lead to success, but time spent in collaboration also leads to group efficacy. The LEGO robotics study by Arís and Orcos noted students reflecting on improved teamwork skills. Students self-evaluated a higher tolerance rate to others’ ideas and an overall fellowship; 70.3% and 69.0%, respectively. (Arís and Orcos, 2019, p. 10)

The integration of courses flowed smoothly with the PBL module. Science and math work together in STEM, and teachers recognize similar academic goals between different courses. With increased course integration came teacher frustration with time constraints. Each teacher is looking for dedicated time for their specific content area. However, Navy and Kaya (2020) found evidence integrated coursework maximized instructional time. “Well, since it

integrates multiple disciplines, you gave a lot of time to teach it, sort of, cause you would use your math time to think of what math you might use and teach that specific math and then you could use science time to actually do the engineering, that kind of thing." (as cited by Navy and Kaya, 2020, p. 291). Ultimately, STEM course work emphasizes academic rigor by challenging the students' critical thinking skills. This integration was noted in Thibaut, Ceuppens, De Loof, Meester, Goovaerts, Struyf, Boeve-de Pauw, Dehaene, De Cock, Hellinckx, Knipprath, Langie, Struyven, Van de Velde, Van Petegem, and Depaepe (2018) as well. They found integrated STEM coursework led to increased inquiry and student planning, questioning, collecting, and analyzing of data. This same study by Thibaut et al. noticed an increase in scientific inquiry and authentic application of the scientific process. The PBL model reinforces the scientific method as a process for project completion. "Another frequently noted affordance is that the integrated STEM approach promotes student engagement and deeper learning" (Navy and Kaya, 2020, p. 291). Navy and Kaya (2020) also found integrated coursework encouraged girls to increase STEM participation. Ng and Fergusson (2020) studied STEAMPunk Girls Program's impact on building girls' involvement with STEM studies and future science and math careers. They found STEAM (Science Technology Engineering Arts Mathematics) integration built girls' awareness and confidence in STEM-related fields of studies. For example, there was an 11.5% increase in girls' interest in studying science at a university after they participated in the STEAMPunk program. There was also a notable increase IT/Tech as well as Arts/Humanities, 11.3% and 7.5% respectively. There was a significant decline in girls' perceptions of barriers surrounding STEM-related fields. A drop of 11.3%, 28.7%, and 35.9% in perceived barriers to women working in the fields of Science, IT/Tech, and Engineering, respectively (Ng and Fergusson, 2020, p. 291). The STEMinist program is a partnership with universities in southern California with Girls Inc to

provide girls an increased opportunity to connect with STEM. A study by Nation, Harlow, Arya, and Longtin (2021). followed the program and its participants to gain a deeper understanding of the impact of the STEMinist program. The study found increased “(i)dentification with scientists; recognition by self and others that one is a scientist or is capable in STEM” (Nation, Harlow, Arya, and Longtin, 2021, p. 39). Multiple studies have shown the value of STEM programs and integrated courses in opening opportunities for girls who have traditionally avoided science, math, and technology careers. For both girls and boys, STEM integration with other courses has shown an improved desire for STEM-related careers. Emembolu et al. looked at the impact a STEM curriculum, especially for students of a lower SES, had on students' awareness of STEM careers. From interviews conducted in 2015 and then again in 2017, Emembolu, Padwick, Shimwell, Sanderson, Davenport, and Strachan (2020) found favorable increases in the perception of STEM careers, including, but not limited to, astronaut, engineer, mechanic, and technician. For example, in 2015, 25.6% of participants were interested in the career path of an engineer. However, in 2017 the percentage increased to 33.1%. Transversely in 2015, 48.3% of participants specifically did not want to be an engineer, while in 2017, the percentage dropped to 34.8% (Emembolu, Padwick, Shimwell, Sanderson, Davenport, and Strachan, 2020, pp. 774 & 775). These numbers indicate the importance of exposure for girls and boys in STEM careers. An extrapolation can be made indicating integrated course work provides more authentic learning experiences and therefore connects students with careers in STEM and non-STEM careers. “The findings of this study demonstrate that the students not only appreciated learning information about global socio-scientific issues and careers but also indicated arousal of interest that stems from learning.” (Drymiotou, Constantinou, and Avraamidou, 2021, p. 773)

When comparing STEM classrooms, “Results of a series of independent samples t-test indicated that class sessions classified as PBL experiences had a higher presence of student autonomy ($t(123) = -4.43, p < .001$), integration of concepts ($t(39.29) = -2.19, p = .04$), and student cooperation and teamwork ($t(87.37) = -3.29, p = .001$) compared to non-PBL class sessions” (Noble, Ferris, LaForce and Zuo, 2020, p. 11). Wallace and Bodzin (2017) also found integrating authentic learning experiences showed an “increase in science and technology significantly increased with students who used the MobiLAP approach.” (Wallace and Bodzin, 2017, p. 57) Mobile Learning and Authentic Practice Approach (MobiLAP) presents students with technology such as digital cameras, GPS, and mobile phones to connect the students with a community mindset of science (citizen science). This integration of tools and content helps to build student engagement. Arís and Orcos (2019) investigated the use of LEGO robotics as a tool to engage students. They found 83.6% of participating teachers saw the use of LEGO robotics as “To what level has the project helped to work STEM skills in an integrated way?” (Arís and Orcos, 2019, p. 5)

STEM is not the only way educators are trying to increase student engagement. Even in a more traditional classroom setting, significant efforts are implemented to create authentic learning environments. These efforts are not an American-specific challenge. “For example, whereas Alberta, Canada assessments included learning outcomes such as teamwork, New Zealand assessments were based on fairly open-ended investigations. Singapore assessments consisted of fairly focused references to aspects of practical science such as ‘manipulation, measurement and observations; presentation of data and observations; and analysis, conclusions and evaluation’.” (Erduran, El Masri, Cullinane, and Ng, 2020 p. 1563) While in Adelaide, South Australia, Whiley, Houston, Smith, and Ross (2018) found at Flinders University few students

were showing interest in Environmental Health studies. In response to this lack of interest, they created a course titled *Zombie Apocalypse: Microbes and Toxins*. Within one year, student enrollment more than double from 11 students in 2016 to 26 students in 2017. At the time of the study, the course boasted an enrollment of 36 students tripling the number of students prior to the rebranding of the course. (Whiley, Houston, Smith, and Ross, 2018 p. 7) The course maintained academic rigor and taught 21st century skills, also called soft skills. Some of the science learned by the students in *Zombie Apocalypse: Microbes and Toxins* include foodborne pathogens, extrinsic and intrinsic microbiological factors (water activity, pH, NaCl), toxicological principles, mycology, and taxonomy. The soft skills noted in the course include scientific reasoning, information-gathering, problem-solving, and statistical analysis. (Whiley, Houston, Smith, and Ross, 2018 pp. 9 & 10) Similarly, Caballero-Garcia (2018) noted an improvement in 21st-century skills when employing thematic units in the language classroom. The 21st-century skills focused on were; collaboration, communication, critical thinking, creativity, innovation, empathy, technology and media literacy, and intercultural communicative competence. These 21st-century skills were observed in an Intermediate Spanish Course. “The first unit dealt with diversity, collaboration, leadership, and empathy via the topic of poverty.” (Caballero-Garcia, 2018, p. 136) There have been positive results in student engagement and academic rigor when educators work to connect the students to an authentic learning experience. As education continues to evolve, there is a growing importance for students to see value in what they are learning. No longer will students study simply because they are instructed to do so. Quality education includes the buy-in from the students. The more the student sees value in what they are learning, the more engaged they will be and more successful.

The 21st-century skills, or soft skills, are the common thread between a science course on microbes and toxins and a world language course of Spanish. The common theme is the effort by the teachers to create an authentic learning environment for their students. Student engagement increased with the increased effort to create an authentic learning environment. “Engaging language learners in various events in the school and community fosters real world learning and grounds theory into practice.” (Caballero-Garcia, 2018, p. 143). “As learning environment designers, we acknowledged the requirement for scientific literacy for both future employment and critical citizenship, and we took both science and non-science students closer to this goal without sacrificing either content of scientific and pedagogic rigour.” (Whiley, Houston, Smith, and Ross, 2018, pp. 12 & 13) As the global community becomes increasingly interconnected, these 21st-century skills (soft skills) become universal and more applicable to productive citizens of society. A knowledge base is a valuable asset but creative problem solving and collaboration help to maximize the content knowledge learned. These soft skills are invaluable to the students to maximize their learned expertise in the various content areas. IE, a strong student in math, can best utilize their strength when they collaborate and problem-solve effectively.

Content is one way to build student engagement. Authentic lessons and curricula are critical for successful education. Methodologies have been investigated to understand the impact of various approaches on student engagement. Project-Based Learning (PBL) has worked its way into prominence for its use of soft skills combined with academic rigor to provide authentic learning experiences for the students. Revelle, Wise, Duke, and Halvorsen (2019) investigated the benefits of PBL for second graders, specifically in lower socioeconomic schools. PBL is said to have the following characteristics (as cited in Revelle, Wise, Duke, and Halvorsen, 2019, p. 698):

- Projects occur over an extended time period and drive the learning.
- Projects are aligned with learning standards across multiple domains and are integrated in nature.
- Projects have an authentic purpose and an authentic audience.
- Students connect to contexts outside of school.
- Students have opportunities to interact with one another.
- Students have some choices within the project.

Another variation of PBL is sometimes noted as problem-based learning. While still authentic, student-driven, and collaborative, problem-based learning is a shorter-term unit. They are often completed in a lesson or two. Mohammadi(2017) studied the effects of problem-based learning in vocabulary acquisition for English language learners. “(I)t can be concluded that authentic problem-based tasks increase language learners’ cognitive involvement with the learning content and result in more effective vocabulary learning.” (Mohammadi, 2017, p. 38) This indicates the benefits of shorter, but still authentic, uses of PBL. Opportunities are still given to the students to have a voice in their studies and opportunities to collaborate on problem-solving.

Authentic tasks can also be achieved by altering the tools used by the students. One of the soft skills listed in many 21st century skills lists is the use of technology. Edwards, Davis, Hadwin, and Milford (2020) studied the effectiveness of blending online course work with in-person learning. The look for engagement on four different levels; Behavioural, Agentive, Cognitive, and Emotional. “The findings from this case study suggest low achieving students who improved their performance demonstrated higher levels of engagement across three of the four dimensions of engagement.” (Edwards, Davis, Hadwin, and Milford, 2020, p. 15). This blended technique of in-person and online shows merit on multiple levels for student engagement. One way to

promote student engagement is to remove the barriers a traditional brick-and-mortar school provides. “Additionally, we found that online spaces with minimal adult support have strong potential for encouraging academic discussions of literature.” (Colwell, Woodward, and Hutchison, 2018, p. 239). Colwell, Woodward, and Hutchison (2018) continue to say, “students explored their own questions, and ideas, engaged in sustained discussions about literature, listened more actively to each other, developed their own strategies to initiate discussions, and encouraged each other to share or expand their ideas.” Building off the critical characteristics of PBL, the online forum provided a student-driven arena for academic engagement and gave ample opportunities for student choice and peer interaction. In the study, Colwell, Woodward, and Hutchison (2018) conducted the online literature discussion during the summer months and at a public library instead of the local school. Kinberg (2020) found success in student writing when the location of the educational experience changed. Students were asked to write in a natural setting outside of a school building. The concept was to present students with a more authentic situation to write. “This natural setting allows access to both abundant plant like and small animals such as bearded dragons, finches, and some turtles.” (Kinberg, 2020, p. 7). The immersion into nature is a trend in schools and districts to provide more accommodating learning environments for students. These location changes are always working towards engagement and creating more authentic atmospheres similar to what students will encounter after graduation. Growing and adapting educational settings continue to promote student engagement alongside community relations. Bringing into the mix the community at large is crucial to the students' success. From public libraries to nature centers, community relations are vital. “Redesigning schools is a huge undertaking that must be a community project, not just a school or district project.” (Mitchell, 2020, p. 10)

Also possible in a brick-and-mortar school is the use of technology. Technology offers both students and educators a wide variety of avenues and experiences to engage with the content and build community. One use of technology is in the form of social media. Social media can be utilized to build both student engagement and educational authenticity. “Our primary use of Twitter centered upon creating an alternative classroom culture of engagement where technology was leveraged.” (Hunter, Silvestri, and Ackerman, 2018, p. 36) A valid concern from many educators is the freedom students have while participating in activities using technology, whether it be social media or learning management systems (LMS) of the school district. During the online literature discussion forum, Colwell, Woodward, and Hutchinson (2018) found “students may spontaneously adopt a more formal tone in online book clubs, as did students in this library program.” (p. 240). The authenticity of these opportunities helps build student engagement and therefore grounds them in more appropriate behavior. “The high school students also noted that being part of a broader literacy community that extended beyond the traditional classroom to include more expert others involved more authentic academic-related tasks and was an enriching experience.” (Hunter, Silvestri, and Ackerman, 2018, p.44) With proper PBL implementation, authentic learning experiences are presented to the students. “Research on reading and writing for authentic purposes and audiences has shown that it has a positive effect on students’ academic achievement.” (Revelle, Wise, Duke, and Halvorsen, 2019, p. 699)

Student engagement comes from a wholesale methodological change. This change embraces soft skills, precisely skills related to what is known as 21st Century Skills, to increase academic rigor and enhance success within the content directly. PBL is a great way to build community relationships, another critical component to deepening student engagement. “Schools have an internal public and an external public, and relationships with both must be cultivated and

nurtured over time for the betterment of the entire system.” (Mitchell, 2020, p. 5) When reporting on increased student engagement with writing, “Their conversations with each other, with us, and with the naturalists were also real-life, rather than virtual.” (Kinberg, 2020, p. 11)

The importance of the digital community is noted as well.

“Students could navigate among book club discussions in the online social network before posting their response and participate in multiple book clubs simultaneously, which seemed to create a consistent tone and writing style across book clubs. This explanation is powerful in examining how initial interactions and opportunities to participate in multiple book club discussions shape an online space.” (Colwell, Woodward, and Hutchison, 2018, p. 237)

Student-driven course work, integrated courses, technology use, tools for creative problem solving, and community relations have all shown positive results in cultivating student engagement. PBL does not distract from academic rigor. Instead, PBL strengthens academic rigor. PBL, in some form or fashion, is a model benefiting a wide variety of classrooms.

“Project-based learning can enable educators to provide ambitious instruction and to create opportunities for students to build the literacy and social studies knowledge and skills needed to become actively engaged citizens.” (Revelle, Wise, Duke, and Halvorsen, 2019, p. 709).

School Profile & Baseline

Timberline School is a part of the Waukee Community School District. Situated in central Iowa, WCSD is a part of the Des Moines greater metropolitan area. The city of Waukee is on pace to double its population in less than two decades. A small community of approximately 15,000 people in 2012, Waukee currently has just shy of 24,000 residents reported on the 2020 census and a project to cross the 30,000 resident threshold in the next few years. Seeing rapid growth in the past decade, WCSD has recently opened a new high school, Waukee Northwest, servicing grades 10 - 12. Students at Timberline School are in grades 8 and 9 and will attend the original Waukee High School. An 11th elementary school is being constructed and will open fall of 2025. A middle-level school will open fall of 2025, and a twelfth elementary school is opening in the near future. WCSD as a whole is a socioeconomic well-off school district. However, Timberline School serves those on the lower end of the socioeconomic spectrum within the district. Nearly 15% of Waukee students are on a free or reduced lunch plan. As a suburb of Des Moines, Waukee also sees a large proportion of immigrants. Timberline School is the academic home of many English Language Learners. Over 36% of Timberline students are non-White, 331 students out of a total student population of 861. The numbers are disproportionate for students enrolled in advanced level or honors classes. 69% of students enrolled in advanced level classes are White. 8.5% of Timberline students are Black, while only 6.3% of the students enrolled in the advanced classes are Black. The numbers change even more dramatically of the Hispanic/Latino population. While they make up 8.4% of the school's population, they only represent 1.6% of the students in advanced classes. However, Waukee Community Schools report higher than the state average in test scores (84.72% proficiency in English/Language arts compared to the state-wide proficiency rate of 69.81% and an 86.50% rate

of proficiency in Mathematics compared to the state level of 70.16%). Waukee Community schools boast a graduation rate of 98.50%.

The Waukee Community Schools set its educational goals around seven core values as guiding principles.

- We believe in developing people
- We believe in equity
- We believe in keeping students our priority
- We believe in integrity
- We believe in joy
- We believe in inclusivity
- We believe in innovative problem solving

Timberline School takes these core values of the Waukee Community Schools and formulates their cornerstones. These cornerstones encapsulate the district's values and create specific principles of education.

- We honor and value collective strength that comes from our differences
- We believe a learner-centered community, founded upon supportive relationships, provides challenging and engaging growth opportunities for all
- We believe trusting partnerships are established through effective communication and collaboration with a solution-oriented approach
- We believe a safe and positive environment is achieved through mutual respect, creating connections and fostering a sense of belonging

The district's core values and the school's cornerstones surround the need for a student-centered learning environment embracing many 21st century skills such as collaboration and

creative problem-solving. The staff of Timberline School mimics 21st-century skills in the collaborative solution minding model of Professional Learning Communities or PLCs. The mission statement of Waukee Community School District's PLC initiative is as follows; "Waukee Community Schools is a rapidly growing and increasingly diverse school district. We believe every individual's unique background and culture enhance our schools. By focusing on the joy of learning and growth for everyone, we create a dynamic work environment for our staff while engaging our students, families and the community through innovative educational experiences."

Timberline's PLCs have a variety of success levels. Teamwork mentality is encouraged and supported throughout the district as well as Timberline. Each Monday, the three 9th-grade history teachers meet as part of a required PLC meeting. The department often meets daily during the common planning period. While not required, this daily meeting promotes standard classroom practices and assessments. The department can also discuss classroom challenges such as student engagement and content differentiation. All 9th-grade history teachers across the district meet bi-weekly to discuss items such as curriculum mapping and common assessments. Timberland employs the team teaching approach. A cohort of approximately 150 students share common core teachers, including Math, Science, English, and Social Studies. Once a week, the cohort's (also known as Color Team) core teachers meet to discuss student behavior and interventions. This allows teachers to collaborate on student performance and behavior and identify possible warning signs of academic, social, and/or emotional struggles. Timberline's PLC work highlights the importance of educator collaboration. The values of the building are accentuated both in the content PLCs and the cohort's PLC.

Much is said in the core values, cornerstones, and mission statements about innovation, collaboration, creative problem solving, and inclusivity. However, the modality of the learning environment is still the isolated classrooms working independently. Most classes work through simulations, hypotheticals, and other abstract challenges. To truly embrace the goals of the district and the school itself, a change is needed in the methodology in the classrooms. There needs to be an adoption of authentic learning experiences for the students. In an authentic learning environment, Waukee and Timberline specifically will be able to embrace the diversity of its student body and maintain, if not increase, the academic rigor. Adapting a model of innovative educational experiences and building a student-oriented collaborative classroom will promote increased parent and community involvement. A will, in turn, build on the principles of inclusivity and the sense of belonging.

Needs Assessment

The dramatic growth in Waukee, IA, has impacted the Waukee Community Schools significantly. There is a larger student population than ever before. There is also a marked increase in students with IEPs, 504s, English Language Learners, ELPs, and numerous other unique needs. The status quo curriculum from the turn of the century is no longer adequate for the growing needs of the student body in Waukee.

While Waukee Community Schools has shown an ability to adapt to the changing times and accommodate the changing needs of the students, more can be done. A 98% graduation is a great high level of success. It still shows some students are slipping through the cracks. Specifically, at Timberline, behavioral issues detract from everyone's educational opportunities. Students who show this deviant social behavior have their educational opportunities directly affected negatively. These students are not engaged with the content, and often, they are not even

in the classroom. In-School and Out of School suspensions may be appropriate consequences for actions. These consequences undoubtedly handicap the students from fully engaging with the educational opportunities. The question remains, how can we engage the students not only, so they learn but also so there is less motivation to participate in the socially deviant behavior leading them into trouble. Indirectly, all students are affected by this deviant behavior. The well-behaved students may not have to deal with suspensions. They do have to deal with the lack of attention they receive. Educators have a limited amount of time and every moment they spend dealing with bad behavior and issuing consequences is time spent away from students who are behaving appropriately in the classroom. To avoid negative consequences or avoid being around deviant behavior, students frequently miss school altogether. There is not a strong enough need or desire to be at school for some students.

In addition to finding better motivation for behavioral issues, educators are continually looking to deepen academic rigor. Long gone are the days of rote memorization. Students need to learn, analyze, and synthesize with and from the content of each course. Academic rigor goes beyond acing a test. Academic rigor needs more tactile products to show both the engagement and understanding of the content by the students. Academic rigor is not a straight line but a web of interacting skills and content to strengthen the students' intellect.

Finally, a methodology is needed to meet the needs of all students. Simply changing content does no good because an educator wants to differentiate their lessons. This differentiation needs to be on the same path as academic rigor. A student working on an IEP should have the same goals and opportunities as a student working on an ELP. A student who is not a native English speaker should have the same academic opportunities and rigor as any other student.

The question remains, what can Waukee Community Schools do to strengthen the Academic rigor at Timberline while at the same time meeting the needs of the entire student body? All the while doing it in a manner motivating students to learn and therefore increases attendance and decreases deviant behaviors.

School Data & Analysis

Timberline school has a need for increased student engagement. Attendance is a concern for a significant portion of the student body. If students are not in the building, they cannot engage with the content. While in the building, students who show socially deviant behavior distract themselves from educational opportunities and take educators away from creating the best educational opportunities for well-behaved students.

The only way to build student engagement is to have students in the building. Students miss school for a variety of reasons. Many reasons are widely accepted and understood as life events. These include illness and family emergencies. This year at Timberline, students have missed school for family emergencies such as funerals, parental job loss, moving from one residence to another, and sibling medical needs. These absences will occur in all situations. Absences to be avoided are those where the student has a choice. Students will often convince their caretaker they are ill, it is o.k. to miss, or nothing significant will happen at school. More robust student engagement will change the motivation of the students. A snapshot of Timberline shows an average of over 10% absence from school. The rate of excused absence comes in just under 10%, at 8.45% of the student population missing school for a reasonable excuse. However, nearly 3.5% of the student population is missing school for unknown or unacceptable reasons. This absentee rate does not include students arriving after the scheduled start time of school. An average day shows just shy of 6% of students arriving at school after 7:55 a.m.

Documented Behaviors are the system of deferrals at Timberline. When a classroom teacher can no longer maintain proper structure and discipline, they write the student up by creating a Documented Behavior. After three quarters completed at Timberline for the 2021 – 2022 school year, 1,190 Documented Behaviors have been recorded. This rate of incidences relates to approximately five overly disruptive behaviors per week. Not only does the specific student suffer, but the class the student was in suffers as well. This behavior was enough of a disruption to warrant a write-up from the teacher. This behavior takes time away from the teacher and the rest of the students in the class.

Action Plan

A solution for Timberline School is to implement a Project-Based Learning cohort. This cohort would be self-contained in one of the color pods at Timberline. The four core teachers will work in tandem to create an integrated learning curriculum. The community will be contacted, and professional relationships will be established. As student engagement increases, academic rigor, attendance, and positive social behavior will increase.

It is recommended one color team initiate the PBL model, whether 8th grade or 9th grade. Since This plan originates from 9 Green, it is recommended to start there. While all core teachers teach six classes, the PBL cohort will populate four of them. As the different departments have Professional Learning Community meetings in the morning, the cohort can occupy the last four class hours of 9 Green. IE, 4th, 5th, 7th, & 8th. This schedule will leave the 6th hour as the time allotted for the Color Team meeting. It is recommended content classes switch between 4th and 5th hour as well as switching 7th and 8th. For example, every student in 4th English will go to 5th-hour History and vice versa. The same content switch will also occur for 7th and 8th hours. Since the same cohort of students will rotate through the core classes, this

allows flexibility for the teachers to integrate the course work in multiple manners. History and Science, Math and English, Math and History, and Science and English, as examples. An 8th-grade Color Team would be encouraged to align with 9 Green to, at the least, begin to prep students for the PBL curriculum. This alignment could manifest as integrated courses or as parallel courses where related topics are studied simultaneously.

It will be crucial for teachers to plan the year in advance as it relates to the students' courses. The teachers will need time to prepare once the students are scheduled in identical classes to create a block schedule model. The table below shows a possible integrated course schedule.

| | History pairs with | English pairs with | Science pairs with | Math pairs with |
|-----------|--------------------|--------------------|--------------------|-----------------|
| Quarter 1 | History | English | Science | Math |
| Quarter 2 | English | History | Math | Science |
| Quarter 3 | Science | Math | History | English |
| Quarter 4 | Math | Science | English | History |

The first quarter would be more independent coursework to establish student rapport, create classroom norms, and not overwhelm students. Once a year-long schedule is established, teachers can decide which units and standards are best suited to working within the assigned integrated courses. Please note, these are partnerships where the teachers work side by side to create authentic educational opportunities. It does not lock teachers into co-teaching each day. Nor does it require teachers to teach outside of their content area. It is a concerted effort to provide a single course to the students with multiple facets.

Once a schedule is set and content partners are established, the educators can begin creating their projects and units. This process will take time to establish and may need a couple

of years of implementation to reach its full potential. One aspect of PBL is the connection to the community. Building community relationships can take years of emails, phone calls, visits, and connections to find the best fit. A quality community partner will be able to provide an authentic challenge to the students engaging them with the standards from each of the content courses. While community partners are not crucial to successful integrated courses, or PBL, evidence has shown community connections significantly improve student engagement.

One struggle at Timberline will be the lack of large meeting rooms. As integrated courses meet, there are no locations where nearly sixty students and multiple educators can adequately meet. The open area within the pod will have to suffice. There is a projector hook up to connect laptops. If students bring a chair from the classroom and sit in the pod, a presenter could present to an integrated class. This use of the common area will have to be coordinated within the pod to ensure both integrated courses have access as needed. This scheduling will be crucial during presentations. For whole cohort meetings, there are two main options. One is to schedule the use of the library. The other is to have students sit on the floor of the pod. Both scenarios will need pre-planning.

Implementation of the Plan

The teachers will need to be aware of this plan at least one academic year in advance to find success. As referenced earlier, successful PBL implementation requires adequate planning. Educators will need planning specifically to adjust to teaching integrated courses. The summer of 2022 will be used to allow collaboration between educators. Content units will need to be aligned to create logical and smooth connections. Integration of courses should flow together and have a logical progression of standards. Some collaboration may require what is known as parallel courses. Parallel courses do not fully integrate but have similar concepts being taught. For

example, in History, the students may ask to find historical evidence to support their claim while writing argumentative papers in English. Similar in concept but unique to the content. It will be crucial to connect teachers who see the benefit of PBL and integration. Teachers will need to be willing to put in extra time to plan and give up some classroom control to the needs and wishes of the students.

The administration will need to juggle the nearly 900 students and their schedules. It will be vital an entire cohort, approximately 100 – 120 students, will need to share similar schedules. These schedules must include the four content areas of English, History, Math, and Science. World Languages, Band, Choir, Art, and other electives will need to be completed during the class hours of 1, 2, 3, & 6. The cohorts schedule will need to occur during class hours 4,5, 7, & 8. This schedule is needed to integrate courses and allow flexibility for PBL work.

Once a schedule is created, it would behoove Timberline to contact parents regarding their students' upcoming schedules. The notice should highlight the commitment to academic rigor. It will also be essential to highlight the concerted effort placed on soft skills known as 21st Century Skills. Connecting these skills to college readiness will help build parental confidence in the PBL goals of Timberline.

The pod area between the classrooms will offer room large enough for class meetings. It will be important each class can easily and quickly move desks and chairs. This flexibility is essential as the daily needs of the classes will change. There is a projector and computer connection station in the pod area, which will be needed for presentations. An Apple TV unit will be helpful. Since each student and staff member has an Air Play capable Macintosh, the Apple TV will allow for quick and smooth transitions of presenters. It will be vitally important for all students to be able to present. A key component of PBL is a student-driven curriculum.

Along those lines, a wireless microphone will help the speaker to broadcast to the entire cohort, including, and especially to, those who are hard of hearing.

As the 2022 – 2023 year progresses, we will observe success on multiple levels. One of the more immediate indicators of success we anticipate is the attendance rate to climb above the 90% mark and stay there. The increased attendance rate will indicate a higher level of engagement from the students. They will be more motivated to be at school and on time. The second indicator of success will be a decrease from nearly 1,600 annual Document Behaviors. Not only will the troubled student find engagement with the lesson, but the decrease in negative behavior will also allow the good students to focus on the lesson. Students who are motivated to be at school and engaged with their learning will not have the time or inclination to act out in a socially deviant manner.

Community feedback will also be evident. As the students participate in the PBL model, they will actively seek relationships with community members. These relationships outside of Timberline will build a positive outlook from the community about the educational opportunities being offered in the building. While teenagers are notorious for sharing little at home, it is anticipated a renewed excitement about school will make it home. This aspect will be crucial as parental support will be needed. Regardless of what the research says and what educators know, if the parents feel their students' education is at risk, changes will need to be made. It will be critical to highlight to the parents and all the stakeholders the students' successes. The successes will include the continuation and growth of academic rigor. The success noted in increased attendance and behavior will also help convince all the stakeholders of the success of the PBL methodology.

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