Quinsigamond Community College Project-Based Learning

An Interactive Qualifying Project Proposal

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Abstract

Quinsigamond Community College (QCC) wants to improve student success and engagement by implementing Project-Based Learning (PBL) at their college. After reaching out to WPI, a project team worked with QCC to provide recommendations on how to implement PBL at the college. In order to accomplish this, the project team interviewed faculty at QCC and other community colleges that utilized PBL, presented to faculty groups, created a PBL toolkit for faculty, and developed tools to help QCC further spread PBL after the project is completed.

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Introduction

Students go to college in order to gain the skills to prepare them for the career that they are interested in. The job market is changing rapidly, and the skills previously needed to succeed in the workforce are becoming inadequate for today's job market. In the digital age, workers need to have knowledge for their trade along with strong analytical and collaboration skills (Schmitz, Baber, John & Brown, 2000). Many students, however, do not have the opportunity to effectively acquire or learn these skills in traditional classroom settings (Trilling & Fadel, 2009). Due to the growing demand for these skills, also known as soft skills, there is a growing need for teaching styles to change to accommodate the changing job market. Collaboration and problem-solving activities help to develop these skills and if applied within classrooms, they could transform education (Buck Institute for Education, 2019; Bhagi, 2017).

Project-Based Learning (PBL) is a teaching style where students gain knowledge through sustained inquiry and use problem solving centered around real-world questions to create active learning (Buck Institute for Education, 2019). One of the benefits of PBL is that students gain exposure to opportunities that allow them to improve their soft skills. The 21st century soft skills that modern day employers are looking for are developed during the process of PBL. Furthermore, PBL is a style of learning that promotes collaboration and interpersonal skills by requiring students to bring a project from an initial concept into a finished product. The group work and processes involved with PBL differs from the stagnant nature of a typical college style lecture where students learn the material and are tested on it. The main goal of PBL is to allow students to interact with one another and undertake a project in their field of study that mimics the real world.

Quinsigamond Community College (QCC) is a diverse commuter school of approximately 13,000 students with several locations in the greater Worcester area that offers 120 different degree and certificate opportunities (Quinsigamond Community College, 2018). The student body of QCC is made up of 36.7% full time and 63.3% part-time students. QCC offers a part time program for working students which allows them to continue working while still maintaining their course load and a standard of living. QCC’s mission is to provide the best education opportunity for their students and are continually seeking to elevate it. Project-Based Learning (PBL) is a tool that will aid them in further accomplishing their mission for a

high-quality education. The project team has partnered with QCC in order to provide recommendations for implementing PBL.

To accomplish this goal, the project team established four objectives. The first objective was to develop an understanding of how other Community Colleges use PBL and how their implementation is applied at their institution, as well as success and failures that they have endured. The second step was to determine the extent of PBL usage at QCC. After this was determined, a PBL toolkit including a framework, rubrics, and PBL tools was developed for QCC. Using the information that was gathered in the second objective the project team aided two "PBL Champions" in evaluating and changing their current curriculum to include PBL. Lastly, when obtaining information for each objective the project team made recommendations to the Quinsigamond Outcomes Research for Excellence (QORE) team to help the college implement PBL.

This project has a strong likelihood to greatly enhance the experience of many students and their lives beyond the classroom. To follow, there is a background section that accumulates all the research that the team has completed on Project-Based Learning and a methodology section that covers the objectives and how each objective was completed. To conclude, the project team highlights all of the team's findings along with the recommendations based on those findings that they leave with QCC.

Background

Project-Based Learning (PBL) provides numerous positive aspects and crucial 21st century skills, which are demanded by employers. A conventional classroom structure does not have enough depth to provide its students with the real-world skills required for the job market (Buck Institute for Education, 2019). Although PBL may have challenges in its implementation process, it is worthwhile. Many classroom experiences involving PBL prove its benefits first hand. These benefits are ideal for teaching students in the 21st Century.

Employers Demand 21st Century Skills

The job market is changing rapidly, and in this digital age, workers need to have knowledge for their trade while also having strong analytical and collaboration skills (Schmitz, Baber, John & Brown, 2000). Some of these important 21st century skills include critical thinking, problem solving, communication, collaboration, and creativity. These skills focus on information and communication technologies, and can include flexibility, adaptability, social and cross cultural interaction, leadership and responsibility (Trilling & Fadel, 2009). These 21st century skills are emphasized today by allowing employees to negotiate change while reinventing themselves in new situations, allowing them to succeed, and climb the economic ladder (Bellanca, 2010). People with underdeveloped 21st century skills are more likely to lag behind in the workplace and are prone to having low-wage or low-skill jobs (Bellanca, 2010).

Employers are looking for employees with skills that will add to their company. They demand that future employees graduate with skills such as learning and innovation, digital literacy, and both career and life skills (Robles, 2010). Historically, employers aimed their focus on employees with hard technical skills; however, the 21st century workplace now calls for both hard and soft skills (Robles, 2010). Hard skills, as shown in Figure 1, include technical skills that apply to a certain job, while soft skills are more interpersonal skills.

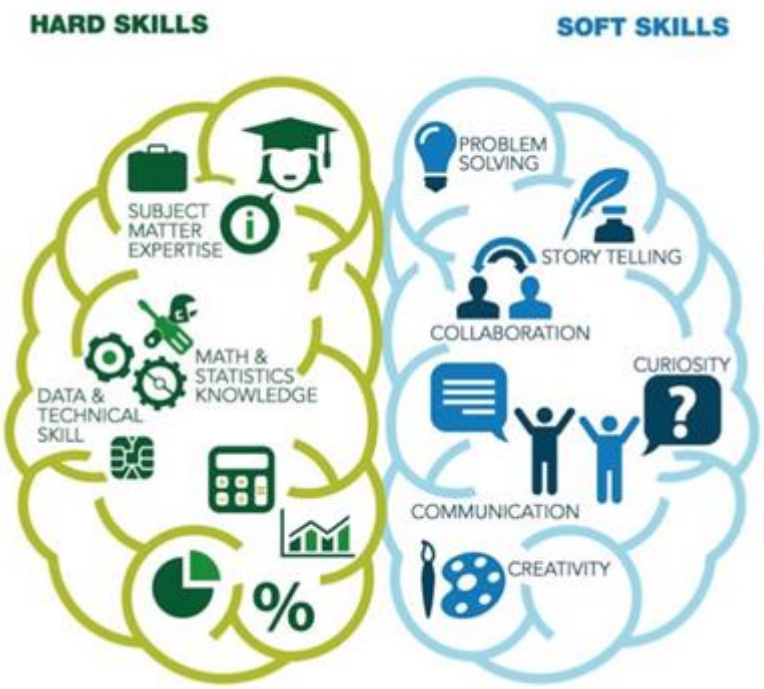

Figure 1: Examples of Hard and Soft Skills (Hard and Soft Skills)

Although creativity, communication, collaboration, and other skills are listed as 'soft', they have strong impacts on the futures' of employees. These are the skills that help society to function. One study showed that hard skills only contribute to 15% of an employee's success while soft skills contribute to the remaining 85% (Robles, 2010). Therefore, those entering today's workforce possessing strong soft skills have a competitive edge in the selective hiring process (Mitchell, 2008). Employers are in search of future candidates that are able to work in teams because, "...teams are able to achieve more collectively than they could individually by combining efforts and expertise" (Mitchell, 2008). Soft skills are key to successful organizations and great customer service (Robles, 2010). Obtaining a majority of these soft skills will allow a future employee to stand out in respect to other candidates and grow along with the company.

Although 21st century skills are not new, they are newly important (Trilling & Fadel, 2009; Bellanca 2010). Today's workers must be able to research and analyze information from various sources in order to work effectively (Larson & Miller, 2011). Technology has and will continue to develop rapidly throughout this century, and as a result, college graduates need to be adaptable. Employers demand 21st century skills and universities must adapt the ways in which

they prepare students. One way to foster the learning of 21st century skills and to give students stronger potential for employment is to change the way in which they learn. By shifting the focus of student learning to involve more interaction and collaboration to solve complex problems, students' soft skills will be enhanced.

Project-Based Learning

To best prepare students to become workers in today's job market, universities must make a switch to teach a different set of skills than a traditional education (Buck Institute for Education, 2019; Bhagi, 2017). Project-Based Learning is an innovative method used to educate students by centering teaching around the use of projects to reinforce soft skills desired by future employers. There are many approaches in the implementations of PBL such as flipped classrooms, weekly projects, and capstone projects. Each of these PBL methods can aid in the development of student's soft skills. Especially since no one method is a complete view of what skills will be required in the workforce, exposure to a variety of Project-Based Learning experiences is a great way to prepare students for the workforce (Buck Institute for Education, 2019). Some of the stronger examples of Project-Based Learning are highlighted below with the skills that each exemplify well.

A common approach is the flipped classroom which consists of lectures being posted online for students to review before class. This allows students to review the material at their own pace (Slomanson, 2014). Since lectures are taught at home, class time is used for group work and problem solving to reinforce the material learned at home. This reduces time conflicts that students may face with commitments outside of school while allowing a greater certainty that groups will meet. The students will also have the convenience of professors being available in the class for assistance. Sibona and Pourreza's 2018 study shows that "... [a] flipped classroom style of instruction[,] where students learn about the concepts first[,] ... [allows them to] delve

deeper into the material in the classroom….” As seen in Figure 2, the results of this study show that most students (50.4%) prefer a lecture followed by activity.

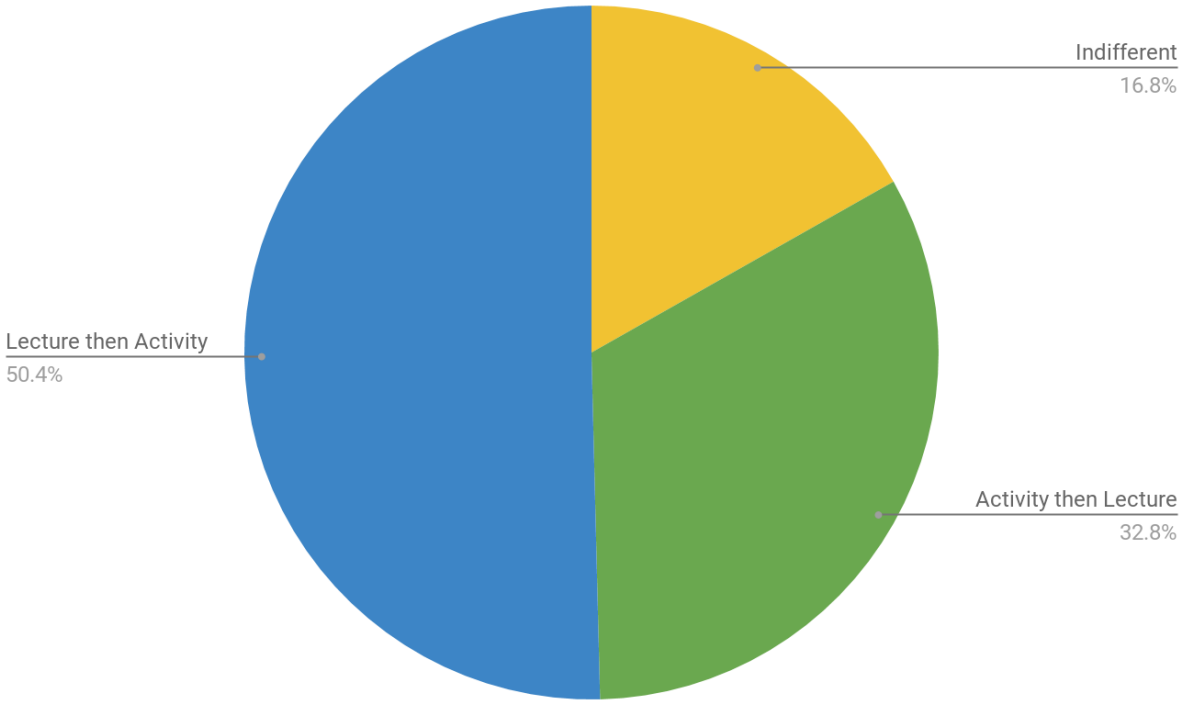

Figure 2: Preferences of Lecture Styles

Another PBL opportunity would be a structure based on cumulative weekly projects. Weekly projects or labs consist of a project question based on the material covered in class the week prior and a procedure to aid students in solving said problem. This is often called the lecture-lab approach, where students have one week to meet with their groups to analyze and complete the project. Each week the projects build off of one another in order to demonstrate how the material applies to the real-world. The lecture-lab system is one way Worcester Polytechnic Institute (WPI) approaches weekly projects. The material is presented in lectures and is then reinforced in the completion of the weekly lab. A course example is RBE 1001, an introduction Robotics course. The basics of mechanical design, electrical design, and programming are covered in the lecture. Those concepts are then used by teams to construct and test a robot in the lab portion of the class. Each lab covers the concepts taught during the previous week and allows students to reinforce those concepts on a real world application. These lab sections build off one another to cover most of the basic aspects of a robot, which allows the

lab teams to complete their robots at the end of the course. This ‘teach in lecture’ and ‘reinforce in lab’ format allows students to learn the concepts and understand them in a real world environment. The labs, building on one another, shows how all the concepts work together rather than being separate chapters, as real world projects don’t just cover specific chapters (Worcester Polytechnic Institute, n.d.-a; Worcester Polytechnic Institute, n.d.-b; Worcester Polytechnic Institute, 2017c).

In addition to flipped classrooms and weekly projects, there are also capstone projects. Capstone projects are semester long projects where students dedicate their time to solving a problem that could help their community while referencing their academic major. The problem being solved can either be given by the professor or the project team can come up with their own idea, which is then approved by the college. At the University of Michigan, students are required to take part in a semester long senior capstone project (Zhu, 2007). With other students in the same major, they begin by brainstorming open ended questions with respect to their major as a class. This then leads to teams forming and beginning their project proposals. Students submit interim reports every three weeks. Throughout the semester the teams are given assessments every four weeks in order for the professor to analyze their progress and determine their understanding of the concepts being taught. The project team may decide they want to have business professionals involved. These business professionals can become sponsors of their projects, which provides them with more information and suggestions on their project (Zhu, 2007). A timeline of the events that take place in the University of Michigan capstone course can be seen in Figure 3**.**

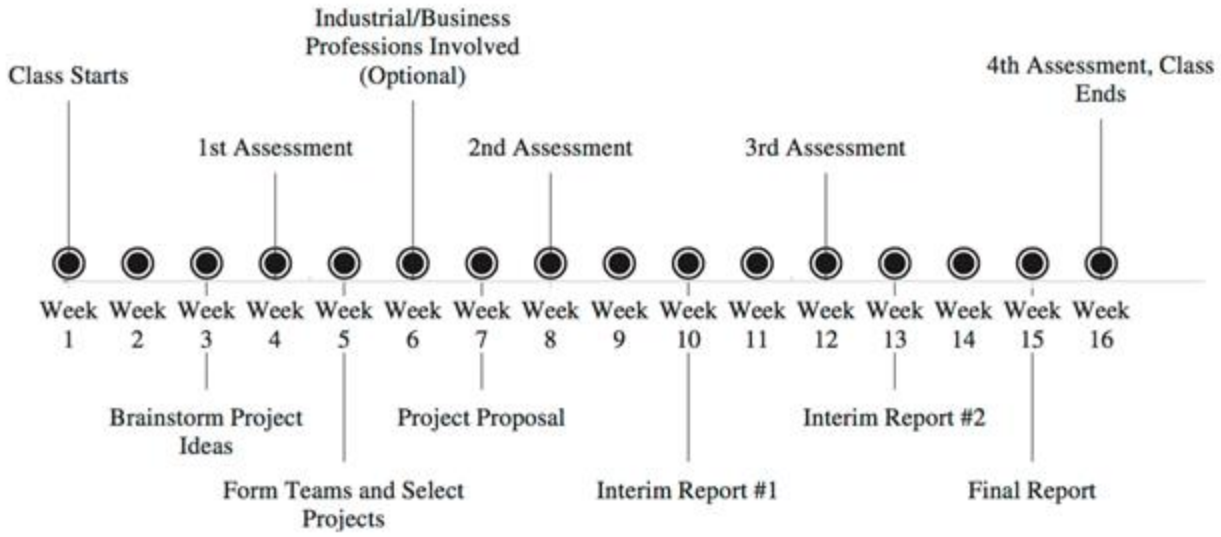

Figure 3: Capstone Course Timeline (Zhu, 2007)

Flipped classroom, weekly projects, and capstone projects are the most widely known methods of implementing PBL in colleges. They are used to help build the soft skills sought out in the 21st Century along with providing many other positive impacts.

Advantages of Project-Based Learning

Many methods of PBL are effective ways to teach students 21st century skills while preparing them for life after school. In PBL, students easily develop communication and teamwork skills (Buck Institute for Education, 2019). PBL changes the normal role that students take and compels them to facilitate new approaches and creative solutions (Clark, 2008). These situations mimic the real-world more effectively than traditional education. When employers are informed that applicants have experience in PBL, confidence is gained by the employers because they know the collaboration skills, experience on authentic problems, and community engagement skills of the applicant will benefit their company (Rotherham & Willingham, 2010). This results in the students becoming more marketable and aids them in securing jobs. The real-world aspect of the project, sometimes being directly assigned by an outside entity such as a company, holds students accountable for their work. It also makes the work publicly available, thus further incentivizing students to perform to higher standards (Lee, Blackwell, Drake & Moran, 2014). All of these factors contribute to students becoming more accustomed to working on real-world issues and projects.

Another teaching style, problem-based learning, focuses on the same fundamental aspects of PBL. Both styles of teaching, problem-based and project-based, offer better learning opportunities for students when compared to traditional lecture based learning. This can be shown by student feedback for the two systems when exposed to both, problem-based learning and lecture based learning. As demonstrated in Table 1, the problem-based learning students had a better mean score, indicating they knew the material better. This shows that students perform better in problem-based learning environments when compared to traditional lectures (Naeve-Velguth & Hariprasad, Lehman).

	Mean score	95% CI (confidence interval) lower bound	95% CI (confidence interval) upper bound
Problem-Based Learning	10.39 / 15	9.47	11.31
Lecture Learning	8.94 / 15	7.97	9.91

Table 1:Student Confidence and Mean Score (Naeve-Velguth & Hariprasad, Lehman)

Problem-based learning includes all of the elements that make PBL effective, but within a shorter time frame. Many studies use the term, problem-based learning, interchangeably with Project-Based Learning. According to Dr. Nathan Scott and Dr. Vojislav Ilic, with the RMIT University in Australia, problem and Project-Based Learning are both pedagogies that can only benefit students (Scott & Ilic, 2004). This claim holds for other research done throughout the world. Braßler and Dettmers found a slight increase in student scores with problem-based learning (Braßler & Dettmers, 2017). Dr. Scott and Dr. Ilic also state that PBL could be more easily implemented at the university level; however, they give no difference in student

experience between PBL and Problem-based learning (Scott & Ilic, 2004). This data shows promising results that PBL is an effective system to prepare students for the workforce.

Despite the advantages of PBL that have been presented, there can be challenges in the implementation process. Not all students are ready for PBL and the self-taught nature of the projects can lead to push back due to the increase in workload and less step-by-step instruction (Sibona & Pourreza, 2018). Although student coordinated projects can provide essential skills that will benefit them in the workforce, some students are not interested in taking on the challenge and push back when introduced to PBL (Sibona & Pourreza, 2018). In fact, both students and professors are in unfamiliar territory with a transition to PBL and as such some students and professors do not like the overall outcome or lack thereof when using PBL (Lee, Blackwell, Drake & Moran, 2014). However, despite the resistance from some faculty or students who do not wish to transition to PBL, the end-of-project benefits and experiences that both parties gain are worthwhile even if the project fails to be completed. This failure brings issues that were not known before to the forefront for either party to address and improve upon. Moreover, this system leaves room for improvement over time and multiple exposures to PBL will be highly beneficial to students entering the job market.

In comparison, a conventional classroom structure has some weaknesses in preparing students for their lives after school. Over time, there has been more research into classroom structure and what practices most positively impact the skill development of students, as well as what was failing students previously. As Duch, Groh, and Allen said: "what worked in the classroom a decade ago will no longer suffice, for the simple reason that past approaches fail to develop the full battery of skills and abilities desired in a contemporary college graduate" (Duch, Groh, Allen, 2001). In a conventional classroom, "[s]tudents are not obliged to interact with the content being delivered. Students are easily overwhelmed with information that they[,professors,] may falsely assume is being digested" (Klemm, 2007). An effective lecture is one that requires some level of interaction between the student and professor (Toto & Nguyen, 2009). Students' main focus is on reading and hearing the material which leads to no interaction with the information. Assignments and exams are given to test students' knowledge, but any information can be easily memorized. Doing so leads to an overall lack of understanding. In

contrast, putting their knowledge to the test in a setting that forces them to have a strong understanding of the topics will set them apart from others.

A more hands on teaching method, such as PBL, provides students with the opportunity to work on communication and teamwork skills in a real world setting. PBL changes the normal role that students take and compels them to facilitate new approaches and creative solutions (Clark, 2008). The skills that students gain from experiences with PBL are far more useful to them than the information that they learn in a conventional classroom. Given the significant benefits of PBL, many colleges are attempting to incorporate it into their curriculum.

Conclusion

With the 21st Century job market in constant change, employers demand that employees obtain soft skills to better aid their company. In order to prepare students, Project-Based Learning is being implemented at colleges to educate students and reinforce soft skills. Experiencing PBL in school brings students more advantages than a conventional classroom structure. After QCC obtained this knowledge at the WPI Summer Institute, the QCC Quinsigamond Outcomes Research for Excellence (QORE) team decided to implement PBL as it is in the best interests of their students, and thus this project was developed. Next, the methodology will cover how the team addressed beginning the implementation of PBL at QCC.

Methodology

The goal of this project was to provide recommendations for different Project-Based Learning (PBL) implementations that would best suit the Quinsigamond Community College (QCC) community. To achieve this goal, the following objectives were established. First, the project team acquired an understanding of the commonly used practices for implementing PBL in other Community Colleges. The second objective was to determine the extent to which PBL was being used in classrooms at QCC by identifying key faculty who were already using PBL. Next, the project team developed a toolkit and framework with implementations of PBL for professors at QCC. The team chose two professors to work with and revamped their syllabi and to have them become PBL champions. The team then presented an overview of the PBL

techniques along with the new toolkit to QCC's faculty. Below, each objective is explained thoroughly with a step-by-step process. The task schedule is also provided in Appendix A.

2.1 - Objective 1: Identify the practices commonly used to implement PBL in the Community College setting

The project team developed an understanding of PBL in community college settings. The purpose behind this objective was for the project team to identify the best practices that would work with the QCC community and present them to QCC's Quinsigamond Outcomes Research for Excellence (QORE) team. This objective was important because community colleges all have a very unique student body. Students at community colleges have to commute to school and often have other major obligations in their life. Because of this, it was important to understand not only how to implement PBL, but to understand the best way to do it at a community college.

In order to accomplish this, the project team inquired with other community colleges in Massachusetts. By doing so, the team purposefully sampled the community colleges. Purposeful sampling is a method in which researchers conduct preliminary sampling of the potential subjects to narrow the breadth of the research that must be done (Berg & Lune, 2017). The project team conducted over the phone interviews with key faculty and instructors to learn the methods that they have used to implement PBL as well as their successes and failures. This included fourteen community colleges in the Massachusetts area, of which four phone interviews were completed. A list of interview questions is provided in Appendix B. Once the project team completed this task, the team compiled data and evaluated it in order to determine the best PBL practices for QCC. By using this information and comparing it to information gathered through background research, the team compiled the most effective techniques for implementation of PBL in a community college setting. These techniques were used when making example assignments and syllabi for professors. The project team presented this information to the QORE group as well as other faculty in order to inform them of the PBL success in a community college setting. The project team gave two major presentations about PBL, one at a monthly faculty think tank meeting and then a final presentation.

2.2 - Objective 2: Determine the extent to which PBL is used in classrooms at QCC and identify faculty utilizing PBL in their courses

To determine the extent to which Project-Based Learning was being used in classrooms at QCC and identify faculty who utilized it in their courses, a multi-step plan was executed. This plan consisted of a survey of QCC faculty, and in-depth interviews with QCC faculty. In order to execute this plan, the project team's use of surveys and interviews had to first be approved by the Institutional Review Board at WPI and QCC.

The first step in Objective 2 was to survey QCC faculty to identify who currently used PBL techniques in their courses. The project team conducted this survey of QCC faculty, per the QCC QORE team request, in order to examine the extent of PBL already in use at QCC (Berg & Lune, 2017). The survey consisted of a brief explanation of what PBL is to establish a baseline for what the project team along with the QCC QORE team considers to be PBL. If the respondent did use PBL, the project team inquired whether they were willing to be interviewed and gave an option to upload a copy of their syllabus to assist the team in developing a PBL toolkit. If the respondent did not already use PBL, they were prompted to choose if they were interested in learning more about PBL in the classroom or not. An example survey can be seen in Appendix D. Once results were received, the project team compiled the results and estimated the extent of PBL usage at QCC and graphed the results for visualization. The project team also made a list of professors to interview for additional information.

The project team used the survey results to determine key QCC faculty who currently used PBL in their courses. In the second phase of objective 2, the team conducted semi-structured snowball interviews with QCC faculty (Berg & Lune, 2017). An example interview plan is included in Appendix C. Through the interviews, the project team gained a better understanding of the course structures that already used PBL. The project team also used the survey to interview professors that did not use PBL in their courses, but wanted to learn more about PBL. These interviews were helpful in providing recommendations and also developing example assignments for the PBL toolkit. The project team used the results of the interviews in objectives 3 and 4.

The information gained from the surveys and interviews in objective 2 assisted the project team in creating a toolkit for PBL by taking into account different perspectives and

experiences from those who have utilized PBL before as well as those who are looking to implement PBL in the future.

2.3 - Objective 3: Develop PBL toolkit and framework for QCC

A key component of this project was developing a PBL toolkit and framework for QCC. The QCC QORE team created the concept of toolkits which are separated into Signature Works, also known as learning objectives. These are available for QCC's faculty and staff on Blackboard, a Web-based software that provides a virtual learning environment and a course management system. On Blackboard, QCC also states, "Signature Work encourages students to connect their learning experiences with the world beyond QCC in significant and meaningful ways" (Quinsigamond Outcomes Research for Excellence, 2019). As shown in Figure 5, a toolkit includes four different types of existing signature works: Writing Assignment, Oral Presentation, Visual Presentation, and Civic Literacy. Each signature contains the frameworks, rubrics, and sample assignments for faculty, as well as resources about assignments for the students. To create a new toolkit or to add to an existing toolkit, a professor can simply send their ideas to the QORE team's email for approval. To view the expanded QCC Toolkits, reference Appendix E.

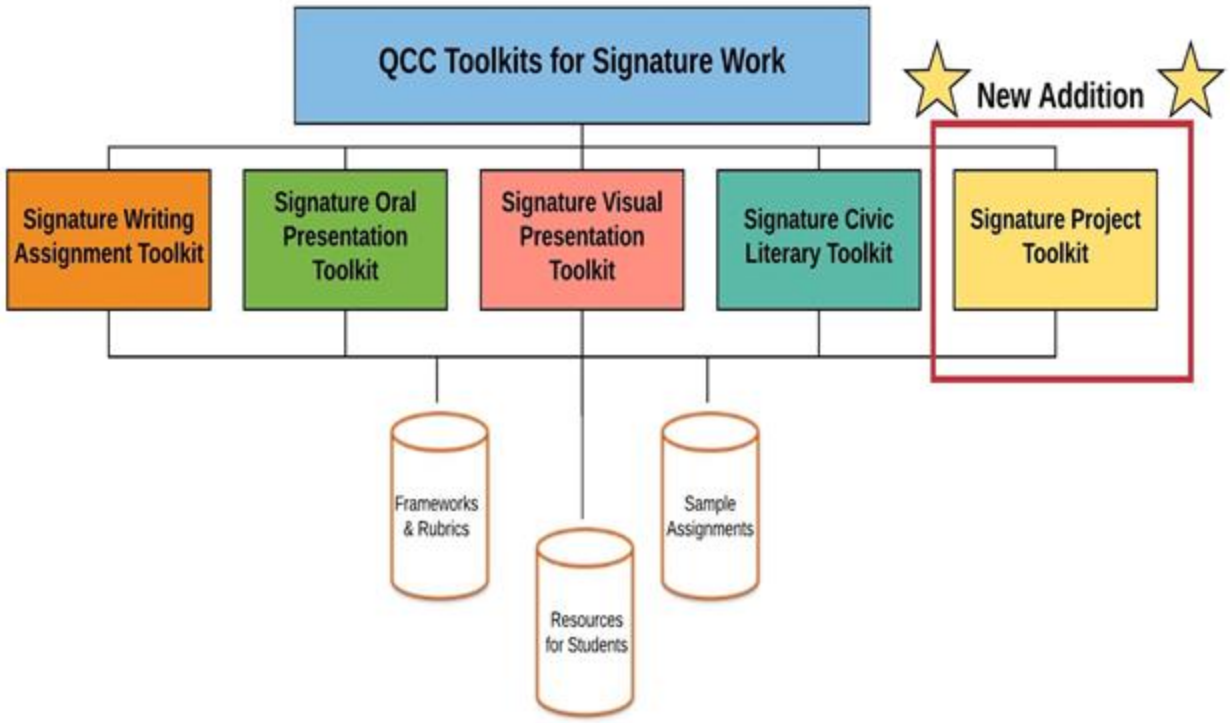

Figure 4: QCC toolkit

In objective 3, using the data gathered in objectives 1 & 2, the project team designed a PBL toolkit that was presented to QCC including Assignment Framework & Rubrics, Sample Assignments, and Resources for Students (Quinsigamond Outcomes Research for Excellence, 2019). This was an iterative process where the project team worked closely with the QORE team to ensure that high quality content was created and was consistent with the current toolkits available to faculty and students.

To begin this process, a rubric was created based on the existing rubrics researched. The results from the survey also helped to identify areas of study to focus on and which PBL method that would be best for QCC. This was essential in creating the rubric which begins with examining the learning objectives in the syllabus. Based on these learning objectives, the goal of the assignment will be specified in each category. This will be used to develop the grading criteria by describing the difference between poor and excellent work in each of the categories. The rubric created was compared to all relevant rubrics and information obtained (Mertler, 2001).

After a rubric that satisfied some courses and PBL methods from the survey results was created, the next step was to create sample assignments. This was done by combining the information from the notes on the toolkit assignments, relevant information about PBL at other Community Colleges, and information gathered through interviews with QCC faculty and staff. The project team followed the steps in curriculum design by defining the problem and analyzing the context, followed by organizing the design process along with the role of the stakeholders and experts in it. This then led to formulating goals, specifying certain methods, constructing a prototype, and revising accordingly (Lunenberg, 2002).

2.4 - Objective 4: Create and work with PBL Champions

While creating sample assignments, the project team also closely worked with two QCC professors to revamp their curriculum, in order to incorporate PBL into their classrooms. These selected professors are known as the PBL Champions for QCC. When the project team is no longer working with QCC, the Champions will be resources for other professors interested in incorporating PBL into their classrooms.The project team worked with, an English professor, Amy Beaudry and focused on her composition class that is taught for Early Childhood Education and Criminal Justice majors. The syllabus for the Criminal Justice course was able to be reworked by the project team taking into account all of the original required material while also including aspects of PBL. While working on these class syllabi, the project team sought out feedback at various stages from the professors to best suit their needs.

Along with Amy Beaudry, the project team worked with Dadbeh Bigonahy, Coordinator of the Engineering Department. The project team reworked the syllabus for the Strength of Materials class in incorporating bi-weekly business letters to allow students to enhance their formal writing. The business letter was originally an idea from a WPI course that one of our project team members attended. The business letters teach students to write straight to the point and how to communicate with a corporation. Group writing, presentation skills, and time in class for students to meet with their groups was incorporated into the already existing research paper. The feedback received was encouraging and Professor Bigonahy believed it would be a great addition to his course.

The project team provided each PBL champion with projects relating to students' interests to aid in participation and engagement. The course structures that the project team created, in collaboration with these professors, can now be used for other QCC professors to model their courses on. In addition to natural growth, the project team created a departmental connections survey for PBL that can be used in order to aid QCC in expanding PBL further.

2.4 - Objective 4: Present recommendations of PBL techniques to the QCC faculty and introduce them to the PBL toolkit

For the final objective, the project team presented the research obtained and the newly developed toolkit to the QCC QORE team, QCC Deans of Academics and QCC faculty to introduce them to the new PBL resources available. The QCC QORE group introduced the project team to a portion of faculty at QCC. This allowed the project team to see who was interested in learning more about PBL and to help move the project forward.

Once the toolkit and frameworks were complete, the project team hosted an in person presentation as it was the most effective way to inform the faculty of the available resources. At the conclusion of the team's presentations, gathering feedback was also important. The project team recorded the presentation in order to make it available to the faculty who were not able to attend, as well as for the QORE team to use at presentations and events after the project team leaves.

In order to achieve this objective, the faculty and staff at QCC played a crucial role. Speaking with QCC faculty was vital, but the most important aspect was attendance at the project team's presentations and discussions. The project team needed to advertise on QCC's campus that the project team was there to talk to the community about PBL. Then, by gaining community interest, the project team was able to educate the faculty with the information gathered.

Conclusion

In conclusion, the project team used surveys and interviews. The information gathered through these methods were used in order to provide QCC with recommendations for PBL that the project team believes to be most suitable. Based off the toolkit created, the QCC faculty can then decide which are the best implementations for them and their success.

Findings

Administrative

While completing the IQP project at QCC, the project team enhanced their knowledge of PBL and the process of implementing it into a curriculum. During the team's initial sponsor interview with the QCC QORE team they were made aware of some administrative questions surrounding PBL implementation. After interviewing with professors and continued conversations with the QORE team these questions continued. Throughout the research, interviews, discussions, and surveys, the project team has learned how to address these questions.

Early on in this process, the QORE team was curious about professor interest or resistance to implementing PBL; however, a survey sent out to faculty and staff provided the team with results that gave hope for the contrary. Based on those who answered the survey, the project team learned that a significant number of professors at QCC are either already using some form of PBL or are interested in learning more about what they could add into their course to involve PBL. The survey received twenty-four responses. As shown in figure 5, of those responses, 50% answered that they are using PBL in some form in their course. Of the twelve professors that answered they do not use PBL in their courses, 91.67% of them answered that they were willing to learn more about PBL in order to potentially reevaluate their course structure, the remaining 8.33% is composed of a single person.

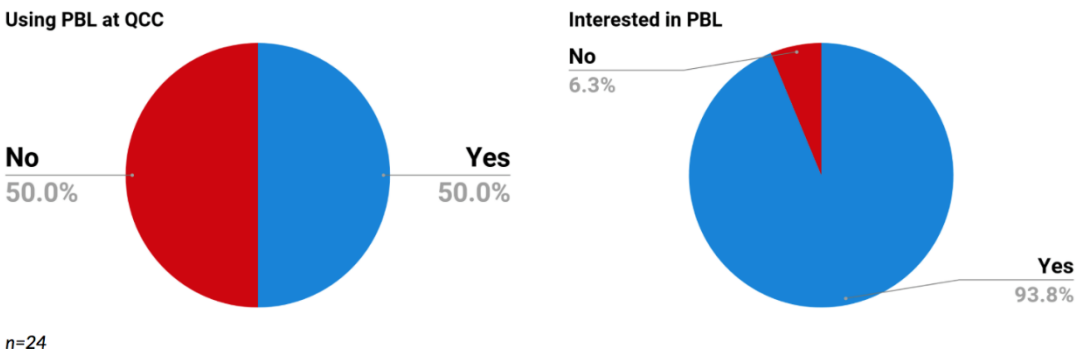

Figure 5: Survey Results

Although twenty-four responses is not the majority of professors at QCC, when the project team spoke to Paula Quinn at the WPI Center for Project Based Learning (CPBL) they learned that this level of response was significant when considering the audience of the survey. PBL takes a significant amount of time to implement but influencing two or three professors would be a foundation to start. Professors may be resistant to changing their classes at first, but if they see first-hand success they become more open to trying new things. Peer pressure, examples of success stories, research to back up PBL's benefits, and administration backing up Project-Based Learning are all ideas Paula Quinn shared on how to motivate professors to become more interested in PBL.

Project-Based Learning is a teaching method that takes time to implement as well as gain success and traction. One thing that professors were worried about, was how to start the implementation process especially in a Community College. While interviewing professors and further confirmed by Paula Quinn at the CPBL, the team found that it is best to start small and then expand as success occurs. Starting off with a project that is individual or in pairs may be effective and then later, the professor can shift to include more group and collaboration. Professors have found success with individual projects, so a next step is to get students working together in order to gain a sense of the real world work environment. A similar question voiced by professors is how to begin planning a new project that they wanted to implement into their course. Speaking with Paula Quinn informed the project team of the process to do so, and provided resources to pass along to professors who were looking to include PBL in their courses. This process is as follows: The first step is to decide what skills and abilities that would be the focus for students to gain in that project. PBL has many different aspects but not every project can focus on every element. The professor can choose skills to focus on for each individual

assignment. The next step is to come up with what tangible evidence is needed at the completion of the project to confirm that students have attained those skills or abilities. Detailed rubrics are the most common way of accomplishing this while also letting students know what is required of them. Once these steps have been determined, brainstorming of a project to meet these criteria can begin.

Faculty

The project team was asked questions in regards to students and a PBL environment, as well as the logistics of PBL implementation. The project team did extensive research on these questions and the potential issues that came with them. They completed interviews with professors, attended faculty discussions, held presentations, and communicated with the QORE team in order to help answer these questions.

Based on professor experience, a large concern was keeping students engaged both in normal class and in a project and avoiding "free riders." In other words, they were worried about tracking students' contribution in a group work setting. Dianne McDermott from North Shore Community College addressed this issue with the project team in a phone interview. When she provides her students with time to work on their assignments during class, she roams around the room in order to observe and discuss what they are accomplishing. This gives her an idea of who in each group is being vocal about their contributions and ideas. Every week she has a quick check-in with each student in order to find out what they prepared, what they contributed, what they learned, and any issues that might be occurring. She has found that these check-ins are very helpful in keeping each individual student engaged and participative. This is also a time for students to address an issue with a teammate if they are not pulling their weight in the workload. She also has heard from her students that because the projects they are working on are related to their careers once they graduate, it keeps them more engaged. She also has received feedback that students feel accountable to their group mates and would be less likely to not complete their part of the assignments because it would affect more than just the individual student. The team also interviewed Linda Grochowalski, a technical writing professor at QCC. She allows her students to address major issues within their teams. Overall, however, her philosophy is that in

the real world people will try to get by without doing as much work as they should, and she mimics this in her classes. She allows students to 'fire' their teammates if they are not working satisfactorily. Students must handle their issues on their own and pick up slack for people who are not willing to go above and beyond.

As QCC is a community college, another concern was if students would have enough time to work outside of the classroom due to other obligations and priorities. Professors at QCC are already requiring approximately 8-10 hours a week of work outside of the classroom. Amy Beaudry, an English and Writing professor at QCC, stated that she would expect two hours of work outside of the class for every one hour they spend in class. Since her courses consist of three one hour periods, she is expecting her students to spend at least six hours outside of class time doing work. With this being said, a typical project would require a similar amount of time, based upon the feedback of professors who have implemented projects into their courses. When completing group work in these classes, most professors at QCC have room in their courses to give students time in class to work on projects. There are also online collaborative sites, such as Blackboard, Google Slides, and Docs for students to work collaboratively online together.

Another question posed at the beginning of this process was if it would be possible to implement PBL into an introductory level course, while also covering the necessary course work. During the phone interview with Dianne McDermott, at North Shore Community College, the project team found that it is possible to do both PBL and cover necessary coursework in first year courses. She teaches an introductory marketing class for first year students and utilizes the flipped classroom approach, in order to allow students the time to complete their projects. She finds that she is able to still cover all the relevant information for the course. In fact, she has seen a significant increase in engagement since switching to a PBL approach.

The last major question posed to the project team was if students would be able to stay connected online, especially for courses that are taught fully online. This is where Blackboard and Google Slides and Docs became key aspects. The project team interviewed Linda Grochowalski, a QCC technical writing professor, who teaches an online class with PBL. She used Blackboard to set up online group rooms for the groups to complete work. She could also view their progress in order to make sure they were completing work. Google Docs is also another forum for students to work collaboratively and also store their work. Both of these forums have chat rooms so the students can interact while completing work.

After completing the methodology and spending seven weeks at Quinsigamond Community College, the project team had several recommendations for QCC. These recommendations came together to form a plan to expand the usage of PBL on campus. Project-Based Learning is something that will take time to implement. Some professors were quite eager, while others were more tentative to use PBL. The recommendations that the project team provided to QCC are built to use what the team accomplished along with other components in order to continue their goal of spreading PBL on their campus and elevating the education for their students.

Recommendations

5.1 - Promote Project-Based Learning at Quinsigamond Community College

5.1.1 - Use the Provided Advertising Tools

One of the most important recommendations that the project team has to offer QCC and the QORE team is to advertise PBL. The project team created three tools to help QCC with this recommendation, and believes QCC should utilize them effectively. The first tool is a PBL booklet. This booklet defines PBL, talks about key components, discusses the types of PBL, and gives faculty places to go in order to learn more. We recommend QCC prints out only several copies, as it may be expensive to print often, and has them on display to read for faculty at big campus events. The other two tools that the project team left QCC with were a PBL flyer, and a PBL brochure. It is recommended that these papers are printed in bulk and placed around campus where faculty congregate as well as faculty meetings. This is important to continue for faculty to see PBL material because then they will understand the benefits of PBL and its basic components. This will then give professors the push they need to go learn more and potentially start PBL in their courses. Another good tactic would be for QCC to put flyers in faculty mailboxes, and whenever there are campus events with significant faculty attendance, such as the

QCC summer showcase or the QCC assessment academy, the QORE team should have an abundance of these advertisements on display.

Another advertising tactic that the QCC QORE team should use the project team's recorded final presentation. This should be played at future campus events, such as the summer showcase and the assessment academy. This is also very useful for faculty who were not able to attend the presentation because they can still receive all of the information. This video should also then be placed in the PBL toolkit as a resource for faculty to learn more.

The reason that the project team is leaving QCC with these tools is so faculty will become aware of PBL, what it is, and what its benefits are. These advertisement tools are meant to entice faculty to want to learn more. They will then look to the PBL toolkit to learn more.

5.1.2 - Send Yearly Surveys to track QCC Growth

Along with promoting PBL on campus, it is important to keep track of the progress in implementing PBL campus-wide. The project team recommends that QCC sends out yearly surveys twice a week for two weeks at the end of the second semester in order to identify how much PBL is growing on their campus. The project team has provided them with a survey template that can be used as shown in Appendix J**.** We recommend that the surveys be sent out through both email and blackboard for a chance to get a wider amount of responses. Based on the survey results, QCC should then decide if more promotion on PBL is needed.

5.2 - Resources to Expand Project-Based Learning

5.2.1 - Utilizing the Project-Based Learning Champions

While providing recommendations to QCC professors on integrating PBL into their courses, the project team also worked closely with two professors as PBL champions. With them, the project team took a closer look into their syllabi and course objectives and constructed a rough syllabus that implements a PBL frame into their courses. This will allow them to develop their own projects based on a pre-built frame. These example syllabi will also serve as examples

for other professors. These champions are the center of the plan to continue the spread of PBL at QCC, and they should be used promote PBL at QCC. The project team recommends that the champions speak with as many other professors as possible. They should talk about what they have accomplished with PBL and the response of their students to this system. If each champion inspires a few other professors to try PBL then there will be a chain reaction.

5.2.2 - Using the Departmental Connections Survey

To help the QORE team and the PBL champions with this expansion, the project team has developed a PBL departmental connections survey. The results from this survey will serve as another tool to expand PBL at QCC. This survey should be sent out to either the program coordinators or the entire faculty body. The survey asks what department they are a part of and what departments they believe would work best in collaboration with their department. A sample of this is provided in Appendix L. This data could then be compiled to allow for the pairing of departments to collaborate and share ideas. One of the key factors that will dictate how well PBL spreads at QCC is the flow of information. As some professors do not know about the toolkits, word of mouth will be a very powerful tool in getting PBL to more than just a startup phase. After the IQP term is over, the project team recommends for the QORE team to utilize all of the tools within the toolkit to spread PBL as effectively as possible.

5.2.3- Creating Project-Based Learning Faculty Learning Communities

Another recommendation from the project team is to create faculty learning communities within QCC for discussing PBL. Faculty learning communities are groups of people that all share a similar interest and meet on a schedule in order to discuss their common interest. The PBL champions are great people to start this community. Based on results from the survey, there is very strong interest in expanding PBL, when compared to some other schools (Quinn, 2019). This community should be used to discuss what professors are trying to accomplish with Project-Based Learning. They can talk about successes they have had as well as some obstacles they may have faced. Other faculty members are the best resources in developing PBL because they are

able to attest to what PBL looks like in a classroom. Other professors will also be able to provide information on solutions to problems that are brought up or be resources to bounce ideas off of. The project team recommends that QCC commits to creating this community and allows growth every year.

5.3 - Utilize the Project-Based Learning Toolkit

5.3.1 - Finalize and Publish the Project-Based Learning Toolkit

While working with the QCC QORE team, the project team finished the early stages of developing a Project-Based Learning toolkit. Based on the timeline of the previous toolkits developed by QCC, the toolkit will still be in development until later in the following school year. However, the team recommends that the QORE team publishes the developing toolkit in order to use their faculty to help gather more material and feedback on the toolkit. The rubric that was drafted would rate students' performances in five different categories while completing a PBL experience, see Appendix F. The project team believes that with the criteria and their definitions, professors at QCC can use this rubric to design a project for a class in any subject. Alongside the rubric, a framework is also provided to assist professors in designing a project assignment. The framework can be viewed in Appendix G.

Along with the PBL rubric, there is a collection of example PBL assignments for professors to utilize, held within the PBL toolkit. The team recommends that the QORE team promotes the toolkit when it becomes published, so that professors become aware of this resource. The team spoke with several professors and discussed ideas to create projects for their classes. The team also reviewed several syllabi for courses that are already using PBL. These interviews and conversations helped the project team to develop drafts for example assignments and projects. There are projects across different fields provided in the toolkit so that many professors regardless of field have access to helpful resources on PBL. Once awareness for PBL has spread, the project team recommends that professors use the resources created as much as possible. When professors draft their own PBL assignments and projects it would be helpful if they show the QORE team their projects so they can be added to the toolkit for everyone's benefit.

5.3.2 - Utilizing the Tools Provided to Create a Workshop

While a faculty learning community will be effective in allowing professors to talk and learn from one another, the project team recommends that QCC holds a PBL workshop or two. PBL is a teaching style that takes time to implement and master. A workshop is a very useful tool throughout this process. There are several ideas that the project team believes could be effective at a workshop. The project team recommends that QCC reaches out to Paula Quinn, an employee at the Center for Project Based Learning at WPI, again or another PBL professional to come and facilitate this workshop. The workshop should cover how to create assignments and think of open-ended questions that can lead to projects. By putting professors through small PBL activities, the benefits of PBL will be shown to them. This workshop provides opportunity for professors to see cases where PBL is successful and open their eyes to the possibilities.

Alternatively, if the first option is not feasible, the project team recommends that the QORE team creates their own workshop or holds a campus wide interactive PBL meeting that focuses on developing PBL from the ground up. In order to do this, the project team would recommend using all of the resources available to develop a curriculum for the implementation of PBL. This includes the information from the Institute for Project-Based Learning Summer Workshop that the QORE team attended, the information provided in the toolkit, and information can also be found online from the Buck Institute for Education on this topic. Lastly, in order to advertise Project-Based Learning and any of these events, the project team has created flyers and brochures that are recommended to be used as notices of events coming up as well as infographics for the toolkit, see Appendix H and Appendix I.

5.4 - Evaluate Classrooms for Active Learning Styles

The last recommendation that the project team has for QCC is to evaluate classrooms on their campus in order to determine which are good candidates for active learning classes. Active learning classrooms should allow for collaboration as well as presentations. The first step to this is to find the classrooms in each building that work the best for both. Some may already be

structured for this, while some may need some slight rearranging. After these classrooms have been determined, QCC administration needs to have an application process for these rooms. Professors should be able to request these rooms based on their course structure. This evaluation process should help with implementation as it will allow for an easier transition if faculty can use the classrooms best suited for PBL.

Final Thoughts

Every project is going to have its obstacles and concerns, but seeing a finished project and all of its benefits should help those on the fence at QCC to see why PBL is so important in educating their students. PBL is going to equip QCC students with the extra knowledge and assets that will launch them to the front of the line in the job hunt. The patience and work required to finish the implementation process will be well worth the benefits it will provide the students and professors. Our project team believes that using the tools provided, it is possible to implement Project-Based Learning at QCC. If the QORE team continues to spread Project-Based Learning each year and encourage the faculty to fully embrace the tools the team has provided, Project-Based Learning will have a significantly higher chance to become an integral part of an education at QCC. A professor at QCC said during our project that, it takes approximately 10 years for something to permanently change in education and the project team believes that when QCC reaches that point Project-Based Learning will be integral to their college.

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Appendices

Appendix A: Task Schedule

TASK	WEEK							
	PQP	1	2	3	4	5	6	7
PBL usage in other Community Colleges								
Approval from WPI & QCC IRB								
Create Survey								
Distribute Survey								
Analyze survey results								
Research current toolkits								
Create toolkits								
Creation of Final Presentation								
Hold Focus Groups for Presentation								
Finishing The Report								

Key:
Objective 1
Objective 2
Objective 3
Objective 4

Appendix B: Sample Phone Interview

Sample email:

Dear Mr/Mrs. X,

We are a junior year project team at Worcester Polytechnic Institute focusing on the implementation of Project-Based Learning at Quinsigamond Community College. We have reached out to you in order to request a phone interview regarding your use of Project-Based Learning at College-University XYZ. If you are willing to schedule a phone interview with our group it would be much appreciated.

Best Regards,
"Member of team" on behalf of The QCC Project Team
Christian Curll
Nicholas Johnson
Alana Keating
Julia Saldanha

Phone Interview:

Preamble:
We are a group of students from Worcester Polytechnic Institute in Massachusetts. We are conducting an interview to discuss your usage of PBL at <insert college name>. We strongly believe this kind of research will ultimately enhance the quality of education available to students at Quinsigamond Community College (QCC).

Your participation in this survey is completely voluntary and you may withdraw at any time. Please remember that your answers can remain confidential. No names or identifying information will appear on the questionnaires or in any of the project reports or publications should you request so.

This is a collaborative project between QCC and WPI, and your participation is greatly appreciated. If interested, a copy of our results can be provided at the conclusion of the study.

Example Questions:

- How does your institution implement PBL into course curriculum?

- Have you tried or do you have a capstone project that all students must complete to graduate?
- What are some key points you believe are vital to the success of PBL in a community college setting?
- Do you wish to inform us of any pitfalls that you may have fallen into?

Wrap up and thank them for their time

Appendix C: Sample Interview

Sample Outreach Email:

Dear John Doe,

Thank you for your participation in our Project-Based Learning survey. You informed us in the survey that you were willing to be interviewed about your usage of Project-Based Learning in classes and we feel you are a candidate that we would like to interview. The interview would be pertaining to the class layout and methods you follow while using Project-Based Learning as well as the engagement and education value seen by your students.

We would like to set up a time to meet with you in person to discuss your Project-Based Learning implementation. Please let our team know when you would be available to discuss this. Our team's availability is:
<Insert team availability>

Thank you for your time in helping our research in partnership with QCC, we look forward to hearing from you.

Thank you,

WPI Project-Based Learning team
gr-QCCD19@wpi.edu

Layout of the interview:

Introduce the project team, project, and why our team is there to interview them

Preamble:
We are a group of students from Worcester Polytechnic Institute in Massachusetts. We are conducting an interview to discuss your usage of PBL in your classroom. We strongly believe this kind of research will ultimately enhance the quality of education available to students at Quinsigamond Community College (QCC).

Your participation in this survey is completely voluntary and you may withdraw at any time. Please remember that your answers can remain confidential. No names or identifying information will appear on the questionnaires or in any of the project reports or publications should you request so. The research will be completed at the end of April. The only risk is you may be quoted in our report if you do not request to remain confidential. If you would like to

contact the Principal Investigator or the Director of Institutional Research for the project, their contact information can be provided if requested.

Contact Information for this study:
Principal Investigator: Ken Dwyer - kdwyer@qcc.mass.edu
Quinsigamond's Institutional Review Board (Director of Institutional Research, 508-854-7520)

This is a collaborative project between QCC and WPI, and your participation is greatly appreciated. If interested, a copy of our results can be provided at the conclusion of the study.

Reinforce our definition of PBL

Sample Question:

- Can you describe the current PBL usage in your classroom(s)?
- Have you tried successfully or unsuccessfully in the past to use different implementations?
- How do you structure your classes around a project or projects?
- Do you find student engagement to be an issue?
- Have you seen creativity among students?
- Do you feel students are critically thinking about the material covered?
- Are you interested in other implementation styles of PBL?
    - Explain what they are briefly and note what style they think would fit their classroom the best.

Wrap up and thank them for their time

Appendix D: Sample Survey

Sample Email:

Dear Mr/Mrs. X,

We are a junior year project team at Worcester Polytechnic Institute focusing on the implementation of Project-Based Learning (PBL) at Quinsigamond Community College. We have reached out to you in order to request your participation in a survey regarding your current usage of PBL in your courses as well as your interest level in hearing about additional PBL opportunities in your classrooms.

We would greatly appreciate your participation. Attached below you will find our survey.

insert survey link here

Best Regards,
"Member of team" on behalf of The QCC Project Team
Christian Curll
Nicholas Johnson
Alana Keating
Julia Saldanha

Layout of Survey Form:

This survey is for a collaborative research project on Project-Based Learning between QCC and WPI. The goal of this survey is to gather information about current Project-Learning usage at QCC. Thank you for taking your time to complete this survey.

Consent:
Your participation in this survey is completely voluntary and you may withdraw at any time. Please remember that your answers will remain confidential. No names or identifying information will appear in publications. There are no risks to you in this survey. Any questions about this survey can be directed to gr-QCCD19@wpi.edu

This is a collaborative project between the QCC and WPI, and your participation is greatly appreciated. If interested, a copy of our results can be provided at the conclusion of the study. This research study will conclude at the end of April.

Contact Information for this study:
Principal Investigator: Ken Dwyer - kdwyer@qcc.mass.edu
Quinsigamond's Institutional Review Board (Director of Institutional Research, 508-854-7520)

Questions:
Ask for the professor's name, title, and what courses they teach

Brief Description of Project-Based Learning

Do you use Project-Based Learning in your courses?

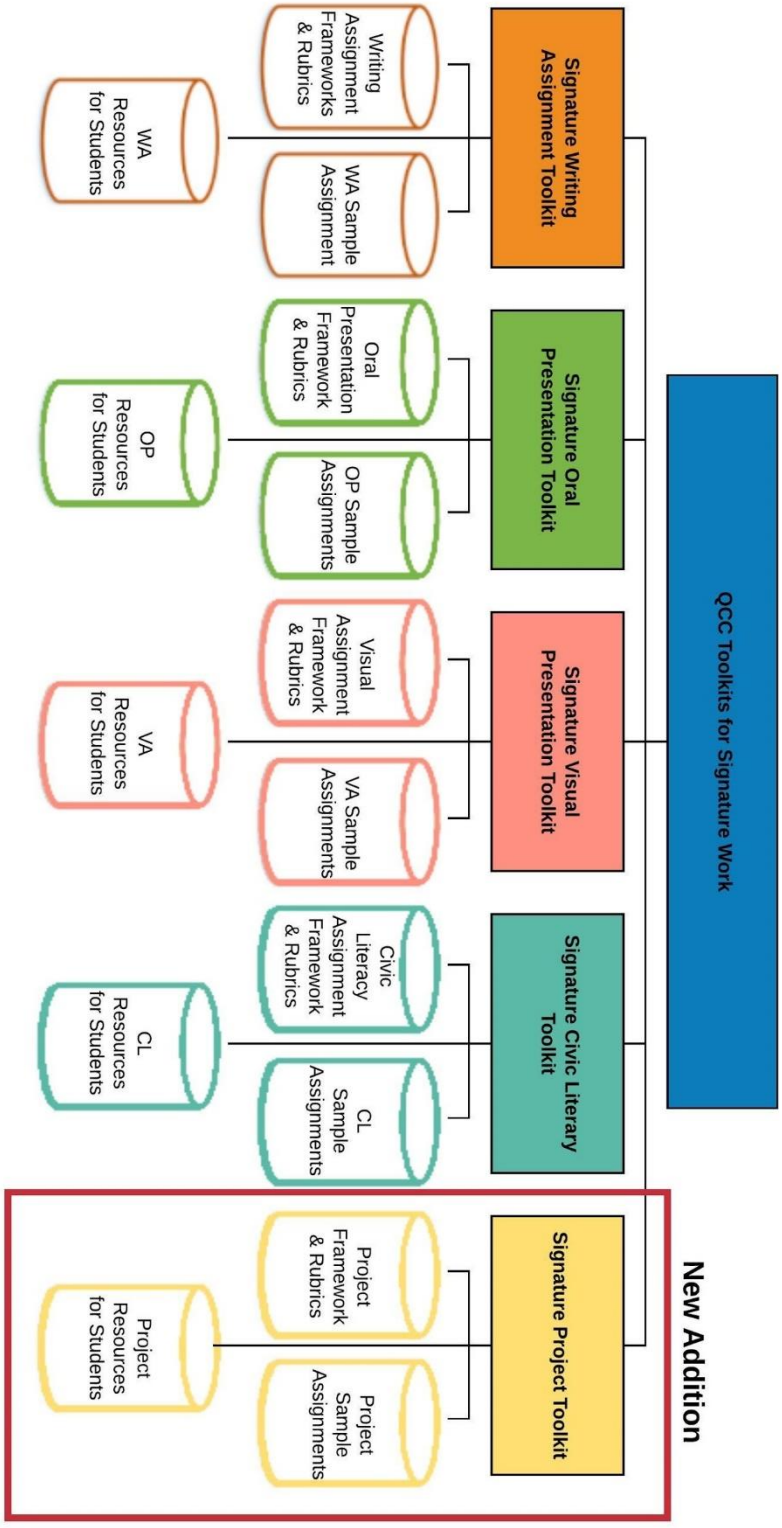
If yes, give an option to upload a syllabus if they are ok with doing so and ask if they would be willing to be interviewed about how they implement PBL in their course

If no, ask if they would be interested in Project-Based Learning in their courses

Digital Signature Agreement - By clicking the submit button, you are agreeing to participate in this survey as stated previously in the consent disclaimer. Thank you for taking your time to participate in this survey.

Appendix E: Expanded PBL QCC Frameworks

Existing Toolkits along with the PBL Toolkit being created (Quinsigamond Outcomes Research for Excellence, 2019)



Appendix F: PBL Sample Rubric

QCC Project-Based Assignment Hybrid Rubric

Criteria	Description	Distinguished (20 pts) *Exceptional Performance Level*	Proficient (17 pts) *Above Average Performance Level*	Developing (15 pts) *Average Performance Level*	Novice (12 pts) *Below Performance Standards*	Not Evident (0 pts) *Or Missing*	Comments
Applied Learning	• Locates, gathers, and organizes evidence to accurately transfer knowledge gained from the course to a challenge in a field-based context. • Identifies causes and several alternate approaches to solve a field-related problem based on knowledge and skills.						
Field-Specific Knowledge/Perspective	• **Demonstrates full understanding and appropriate application of theories, practices, and terminology that are relevant to the field.**						
Professionalism, Presentation and Public Speaking	• Demonstrates effective communication skills within and outside of the team in standard spoken English. • Consistently utilizes professional speaking skills and proper etiquette in the academic setting. • Demonstrates consistent consideration of context and purpose with appropriate use of visuals, audience engagement, and strong speaking skills.						
Teamwork, Collaboration and Troubleshooting Skills	• **Demonstrates the ability to work well in a group setting by managing team members, team contributions, a balanced workload, and team conflicts.** • **Takes responsibility for their own work as well as the work of group mates.** • **Uses critical thinking to brainstorm potential solutions to problems and begins research to implement solution.**						
Use of Information Resources	• Identifies, categorizes, evaluates, and cites information resource(s) as appropriate. • Demonstrates an understanding of the relationship among material obtained from all sources.						
Average Final Score:							
Overall Comments:							

SCORING KEY

Final Score	Grade
90 to 100	A
80 to 89	B
70 to 79	C
60 to 69	D
59 or under	F

Appendix G: Sample Framework

This document presents a Project Based Learning Assignment envisioned by a WPI IQP PBL team in conjunction with Quinsigamond Outcomes Research for Excellence. The assignment directions included here reflect best practices in college-level projects and characterize any project that requires students to work in groups. The expectation is that faculty members using this assignment frame with students will elaborate upon the directions included here. A rationale and student learning outcomes are included for each direction. Other materials available to support this assignment include a rubric to support various teaching and grading styles, a collection of resources for faculty, and a collection of resources for students.

Global Competency	Generic Assignment Directions	Rationale for Inclusion	Student Learning Outcomes
Applied Learning	Locate, gather, and organize evidence to apply knowledge to a challenge in a field-based context.	This descriptor emphasizes what students can do with what they know. Students may address unscripted problems at work or in other settings outside the classroom, evaluate cases, develop and execute research or creative activities, or demonstrate practical skills.	Uses evidence to apply knowledge to the task assigned. Use skills associated with the field to address problems in context.
Field-Specific Knowledge/Perspective	Incorporate theories and practices of the relevant discipline and employ field-related terminology.	This category addresses what students should demonstrate with respect to a particular field of study.	Employs field-specific terminology. Incorporates theoretical, practical and genre conventions of the field.
Professionalism, Presentation and Public Speaking	Speak, write, and communicate professionally and effectively.	Being professional in a group environment is vital to student success in life. Professional presentation skills are a foundation to a highly successful individual.	Demonstrates composure and etiquette when interacting with people in and out of their group. Speaks and writes in an academic and professional fashion.
Teamwork, Collaboration, and Troubleshooting Skills	Work effectively in a group and communicate to help solve the problem presented.	This descriptor emphasizes students' ability to perform while in a group setting and should mimic the professional world.	Demonstrates skills necessary to work as a professional in a team.
Use of Information Resources	Identify, categorize, evaluate, and cite information resource(s) as appropriate.	Seeking, finding, and using a variety of resources are traditional intellectual skills. Such skills may be nuanced as a result of particular technologies, particular fields of study, or broad contexts or themes.	Demonstrates an understanding of the relationship among materials obtained from all sources. Identifies, categorizes, evaluates, and cites information resource(s) as appropriate.

Appendix H: Brochure

Want to Learn More?

Professors to Contact:

1. Amy Beaudry → English Department
2. Dadbeh Bigonahy → Engineering Department

QCC toolkit available:

- Sample Rubric
- Sample Assignments
- Sample Framework

Available at: http://pbl.qcc.cmu.edu

Project-Based Learning is a teaching pedagogy that is designed to engage students through **active learning, sustained inquiry, and open-ended questions**. PBL teaches real-world skills that employers are currently looking for in applicants, such as **communication, problem solving, and teamwork skills.**[1]

Acknowledgments

1. Trilling, B., & Fadel, C. (2009). 21st century skills: Learning for life in our times. Jossey-Bass. Retrieved from https://epdf.tips/21st-century-skills-learning-for-life-in-our-times.html

2. Buck Institute for Education. (2019). What is PBL. Retrieved January 16, 2019, from https://www.bie.org/about/what_pbl

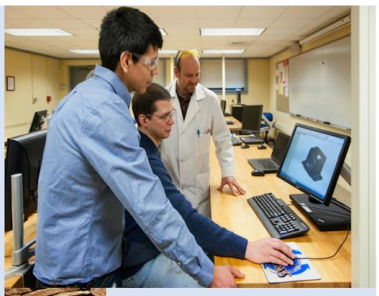
3. Are we robbing students of tomorrow? (2017, February 12). Retrieved from https://www.longviewoneducation.org/are-we-robbing-students-of-tomorrow/

4. Robles, M. M. (2012). Executive perceptions of the top 10 soft skills needed in today's workplace. *Business Communication Quarterly* 75(4) 453-465. doi: 10.1177/1080569912460400

5. Hariprasad, D., Lehman, M., & Naeve-Velguth, S. (2003). A comparison of lecture based and problem-based instructional formats for FM inservices. *Journal of education audiology. II.* Central Michigan University: Department of Communication Disorders. Retrieved from, http://www.edaud.org/journal/2003/1-article-03.pdf

6. Slomanson, W. (2014). Blended learning: A flipped classroom experiment. *Journal of Legal Education*, 64(1), 93-102. Retrieved from http://www.jstor.org/stable/24716075

Photos supplies by QCC institutional communications



Project-Based Learning

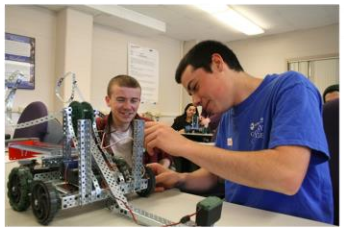
An active approach to education

"If we teach today's students as we taught yesterday's, we rob them of tomorrow."
-John Dewey

Created by the WPI Project-Based Learning Team with the assistance of the Quinsigamond Outcomes Research for Excellence (QORE) team:

Christian Curll
Nicholas Johnson
Alana Keating
Julia Saldanha

85% of the skills employers are looking for are soft skills[4]



On average, students score **10%** higher on assessments when exposed to PBL[5]

What have you noticed in your class since implementing PBL?

"My students are more attentive in class and think critically more often with PBL."
-Amy H: Respiratory Care

"Since implementing PBL into my courses, the drop out rate has decreased significantly."
-Dianne M: Marketing

QUINSIGAMOND

Flipped Classroom

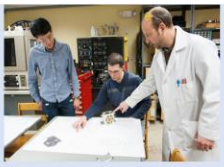
A flipped classroom has students work outside of the class hours on normal lecture material so that they can put what they have learned to the test in a practical environment during class hours.[6]

Weekly Projects

This method has students complete a new portion of their project at the end of every week. These weekly assignments come together to build a larger summulative project. All of this material demonstrates the students' mastery of the class material.

Capstone

A capstone is a project completed at the end of a degree or course in which students use all of the knowledge they have gained. Often times capstones are used to show students proficiency in all topics.



Appendix I: Flyer

Project-Based Learning

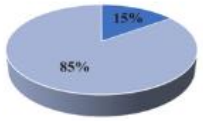
Project-Based Learning (PBL) is a teaching style where students gain knowledge through sustained inquiry and use problem-solving centered around real-world questions to create active learning.

- Eases the transition from a community college into the real world or a four-year institution;
- Engages students with real-world problems and situations;
- Promotes collaboration and interpersonal skills;
- Centered around over-arching questions and projects.

4.

QUINSIGAMOND Community College

Skills Employers Look for in the 21st Century

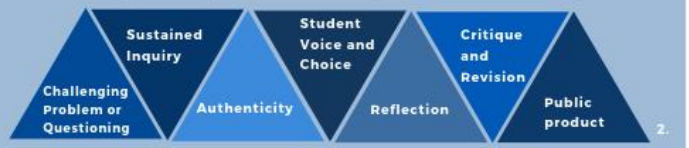


3.

21st Century Skills

- Critical Thinking
- Problem Solving
- Communication
- Collaboration
- Creativity
- Flexibility
- Adaptability
- Social Interaction
- Professionalism 1.

Major Components of Project-Based Learning



2.

RESOURCES

QCC has resources available to help you get started with Project-Based Learning

QCC has created a variety of toolkits to help professors develop their curriculum. One of the new toolkits available is a Project-Based Learning Toolkit. This toolkit has been created to attempt to give professors the tools needed to get started with Project-Based Learning

Contained in the toolkit:

- Example Rubrics
- Example Frameworks
- Sample Assignments

Accessible at:

https://mycourses.qcc.edu

1. Trilling, B., & Fadel, C. (2009). 21st century skills: Learning for life in our times.

2. Buck Institute for Education. (2019). What is PBL. Retrieved January 16, 2019, from https://www.bie.org/about/what_pbl

3. Jossey-Bass. Retrieved from https://epdf.tips/21st-century-skills-learning-for-life-in-our-times.html

4. Photos supplied by QCC institutional Communications

Appendix J: PBL Booklet

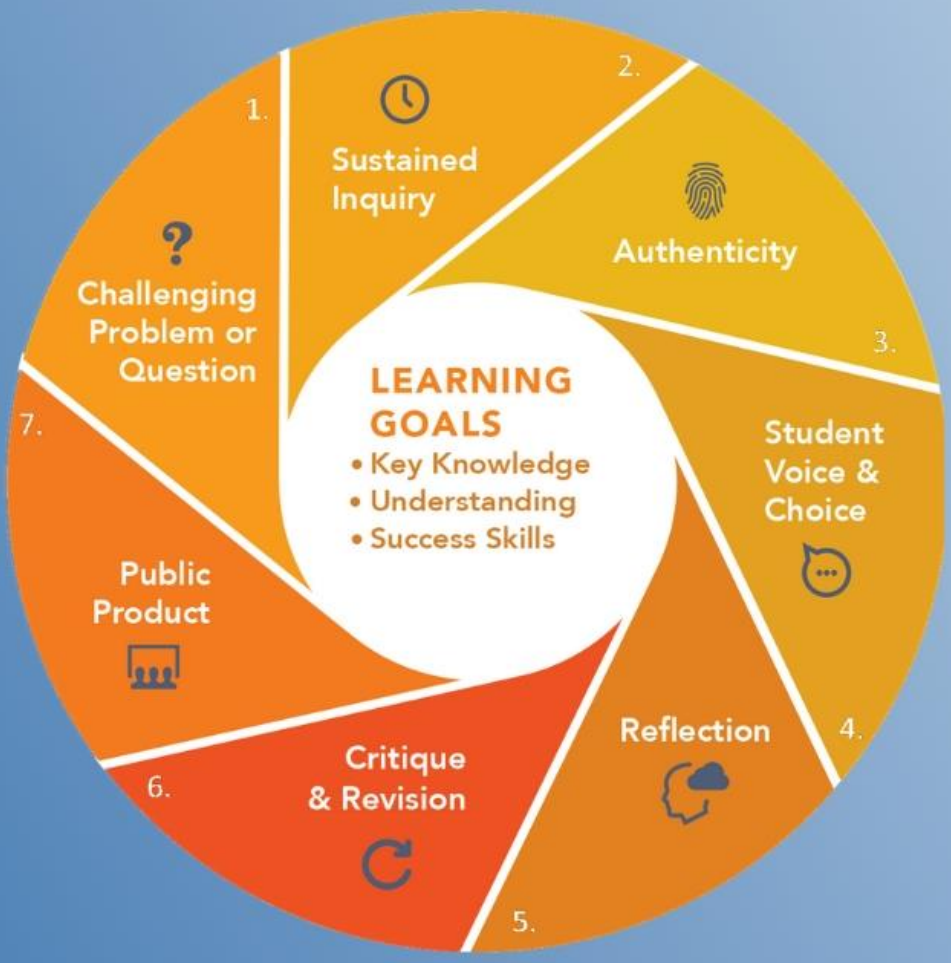

85% of skills employers are looking for are soft skills
Robles
THE COMMONWEALTH HONORS PROGRAM
QUINSIGAMOND
Student Life Leadership
Join Phi Theta Kappa...
FUTURE FOCUS PROGRAM
QCC TUTORING CENTERS
On average students score 10% higher on assessments when exposed to PBL structures
Naeve-Velguth & Hariprasad, Lehman

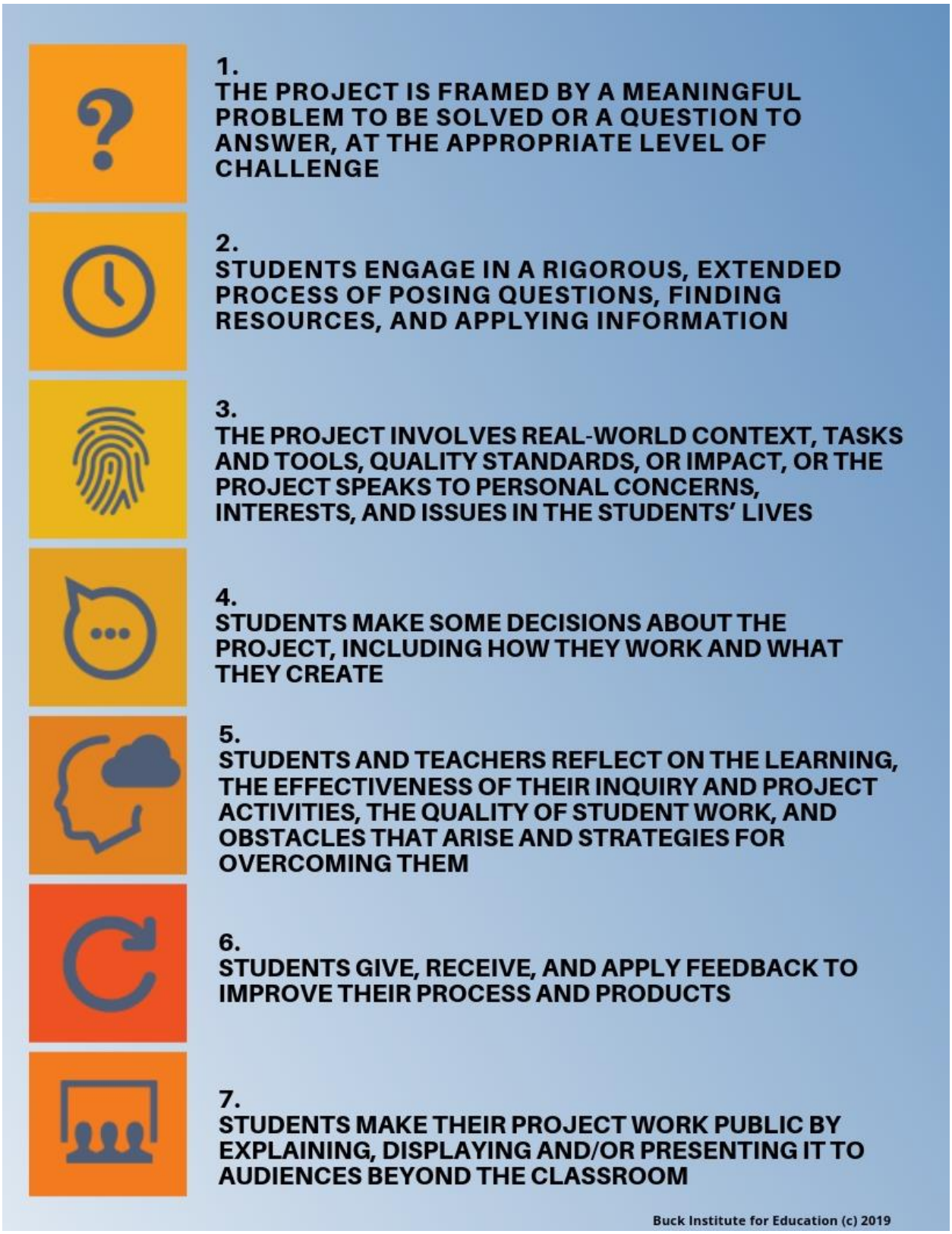
PROJECT-BASED LEARNING

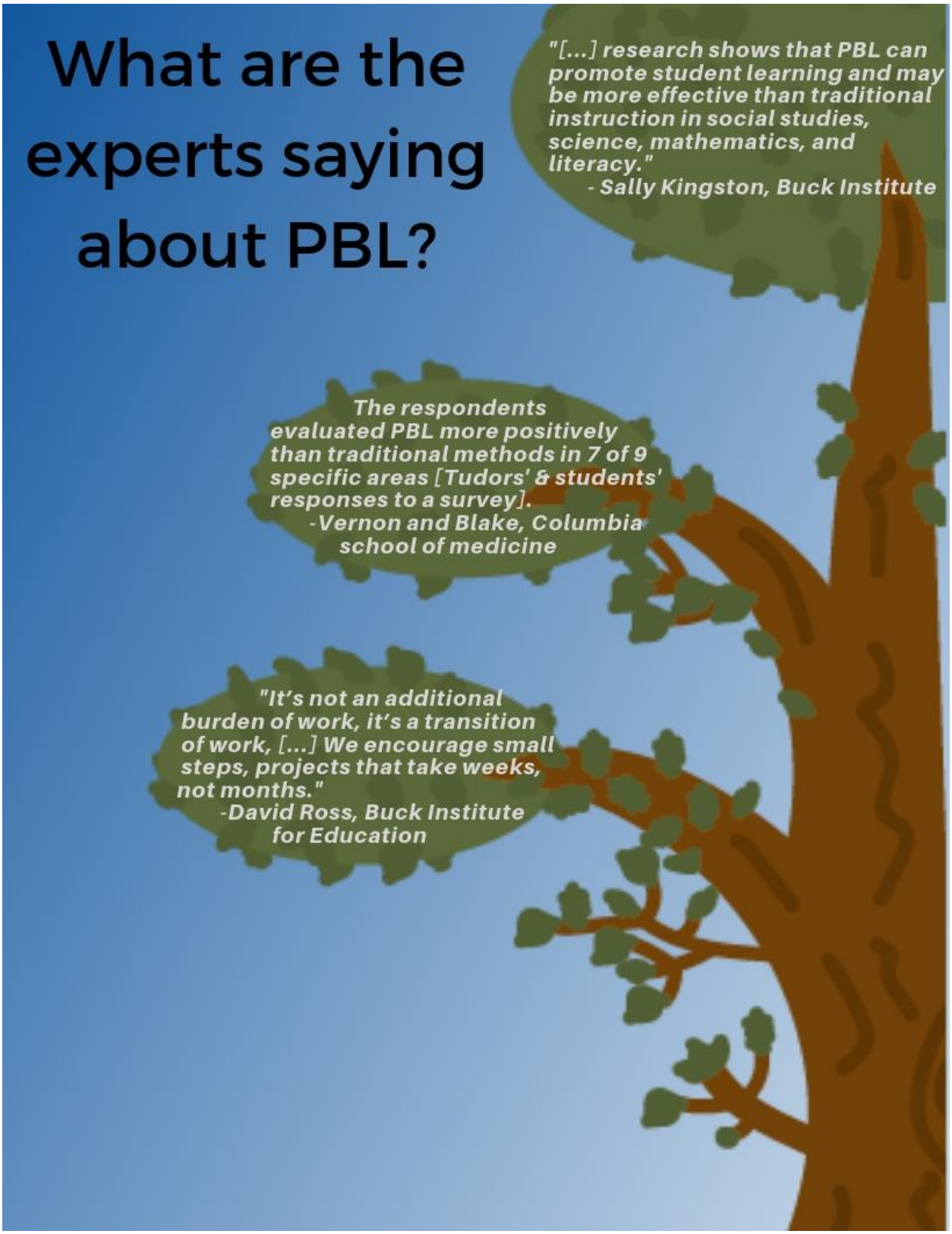
Project-Based Learning is a teaching pedagogy that is designed to engage students through active learning, sustained inquiry, and open ended questions. Project-Based Learning teaches real world skills that employers are currently looking for in applicants, such as communication, problem solving, and teamwork skills.

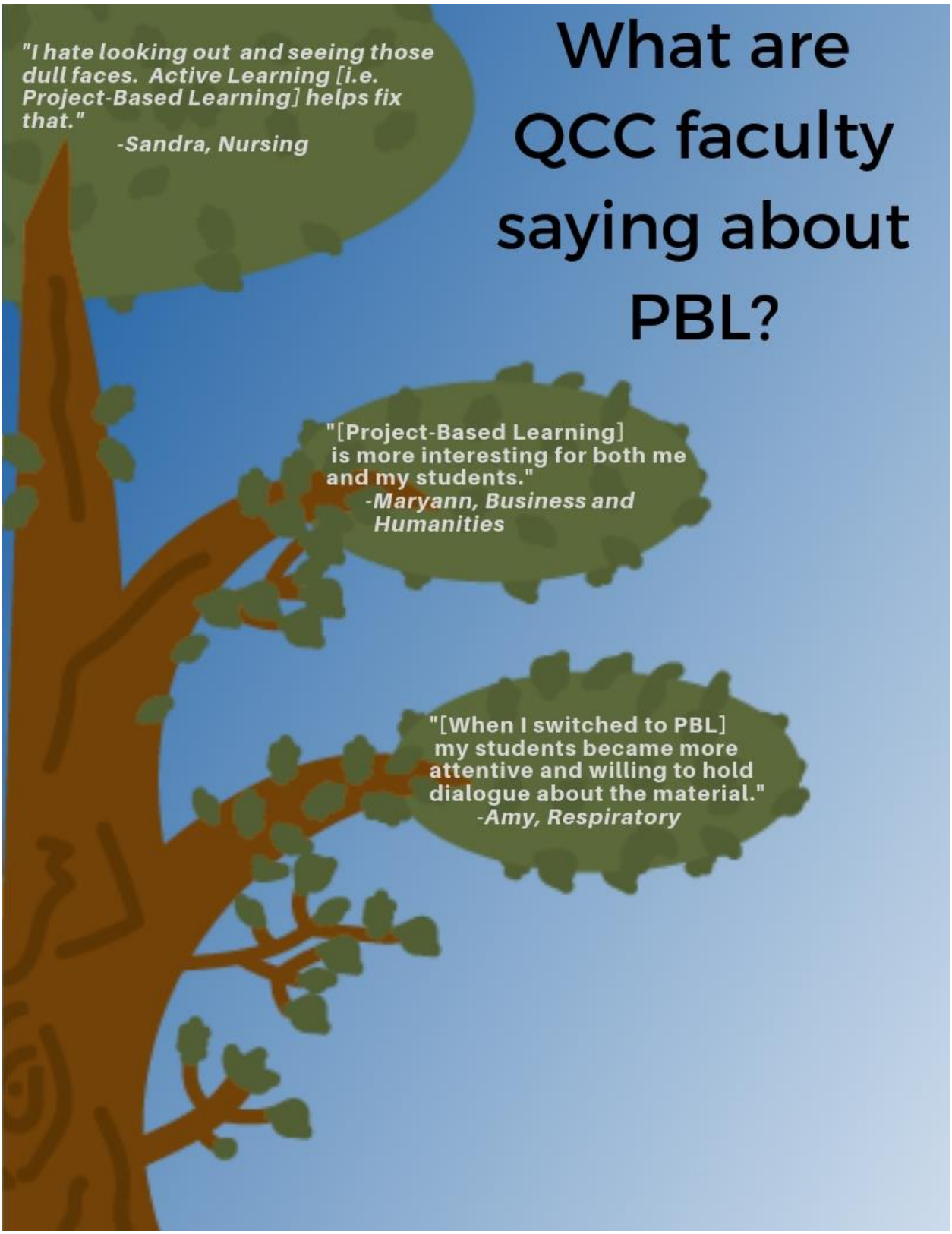
Looking to give students more than just an education?

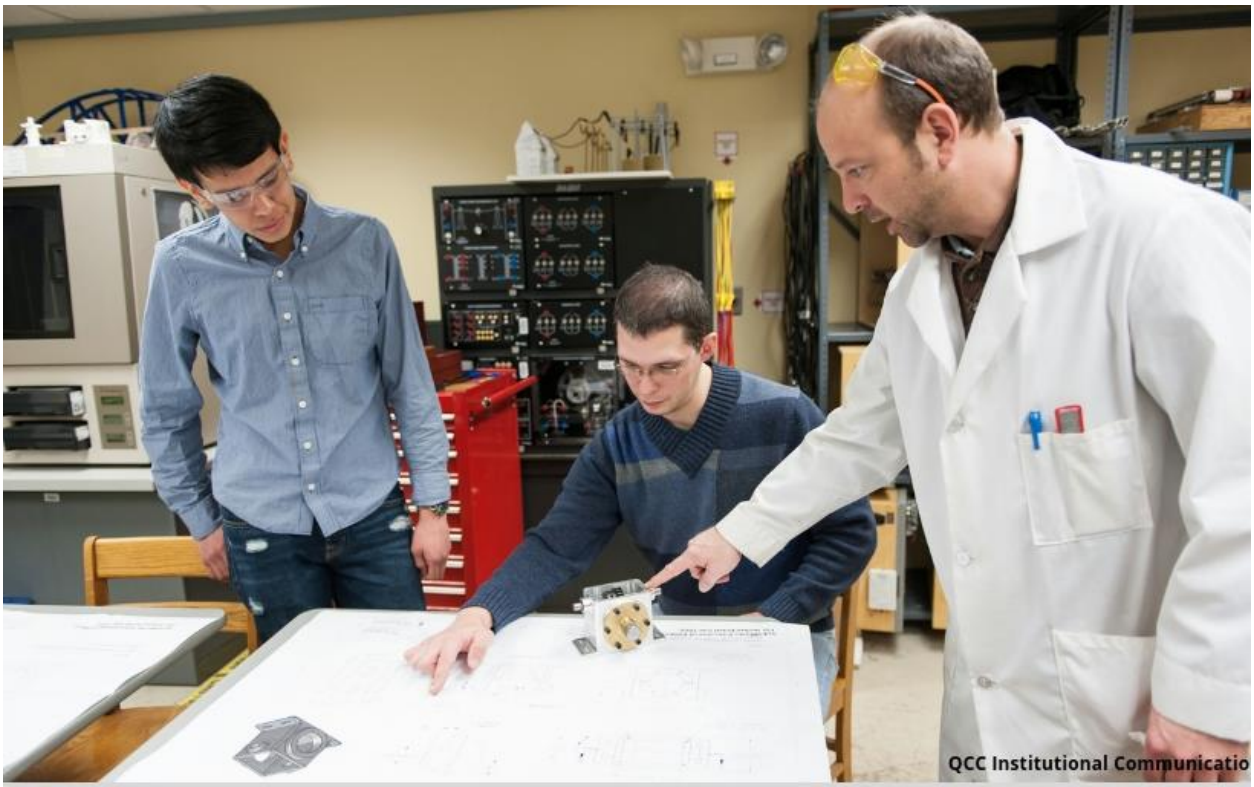
Here are the pillars of Project-Based Learning




1.
THE PROJECT IS FRAMED BY A MEANINGFUL PROBLEM TO BE SOLVED OR A QUESTION TO ANSWER, AT THE APPROPRIATE LEVEL OF CHALLENGE
2.
STUDENTS ENGAGE IN A RIGOROUS, EXTENDED PROCESS OF POSING QUESTIONS, FINDING RESOURCES, AND APPLYING INFORMATION
3.
THE PROJECT INVOLVES REAL-WORLD CONTEXT, TASKS AND TOOLS, QUALITY STANDARDS, OR IMPACT, OR THE PROJECT SPEAKS TO PERSONAL CONCERNS, INTERESTS, AND ISSUES IN THE STUDENTS' LIVES
4.
STUDENTS MAKE SOME DECISIONS ABOUT THE PROJECT, INCLUDING HOW THEY WORK AND WHAT THEY CREATE
5.
STUDENTS AND TEACHERS REFLECT ON THE LEARNING, THE EFFECTIVENESS OF THEIR INQUIRY AND PROJECT ACTIVITIES, THE QUALITY OF STUDENT WORK, AND OBSTACLES THAT ARISE AND STRATEGIES FOR OVERCOMING THEM
6.
STUDENTS GIVE, RECEIVE, AND APPLY FEEDBACK TO IMPROVE THEIR PROCESS AND PRODUCTS
7.
STUDENTS MAKE THEIR PROJECT WORK PUBLIC BY EXPLAINING, DISPLAYING AND/OR PRESENTING IT TO AUDIENCES BEYOND THE CLASSROOM
Buck Institute for Education (c) 2019

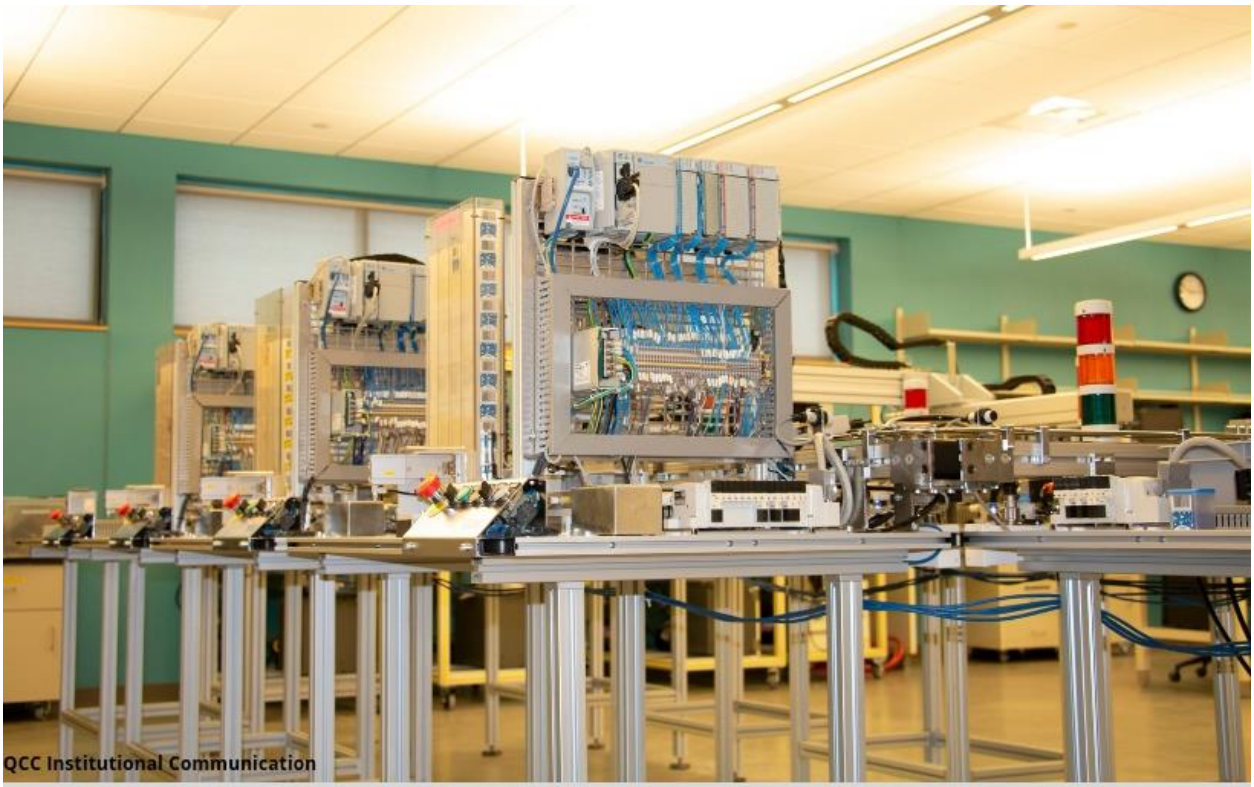

What are the experts saying about PBL?
"[...] research shows that PBL can promote student learning and may be more effective than traditional instruction in social studies, science, mathematics, and literacy."
- Sally Kingston, Buck Institute
The respondents evaluated PBL more positively than traditional methods in 7 of 9 specific areas [Tudors' & students' responses to a survey].
-Vernon and Blake, Columbia school of medicine
"It's not an additional burden of work, it's a transition of work, [...] We encourage small steps, projects that take weeks, not months."
-David Ross, Buck Institute for Education


What are QCC faculty saying about PBL?
"I hate looking out and seeing those dull faces. Active Learning [i.e. Project-Based Learning] helps fix that."
-Sandra, Nursing
"[Project-Based Learning] is more interesting for both me and my students."
-Maryann, Business and Humanities
"[When I switched to PBL] my students became more attentive and willing to hold dialogue about the material."
-Amy, Respiratory



FLIPPED CLASSROOM

A Flipped Classroom is a teaching style conducive to Project-Based Learning. A flipped classroom has students work outside of class hours on normal lecture material so that they can put what they have learned to the test in a practical environment during class hours.

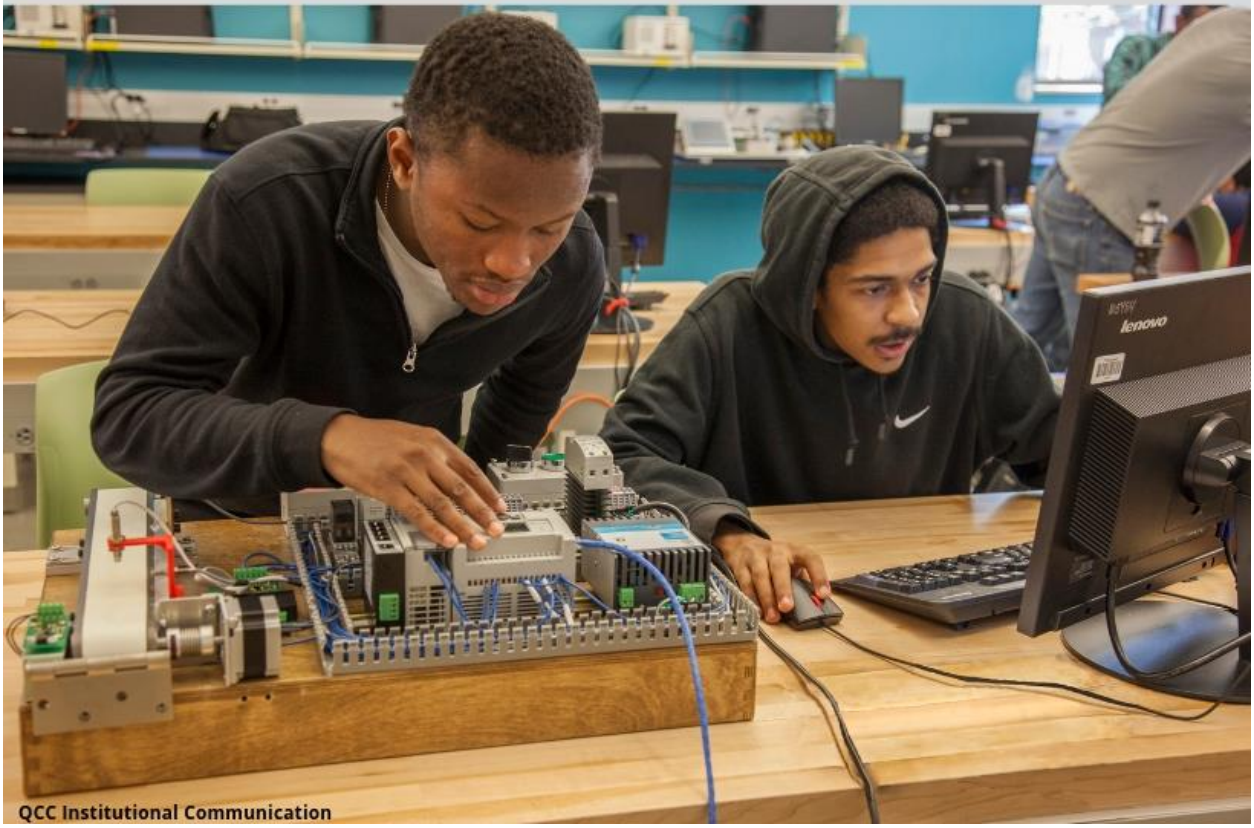


JIGSAW CLASSROOM

A jigsaw classroom is a style of Project-Based Learning where students assume the role of both a researcher and a teacher. This builds their presentation and critical thinking skills, while staying engaged with their peers.

LECTURE & LAB

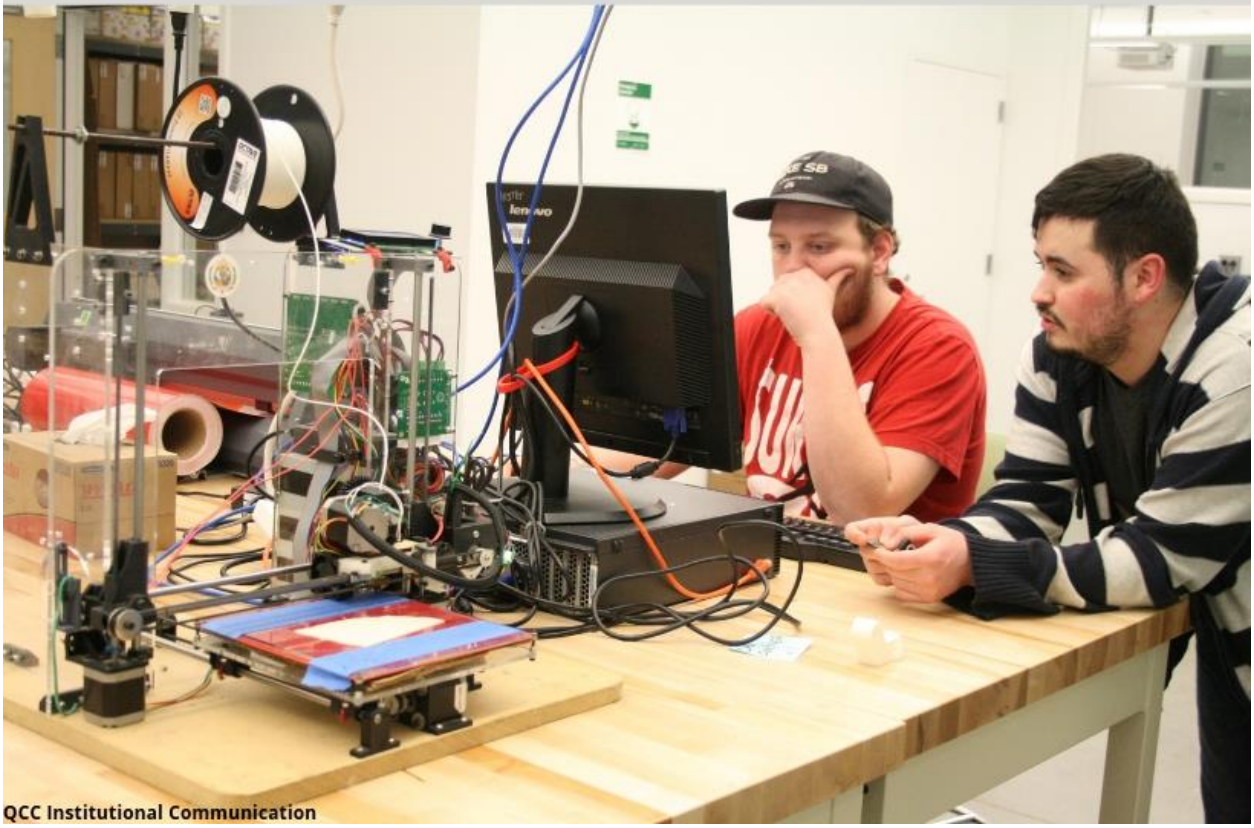
The Lecture and Lab method is a style designed to build weekly teaching concepts into a cumulative laboratory assignment that demonstrates student mastery of the class material.



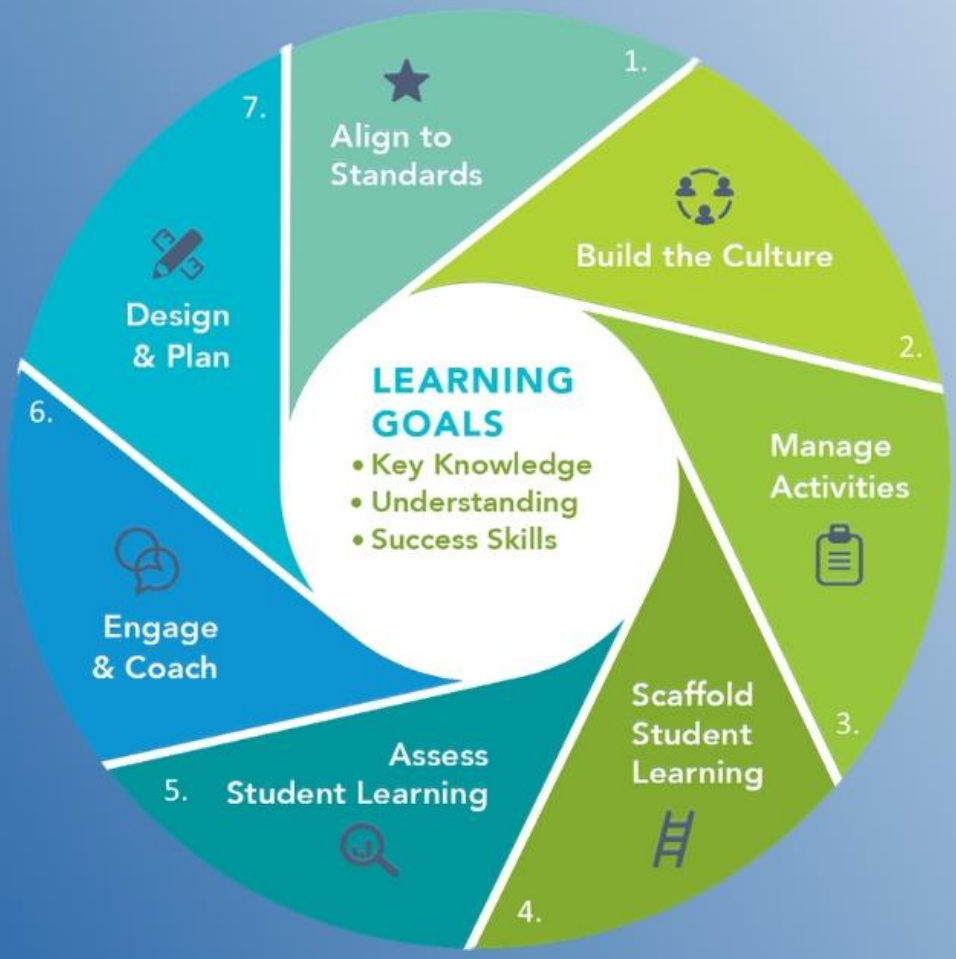
QCC Institutional Communication

CAPSTONE

A capstone is a project completed at the end of a degree or course in which students use all of the knowledge they have gained. Often times capstones are used to show student proficiency in all topics.



What teaching practices do you need to get started?



FACULTY AVAILABLE TO HELP

AMY BEAUDRY

Amy Beaudry is a Professor of English and the Academic Technology Facilitator at Quinsigamond Community College, where she has worked since 2004. In addition to teaching composition, literature and philosophy classes, Amy is involved in a variety of online teaching and learning, professional development, assessment, retention, and OER initiatives at the campus and state levels. Recently she was awarded the American Association of Community Colleges 2019 Dale P. Parnell Faculty Distinction Recognition.

Dadbeh Bigonahy is a Professor and Coordinator of Engineering, Biomedical Engineering and Sciences at QCC where he has worked for over 30 years. He is a huge proponent of continuing education and has stayed up-to-date with courses in fields relating to engineering. Dadbeh gets to know students in his courses to coach, encourage and prepare his students to transition to 4-year institutions successfully. Dadbeh received the American Association of Community Colleges Inaugural Dale P. Parnell Distinguished Faculty Recognition (2018).

DADBEH BIGONAHY

1.
TEACHERS USE STANDARDS TO PLAN THE PROJECT AND MAKE SURE IT ADDRESSES KEY KNOWLEDGE AND UNDERSTANDING FROM SUBJECT AREAS TO BE INCLUDED

2.
TEACHERS EXPLICITLY AND IMPLICITLY PROMOTE STUDENT INDEPENDENCE AND GROWTH, OPEN-ENDED INQUIRY, TEAM SPIRIT, AND ATTENTION TO QUALITY

3.
TEACHERS WORK WITH STUDENTS TO ORGANIZE TASKS AND SCHEDULES, SET CHECKPOINTS AND DEADLINES, FIND AND USE RESOURCES, CREATE PRODUCTS AND MAKE THEM PUBLIC

4.
TEACHERS EMPLOY A VARIETY OF LESSONS, TOOLS, AND INSTRUCTIONAL STRATEGIES TO SUPPORT ALL STUDENTS IN REACHING PROJECT GOALS

5.
TEACHERS USE FORMATIVE AND SUMMATIVE ASSESSMENTS OF KNOWLEDGE, UNDERSTANDING, AND SUCCESS SKILLS, AND INCLUDE SELF AND PEER ASSESSMENT OF TEAM AND INDIVIDUAL WORK

6.
TEACHERS ENGAGE IN LEARNING AND CREATING ALONGSIDE STUDENTS, AND IDENTIFY WHEN THEY NEED SKILL-BUILDING, REDIRECTION, ENCOURAGEMENT, AND CELEBRATION

7.
TEACHERS CREATE OR ADAPT A PROJECT FOR THEIR CONTEXT AND STUDENTS, AND PLAN ITS IMPLEMENTATION FROM LAUNCH TO CULMINATION WHILE ALLOWING FOR SOME DEGREE OF STUDENT VOICE AND CHOICE

RESOURCES

QCC has resources available to help you get started with Project-Based Learning

QCC has created a variety of materials to help professors develop their curriculum. The new toolkit available is the Project-Based Learning Toolkit. This toolkit has been created to provide professors with tools to get started with Project-Based Learning

Contained in the toolkit:

- Sample Rubrics
- Sample Frameworks
- Sample Assignments

Accessible at:

https://mycourses.qcc.edu

To access the toolkit, navigate to Blackboard.

1. Login to your Blackboard account
2. Under courses and communities find the **Educator Idea Vault**
3. Look through all of the toolkits and the information they have to offer

A WPI project team sponsored by:

The QCC QORE team

Christian Curll

Nicholas Johnson

Alana Keating

Julia Saldanha

WPI

QUINSIGAMOND
Community College

Appendix K: Yearly Survey Template

Name		
Department		
Email		
Do you currently use PBL?		
If yes,		**If no,**
In which classes?		Thank you, please check out our PBL toolkit with more info
Would you be willing to share your projects/assignments for other professors to have as resources/examples?		
If yes,	**If no,**	
Please submit below	Thank you, please check out our PBL toolkit with more info	
Thank you, please check out our PBL toolkit with more info		

Appendix L: Spread Plan

PBL Spread Plan

Please mark which department you are a part of as well as which departments you already work with or believe you could work with

Select your Department *

1. Business, Financial and Hospitality
2. Computer and Information Technology
3. Education
4. Engineering and Engineering Technology
5. Healthcare
6. Installation, Maintenance and Repair Technologies
7. Liberal arts/Sciences and General Studies
8. Public and Social Service

Check every Department you feel you may work well with *

- [ ] Business, Financial and Hospitality
- [ ] Computer and Information Technology
- [ ] Education
- [ ] Engineering and Engineering Technology
- [ ] Healthcare
- [ ] Installation, Maintenance and Repair Technologies
- [ ] Liberal arts/Sciences and General Studies
- [ ] Public and Social Service

Appendix M: Sample Assignments List

List of Programs at QCC

1. **Business Financial and Hospitality**
    a. Large: work with an outside business or the professor to develop a mock business scenario or event plan for the students to complete for a portion of the class, capstone at end of course or beginning of a 200/300 course
    b. Small: form small groups to develop, based on an idea of their choosing, a business strategy based on a classwide theme
2. **Business Administration**
    a. Design a new start-up company and you and your partner are the co-founders. Decide how to structure your employers and managers, how to market your company, and how to finance it.
    b. Observe a company and the structure of it. Be a consulting team and provide recommendations on their hierarchy structure, marketing, and finance.
3. **Hospitality and Recreation Management (Hospitality/Food service)**
    a. Have event planning boards (made up of students in the class) collaborate to plan a big event.
4. **Computer Information and Technology**
    a. Work in groups to diagnose a created scenario that may happen in a real IT scenario
    b. Have students try to create a method to deal with common issues in a business i.e: prevent co-workers from falling for phishing schemes or how to manage company passwords in a safe manner
    c. Design a server structure for a made up business, including security and usage tracking
5. **Computer Science Transfer**
    a. Work as a team on a software project structured as an actual team project as would be seen in industry
        i. Large project to delegate parts, need communication
        ii. Weekly project check ins from project owner (professor)
        iii. Give a presentation on the project at the conclusion of the project
6. **Interactive Media - Game Design Option**
    a. Intro: in small groups design a 1 or 2 minute animation/ cutscene for a predetermined storyboard, give students artistic freedom
    b. Work in groups of 3 to design a simple game based on a few predefined objectives
7. **Early Childhood Education**

a. Observe a classroom for a certain period of time. Then, the student will create lesson plans for the next chapter of the class. Hopefully they can actually teach it with help from the teachers. (higher level class) If not they can write/present about how they would do it and provide materials.

8. Engineering and Engineering Technology

a. Dadbeh's class structures

9. Electronics Engineering Technology

a. Intro: weekly labs that develop into one final design i.e: using voltage dividers and op amps to create a 3 stage audio amp *see attached schematic
b. Medium: pair with an outside company to tackle one of their larger technical issues and present findings and recommendations at end of semester on how they feel the company may be able to solve their problem. Teams of 4-6
c. High: research and develop a prototype for any electronic design they want. Using components determined by the professor, turn it into a science fair style competition to get students engaged
d. Jim's mechatronics troubleshooting project

10. Engineering - Biomedical Engineering Option

a. Work with disabilities and actually simulate the disability. (i.e. is your task is to make shoes for blind people you should blindfold yourself or your group, or if the task is to allow someone with arthritis to still give an injection, you and your group should wear mittens.)

11. Occupational Therapy Assistant

a. Observe a patient and step by step plan to help them with the daily activities that they need help completing. Once the plan is structured, students should write a report and present to their class on this.

12. Dental Hygiene

a. Unpaid internship at a local dentist
b. Free patients come to QCC for cleaning

13. Nurse Education - Evening

a. Unpaid internship at a local hospital

14. Paramedic Technology

a. Students are given a scenario within a team. The students have to analyze the scene and decide what technology they need to solve the situation. They then present about their experiences as well as what better technology (existing or not) that would've been useful to them in the moment.

15. Physical Therapist Assistant

a. Create a treatment plan for a patient
b. Observation

16. Respiratory Care

a. Weekly: Case studies - see Amy Hogan syllabus for example

b. Large: Work in local healthcare

17. Automotive Technology - Ford Maintenance and Light Repair Certificate

a. Do some hours with an automobile shop technician in a group of two or three.

18. Liberal Arts - Sociology Option

a. Survey students on campus for a Research Project
    i. QCC has a great diversity

19. Public and Social Service

a. Service Learning

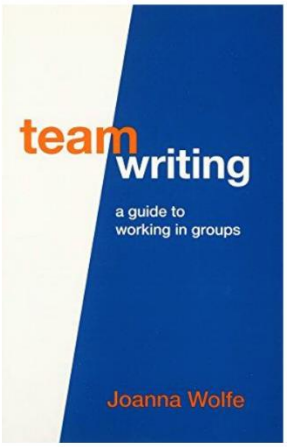
20. Criminal Justice

a. Drive alongs
b. Simulations

Appendix N: Resources for students

Student Resources

Working in Teams:

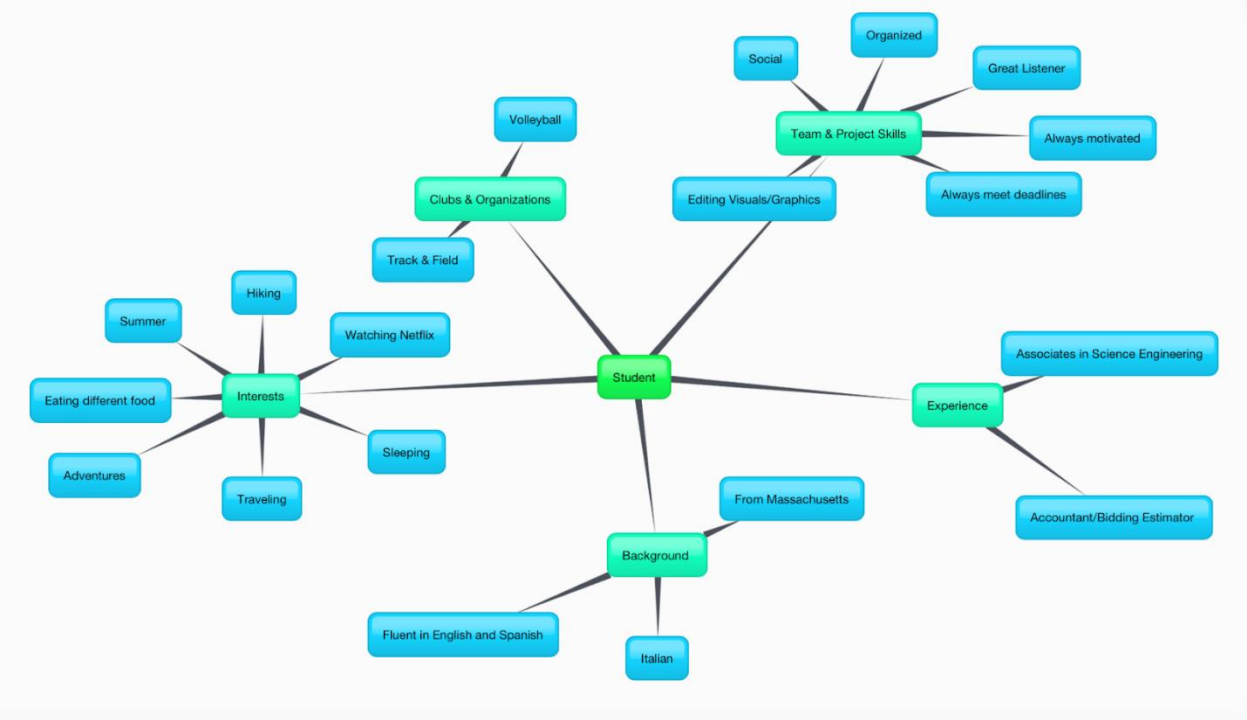


- ***Team Writing by Joanna Wolfe*** **(Ranges about $12-$20)**
    - This book will help students in working with their groups. It demonstrates typical situations that you may see in a team environment and it provides recommendations on how to approach the situation. Along with approaching situations, it provides recommendations on writing a logistical flowing paper.

- ***Asset maps***
    - Once grouping students together, assigning them to create asset maps will help throughout their project. Asset maps allows students to obtain confidence and prioritize what they do know. It also allows students to divide tasks based on skills and interest.
    - *Bubbl.us*
        - Bubbl.us is a simple and effective site to use in order to create these asset maps.

- See Figure 1 for an example asset map

Figure 1: Example Asset Map



- ***Team Equity***
  - Team equity is also known as a team contract. Assigning the students to create a team contract will allow the team to discuss their goals and reference any outside of class commitment another student might have. This will give students their roles in the group and be aware of what to do.

Appendix O: Aggregated Interview Notes

Applicable Aggregated Interview Notes

Interviewee #1 (Community College)

- Uses PBL in all classes
- Interviewee #1's department, more than 50% use PBL
- 75 minute classes
- Uses Flipped Classroom
    - Prep work before class
    - Assignment in class as groups (5-6 students)
        - Change groups 3 times per semester
        - Group lead changes each week
    - In class project is the largest part of the grade
        - Beginning of the week the team works together
        - End of the week the teams present their work
        - 5 minute follow up at the end of every week to receive a grade
            - What did you do to prepare?
            - What did you contribute to the class?
            - What did you learn this week?
            - Any issues in the project?
        - Noticed peer pressure and the follow up do a good job to keep students on track
- After using PBL, noticed a dramatic reduction in drop outs
- Key items to make PBL work
    - Make sure the students have time to complete the project
    - Reinforcing the need for preparation
        - Reading
        - Videos (2-5 min)
        - Pre-class quiz
    - Topics need to be interesting to engage the students

Interviewee #2 (QCC)

Uses combination of Independent and Group classes

- Uses case studies
    - Different topic of focus chosen each semester
    - Rubrics to state exactly what is required
- Regular teaching vs Project based
    - Students more attentive
    - Recommendations
        - Rubrics for everything
        - Timelines
        - Structure
        - Student centered
        - Student feedback

    - Students more often critically think
    - Infuse technology
        - Website
    - Use peer reviews to catch freeriders and adjust grades accordingly
- Projects used to intermix the different students
- Large dropout at beginning of program, but those that stayed, stayed to completion

Interviewee #3 (QCC) -

- Working in industry before teaching provided insight that PBL was the best type of teaching to prepare students for the workforce
- Both online and in-person classes
- Providing examples to students is important
- Along with providing instructions, provide why the assignment/project is helpful to a student
- For online classes groups can be made in Blackboard
- Jobs are assigned for each assignment, those positions switch with each assignment
- Multiple groups per semester
- If students are not working well in a group, students need to inform the professor and try to work through it

Interviewee #4 (QCC) -

- Uses PBL in all classes, one type is Flipped Classroom
- Students prepare for class by reviewing articles and preparing for interviews
- Gives students ownership over the projects which leads to better engagement as the students are more invested
- Provides resources for projects so students have tools when they are stuck
- Brings in guest speakers
- Using PBL is more real life and would be boring for the professor and students with a traditional classroom which is boring and repetitive
- Has used other styles
    - Lecture 1st day
    - 2nd day students are expected to be prepared with research to discuss with their group
    - 3rd day The class has an argumentative debate on the material researched
    - Group leaders flip each week
    - Students are hesitant to speak at the beginning, but by the end of the semester students are open and love the topic
- These classes really make students critically think and connect the dots, makes students understand the importance of backing up their research

Appendix P: Backward Design worksheet

This is included in the toolkit, but is unable to be publicly published.

Appendix Q: PBL Literature

Why PBL and the Benefits of PBL

Bauer-Ramazani, C., Graney, J. M., Marshall, H. W., & Sabieh, C. (2016, March 31). Flipped Learning in TESOL: Definitions, Approaches, and Implementation. Retrieved January 26, 2019, from https://onlinelibrary.wiley.com/doi/full/10.1002/tesj.250

Behizadeh, N. (2014). Enacting Problem-Posing Education through Project-Based Learning. *The English Journal, 104*(2), 99-104. Retrieved from http://www.jstor.org.ezproxy.wpi.edu/stable/24484422

Krajcik, J. S., & Blumenfeld, P. C. (2005). *Project-Based Learning*. Cambridge University Press. doi:10.1017/CBO9780511816833.020

Riordan, R. (2011). Project-Based Learning Engages Students in Meaningful Work (H. Lattimer, Ed.). *Middle School Journal, 43*(2), 18-23. doi:10.1080/00940771.2011.11461797

Flipped Classrooms

Alpaslan Sahin, Baki Cavlazoglu, & Yunus E. Zeytuncu. (2015). Flipping a College Calculus Course: A Case Study. *Journal of Educational Technology & Society, 18*(3), 142-152. Retrieved from http://www.jstor.org/stable/jeductechsoci.18.3.142

Bauer-Ramazani, C., Graney, J. M., Marshall, H. W., & Sabieh, C. (2016, March 31). Flipped Learning in TESOL: Definitions, Approaches, and Implementation. Retrieved January 26, 2019, from https://onlinelibrary.wiley.com/doi/full/10.1002/tesj.250

Slomanson, W. (2014). Blended Learning: A Flipped Classroom Experiment. *Journal of Legal Education, 64*(1), 93-102. Retrieved from http://www.jstor.org/stable/24716075

Chis, A. E., Moldovan, A.-N., Murphy, L., Pathak, P., & Muntean, C. H. (2018). Investigating Flipped Classroom and Problem-based Learning in a Programming Module for Computing Conversion Course. *Educational Technology & Society, 21* (4), 232–247

Examples of PBL Implementation

Albritton, S., & Stacks, J. (2016). Implementing a Project-Based Learning Model in A Pre-Service Leadership Program. Retrieved January 20, 2019, from https://files.eric.ed.gov/fulltext/EJ1103657.pdf

Basjaruddin, N. C. (2016). Implementation of Project Based Learning in Mechatronic Lab Course at Bandung State Polytechnic. Retrieved January 20, 2019, from https://files.eric.ed.gov/fulltext/EJ1132222.pdf

Creating a Project-Based Learning Environment to Improve Project Management Skills of Graduate Students, from https://files.eric.ed.gov/fulltext/EJ1108310.pdf

McLoone, S. C., Lawlor, B. J., & Meehan, A. R. (2016). The Implementation and Evaluation of a Project-Oriented Problem-Based Learning Module in a First Year Engineering Programme. Retrieved January 20, 2019, from https://files.eric.ed.gov/fulltext/EJ1124226.pdf

Riyanti, M. T., Erwin, T. N., & S.H., S. (2017). Implementing Project Based Learning Approach to Graphic Design Course. Retrieved January 20, 2019, from https://files.eric.ed.gov/fulltext/EJ1143828.pdf

Schwalm, J., & Tylek, K. S. (2012). Systemwide Implementation of Project-Based Learning: The Philadelphia Approach. Retrieved January 26, 2019, from https://files.eric.ed.gov/fulltext/EJ980187.pdf

Sibona, C., & Pourreza, S. (2018). The Impact of Teaching Approaches and Ordering on IT Project Management: Active Learning vs. Lecturing. Retrieved January 26, 2019, from https://files.eric.ed.gov/fulltext/EJ1193495.pdf

Appendix R: List of faculty

Project-Based Learning Champions

1. Amy Beaudry → abeaudry@qcc.mass.edu
   a. Professor of English
   b. Academic Technology Facilitator
   c. Member of the QCC QORE team
2. Dadbeh Bigonahy → dbigonahy@qcc.mass.edu
   a. Professor and Coordinator of Engineering

List of other QCC Faculty to Reach out to:

1. James Heffernan → jheffernan@qcc.mass.edu
   a. Professor of electronics engineering technology
   b. Coordinator of the electronics engineering technology programs
2. Amy Hogan → ahogan@qcc.mass.edu
   a. Assistant professor of Respiratory Care
3. Linda Grochowalski → lgrochowalski@qcc.mass.edu
   a. English and Humanities
4. MaryAnn Kania → mkania@qcc.mass.edu
   a. Professor of Business Administration
   b. Business Support Specialist Programs
5. Sandra Martin → smartin@qcc.mass.edu
   a. Assistant professor of Nurse Education
   b. A.D.N. Program
6. Gaelan Benway → gbenway@qcc.mass.edu
   a. Professor of Sociology
   b. Member of the QCC QORE team

Appendix S: Example Syllabi

Example Syllabi will be available in the toolkit but we are unable to publish these publicly.

Career Strategies Syllabus

Embedded Microcontroller Syllabus

Manufacturing Syllabus

Respiratory Care Syllabus

Software Engineering Syllabus

Appendix T: Amy Beaudry's Revamped Syllabus

- Week 1:
  - Day 1:
    - Introductions and Syllabus
    - Basics on how to use Blackboard
    - Technology Questionnaire
    - Goal Setting
  - Day 2:
    - Six-word memoir exercise
    - Discuss student learning outcomes for this course
    - Discussion on Criminal Justice Issues→ choose a topic that seems to interest the class as a majority.
- Week 2:
  - Day 3:
    - Introduction to Unit 1: Understanding of people's ideas. (summarizing and paraphrasing).
    - Reading: "Reading and Writing in College"
    - Writing for academic and professional purposes
    - Audience and purpose group exercises
  - Day 4:
    - Reading: How to Write a Summary of an Article.
    - Major Writing Assignment #1 Instructions given.
      - Explain Research notebooks and how to find good sources.
  - Day 5:
    - Anatomy of a scholarly article
    - Students come to class with their research notebook
    - Present to class quickly the main ideas from the articles you found???
    - Remainder of time → choose article you wish to use and begin reading/writing
    - Professor circulate through the room
- Week 3:
  - Day 6:
    - Reading: "Author's Note," "A Circle of Grief," and "A Killing" (Levoy 321-324, and 3-21)
    - In class summary exercises
  - Day 7:
    - General introduction to APA style
    - Continue work on writing assignment #1
  - Day 8:
    - Writing Assignment #1 First Draft due
    - Group workshops for feedback from peers
- Week 4:
  - Day 9:
    - Reading: "Ghettoside" and "School of Catastrohpe"
    - Reading: "Audience"
    - Audience Exercise
    - Return feedback on the first writing assignment
  - Day 10:

        - Library Session #1

    - Day 11:
        - Major writing assignment #1 Final draft due
        - Start Unit 2: Articulating One's own ideas
        - Readings: "The writing process: How do I begin?" and "Prewriting"
        - The writing process, and prewriting and outlining
- Week 5:
    - Day 12:
        - Major Writing Assignment #2 directions given
        - Discussion about subtopics to the overarching CJ issue
            - Group sign ups based on everyone's interest
            - Exchange contact information
            - Groups will be used as discussion groups and sounding boards for each other
    - Day 13:
        - Library Session #2
    - Day 14:
        - Readings: "Developing a Strong Thesis statement," "Writing Paragraphs: Separating Ideas and Shaping Content," and "Writing Introductory and Concluding Paragraphs"
        - How to write a five-paragraph essay
        - Outlining and using graphic organizers
        - How to write a Thesis statement
- Week 6:
    - Day 15:
        - Reading: "Clearance," "The circumstantial Case," and "Good People and Knuckleheads"
        - Group up and discuss your progress on writing assignment #2
    - Day 16:
        - Reading: "Plagiarism"
        - APA Formatting
        - Major Writing Assignment #2 First Draft due
        - Group Feedback for each other
    - Day 17:
        - Readings: "Refining your writing -- How do I improve my writing technique?" "Revising," and "Reviewing"
        - Reverse Outlining revision exercise
        - Word choice and sentence structure revision exercise
- Week 7:
    - Day 18:
        - Major Writing Assignment #2 is due
        - Begin Unit 3: Combining other people's and one's own ideas (synthesizing, interpreting, analyzing, and evaluating)
        - Major Writing Assignment #3 directions given
    - Day 19:
        - Readings: "Son of the City" and "It's My Son"
        - Readings: "Strategies for gathering reliable information" and "Evaluation scholarly sources"
    - Day 20:
        - Research notebook for assignment #3 due

        - Reading: “The killing of Dovon harris,” “Nothing Worse,” and “The assignment”
        - Discuss Interviewing Techniques and Writing about data collected through interviews
- Week 8:
    - Day 21:
        - Reading: “Everybody Know” and “The Witness”
        - Group time to finalize interview strategy
    - Day 22:
        - Interviewees come into class for exercise
    - Day 23:
        - Library session #3
- Week 9:
    - Day 24:
        - Reading: “Baby Man” and “Mutual Combat”
        - Work on Major Writing Assignment #3
    - Day 25:
        - Work on Major Writing Assignment #3
    - Day 26:
        - First Draft of Writing Assignment #3 is due
        - Swap with another group to peer revise
- Week 10:
    - Day 27:
        - Reading: “Witness Welfare” and “Lost Souls”
        - Sentence editing: the paramedic method
        - Return feedback on writing assignment #3
    - Day 28:
        - Reading: “The victims’ side” and “The opening”
        - Work on Major Writing Assignment #3
    - Day 29:
        - Major Writing Assignment #3 Final Draft is due
        - Begin Unit 4: Engaging the public and sharing one’s writing
        - Major Writing Assignment #4 directions given
- Week 11:
    - Day 30:
        - Reading: “We have to pray for peace” and “The missing”
        - Discuss the most effective ways to reach the target audience
    - Day 31:
        - Built in no class day
    - Day 32:
        - Discuss Presentation (or other options) methods
        - Work with group on major writing assignment #4
- Week 12:
    - Day 33:
        - Reading: “Epilogue”
        - Discuss Presentation
    - Day 34:
        - Built in no class day
    - Day 35:
        - Work on Major Writing Assignment #4
- Week 13

- Day 36:
  - Major Writing Assignment #4 first draft due
  - Workshop for peer revising
- Day 37:
  - In-class self-assessment exercise
- Day 38:
  - Built in No class day

- Week 14:
  - Day 39:
    - Review of what we've covered this semester
    - Six-word advice exercise
  - Day 40:
    - What to expect in ENG 102
  - Day 41:
    - Final presentations on Major Writing Assignment #4

1. Major Writing Assignment #1
   a. Summarizing Author's thesis, main points, purpose, and organization of ideas.
   b. 1-2 page summary
   c. Research notebooks → 3-4 potential credible articles for them to summarize
   d. Potential brief presentation of their basic article findings
      i. Very Informal
      ii. 1 minute per student
2. Major Writing Assignment #2
. Goal is to narrow your broad topic in order to explore your own opinion about the topic
   a. Discuss a bunch of subtopics of the criminal justice issue that the class is working with
   b. Have group sign ups based on what they are interested in (groups of 4-5)
   c. Use them as a sounding board to bounce ideas off of and brainstorm together
   d. Present to your group only about the opinion that you have developed while writing this essay
   e. 2-3 pages → per student
3. Major Writing Assignment #3
   a. Delve into your topic even deeper by using sources
   b. Another research notebook → 2-3 more potential credible sources that they can use
. Find 3 professionals on this topic to come into class
   c. Round robin group interviews with each of the 3 people
   d. Write about these findings that you have found
   e. 12-15 pages → per group
4. Major Writing Assignment #4
   a. Workshop/Presentation style
   b. Other things on that your assignment list could be useful if it is more effective for their audience.
   c. Identify who needs to know about your issue
   d If feasible, would be cool to invite potential people to come see presentation (interviewees maybe???)
   e. Determine what you want them to know or do with what they learn from you

Appendix U: Dadbeh Bigonahy's Revamped Syllabus

Project-Based Learning in Strength of Materials

****Business Letter****

Having students write business letters will enhance their practice in writing formally and to the point. Prior to starting the business letters, the students will be given a template in a business letter format that explains how it should be written. The business letter format is provided in Appendix V. An example of a Business Letter that the professor should send to the students as homework is shown in Appendix B and C (the business letters provided were previously created by a WPI Professor). Creating a storyline that builds upon the first business letter will keep things more interesting. For instance, create a business letter from a fake company that is looking to hire the student and their first project will be based on what they learned in the first two weeks. The "project" will be a question that will allow the students to use their new knowledge from the course in solving the problem and responding to the company. The question(s) used can be taken out of the book and put into an interesting scenario. The following business letter they receive will include another job for the student that requires them to solve a new problem on any new course content.

Our project team has included the due dates in the syllabus in a time frame that won't overload the students with work. Most business letters are due before a test in order to help students practice and review the content.

****Research Paper****

After analyzing the syllabus and reading the requirements for the research paper, this is great opportunity to have students working in teams. Allowing students to work in teams of 3-4 will enhance some of their soft skills; teamwork, time management, communication, leadership, etc. Our project team has incorporated about 5 times in the course timeline where students should have about 30 minutes to meet with their groups and discuss what needs to be done/ working on the research paper. At the end of the semester the teams should turn in a 15-20 page paper. Along with turning in the paper, students should create 5-10 minute presentation on what they have written in order to present to the class. This will help them gain the confidence they need in presenting their work.

Course Outline

Week	Subject
01	Ch 7: Review, CH.8, 11: Stress and strain; stresses and stress resultants; stresses due to axial loading; average normal, shear, and bearing stresses, shear and moment equations and graphs, mechanical properties of materials
02	States of stress at a point, deformation and strain, material tests and data representation, resistive behavior of materials, material properties and stress-strain relations ****Business Letter 1****

03 **Test 1**
Ch.9: Axial Load, generalized Hook's Law, load/stress and load/deformation relations, design criteria and safety factors.

04 Ch.10; Torsion, validity of load-stress relations, deformation, statically indeterminate problems, thermal strains and stresses; strain and stress concentrations
****Business Letter 2****
****Research Paper****

05 **Test 2**
Inelastic behavior of statically indeterminate structures, thin-walled cylinders and spheres

06 Ch.11: Bending, deformation patterns and strains, shear stresses - linearly elastic case, stresses on oblique planes
****Business Letter 3****
****Research Paper****

07 Angle of twist, inelastic behavior, limit loads

08 Ch.12: Transfer Shear; shear and bending moment diagrams; load, shear, and moment relations, deformation pattern and strains
****Research Paper****

09 Ch.13: Combined Loading shear stresses in beams, deflection of beams, singularity functions, combined loading
****Business Letter 4****

Course Outline Continued

10 **Test 3**
Ch.13: Combined loading continue, Ch.14; thin-walled pressure vessels, beam deflections by superimposition, inelastic response of beams, limit loads, Mohr's Circle, maximum stresses, plain strain, Stress and Strain Transformation

11 Ch.15: Design of beams and shafts , prismatic beam design, Ch.16: Deflection of beams and shafts, the elastic curve, slope and displacement by integration, method of superposition, statically indeterminate beams and shafts
****Business Letter 5****

12 Ch.17: Buckling of columns, critical load, ideal column with pin supports
****Research Paper****

13 Columns having various types of supports, the secant formula, inelastic buckling
****Business Letter 6****
****Research Paper****

14 Review;
Test 4, during final exam week
****Research Paper Presentation****

Appendix V: Strength and Materials Business Letter Format

Dadbeh Bigonahy
QuEST 213a
Worcester, MA 01604

April 12, 2019

Strength of Materials Student
123 Student St.
Worcester, MA 01604

Dear sir or madam,

Business letters can be written in different ways. Although, an ideal way to write one is to have the first paragraph remind the reader why you are contacting them. This letter is in business format and being able to write these will be useful in your future.

The middle paragraph(s) provide the information that you are trying to tell the reader or answer their question. For example, this paragraph contains information on how to format a business letter and the next paragraph contains content information. Business letters should not be longer than one page. You can choose your own fonts and margins, although, it should not be odd. The sender and recipient addresses should be at the top left, separated by the date. If you have a company logo, it will be located on the top right. If the logo contains your address, then it will go in the top center.

If you know the person that you are contacting, you can include some pleasantries in the beginning of the first paragraph. One may be, “Hope your family is well!” but this is unusual unless you are very close friends. A business letter uses formal language but make sure it doesn’t sound stiff. Slang terms, idiomatic expression, and jokes are typically not included in a business letter. Equations, photographs, and diagrams could be attached on the appendix on the second page if necessary. In terms of this class, you need to show your answer and explain how you got it. For example, “The stress is 500 psi and was calculated by...”. Also, you do not need to show the equations that you used.

The final paragraph usually summarizes the information and lays out plans for the future. For instance, in this letter, how to write a business letter has been explained and I hope this information is useful when creating your own. Put your title and contact info under your signature.

Sincerely,

Signature in a space that is 3 returns long

Dadbeh Bigonahy
Dean of Engineering

Appendix W: Strength and Materials Example Homework 1

dadbehb@qcc.mass.edu

Octan Oil Corporation
Aastvej 1
DK7190 Billund
Denmark

23 October 2018

Worcester Polytechnic Institute
100 Institute Road
Worcester MA, 01604

Dear CE2001 Student,

As we discussed on the phone this week, I would like to hire you as a structural engineering consultant on behalf of the Octan Oil Corporation Family. We are greatly expanding our operations in Bricksburg, and need someone with an expertise in Analytical Mechanics to help us.

Our first project involves a mobile distribution center for City Pizza (a wholly owned subsidiary of Octan Oil Corporation). We want to build a truss to hold up the ceiling using bars with a cross-sectional area of 1.25 in^2. According to Bricksburg building regulations, the maximum average normal stress in any bar is not allowed to exceed 20 ksi. Please determine the maximum magnitude of the load *P* that can be applied to the truss, as well as identified which bar undergoes the highest normal stress. If we wanted to increase the load *P* that we are applying to the truss (that is, if we want to use a heavier roofing material) what would you recommend that we do so that we still stay within the Bricksburg building regulations? I have attached a photo of the distribution center in Appendix A, and a diagram of the truss in Appendix B.

I look forward to receiving your response in a properly formatted business letter by noon on October 26th. I will have my assistant get in touch with you about arranging payments.

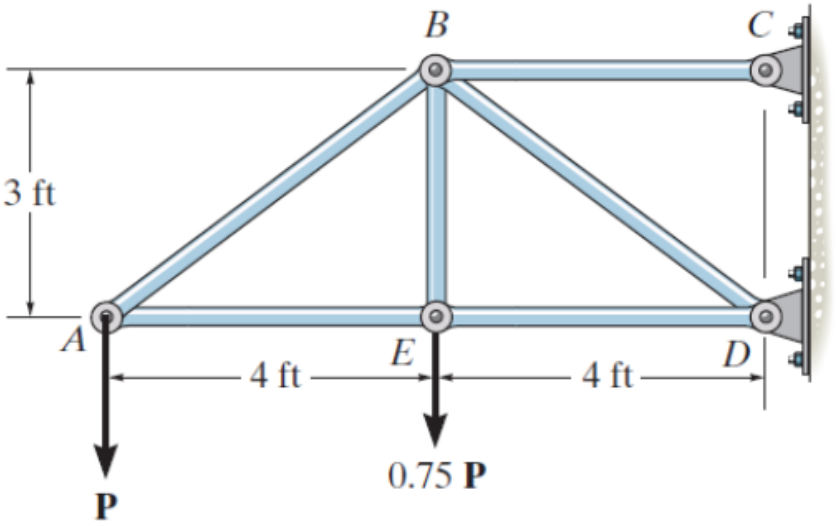
Thank you,
Niels B. Christiansen
Niels B. Christiansen
Chairman, Octan Oil Corporation

Aaron Sakulich, Associate Professor of Civil and Environmental Engineering, Worcester Polytechnic Institute, CE 2001

Appendix A: Mobile distribution warehouse [1]

[1] Image courtesy janbricks.com

Aaron Sakulich, Associate Professor of Civil and Environmental Engineering, Worcester Polytechnic Institute, CE 2001



Aaron Sakulich, Associate Professor of Civil and Environmental Engineering, Worcester Polytechnic Institute, CE 2001

Appendix X: Strength and Materials Example Homework 2

Octan Oil Corporation
Aastvej 1
DK7190 Billund
Denmark

29 October 2018

Worcester Polytechnic Institute
100 Institute Road
Worcester MA, 01604

Dear CE2001 Student,

Thank you for your work on the truss for the City Pizza mobile distribution warehouse. Once complete, this vehicle will serve all residents of Bricksburg with hot, delicious pizza at a reasonable price. The construction company that we have contracted to actually build the mobile warehouse has alerted me to some additional information that they need before they can begin construction.

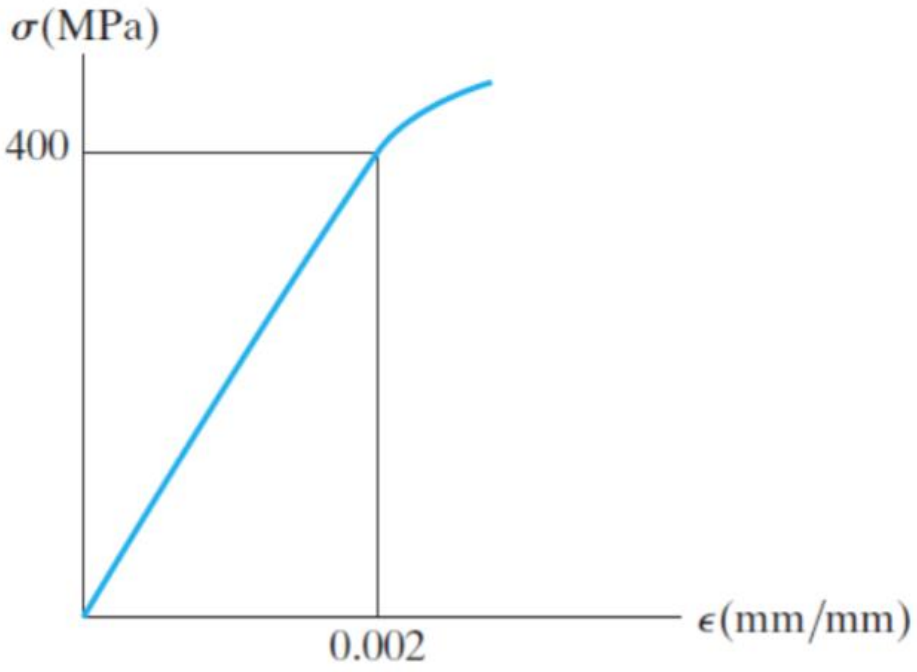
We plan to build the truss using a steel alloy, the stress/strain diagram for which is shown in Appendix A. The specimen from which this diagram was obtained had an original diameter of 13 mm and a gauge length of 50 mm. When the load applied to the specimen was 50 kN, the diameter was measured to be 12.99265 mm. Can you determine the Poisson's ratio for this material? Incidentally, a competitor is offering a material that has a Poisson's ratio of 0.15 at a slightly lower price. Which material would you recommend? Why?

I look forward to receiving your response by noon on November 2nd. In lieu of payment, the Octan Oil Corporation would like to offer you unlimited (terms and conditions apply), free City Pizza-brand pizza for a period of two months after the mobile distribution warehouse begins operations. I am sure that you will not decline this very generous offer, and will have our lawyers send over the appropriate paperwork.

Thank you,
Niels B. Christiansen
Niels B. Christiansen
Chairman, Octan Oil Corporation

Aaron Sakulich, Associate Professor of Civil and Environmental Engineering, Worcester Polytechnic Institute, CE 2001

Appendix A: Stress/Strain diagram



Aaron Sakulich, Associate Professor of Civil and Environmental Engineering, Worcester Polytechnic Institute, CE 2001

Appendix Y: QCC Informed Consent Interview Form

Informed Consent Agreement for Participation in an Interview

<Interviewer Name>
Worcester Polytechnic Institute
Interactive Qualifying Project Interview Document

Purpose: We are a group of student researchers from Worcester Polytechnic Institute's Worcester Community Project Center. We are working collaboratively with Quinsigamond Community College (QCC) to provide recommendations for different Project-Based Learning (PBL) implementations that will best suit the QCC community. A requirement for the academic portion of our research is Interviewing QCC professors that have utilized Project-Based Learning in their course. Your participation in this Interview would be greatly appreciated and is entirely voluntary. Thank you.

Procedures to be followed: We will be taking written notes of this conversation for later reference. Interview questions will vary by participant.

Risks to interviewee: No direct risks as a result of notes taken during the interview
Record keeping and confidentiality: We are happy to keep any level of confidentiality; this Interview will be used for reference to improve the PBL toolkits that the project team is developing and may be quoted in the project report. If you are interested, information concerning the published report can be provided at the conclusion of the project which will occur at the end of April 2019. The resulting report will be available to the public and will be published to Worcester Polytechnic Institute's Worcester Community Project Center webpage, https://wp.wpi.edu/wcpc/projects/projects-by-term/spring-2019/quinsigamond-community-college-providing-recommendations-for-project-based-learning-implementations/
For more information about contacts:
Interviewer <Interviewer Name>, Email: <Interviewer email>,
The WPI Student Research Group Email: gr-QCCD19@wpi.edu
Corey Denenberg Dehner, WCPC Director/WROC Co-Director and faculty advisor: cdehner@wpi.edu
Laura Roberts: WCPC Assistant Director, Interdisciplinary Global Studies Division: lroberts@wpi.edu
IRB Chair, Professor Kent Rissmiller, Tel. 508-831-5019, Email: kjr@wpi.edu
University Compliance Officer Jon E. Bartelson, Tel. 508-831-5725, Email: jonb@wpi.edu
Principal Investigator: Ken Dwyer - kdwyer@qcc.mass.edu
Quinsigamond's Institutional Review Board (Director of Institutional Research, 508-854-7520)

Your participation in this interview is voluntary. Your refusal to participate will not result in any penalty to you or any loss of benefits to which you may otherwise be entitled. You may decide to stop recording at any time without penalty or loss of other benefits.

By signing below, you acknowledge that you have been informed about and consent to be a participant in the study described above. Make sure that your questions are answered to your satisfaction before signing. You are entitled to retain a copy of this consent agreement.

Participant Signature	Participant Name Printed	Date (mm/dd/yyyy)

Signature of Person who explained interview	Date (mm/dd/yyyy)