L'École Nationale Supérieure d'Informatique et d'Analyse des Systèmes
Project Based Learning

An Interactive Qualifying Project
Proposal Submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
In partial fulfillment of the requirements for the degree of Bachelor of Science.

By: Jeffrey Harnois
Khadijah Ibrahim
Lara Padir
Olivia Furner

Date:
07 March 2020

Report Submitted to:

Project Sponsor Mohammed Essaaidi
L'École Nationale Supérieure d'Informatique et d'Analyse des Systèmes
Avenue Mohamed Ben Abdellah Regragui, Rabat, Morocco

WPI Faculty Advisors
Professor Laura Roberts
Professor Mohhamed Hamzoui

Abstract

Project-based learning (PBL) facilitates learning through the inclusion of projects in classes. Our project assists Dr. Mohamed Essaaidi in diagnosing the current state of teaching pedagogies used at L'École Nationale Supérieure d'Informatique et d'Analyse des Systèmes (ENSIAS) to provide recommendations on how ENSIAS can implement PBL. We interviewed and surveyed faculty and students at ENSIAS to identify challenges faced by various stakeholders and current PBL approaches used at the school. From our data, we recommended for ENSIAS to form a PBL faculty committee, lead a training workshop on PBL, develop a first-year project-based course, and complete course and project team evaluations. These recommendations will aid in the potential development of PBL at ENSIAS.

Acknowledgments

Our team would like to thank the following people for the help and support of our project.

ENSIAS, for your hospitality. Specifically, we would like to thank,

- Dr. Mohammed Essaaidi for sponsoring our project, and providing our working space.
- Professor Berbia for his time and dedication to our project. Thank you for putting us in contact with many professors at ENSIAS, and allowing us to interview you.
- All ENSIAS faculty members that we interviewed. Thank you for the information you provided to our research, and the time you took to speak with us.
- Professor Faizi and Professor Belahmer for welcoming our team into their class and introducing us to many students.
- The students of ENSIAS for taking the time to speak with us and answering our survey.

Anas Sebbar who directed us throughout the day at UIR and put us in contact with all of the faculty members at UIR.

The UIR faculty who took the time to speak with us and provided thoughtful information to our project.

Professor El Hamzaoui and Professor Roberts, for their feedback, support, translations, and advice on our project. We appreciate the time, consideration, and patience you had with our project. You were the best advisors a team could ask for!

Jeffrey Thomas for meeting with us and bringing outside information to our project.

IES staff members, Imane Rimi, Oussama El Addouli, and Adil Errami, for speaking with us and making a great Moroccan experience for our team. Your informative interviews shaped our project experience from the beginning.

Authorship

Section Title	Primary Author(s)	Primary Editor(s)
Abstract	Olivia Furner, Lara Padir	Lara Padir, Khadijah Ibrahim
Executive Summary	Olivia Furner	Lara Padir, Khadijah Ibrahim, Olivia Furner
Introduction	Lara Padir	Lara Padir, Khadijah Ibrahim
Literature Review		
Introduction	Olivia Furner	All
Active Learning	Lara Padir	All
Project-Based Learning	Olivia Furner	All
Approaches to PBL		
Flipped Classroom	Lara Padir	All
Projects	Khadijah Ibrahim	All
Benefits of Project-Based Learning		
Connection to Reality	Olivia Furner	All
Entrepreneurial Mindset	Lara Padir, Jeffery Harnois	All
Student Interest and Abilities	Olivia Furner, Khadijah Ibrahim	All
Critical Thinking and Student Performance	Olivia Furner, Jeffery Harnois	All
Conclusion	Olivia Furner	All
Methodology		
Introduction	Lara Padir	All
Objective 1	Olivia Furner	Lara Padir
Objective 2	Khadijah Ibrahim, Lara Padir	Lara Padir
Objective 3	Lara Padir, Jeffery Harnois	All
Conclusion	Lara Padir	All
Findings		
Finding 1	Lara Padir	Lara Padir, Olivia Furner, Khadijah Ibrahim
Finding 2	Khadijah Ibrahim	Olivia Furner, Khadijah Ibrahim, Lara Padir
Finding 3	Jeffery Harnois	All
Finding 4	Olivia Furner	Khadijah Ibrahim, Lara Padir, Olivia Furner
Conclusion	Olivia Furner	All
Recommendations		
Recommendation 1	Olivia Furner	Lara Padir, Olivia Furner, Khadijah Ibrahim
Recommendation 2	Khadijah Ibrahim	Olivia Furner, Khadijah Ibrahim, Lara Padir
Recommendation 3	Jeffery Harnois	All

Recommendation 4	Lara Padir	Khadijah Ibrahim, Lara Padir, Olivia Furner
Recommendation 5	Lara Padir	Lara Padir, Olivia Furner, Khadijah Ibrahim
Conclusions	Lara Padir	Olivia Furner, Khadijah Ibrahim, Lara Padir
Appendices		
Appendix A	All	All
Appendix B	All	All
Appendix C	All	All
Appendix D	All	All
Appendix E	All	All
Appendix F	All	All
Appendix G	All	All
Appendix H	All	All
Appendix I	All	All
Appendix J	All	All
Appendix K	All	All
Appendix L	All	All
Appendix M	Jeffery Harnois	Lara Padir, Olivia Furner
Appendix N	All	All
Appendix O	All	All
Appendix P	All	All
Appendix Q	All	All

Table of Contents

List of Figures

List of Tables

Executive Summary

The lecture pedagogy traditionally used in higher education has weaknesses that hinder students in today's competitive workforce and academia (Gavin, 2011). Reliance on traditional education methods leaves students without developed soft skills, such as collaboration and communication (Center for Educational Innovation, 2019). Students additionally struggle to maintain their depth of knowledge past time in the classroom (Queen's University, 2019). In STEM education, students benefit greatly from applying their knowledge in practical applications instead of solely attending lectures (Edutopia, 2013).

Several universities seeking to improve their methods of higher education have turned to the inclusion of active-learning components and projects (PBLworks, 2019). L'École Nationale Supérieure d'Informatique et d'Analyse des Systèmes (ENSIAS), a public STEM school located in Rabat, has looked to expand upon their current teaching pedagogies. This school is part of Mohammed V University. ENSIAS and its students could benefit from the further inclusion of project-based learning (PBL) in the numerous courses offered at the school.

PBL facilitates learning through course-related and interdisciplinary projects (PBLworks, 2019). Students typically work in small groups and learn to collaborate and depend on others. Students have a chance to independently learn material and apply knowledge acquired in the classroom. Students improve their study skills through projects and rely less on professors to learn new information. Class time is used to facilitate active learning techniques to engage students and further apply course-related knowledge (Omerad.msu.edu, n.d.). Through these methods students retain more information, are further engaged in their coursework, and have improved academic performance. Students also develop an entrepreneurial mindset,

critical thinking and 21st-century skills. These qualities prepare students for a competitive workforce (Partnership, G. S., 2016).

This project was completed by working with our sponsor, Dr. Mohamed Essaaidi, and in close collaboration with Professor Hassan Berbia of ENSIAS. Dr. Essaaidi is the former director of ENSIAS and currently works as a professor at the school. Professor Berbia is the head of Embedded and Mobile Systems in the Embedded Systems Engineering Department at ENSIAS. Both of these professors have prioritized the inclusion of projects at ENSIAS. Professor Berbia attended the PBL seminar hosted at Worcester Polytechnic Institute (WPI) but found difficulty in the logistics of implementing PBL once returning to ENSIAS.

Goal and Objectives

Our project goal developed recommendations on how ENSIAS can implement PBL. To achieve this, we established three objectives:

1. Build an argument for incorporating PBL at ENSIAS
2. Diagnose the current state of the teaching pedagogy used at ENSIAS
3. Create recommendations for ENSIAS to implement PBL

Methodology

Build an argument for incorporating PBL at ENSIAS

The incorporation of PBL requires an initial effort from the administration, professors, and students of a school. This requires work beyond the traditional lecture-based system that has been practiced at ENSIAS. It was necessary to build an argument for why PBL should be incorporated into higher-level courses. This argument explains to faculty and students why an effort to embrace a new pedagogy would prove valuable in the long run.

Diagnose the current state of the teaching pedagogy used at ENSIAS

Our second objective surrounded the specifics of ENSIAS and the current practices in place at the school. To accomplish this objective, we collected data from the administration, professors, and students of ENSIAS. We conducted group interviews, observed classes, held individual interviews, and sent out surveys to students and faculty. Our surveys for faculty and students were built with Qualtrics. Faculty answered questions regarding their background in teaching, their opinions on student engagement and course projects, and the challenges they face at ENSIAS. The survey consisted of mixed open-ended questions and Likert scale questions where respondents answered questions on a 1-5 scale. Student respondents answered questions relating to their current education level, their relationship with professors and classmates, and their favorite and least favorite part of courses taken at ENSIAS. Students additionally provided their weekly hours of class time and rated their independent study skills.

We additionally interviewed professors and students at Université Internationale de Rabat (UIR) to compare the practices at another school. We examined UIR to further understand engineering education in Morocco.

Create recommendations for ENSIAS to implement PBL

Our third objective was to create recommendations for ENSIAS based on the data we collected from faculty and students. We created three recommendations for ENSIAS to have a starting point for the further implementation of PBL.

Findings

1. There is not widespread commitment to PBL amongst faculty at ENSIAS
2. The current schedule of ENSIAS does not support the implementation of PBL

3. Students have an interest in PBL at ENSIAS
4. The engineering cycle accreditation standard supports PBL

There is not widespread commitment to PBL amongst faculty at ENSIAS

During our data collection, we found a lack of widespread faculty commitment to PBL at ENSIAS. We struggled to schedule interviews with faculty at ENSIAS and were unable to interview any administration. There was not widespread interest to our project or to learning about PBL. During our time at UIR, we were able to setup and conduct eleven interviews in one day. Throughout our seven weeks in Rabat, we were only able to meet with eight professors from ENSIAS. While we did not find widespread interest in our project, the small sample of professors we interviewed were excited to discuss project work and student engagement with us.

The current schedule of ENSIAS does not support the implementation of PBL

We found that ENSIAS professors and students are in class for long hours daily. This current class schedule does not support the implementation of PBL. Undergraduate students are in class between 30 and 35 hours per week, while masters and PhD students have less class time. For undergraduates, there is little time to work on projects outside of class. Additionally, professors do not have as much time to hold office hours or meetings with students outside of class on a regular basis. This is essential to provide feedback to students on their projects. We found that since long hours of lectures are in place at ENSIAS, there is not room for students to collaborate with each other and complete projects to the best of their ability outside of class.

Students have an interest in PBL at ENSIAS

During our interviews with students, we found that many had an interest in PBL at ENSIAS. Students discussed how they wanted to increase their level of engagement in their

courses. In our student survey results, students reported having strong independent study skills, and that they wished to have a deeper connection with the material they learned. Students acknowledged that they are strong in theoretical courses but lack the skills to apply this knowledge in a practical way. Additionally, students reported they enjoy classes more when they contain real-world applications. The student survey highlighted the major aspects of classes students enjoyed at ENSIAS. These aspects are theoretical material and its application combined and when professors actively engage students throughout the class. PBL can provide both of these aspects to courses.

The engineering cycle accreditation standard supports PBL

ENSIAS is accredited by the organization Agence Nationale d'Evaluation et d'Assurance Qualité de l'Enseignement Supérieur et de la Recherche Scientifique, known as ANEAQ. ANEAQ's published standards for the engineering cycles in Morocco show that there is room for PBL within ENSIAS curriculum. The standards outline how projects can be used as a module or module element, how a university can set their own guidelines for assessing student work, and how modules can be graded by various departments (ANEAQ, 2014). ANEAQ also calls for the continuous assessment and monitoring of student progress. Projects provide a deliverable that can be assessed throughout its development. Since there is student interest in PBL and it meets ANEAQ standards, we have developed recommendations for the inclusion of PBL within the ENSIAS curriculum.

Recommendations

Based on our findings, our recommendations for ENSIAS are as follows:

1. Form a Faculty Committee dedicated to expanding the use of PBL at ENSIAS

2. Hold an ENSIAS-lead training workshop on PBL for ENSIAS faculty
3. Develop a project-based interdisciplinary course for first-year students
4. Develop and implement a process for course evaluations
5. ENSIAS project teams complete team evaluations

Form a Faculty Committee dedicated to expanding the use of PBL at ENSIAS

We recommend ENSIAS form a faculty committee to champion PBL within the school. Without faculty support for PBL, the pedagogy will never be in widespread use. Members of the faculty committee would be provided with materials on PBL they could share with other faculty members. For example, information on the Gold Standard PBL and the flipped classroom pedagogy will be provided. This committee would allow PBL to come from professors and not solely the administration.

Hold an ENSIAS-lead training workshop on PBL for ENSIAS faculty

We recommend ENSIAS hold a PBL workshop that trains teachers on the definition of PBL, its benefits, and examples of PBL in various courses. Along with this recommendation, we provide many resources which we acquired through our research. This includes step-by-step instructions on how to form projects in specific courses and the Gold Standard PBL.

Develop a project-based interdisciplinary course for first-year students

We recommend ENSIAS provide a PBL course to first-year students. This course would be based around a single project. Students would work in groups to provide a solution to a real-world problem. Students are forced to collaborate to succeed and present their complete solution to each other. Upon completion of the course, the goal for students is improved independent learning skills, collaborative abilities, and presentation opportunities.

Develop and implement a process for course evaluations

Course evaluations allow for students to assess how engaging and effective their professors' teaching approaches are. This makes professors recognize student opinions and helps them understand what students would benefit from in the future. Evaluations will allow for improvements to be made to course material. Well-constructed questions will allow students to provide useful data as it pertains to their learning (The University of Arizona, n.d.). We provide an example teacher evaluation for referral.

ENSIAS project teams complete team evaluations

Project team evaluations, conducted through peer reviews, require students to evaluate their partners in group projects. Professors then understand what contributions each student is making toward the final product and ensure every student is contributing. Students will be encouraged to collaborate to guarantee a good grade on the project. Peer reviews are a structured learning process that allow students to give constructive critiques to each other.
Students will develop assessment skills that they can use to take responsibility and manage their own learning (Center for Teaching Innovation, 2020). We provide an
example student peer review worksheet for referral.

Conclusions

Based on our findings, PBL may be difficult to implement at ENSIAS. However, there is student interest for PBL and PBL would benefit ENSIAS. The ANEAQ accreditation standards which ENSIAS follows also supports the inclusion of PBL in curriculum. We developed recommendations for ENSIAS to further introduce PBL to their curriculum. We recommended

for ENSIAS to form a PBL faculty committee, lead a training workshop on PBL, develop a first-year project-based course, and complete course evaluations and project team evaluations. Additionally, we provided a deliverable to our sponsor with useful resources for further use of PBL. We hope implementing our recommendations will form the beginnings of PBL curriculum at ENSIAS.

Introduction

The workforce is constantly changing, and students need to adapt to these changes. The business world demands civic engagement, critical thinking, technological skills, collaboration, global awareness and effective communication (Ross, 2017). 21st-century skills have become increasingly important for students to learn in college (Ross, 2017). These skills are necessary when applying for jobs and ensure success in the workforce (Ross, 2017). Not all students are able to acquire these skills in a traditional classroom. Consequently, there is a higher demand for teaching pedagogies that develop 21st-century skills. Active learning is a teaching approach where students engage in the learning process, thus developing these critical skills (Center for Educational Innovation, 2019).

Project-based learning (PBL) derives from active learning and involves students in meaningful real-world projects (PBLWorks, 2019). PBL has many benefits including granting exposure to 21st-century skills. Students, therefore, understand complex problems and challenges not offered in traditional teaching approaches. The overarching goal of PBL is to inspire a love for learning, build a connection to education, and engage students in long-lasting knowledge (PBLWorks, 2019).

L'École Nationale Supérieure d'Informatique et d'Analyse des Systèmes (ENISAS), The National School of Computer Science and Systems Analysis, located in Rabat, Morocco, specializes in the fields of computer science and electrical engineering and offers additional STEM degrees.

The current lecture pedagogies practiced at ENSIAS do not address all 21st-century skills. Active learning is a new concept to ENSIAS and other Moroccan Universities. ENSIAS expressed interest in introducing PBL into their curriculum and was uncertain about where

to begin. Our project developed recommendations on how ENSIAS can implement project-based learning (PBL). To accomplish this, we built an argument for incorporating PBL at ENSIAS, diagnosed the current state of the teaching pedagogy used at ENSIAS, developed a usable framework for a future PBL workshop, and created recommendations for ENSIAS to implement PBL. These objectives were completed through individual, and group interviews and referencing previous research and workshops.

Following this segment is a background section where we present more in-depth research on PBL. The methodology behind our project will follow the background where we further explain our goals and objectives. The section containing our findings, recommendations, and conclusions follows the methodology section. The appendices for the methodology, findings, and recommendations will be at the end of the report.

Background

Introduction

Education provides people with knowledge and immense personal and social growth. The value of education cannot be overstated. Research is constantly conducted to determine the most effective ways of teaching students to further their education. Active learning is identified through research as an effective way of teaching because it engages and connects students to their classes. This type of learning allows students to develop social skills and expert knowledge they can use after graduation.

Active Learning

Active learning refers to teaching methods that push students to be "active participants," engaged in their courses (Center for Educational Innovation, 2019). This encompasses activities during and outside of class time. These techniques allow students to synthesize information by applying their knowledge to group activities. Class time is used to promote understanding by addressing student weaknesses (Center for Educational Innovation, 2019).

Active learning allows students to develop better critical thinking and interpersonal skills (Queen's University, 2019). Students possess more motivation, maximize information retention, and decrease the number of course failures (Center for Educational Innovation, 2019; Queen's University, 2019). Active learning leads to higher levels of individual growth and achievement through collaborative and hands-on experiences (Center for Educational Innovation, 2019). The flexibility of active learning means it can reach students across several disciplines. An adaptable and common approach to active learning is through project-based learning (PBL).

Project-Based Learning

PBL facilitates learning through the inclusion of projects in classes. A break from the traditional dependence on lectures allows for an increased focus on student engagement. Effective projects cultivate knowledge and engagement through key design elements.

The seven elements of an effective project are a challenging problem or question, sustained inquiry, authenticity, student voice and choice, reflection, critique and revision, and a public product (PBLworks, 2019). Students are able to have a tangible impact on realistic problems. Realistic problems allow students to connect with their work and be motivated by it. There are three needs for student motivation: competence, relatedness, and autonomy (Vallerand, 2000). Competence comes from sustained inquiry, reflection, and revision. Student voice and choice give a degree of autonomy to students. While instructors provide guidance through critique and revision suggestions, students have the final say. Effectively designed projects address students' needs for motivation.

Approaches to PBL

PBL can be applied and integrated into different teaching pedagogies. PBL applications include learning through flipped classrooms, course-specific individual or group projects, and workshops.

Flipped Classrooms

The flipped classroom method is a popular example of active learning used in PBL. Students learn material outside of the classroom through recorded lectures, assigned readings, and other exercises (Slomanson, 2014). Through this, students develop higher-level independent study and cognitive skills. A flipped classroom allows professors to vary their teaching model and establish new learning opportunities for students. The teacher becomes a "facilitator and

coach," enhancing student learning and autonomy (Omerad.msu.edu, n.d.). Professors expand on material students learn outside of the classroom. The flipped classroom model provides ample opportunities for projects and discussion during class time, transforming the classroom into a more dynamic environment (Omerad.msu.edu, n.d.). The students have more voice in their classes and a sense of responsibility to learn the course material (Heacademy.ac.uk, 2018). Students spend increased time interacting with course material and each other, improving student-to-student interaction and social skills (Omerad.msu.edu, n.d.).

A flipped classroom needs students that are eager to engage in active learning activities. If students do not take responsibility to learn course material, in-class time will not be productive (Omerad.msu.edu, n.d.). The flipped classroom approach is considered demanding for professors because they need to provide more feedback for students and continually assess student work (Omerad.msu.edu, n.d.). Projects are one method used by professors to engage and assess students.

Projects

Professors can draw from various types of projects to combine PBL with other teaching methods. Course-specific individual projects are assignments that students complete on their own outside of class. Individual assignments give students the advantage of learning topics on their own and taking full responsibility for their work. Students have creative freedom when approaching their projects and avoid having to compromise within a group (TCI, 2018). PBL enables students to gain skills through trial and error. Students are encouraged to think independently and gain self-sufficient problem-solving skills. (TCI, 2018). Students can apply PBL by finding a solution to a problem and analyzing their approach. Students become more

self-aware of their strengths and limitations. Course individual projects promote learning outside of the classroom and give necessary independence to students for future challenges and success. Course-specific group projects are completed with a team outside of class. Group projects present 21st-century skills to students and thrive on teamwork and collaboration to complete a task. Students learn how to deconstruct a task and allocate responsibilities to all members of the group (TCI, 2018). Students are capable of tackling more complex problems in comparison to individual projects (TCI, 2018). Each member should contribute the same amount of effort as others to achieve a favorable result. PBL can be applied to group work because projects encourage students to engage with one another through challenges. Course-specific group projects promote collaboration and allow students to identify and improve their weaknesses.

A capstone project is a culminating academic assignment that students commonly complete during their final year in school. Capstones prepare students for higher academic institutions or the workforce. Topics are generally department-specific and can include research projects. Students gain professional development and demonstrate their learning and proficiency in a specific discipline (Partnership, G. S., 2016). Students gain more confidence in their knowledge through a challenging project. Capstones increase student motivation, engagement, and career aspirations (Partnership, G. S., 2016). Beyond this, capstones create an environment where students can share their knowledge within the academic community.

Benefits of Project-Based Learning

PBL has abundant benefits that make its application valuable to the curriculum of higher-level education courses. Projects connect students to the real world and develop their critical thinking, problem-solving, and social abilities. By learning through projects, students acquire in-depth flexible knowledge that translates to improved test scores and entrepreneurial skills.

Connection to Reality

A key facet of PBL is how it forms a connection to the world outside of the classroom. PBL creates a focus on real-world issues through the inclusion of realistic problems. PBL reproduces the conditions that experts learn from in the real world (Thomas, 2000). This simulation familiarizes students with the types of issues they can solve with the knowledge from their courses and skills they develop through education. PBL engages students by forming a relationship between higher-level education and tangible problem-solving, students develop a better ability to apply and support ethical appeals (Stepien et al., 1993). PBL also improves students' ability to use reasoned arguments as they work to solve social problems (Stepien et al., 1993). As students work through their realistic projects, they are immersed in creativity and innovation.

Entrepreneurial Mindset

An entrepreneurial mindset is crucial for cutting edge innovation. It allows students to identify opportunities, evaluate markets, and recognize the "bigger picture" (KEEN, 2017). The Kern Entrepreneurship Education Network (KEEN) Institute's mission is to foster the entrepreneurial mindset in student engineers. According to the KEEN Institute the core components of the entrepreneurial mindset include curiosity, connections, and creating value (KEEN, 2017). Curiosity exemplifies the importance of asking questions to uncover new advancements. Innovative solutions are built from connecting the information of different contexts. Creations are based on opportunity, impact and stakeholders. Consequently, students must be educated to adapt to the "needs of a changing world" (KEEN, 2017). An entrepreneurial mindset allows students to think critically about their engineering field and contribute value to

the industry. Students are also more eager to complete challenges and propose ideas to employers.

The KEEN Framework combines opportunity, design, and impact by coupling the engineering skill set with an entrepreneurial mindset. At the Colorado Technical University College of Engineering (CoE), they utilize the KEEN model to develop the entrepreneurial mindset in undergraduate students to achieve their mission. Their mission seeks to shape "team-oriented engineering professionals" who are prepared to propose solutions and add value to the "dynamic world" (Santigo, 2017). Professors attended a workshop intended to help build students entrepreneurial mindsets. The professors then created a set of learning modules based on this workshop using the KEEN model. In 2017, the CoE embedded Entrepreneurial-Minded Learning (EML) activities throughout courses in the program curriculum. Before the inclusion of EML, students were already offered technical problem-solving in capstone courses. The inclusion of EML allowed students to graduate not only with the technical "know how", but also the "why" mentality (Santigo, 2017). CoE incorporated elements of PBL into undergraduate curriculum and integrated EML into courses (Santigo, 2017). CoE surveyed students from an experimental engineering course and recorded preliminary results. Student feedback indicated that EML modules fostered the KEEN defined entrepreneurial skill set.

The purpose of EML is not about startups, it is about creativity and improving society (Santigo, 2017). EML modules are uniquely employed throughout all four years of the Civil-Engineering (CE) curriculum at Villanova University and the University of New Haven to encourage an entrepreneurial mindset in students. These modules are implemented into courses through the flipped classroom pedagogy. Flipped classroom enables success since out-of-class-time is dedicated to learning new material and in-class time is spent applying the new

knowledge. The University of Florida College of Engineering offers a course which mimics "the real-world experiences of enterprise formation and growth in an academic environment" through the use of project work (Santigo, 2017). EML has also been integrated into design projects at Arizona State University, and various projects at other universities as well (Santigo, 2017).

The curiosity, connections, and creation of value that define entrepreneurship can be fostered through a PBL curriculum. The long-term impacts of PBL was displayed through a study that will be referred to throughout the text as the WPI Alumni Study. The WPI Alumni Study was conducted through surveying previous undergraduates of Worcester Polytechnic Institute (WPI), varying in graduation year from 1974 to 2011 (Heinricher et al., 2013). Each respondent engaged in PBL throughout all years at WPI. The study relied on the Likert scale of seven questions where respondents gave numerical rankings from a great negative impact to a great positive impact. Respondents answered questions concerning how their experience with PBL as an undergraduate affected them after graduation.

Table 1

Project-Based Learning Impacts Associated with the Entrepreneurial Mindset

Area of Impact	***n***	**% "Much" or "Very Much"**
Solve problems	2471	67
Develop ideas	2473	68
Make connections across disciplines	2461	52
Effectively manage a project	2470	65
Function effectively on a team	2419	66
Interact effectively within a professional capacity	2463	64
Effectively manage interpersonal dynamics	2465	58

Be an effective leader	2418	53
Understanding of the connections between technology and society	2456	50
Function effectively in the "real world"	2461	66
View issues from several different perspectives	2460	61
Succeed in business or industry	2446	54

Note. Shows the impacts associated with the entrepreneurial mindset. Recreated from "Long-term Impacts of Project-Based Learning in Science and Engineering" by Heinricher et al., (2013).

Table 1 displays the benefits of PBL that foster the entrepreneurial mindset. Over 50% of respondents to the survey reported that working on projects during their undergraduate years impacted their future abilities to develop ideas, make connections across disciplines, solve problems, be an effective leader, and succeed in business or industry (Heinricher et al., 2013).

The University of Pretoria (UP), in South Africa, holds a first-year entrepreneurship course for undergraduates that utilizes PBL. Through student lectures, individual case studies, and group projects, students were able to practice skills essential to building an entrepreneurial mindset (Bortha, 2010). UP's motto "you do, we listen, you remember" embodies the foundation of PBL (Bortha, 2010). Students completed a survey that focused on creativity and innovation, entrepreneurial characteristics and orientation, and routes to entrepreneurship. Each category surveyed resulted in perceived positive impact after taking the course due to the flipped classroom method of teaching (Botha, 2010). After taking the class, students reported a strong increase of their entrepreneurial skills such as creativity and being innovative. They reported being able to determine the value of pre-existing businesses. Using PBL as an approach to entrepreneurship education can shape an entrepreneurial mindset in students.

Employing projects as a way to instruct entrepreneurship has proven to build business and soft skills that lead to the creation of start-ups (Jarrar & Anis, 2016; Botha, 2010). The University of Ottawa in Canada has integrated PBL into a class to teach engineering with a focus on entrepreneurship. Students complete individual research and group projects that require them to collaborate and design a product to sell to potential customers. In a post-class survey, students reported that the class had a positive impact on their soft skills (Jarrar & Anis, 2016). Groups of students have reported to have formed over 60 start-ups as a result of PBL in their class (Jarrar & Anis, 2016; Botha, 2010). The improvement of project management, teamwork, and communication skills helped the students collaborate to form these start-ups. These start-ups demonstrate how PBL can be used to develop and increase student interest in the entrepreneurial mindset.

Increased Student Interest and Abilities

Beyond the entrepreneurial mindset, PBL has been found to advance students' interest in courses and increase student engagement. In engineering schools, students experience an increased interest in STEM after interacting with STEM-related projects that contextualize knowledge gained in or out of class (Laforce, Noble, & Blackwell, 2017). In experimental self-reports, students described how PBL increased their confidence, learning, and social skills (Thomas, 2000; Horan, Lavaroni, and Beldon, 1996). PBL students show increased collaboration, initiation, ability to manage, and awareness when compared to control groups (Thomas, 2000). These skills are attributed to effective group collaboration.

Many schools have incorporated PBL into course curriculums because of the attributed improved skills and student interest. Researchers completed a case study at the University College Dublin (UCD) where they looked at the effects of PBL on CE master's students (Gavin,

2011). The program was designed for students who have completed a Bachelor of Science in CE or an equivalent major. The CE design course was offered during the first semester of UCD's two-year CE Master program. Researchers designed their own PBL module that was catered to the CE design course (Gavin, 2011). The module was a holistic view of important elements that should be considered in PBL curriculum. These elements are objectives and knowledge, types of problems, progression, size and duration, student learning, academic staff facilitation, space and organization, and assessments and evaluations (Gavin, 2011). Throughout the course, students were assigned to work in groups to solve challenging problems and then present their designs and findings to their peers. Researchers were able to gather information on student feedback and performance through surveys and class evaluations. The collected results displayed improvement in students understanding the material covered in the lectures.

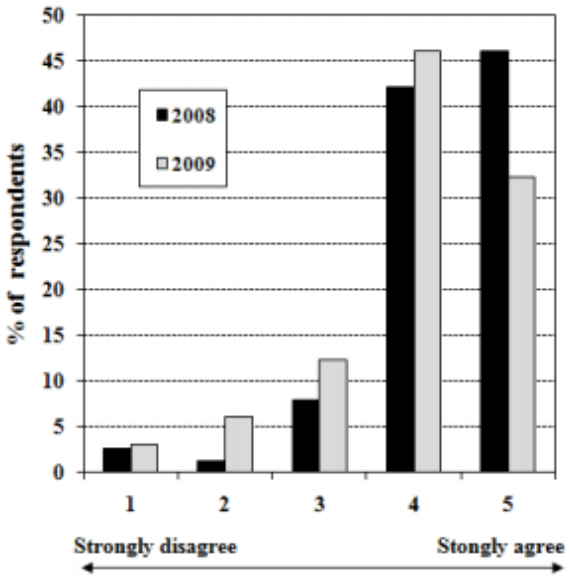


Figure 1. Response to PBL improving understanding of material covered in lectures. Adapted from "Case study of a project-based learning course in civil engineering design" by Gavin, (2011).

Students were also asked to rank the importance of defined PBL elements that were used throughout the course. As exhibited in Figure 1, students reported that PBL helped to improve their understanding of material covered in lectures. The top three elements students ranked as the most important were quality of working groups, competence of individuals, and guidance by the lecturer.

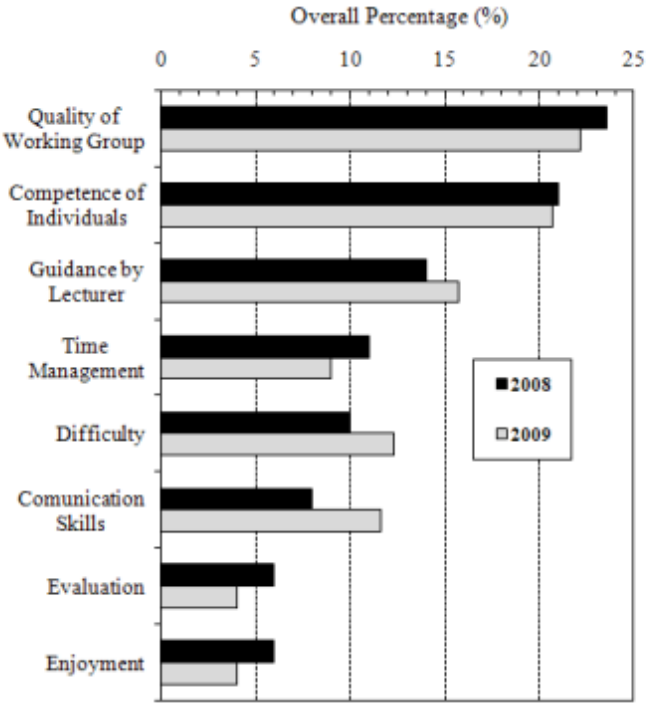


Figure 2. Response to the rated importance of certain elements of PBL. Adapted from "Case study of a project-based learning course in civil engineering design" by Gavin, (2011).

Figure 2 displays how important students reported specific elements of PBL to be. 70% of the students were in favor of expanding PBL to other parts of their curriculum and 90% of students said that their understanding of the material improved compared to traditional lecture classes (Gavin, 2011). WPI is one university that has expanded PBL throughout their curriculum.

A study of WPI Alumni, conducted in 2013, found that PBL had many impacts related to increased student interest and abilities.

Table 2

Project-Based Learning Impacts Associated with Increased Student Abilities

Area of Impact	*n*	%"Much" or "Very Much"
Take responsibility for own learning	2475	72
Master fundamental concepts and methods in the major	2453	61
Develop a solid base of knowledge	2466	58
Make connections across disciplines	2461	52
Effectively manage a project	2470	66
Write clearly and effectively	2490	56
Deliver effective presentations	2453	51
Develop a stronger personal character	2461	66
Feelings that one's own ideas are valuable	2455	52

Note. Shows the impacts of PBL associated with increased student abilities. Recreated from "Long-term Impacts of Project-Based Learning in Science and Engineering" by Heinricher et al., (2013).

72% of respondents said that their experience with PBL either positively or greatly impacted their ability to take responsibility for their own learning (Heinricher et al., 2013). 66% of respondents said that PBL enabled them to develop a stronger personal character (Heinricher et al., 2013). The majority of respondents reported that PBL either positively or greatly impacted their ability to write clearly and effectively and deliver effective presentations (Heinricher et al., 2013). Table 2 shows other findings from the WPI Alumni Study.

The short and long-term impacts of PBL lead to increased student engagement and overall interest in their courses and field of study. Student engagement and interest is "positively and significantly correlated" to higher test scores (Scheidler, 2012). Furthermore, PBL

encourages students to hone their critical thinking skills to better their academic performance and real-world experiences.

Critical Thinking and Student Performance

Students develop critical thinking skills as they consider the large-scale impacts of their problem and work to find a solution. PBL often incorporates "ill-structured projects" that imitate or copy unsolved problems (Gallagher et al., 1992). The answers to these projects are not clear-cut. PBL develops proficiency in inquiry and problem-solving as students must work autonomously to come up with a solution (Gallagher et al., 1992). As students undertake these challenging projects, they show gains in critical thinking behaviors, shown through the use of the Cornell Critical Thinking Test (Shepherd, 1998). These skills include synthesizing, forecasting, producing, evaluating, and reflecting (Horan, Lavoroni, and Beldon, 1996).

Critical thinking enables students to gain a better knowledge of factual content through problem-solving (Barrows, 1992). A study of traditional and problem-based methods for teaching mathematics over several years in Great Britain demonstrates the benefits of critical thinking. The study concluded that students under PBL instruction passed the national examination at significantly higher rates with higher scores (Boaler, 1998). Learning in the context of problem-solving is more flexible and has a greater chance of being remembered (Boaler, 1998; Bransford et al., 1990). In mathematics courses, students instructed through projects can answer conceptual questions better than their traditionally instructed peers. This exemplifies how PBL students can apply their knowledge in a flexible manner (Boaler, 1998).

State standardized tests examine the math and science ability of students as well as their reading and comprehension levels. PBL students show an improvement in test scores across the board. Elementary and middle schools across the United States have implemented Expeditionary

Learning programs that use an "interdisciplinary project-based curriculum" (ELOB, 1999). Students in Dubuque, Iowa were enrolled in a PBL curriculum for four years scored "above the district average in almost every area" on Iowa standardized tests (ELOB, 1999). In Massachusetts, a Boston inner-city middle school held the second highest scores in the district after the implementation of projects through PBL (Thomas, 2000). A middle school in Portland, Maine implemented PBL through an Expeditionary Learning curriculum. This school showed improvement in all areas covered by Maine standardized testing. Scores improved by an average of 59 points (ELOB, 1999). This is an immense improvement compared to the rest of Maine, where the average improvement was 15 points (Thomas, 2000). Similar schools using project-based curriculum showed improvement on standardized tests from other states such as Colorado, Georgia, Ohio, Tennessee, and New York (Thomas, 2000). Overall, schools that implemented PBL displayed above-average performances that improved year to year (Thomas, 2000). PBL students were able to outperform students from either the same or similar district and background because of their engaging and effective project curriculum.

Advanced Placement (AP) courses and exams are offered in the United States and Canada. These exams measure how well students understand the content of a specific subject and are equivalent to first year college courses. The Knowledge in Action project compared the outcomes of AP exam scores amongst students who were taught using PBL and those who were not (Edutopia, 2013). The study compared AP United States Government and Politics and AP Environmental Science. The research showed that students taking the PBL course do as well or better when compared to students in control classrooms (Edutopia, 2013). In 2012 to 2013, PBL courses were also introduced to two poverty-impacted schools who had an 88% passing rate when using PBL in comparison to the national average of 24% passing rate. 80% of the students

who took the PBL course reported that the most rewarding outcome of the course was the ability to apply acquired knowledge outside of the classroom (Edutopia, 2013). PBL has been applied to courses in high schools and gives students the ability to strengthen their knowledge and have higher success rates on more difficult exams.

Table 3

Impacts Related to Critical Thinking and Student Performance

Area of Impact	***n***	**%"Much" or "Very Much"**
Function effectively on a team	2419	66
View issues from several different perspectives	2460	55
Function effectively in the "real world"	2460	61
Succeed in business or industry	2446	54
Make connections across disciplines	2461	52
Integrate information from multiple sources	2477	65
Master fundamental concepts and methods in the major	2466	61
Understand ethical responsibilities	2314	35

Note. From the 2013 Alumni study run at WPI. Shows the impacts of PBL on critical thinking and student performance. Recreated from "Long-term Impacts of Project-Based Learning in Science and Engineering" by Heinricher et al., (2013).

There are many long-term impacts of PBL related to critical thinking and student performance. The WPI Alumni study defined several of these impacts displayed in table 3. Students of PBL found that they could view issues from different perspectives and make connections across disciplines (Heinricher et al., 2013). Additionally, participants found they could integrate information from multiple sources. These skills are carried on into the real world, including being able to succeed in business or industry and effectively function on a team.

Conclusion

Given the benefits of PBL, ENSAIS would like to establish a framework for incorporating more PBL into their curriculum. Our project analyzed the feasibility of introducing PBL into the curriculum of a Moroccan university. PBL shows promise in the future of higher education and will benefit students, universities, and employers. 21st century skills cannot be easily attained in traditional classroom settings. Successful PBL students work effectively on a team and utilize their variety of abilities to solve real-world problems. PBL facilitates the development of critical tools for the workforce and can establish an entrepreneurial mindset in students. Therefore, implementing PBL creates a better outcome and more opportunities for students. In the next chapter we discuss the methodology that shapes our project.

Methodology

This project developed recommendations on how ENSIAS can implement project-based learning (PBL). Three main objectives were constructed to accomplish this goal. The first objective was to build an argument for incorporating PBL at ENSIAS. The next objective was to diagnose the current state of the teaching pedagogy used at ENSIAS. The final objective was to create recommendations for engineering educators at ENSIAS to implement PBL. PBL shows promise in STEM universities like ENSIAS. This project demonstrated the benefits of PBL to ENSIAS and potentially other Moroccan Universities. We explored the current state of the curriculum at ENSIAS and provided recommendations for faculty to implement PBL. The chosen methodologies included classroom observations and online surveys as well individual and group interviews. Sponsor and faculty feedback alongside previously suggested workshops were also utilized. Refer to Appendix A for our timeline. We thoroughly examine our objectives and ensuing methods below.

Objective 1- Build an argument for incorporating PBL at ENSIAS

In order to build an argument for the incorporation of PBL, we researched PBL for our literature review in detail. We worked to define active learning, the flipped classroom pedagogy, and how PBL incorporates these learning elements. We discussed the different types of projects used in PBL and how workshops can train faculty to use PBL. We highlighted the many benefits of PBL in order to make a case for why it should be incorporated at ENSIAS. We outlined how PBL provides a connection to reality and engages students. We showed how PBL leads to increased student abilities relating to 21st-century skills and improves academic performance using several studies. Upon arrival in Morocco, we additionally concentrated on how PBL learning can develop an entrepreneurial mindset in students and prepare them for a

competitive workforce and economy. We expanded on our initial literature review to include more studies on why PBL is effective and how it can be used in classes with entrepreneurship. We presented our updated literature review to explain why PBL would be beneficial to ENSIAS.

We then translated and reviewed the engineering cycle accreditation standards which ENSIAS follows. ENSIAS is accredited by ANEAQ,
or Agence Nationale d'Evaluation et d'Assurance Qualité de l'Enseignement Supérieur et de la Recherche Scientifique (ANEAQ, 2014). We observed the outcomes and requirements of the ANEAQ accreditation and evaluated how PBL could potentially fit into those standards. This led us to build a more complete argument on how to incorporate PBL into the current engineering standards at ENSIAS. Refer to Appendix B for a matrix that relates the ANEAQ accreditation standards to PBL.

Additionally, we created a brochure that highlights what PBL is and the benefits associated with PBL. We built the brochure to distribute to faculty and students we interviewed. This assisted in the description of our project and surpassed the language barrier. Refer to Appendix C for the brochure.

Objective 2- Diagnose the current state of the teaching pedagogy used at ENSIAS

The challenges faculty and students endure with current teaching pedagogies at ENSIAS were unknown. First, we interviewed ENSIAS faculty to identify their teaching approach and obstacles. To accomplish this, we conducted individual interviews at ENSIAS to identify people that were most relevant to our research question. We spoke with a total of eight faculty members at ENSIAS. During individual interviews, we asked faculty in-depth questions about PBL and ENSIAS. These discussions focused around their challenges with students and ENSIAS itself as

a professor. Refer to Appendix D for interviews conducted with faculty at ENSIAS. Alongside these interviews, we sent out online surveys to receive responses from more faculty. The purpose of the survey was to draw a larger number of responses than interviews alone. However, we only received one response to the survey. Refer to Appendix E for the distributed online survey.

In order to provide recommendations to ENSIAS on how to implement PBL, we needed to speak with faculty from other Moroccan schools. We interviewed eleven professors from the Universite Internationale de Rabat (UIR). These faculty members informed us about the teaching pedagogies utilized at UIR. UIR is a private university where students pay a relatively high tuition for their education. ENSIAS is a publicly funded school where students receive their education for free. Interviews with the faculty from UIR permitted us to compare responses with faculty from ENSIAS. Refer to Appendix F for interviews conducted with faculty at UIR. We also spoke with five professors outside of ENSIAS and UIR. Refer to Appendix G for interviews conducted with faculty from other universities.

Additionally, we observed classroom dynamics at ENSIAS. One professor allowed us to sit in on their class period. We received permission from students to observe this class. Our observations were necessary to identify the typical teacher-student relationship and the amount of interaction. We monitored student engagement throughout the class period. These observations aimed to uncover the extent of active learning techniques used at ENSIAS. Refer to Appendix H for an example of what we observed in the classroom.

We also participated in an English-taught classroom discussion. The class activity was focused on debating whether breaking the law on copyright by file sharing was ethical or unethical. We engaged in conversation with students and acted as students at ENSIAS for the day. In comparison to observing a classroom, being involved in the discussion enabled us to see

active learning unfold and understand student participation in the classroom ourselves. We noted the methods the professor used to engage his students. Refer to Appendix I for the questions used to conduct this discussion.

Next, we identified challenges students face at ENSIAS. We held one group interview with six students. This group interview intended for us to interview more students during our data collection period. We asked questions regarding class engagement, improvements they would make to the curriculum, and challenges they experience at ENSIAS. Refer to Appendix J for interviews conducted with students at ENSIAS. This group interview allowed students to express opinions in an open space. Additionally, students gained clarification and broader information on discussed topics (Frey & Fontana, 2002). The group interview obtained the students' detailed opinions on pedagogies at ENSIAS. We also conducted individual interviews with three students, where we asked the same questions. Alongside these interviews, we distributed an online survey regarding classroom engagement to students. We obtained 32 responses to this survey. This allowed us to obtain anonymous results focused solely on student engagement to support data collected from the interviews. Refer to Appendix K for the distributed online survey questions and results.

Objective 3- Create recommendations for ENSIAS to implement PBL

The end goal of this project was to develop recommendations on how ENSIAS can implement project-based learning. The last objective was to compile data we collected to provide recommendations to ENSIAS based on our analysis. To produce recommendations, we combined the research on why PBL is beneficial to universities and the current state of pedagogies at ENSIAS. This research enabled us to pinpoint why PBL could be effective at

ENSAIS and identify potential barriers of PBL. This allowed us to further develop these recommendations.

Ethical Considerations and the Institutional Review Board

We submitted our methodology for approval from the WPI IRB for consideration. We followed all of the IRB procedures. We also informed participants that their involvement is voluntary in our interviews and observations.

Conclusion

The combination of individual, and group interviews, surveys and observations gave us sufficient data to inform our recommendations. We faced challenges during our data collection process, specifically the number of survey responses and acquiring interviewees. We developed our findings and recommendations with these challenges in mind.

Findings

The purpose of our research was to develop recommendations on how ENSIAS can implement project-based learning (PBL). The following section presents our findings and analysis in order to present these recommendations to ENSIAS.

Our findings are as follows:

1. There is not widespread commitment to PBL amongst faculty at ENSIAS
2. The current schedule of ENSIAS does not support the implementation of PBL
3. Students have an interest in PBL at ENSIAS
4. The engineering cycle accreditation standard supports PBL

Finding 1: There is not widespread commitment to PBL amongst faculty at ENSIAS

Our team worked in Morocco for seven weeks. During these seven weeks, we interviewed eight faculty members from ENSIAS, eleven faculty members from UIR, and five professors outside of these schools. The eight interviews conducted at ENSIAS were scattered throughout the term. One interview occurred at the start of our data collection process, four took place at the end of our data collection, and three were completed after our intended end of data collection. Our team struggled to schedule interviews with faculty at ENSIAS. However, at UIR, we were able to setup and conduct eleven interviews in one day. Although the professors we spoke with at ENSIAS were eager about project work and student engagement, there was no urgency from other professors to speak with us on the matter. We were also unable to speak with any administration at ENSIAS. This demonstrates a lack of widespread faculty interest in PBL at ENSIAS at this time.

Our team was unable to ascertain a clear vision from our sponsor. Our sponsor was not willing to provide professors' contact information for interviews and instructed us to distribute a survey to faculty instead. We built our survey for our sponsor to distribute and requested for it to

be distributed multiple times. We received one response to this survey from a professor we directly sent it to. Based on the lack of response, we are not confident that the survey was forwarded. Given the lack of interest in our project, we concluded that at this time there is a lack of faculty commitment to PBL at ENSIAS.

Finding 2: The current schedule of ENSIAS does not support the implementation of PBL

We discovered the current schedules of students and professors do not support implementing PBL. Implementing PBL requires a large time commitment where more work is primarily done outside of the classroom by both the students and professors (Bouhuijs, 2011). We found it would be difficult to introduce PBL currently.

ENSIAS is accredited by ANEAQ, which stands for Agence Nationale d'Evaluation et d'Assurance Qualité de l'Enseignement Supérieur et de la Recherche Scientifique (ANEAQ, 2014). The ANEAQ Engineering Cycle Accreditation Standards state the "minimum overall semester schedule [includes] 384 hours of teaching and assessment and a Project of End Study" (ANEAQ. 2014). The minimum of 384 hours signifies that teachers spend a great deal of time lecturing over a semester. This reduces the time available for students and professors in the work week. Undergraduate students spend 30-35 hours in class every week (Clark, 2017). An undergraduate student we interviewed stated, "I spend 8 hours a day in class" (anonymous, student, 2020). Interviewed professors said they "do not have much time" outside of the classroom to assess student work (anonymous, student, 2020). Appendix L shows two schedules used by current students at ENSIAS. There is a limited amount of time professors and students have to meet with each other. Students and professors both stated that they have a hard time completing assignments and projects because they are in class all day.

The ANEAQ Engineering Cycle Standards also state that an "engineering course is composed of 30-40 modules spread over five semesters," (ANEAQ, 2014). Each module is composed of 1-3 courses, known as elements. Each semester is composed of 6-8 modules. Due to the large number of classes per semester, students do not have much time outside of class to collaborate on projects. Since there is a large amount of class time each week, implementing PBL will be difficult with the current class schedule as it relies on out-of-class, team-based work.

Finding 3: Students have an interest in PBL at ENSIAS

The implementation of PBL would require students to become "active participants" within the classroom (Center for Educational Innovation, 2019). We have found that students at ENSIAS already show an interest in PBL. Students want to increase their level of engagement within classes. Their current participation, along with their aspiration to increase their engagement levels, shows promise for the effective implementation of PBL at ENSIAS.

From our interviews and online surveys, professors have defined the lack of student motivation as a challenge in the classroom. Students have described some of their classes as not engaging, welcoming, or enjoyable. PBL can bring more student motivation and student engagement (Thomas, 2000; Horan, Lavaroni, and Beldon, 1996).

Many students reported having participated in activities that are essential to PBL in our interviews and surveys. As shown in Appendix K, 74% of students have reported having strong independent study skills. In interviews, students explained that their projects require them to solve technical issues. For example, computer science majors are often faced with technical challenges that need to be researched and solved on their own. These study skills are important in implementing PBL as it requires independent work on projects outside of class.

Students also wish to become more engaged with their classes and have a deeper connection with the material they are learning. Students have acknowledged that they lack the skills needed to apply the theory they learn in their classes. The student survey highlighted two major aspects of the classes that students enjoy the most in their courses at ENSIAS. The first is that students enjoy when classes link theoretical material to its real-world application. The second course aspect students enjoy is when professors actively engage students with the course material throughout the class.

A dependent t-test for the difference in means was conducted on these two sets of results. Both t-tests were run with 26 degrees of freedom. As shown in Appendix K, each question was asked on a five-point Likert scale based on how much they agreed with certain statements. A p-value is reported with each t-test to measure the level at which the results could be due to error. By having a p-value of less than .05, we were able to determine that our results are significant and not a result of error.

There is a statistically significant difference in the level at which student expectations of real-world connection and student engagement were met for classes that they enjoyed (M=3.156, SD=1.298) versus did not enjoy (M=1.906, SD=1.088), $t(26)$=4.846, p=0. This demonstrates when classes have a connection to the real-world, students enjoy the classes more. A third-year student specified that it was “fascinating and illuminating to [see] how [class material] can be applied in real-life situations” (anonymous, student, 2020). Students enjoy classes more when they contain real-world applications.

The faculty members at ENSIAS recognize that students are more engaged when professors involve material with real-world applications. A former professor of ENSIAS explained, “students enjoyed [open-ended projects]. They would use their projects as a key point

on their resumes to show the skills they gained from real-world experiences" (anonymous, professor, 2020). PBL can be used to provide the aspects of courses students enjoy. As shown in these two sets of results, there is currently student interest in PBL at ENSIAS.

Finding 4: The engineering cycle accreditation standard supports PBL

The ANEAQ accreditation body publishes national educational standards booklets to outline the education standards that Moroccan universities and faculty, such as ENSIAS, must set and follow. The standards for the engineering cycle show that ENSIAS can use PBL within their course curriculum. The standards state that the institutions "shall develop regulations for the assessment of knowledge, skills, and abilities and of competences," meaning that ENSIAS can develop regulations that include PBL in the assessment of students (ANEAQ, 2014). The standards outline several places where projects can be incorporated in the module system used at ENSIAS. The standards outline the composition of modules that determine the individual courses a student may take. Module elements can be a theoretical class and a practical activity or project relating to the subject. ANEAQ states that the "assessment of knowledge, skills, and competencies for each module is carried out in the form of continuous monitoring," (ANEAQ, 2014). Projects can be continuously monitored for progress and student success. Also, ANEAQ states the reportable projects can be carried out as part of the training. Refer to Appendix B for a matrix which shows how PBL meets the engineering accreditation standards.

Conclusion

We found that the full implementation of PBL at ENSIAS would be hindered by the lack of widespread commitment within faculty for PBL and the current student schedule. Despite these challenges, we found there is student interest in PBL and support from the ANEAQ

accreditation standards. Due to these factors, we have developed recommendations below to further PBL at ENSIAS.

Recommendations and Conclusions

Based on our research and analysis, we have made concluded recommendations for ENSIAS to further the introduction of PBL. These next steps will help increase student engagement and develop 21st century skills in students.

Our recommendations for ENSIAS are as follows:

1. Form a faculty committee dedicated to expanding the use of PBL at ENSIAS
2. Hold an ENSIAS-lead training workshop on PBL for ENSIAS faculty
3. Develop a project-based interdisciplinary course for first-year students
4. Develop and implement a process for course evaluations
5. ENSIAS project teams complete team evaluations

Recommendation 1: Form a PBL faculty committee dedicated to expanding the use of PBL at ENSIAS

We recommend that ENSIAS forms a PBL faculty committee. A PBL faculty committee is a group of faculty members that are willing to champion PBL as a pedagogy. These professors are provided with resources to inform other professors about how to use PBL in their courses. For example, these professors will provide information on Gold Standard PBL and flipped classroom to their peers. We found that there is not currently a lack of support for PBL at ENSIAS, which would make implementation difficult. We are recommending ENSIAS forms a PBL faculty committee because there is currently not enough PBL faculty support at ENSIAS. The group of faculties on the committee will champion PBL to reach a widespread knowledge and acceptance of PBL as a pedagogy at ENSIAS. While the administration can guide the incorporation of PBL, professors need to embrace the pedagogy for it to be successful. Therefore, the push for PBL needs to come from within the faculty. This faculty committee

will address the current lack of commitment to PBL at ENSIAS and develop the formation of PBL at ENSIAS.

Recommendation 2: Hold an ENSIAS-lead training workshop on PBL for ENSIAS faculty

We recommend that ENSIAS leads a training workshop on PBL. A workshop is a teaching technique that allows groups of people to engage in discussions and participate in activities associated with the discussion. Workshops can introduce PBL to an audience, discuss how to approach problem-solving, and working in teams. Different implementations of PBL include the classroom, assigned homework, afterschool programs, and more. Workshops are beneficial because they allow people to gain new skills, become motivated through work, and gain new opportunities (Tomorrow's World Today, 2018). Workshops can give content to why PBL is effective and promote discussion amongst the audience. A workshop incorporates collaboration and engagement which are important aspects of PBL. Workshops can effectively introduce PBL as they inherently use the concepts that make PBL successful.

Conducting a workshop will educate the ENSIAS community on PBL and how it can be applied within their curriculum. The workshop will be followed by an activity that demonstrates how to apply PBL. The workshop should focus on the benefits of PBL. We will provide the facilitators of the workshop with the research we gathered in our literature review. WPI resources will be provided to demonstrate how to structure workshops on PBL. We suggest the workshop should contain what PBL is and the Gold Standard PBL Design Elements. Elements of PBL include a challenging problem or question, sustained inquiry, student voice and choice, and more. Refer to Appendix N for a Gold Standard PBL detailed report. Refer to Appendix M, section 2, for all the provided resources compiled on workshops.

We suggest the workshop be a series of days which highlight important aspects of PBL for the community of ENSIAS to know. After defining what PBL is, the workshop should show the participants how to build projects within their courses. This is essential because professors of various different disciplines will be in attendance. ENSIAS is already familiar with using projects in coursework. New projects can be modeled using Gold Standard PBL in order to incorporate PBL into the curriculum at ENSIAS. Projects following this standard provide the full benefits of PBL (PBLworks, n.d.).

The goals of PBL and the accreditation standards provided by ANEAQ coincide with the outcomes of the engineering program. How projects are presented to students will spark that change needed to push the implementation of PBL. Once the participants learn how to create PBL projects for their courses, the workshop should then highlight how to incorporate these projects within their courses. The projects should surround material covered in class. Theories from class can then be applied to practical applications through projects. Students have stressed wanting to do more "real world projects" based on our student interviews. Real world projects will allow them to gain the skills needed for the workforce.

We interviewed a professor at ENSIAS who expressed interest in having a PBL workshop. This professor stated they "wanted a good workshop on PBL for the whole university and not just ENSIAS" (anonymous, professor, 2020). PBL can reach the ENSIAS community through a workshop and continue to spark interest amongst other professors.

We recommend a workshop because ENSIAS will benefit from informing faculty and staff on PBL and help them introduce the idea PBL to the school. Currently at ENSIAS, most professors do not have any teacher training. Many receive their PhDs and start teaching after receiving their degrees. Professors do not possess all the knowledge on how to engage students

and create an active learning classroom. This workshop will address the current lack of commitment to PBL at ENSIAS. Once professors develop and understanding of the basis of PBL and how to use PBL approaches in the classroom they will understand the long-term effects of PBL. More professors will want to embrace PBL and add these approaches to their classrooms. The combination of a PBL faculty committee and this PBL workshop will spark interest in more professors and further PBL at ENSIAS.

Recommendation 3: Develop a project-based interdisciplinary course for first-year students

We recommend that ENSIAS create a first-year project-based course. The course aims to expose students to the process of conducting research at the university level. This multidisciplinary research would be conducted on topics outside the students' field of study. Students at ENSIAS have shown interest in wanting to make real-world connections in their work. They have reported their favorite classes to be those that allow them to explore their interests within the subject matter. This can be achieved by a course like the Great-Problems Seminar (GPS) held at WPI for first-year students.

The purpose of the GPS course is to identify issues that confront communities and introduce intuitive ways of solving these problems. The GPS course is broken down into two parts over the course of the semester. The first part consists of background research to assist the students with a proposal for their project. The second part of the semester is dedicated to the execution of their proposal. As shown in Appendix M, section 3.3 and section 3.4, there is a separate syllabus which is given out for each part of the course. At the end of the semester,

students present their projects with poster presentations. Appendix M, section 3.1, shows an example presentation created and presented by students in 2013.

Students work in groups to research topics, collaborate, present proposals, and complete other assignments. Working on a team allows for students to grow their communication, collaboration, project management, and personal development skills (Antonio et al., 2017; Neal et al., 2015). This course will improve student soft skills which are necessary for the workforce, including writing and communication skills. Appendix L displays the learning objectives for the course which mention specific soft skills students should attain from the course. Students can then use these acquired skills in later courses at ENSIAS.

The implementation of a first-year project-based course at ENSIAS will require the professor to supply students with several resources. A course syllabus will need to be provided to students at the start of class that outlines course expectations. Each assignment should have its learning objectives outlined, as shown in Appendix M, section 3.5. Professors also need to provide timely feedback to students.

The ANEAQ accreditation standard for an engineering cycle provides a breakdown for the time in modules relating to management, language, and communication. We believe this project-based course could combine an element of these modules with another in mathematics or science. Professors would need to rearrange in-class time to allow for student team meetings to provide feedback. Students would also provide feedback for professors through course evaluations to determine if PBL is used effectively. This leads into our next recommendation, which permits students to give feedback about the course.

Recommendation 4: Develop and implement a process for Course Evaluations

We recommend that students complete course evaluations. Course evaluations are typically anonymous and given to students at the end of a course. They identify what boosts student performance and what needs improvement in a course. They serve to measure professor performance and allow the professor to see ways they could improve (The University of Arizona, 2020). Questions include the amount of work given in the class, the availability of the professor, the classroom manner of the professor, the classroom atmosphere, and more. Refer to Appendix O for an example course evaluation.

We are recommending course evaluations to improve class structure at ENSIAS. ENSIAS does not currently have formal course evaluations. Based on multiple interviews conducted at ENSIAS, professors think that student feedback is important. One professor stated that "course evaluation would help me as a professor. You can adapt your courses and understand why the students are not attending the courses" (anonymous, professor, 2020). Another professor expressed that "we do not have good feedback from students and do not know how they view their courses and the teaching here" (anonymous, professor, 2020). Course evaluations detect current pedagogies in the classroom and will help professors understand what students like and dislike about current pedagogies used in the classroom. If professors are using PBL techniques, they will know if students enjoy those approaches. This will assist in tracking the inclusion of PBL in different classrooms and evaluate if new approaches to teaching are effective. Professors can then structure their class time more effectively for students to be more motivated to learn and contribute. Students will then have higher interest in courses and are more likely succeed. Course evaluations strengthen teaching

and the learning outcome of students by measuring the teaching effectiveness throughout the class (The University of Arizona, 2020).

Recommendation 5: ENSIAS project teams complete team evaluations

We recommend that students complete project team evaluations. Team evaluations refer to the process in which students give feedback on each other's work. A peer review within a project setting is an assessment of team member(s) quality of work and contributions to the team as a whole (Center for Teaching Innovation, 2020). It allows a professor to understand how work is completed in the group and what contributions individual students are making. Refer to Appendix P for a self and peer evaluation sheet and Appendix Q for example rubrics to evaluate members of a team.

We recommend team evaluations to boost collaboration on projects. Based on student interviews, students at ENSIAS tend to work individually even during group projects. Collaboration is an important aspect of PBL, and students are required to interact and work together on a team. For PBL to work in full effect, all students need to be collaborating on each team. Team evaluations provide for another metric of evaluating students beyond a professor's assessment. Team evaluations on these projects will allow for professors to understand who is working on each aspect of the project and if the students are collaborating with one another. Professors can then give different grades to each member based on contribution and collaboration. Students can receive full credit for their contributions and learn more skills when required to work on other aspects of a project. This will increase student motivation on projects and collaboration in a group. These team evaluations will allow professors to better incorporate PBL in their curriculum.

Conclusions

While PBL may be difficult for ENSIAS to introduce, there are benefits to including PBL in ENSIAS curriculum. Our data collection revealed a lack of widespread faculty commitment to PBL at ENSIAS and the current schedule does not allow for the full implementation of PBL. However, we have also concluded that students show interest in PBL courses, and the engineering cycle accreditation standards provided by ANEAQ support PBL. We developed recommendations for ENSIAS to include PBL in their curriculum. We recommended ENSIAS form a PBL faculty committee, lead a training workshop on PBL, develop a first-year project-based course, and complete course evaluations and project team evaluations. Furthermore, we have compiled a deliverable of resources in order to assist the potential development of PBL at ENSIAS and educate faculty and students on the PBL approach. These resources were given to our sponsor and can be viewed in Appendix M. We hope ENSIAS will implement our recommendations and form a foundation for PBL at the school.

References

ANEAQ. (2014). *Cahier des Normes Pedagogiques Nationales du Cycle Ingenieur*. Retrieved from http://www.aneaq.ma/wpcontent/uploads/2019/08/CNPN_Cycle_Ingenieur_2014_Fr.pdf

Aslanides, C. D. et al. (2016). *Advantages, Disadvantages and the Viability of Project-Based Learning Integration in Engineering Studies Curriculum: The Greek Case* (pp. 1–10). Tampere, Finland. Retrieved from https://www.auth.gr/sites/default/files/press/advantages-disadvantages-and-the-viability-of-project-based-learning-integration-180.pdf

Barrows, H. S. (1992). The tutorial process. Springfield, IL: Southern Illinois University School of Medicine. https://doi.org/10.1016/0307-4412(89)90116-7

Boaler, J. (1998). Open and Closed Mathematics: Student Experiences and Understandings. *Journal for Research in Mathematics Education, 29*(1), 41-62. doi:10.2307/749717

Botha, Melodi. (2010). A project-based learning approach as a method of teaching entrepreneurship to a large group of undergraduate students in South Africa. Education As Change. 14. 213-232. 10.1080/16823206.2010.522059.

Bouhuijs, P. A. J. (2011). Implementing Problem Based Learning: Why is it so hard? *Revista De Docencia Universitaria*, *9*(1), 17–24.

Bransford, J. D. Sherwood, R. S., Hasselbring, T. S., Kinzer, C. K. & Williams, S. M (1990). Anchored instruction: Why we need it and how technology can help. In D. Nix & R.

Spiro (Eds.). Cognition, education, and multimedia: Exploring ideas in high technology, (pp. 115-141). Hillsdale, NJ: Lawrence Erlbaum Associates. Retrieved from http://www.jstor.org/stable/1177136.

Buck Institute for Education. (2015). Gold Standard PBL: Essential Project Design Elements. Retrieved from WPI. https://cpb-usw2.wpmucdn.com/wp.wpi.edu/dist/e/220/files/2018/06/Gold-Standard-PBL.pdf.

"Canvas LMS". *Llu.Instructure.Com*, 2020, https://llu.instructure.com.

Capraro, R. M., Capraro, M. M., & Morgan, J. R. (2013). *Stem project-based learning: an integrated science, technology, engineering, and mathematics (Stem) approach*. Rotterdam: Sense Publishers.

Center for Educational Innovation. (2019). *Active Learning*. [online] Available at https://cei.umn.edu/active-learning.

Center for Teaching Innovation. (2020). Peer Assessment: Center for Teaching Innovation. Retrieved 2020, from https://teaching.cornell.edu/teaching-resources/assessment-evaluation/peer-assessment

Christiansen, Marquardt , Picchione & Sullivan (no date). *Evaluating Biogas as an Option to Heat an Urban Greenhouse* (poster). Worcester, MA: Author.

Clark, N. (2017, July 12). Education in Maghreb: Morocco. Retrieved from https://wenr.wes.org/2006/04/wenr-apr-2006-education-in-morocco

Cognition and Technology Group at Vanderbilt (1992) The Jasper Series as an Example of Anchored Instruction: Theory, Program Description, and Assessment Data, Educational Psychologist, 27:3, 291-315. doi: 10.1207/s15326985ep2703_3

Cooper, N. (2019, August 15). Distance Learning vs Face-to-Face – Benefits and Drawbacks. Retrieved from https://www.ncchomelearning.co.uk/blog/distance-learning-vs-face-to-face-benefits-and-drawbacks/.

Curll, C., Johnson, N., Keating, A., & Saldanha, J. (n.d.). Quinsigamond Community College Project Based Learning. Quinsigamond Community College Project-Based Learning (pp. 1–97). Retrieved from https://web.wpi.edu/Pubs-/E-project/Available/E-project-042919140205/unrestricted/QCC_IQP_Final_Rep-ort_D19.

Da Silva, Glauco & Costa, Helder & Barros, Marta. (2015). Entrepreneurship in Engineering Education: A Literature Review. International Journal of Engineering Education. 31. 1701-1710.

Debois, S. (2019). *10 Advantages and Disadvantages of Questionnaires - Survey Anyplace*. [online] Survey Anyplace. Available at: https://surveyanyplace.com/questionnaire-pros-and-cons/.

Diaz, D. P., & Bontenbal, K. F. (2000). Pedagogy-based technology training. *Teaching and learning in a network world, 105*, 50-54.

Edutopia, E. (2013, October 17). Knowledge in Action Research: Results to Date. Retrieved from https://www.edutopia.org/knowledge-in-action-PBL-research-results

Explorable. (2019). *Snowball Sampling - Chain Referral Sampling*. [online] Available at: https://explorable.com/snowball-sampling.

Fahs, G. (2017, September 25). First Hackathon? Here Are 6 Things You Need To Know. Retrieved from https://medium.com/@ginnyfahs/first-hackathon-here-are-6-things-you-need-to-know-46640c3ef72e.

Frey, J. H., & Fontana, A. (2002, July 1). The group interview in social research. Retrieved from https://www.sciencedirect.com/science/article/abs/pii/036233199190003M

Gallagher, S. A., Stepien, W. J., & Rosenthal, H. (1992). The effects of problem-based learning on problem solving. Gifted Child Quarterly, 36, 195-200. https://doi.org/10.1177/001698629203600405

Gallup, Inc. (2019). *Creativity in Learning Report* (Report No. 1). Retrieved from https://www.gallup.com/education/267449/creativity-learning-transformative-technology-gallup-report-2019.aspx

Gavin, K. (2011). Case Study of a Project-Based Learning Course in Civil Engineering Design . Retrieved from https://researchrepository.ucd.ie/bitstream/10197/4134/2/Case history of project based learning_KG.pdf

Ghaicha, A. (2018) Moroccan Higher Education System: Reality and Prospects. *Higher Education of Social Science*. 14(1), 10-17

Ghazouani, K., Ammor, F., Ghanimi, A., & Benabdellaoui, Y. (2017) *Overview of the higher education system, Morocco.* Retrieved from https://eacea.ec.europa.eu/sites/eaceasite/files/countryfiches_morocco_2017.pdf

Heacademy.ac.uk. (2018). *Flipped learning*. [online] Available at: https://www.heacademy.ac.uk/knowledge-hub/flipped-learning-0.

Heinricher, A. C., Quinn, P., Vaz, R., & Rissmille, K. (2013, June 23). Long-term Impacts of Project-Based Learning in Science and Engineering. Retrieved from https://peer.asee.org/long-term-impacts-of-project-based-learning-in-science-and-engineering

Hofer, C. L. (2016). The Impact Of Classroom Observations And Collaborative Feedback On Evaluation Of Teacher Performance, Based On The Danielson Framework For Teaching (dissertation).

Horan, C., Lavaroni, C.. & Beldon, P. (1996). Observation of the Tinker Tech Program students for critical thinking and social participation behaviors. Novato, CA: Buck Institute for Education.

Illinois Center in Innovation of Learning & Teaching. (2019). *Lecture-Based Classes*. [online] Available at: https://citl.illinois.edu/citl-101/teaching-learning/resources/teaching-in-specific contexts/lecture-based-classes.

KEEN. (2017). KEEN - Engineers With an Entrepreneurial Mindset Transform the World. Retrieved January 2020, from https://engineeringunleashed.com/

Laforce, M., Noble, E., & Blackwell, C. (2017). Problem-Based Learning (PBL) and Student Interest in STEM Careers: The Roles of Motivation and Ability Beliefs. *Education Sciences*, *7*(4), 92. doi: 10.3390/educsci7040092

Lazrak, M. (2016). Issues in Moroccan Higher Education. *International Journal of English Language and Translation Studies.* 5(2), 86-93

Meet the Team. (2019). Retrieved from WPI. https://wp.wpi.edu/projectbasedlearning/contact/leadership-team/.

Michel, N., Cater, J. J., & Varela, O. (2009). Active versus passive teaching styles: An empirical study of student learning outcomes. Human Resource Development Quarterly, 20(4), 397–418. doi: 10.1002/hrdq.20025

National Education Association. (2012). Preparing 21st century students for a global society: An educator's guide to "the four Cs." Washington, DC. Retrived from http://www.nea.org/assets/docs/A-Guide-to-Four-Cs.pdf

Neal, P. R., Ho, M., Fimbres-Weihs, G., Hussain, F., & Cinar, Y. (2011). Project-Based Learning for First-Year Engineering Students: Design of CO2 Sequestration. *Australasian Journal of Engineering Education*, *17*(2), 101–118. doi: 10.1080/22054952.2011.11464059

O. E. D. B. (2018). 10 Advantages of Taking Online Classes. Retrieved from https://oedb.org/ilibrarian/10-advantages-to-taking-online-classes/

Nyumba, T. O., Wilson, K., Derrick, C. J., & Mukherjee, N. (2018). The use of focus group discussion methodology: Insights from two decades of application in conservation. Methods in Ecology and Evolution, 9(1), 20–32. doi: 10.1111/2041-210x.12860

Omerad.msu.edu. (n.d.). *What, Why, and How to Implement a Flipped Classroom Model*. [online] Available at: https://omerad.msu.edu/teaching/teaching-strategies/27-teaching/162-what-why-and-how-to-implement-a-flipped-classroom-model.

Partnership, G. S. (2016, March 23). Capstone Project Definition. Retrieved from https://www.edglossary.org/capstone-project/.

PBLWorks. (2019). *What is PBL?*. [online] Available at: https://www.pblworks.org/what-is-pbl.

Pereira, M. A. C., Barreto, M. A. M., & Pazeti, M. (2017). Application of Project-Based Learning in the first year of an Industrial Engineering Program: lessons learned and challenges. *Production*, *27*(spe). doi: 10.1590/0103-6513.223816

Perry, N. (2017, September 8). Studies Show Project-based Learning Leads to Workforce Readiness and Future Success. Retrieved from https://mauryalliance.com/studies-show-project-based-learning-leads-to-workforce-readiness-and-future-success/.

Poppulo. (2017). *Focus group advantages and disadvantages*. [online] Available at: https://www.poppulo.com/blog/focus-group-advantages-and-disadvantages/.

Qiu, M., & McDougall, D. (2013, March 6). Foster strengths and circumvent weaknesses: Advantages and disadvantages of online versus face-to-face subgroup discourse. Retrieved from https://www.sciencedirect.com/science/article/pii/S0360131513000407.

Queen's University. (2019). *Benefits of Active Learning*. [online] Available at:https://www.queensu.ca/activelearningspaces/active-learning/benefits-active-learning.

Ross, D. (2017). *Empowering Our Students with the 21st Century Skills Today*. [online] Getting Smart. Available at: https://www.gettingsmart.com/2017/04/empowering-students-21st-century-skills/.

Santigo, J. (2017). Developing an Entrepreneurial Mindset Using the KEEN Framework for a Digital Communication System Course. Retrieved from https://peer.asee.org/developing-an-entrepreneurial-mindset-using-the-keen-framework-for-a-digital-communication-system-course.pdf

Scheidler, M. J. (2012, October). The Relationship Between Student Engagement and Standardized Test Scores of Middle School Students: Does Student Engagement Increase Academic Achievement? Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.869.6571&rep=rep1&type=pdf

Sharma, R. (2018, August 23). What is Project-Based Learning? What are the Advantages & Disadvantages of PBL Approach? Retrieved from https://allusefulinfo.com/what-is-project-based-learning-advantages-disadvantages-of-pbl-approach/.

Shepherd, H. G. (1998). The probe method: A problem-based learning model's effect on critical thinking skills of fourth- and fifth-grade social studies students. Dissertation Abstracts International, Section A: Humanities and Social Sciences, September 1988, 59 (3-A), p. 0779. Retrieved from https://www.learntechlib.org/p/117976/

Shorall, C. (2018, July 4). The Case for Hackathons. Retrieved from https://www.teachingchannel.org/blog/2015/07/15/the-case-for-hackathons.

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

Stepien, W. J., Gallagher, S. A., & Workman, D. (1993). Problem-Based Learning for Traditional and Interdisciplinary Classrooms. Journal for the Education of the Gifted, 16(4), 338–357. https://doi.org/10.1177/016235329301600402

Stetzik, L., Deeter, A., Parker, J., & Yukech, C. (2015). Puzzle-based versus traditional lecture: comparing the effects of pedagogy on academic performance in an undergraduate human anatomy and physiology II lab. *BMC Medical Education*, *15*(1). doi:10.1186/s12909-015-03906

Tagg, J. (2012, January). Why does the faculty resist change? *Change: The Magazine of Higher Learning*. Retrieved from https://web.peralta.edu/pbi/files/2010/11/John-Tagg-article-Jan-2012.pdf

TCI. (2018, July 9). Group vs. Individual Projects: Which Is Best? Retrieved from https://www.teachtci.com/groups-vs-individual-projects-which-is-best/.

TED. (2012, August 1). *Michelle Beatty: Student Engagement and Project Based Learning* [Video file]. Retrieved from https://www.youtube.com/watch?v=T5WwKQGBXgI

Ternay, G. de. (2019, April 19). This Is How You Plan & Run a Great Workshop. Guerric. Retrieved from https://guerric.co.uk/plan-run-great-workshop/.

The WPI Plan. (n.d.). Retrieved January 21, 2020, from https://www.wpi.edu/project-based learning/wpi-plan

Thomas, J. W. (2000). A Review of Research on Project-Based Learning. Buck Institute for Education. Retrieved from http://www.bie.org/research/study/review_of_project_based_learning_2000.

Thornton, P. (2013). Three Teaching Styles. [online] Faculty Focus | Higher Ed Teaching & Learning. Available at: https://www.facultyfocus.com/articles/philosophy-of-teaching/three-teaching-styles/.

Tomorrow's World Today. (2018, May 7). The Benefits of Workshops. Retrieved from https://www.tomorrowsworldtoday.com/news/2018/05/09/the-benefits-of-workshopping/.

Vallerand, R. (2000). Deci and Ryan's Self-Determination Theory: A View from the Hierarchical Model of Intrinsic and Extrinsic Motivation. Psychological Inquiry, 11(4), 312–318. Retrieved from https://www.jstor.org/stable/1449629.

What is Online Course. (n.d.). Retrieved from https://www.igi-global.com/dictionary/designing-online learning-programs/20939.

WPI Student Course Reports. (2020). Retrieved from http://bannerweb.wpi.edu/

Worcester Polytechnic Institute. (2019). *Heal The World.* Worcester, MA: Author.

Worcester Polytechnic Institute. (2018). *Human Biology.* Worcester, MA: Author.

Young, H. (2014, August 20). In Morocco youth unemployment is driving up inequality. Retrieved from https://www.theguardian.com/global-development-professionals-network/2014/aug/20/youth-unemployment-interactive-abdeslam-seddiki-morocco.

Appendices

Appendix A: Timeline

	Week							
Objective	PQP	1	2	3	4	5	6	7
Build an argument for incorporating PBL at ENSIAS								
Diagnose the current state of the teaching pedagogy used at ENSIAS								
Create recommendations for engineering educators at ENSIAS to implement PBL								

Appendix B: Accreditation Standard and the PBL Matrix

ANEAQ Engineering Cycle	**How it could relate to PBL**
Modules of your choice can be added during the course of the training.	Modules are customizable and could include a PBL module.
The block of Management modules, consisting essentially of modules of project management, business management ... It represents 10 to 20% of the volume overall schedule for the first five semesters of the course.	PBL could be used in a management module.
The block of language, communication and ICT modules representing 10 to 20% of the total number of modules in the first five semesters of the course.	PBL could be used in the language, communication, and ICT modules.
The objectives and contents of the modules making up a stream are consistent with the objectives of the sector.	PBL can be used to meet the objectives of the sector.
A stream is administratively attached to an institution of higher education, and it is consistent with the missions of this institution. Its modules can be provided by a or several departments or even several higher education institutions or by socio-economic stakeholders.	Modules can be provided by a or several departments. This means that departments can work together on projects in a module for a stream.
The module is the fundamental unit of the training system. It consists of one to three elements of modules that can be taught in one or more languages; a module element can be taught in one or more languages; a module element can be either a subject taught in the form of theoretical courses accompanied or not by assignments, or tutorials and/or practical work, either a practical activity consisting of fieldwork, or project. The individual elements of a module form a coherent unit.	A module element can be a practical activity consisting of fieldwork or a project, meaning PBL could be used in the modules. Individual elements of a module form a coherent unit. A project element could be used to link two other elements of a module, meaning PBL can be used in the modules to link elements together and expand
A hands-on activity can be part of a module, a whole module, or several modules.	This hands-on activity could be a project that could be part of a module or be the module itself.
A part of a module can be taught remotely and/or by alternating within the limit set by the institution.	The project can be taught remotely if it is part of the module.

A teaching module is spread over one semester and corresponds to an hourly volume. There is a minimum of 48 hours of teaching and evaluation per module.	A project could be designed to be incorporated into this minimum of 48 hours of teaching and evaluation.
The practical activity can take different forms: • Internships. • Projects outside the EFP • Fieldwork • Study visits • Other forms of outreach activities specified in the description The practical activity may constitute all or part of a module.	The practical activity for a module or module element could be a project or fieldwork instead of an internship. Fieldwork, or an internship, and a project could be tied together for an interdisciplinary approach.
The internship can be carried out in a private, public or semi-public company, in a administration, local authorities, etc. A minimum of two internships is required during the first four semesters. The minimum duration of the internship per year is 20 working days.	The internship could double count as a project if they could take a module or module element where they went more in-depth into their internship work and wrote about their experiences, or connected their internship work with another course they are doing.
Reportable projects can be carried out as part of the training. The project can be carried out in the home institution of the sector or in a company. private, public or semi-public, in an administration, in local authorities, etc.	Projects can be at ENSIAS or in various types of companies so students gain more experience. This is considered PBL.
Assessment of knowledge, skills, and competencies for each module is carried out in the form of continuous monitoring, which may take the form of examinations, tests, assignments, presentations, internship reports or any other means of control.	Continuous monitoring could be provided by projects, where knowledge, skills, and competencies are checked on a regular basis Projects that are often assessed fit this guideline and are an example of how PBL is supported by the accreditation.
Each institution shall develop regulations for the assessment of knowledge, skills and abilities and of competences,	ENSIAS can develop regulations for the knowledge/skills/abilities/competencies gained through projects. ENSIAS can develop their own regulations for how to assess projects within a PBL curriculum.

Appendix C: PBL Benefits Brochure

What is Project Based Learning?

PBL facilitates learning through the inclusion of projects in classes.

- Project-based learning (PBL) derives from active learning and involves students in meaningful real-world projects.
- PBL applications include learning through flipped classrooms, course-specific individual or group projects, and workshops
- The overarching goal of PBL is to inspire a love for learning, build a connection to education, and engage students in long-lasting knowledge

Why PBL?

Successful PBL students work effectively on a team and utilize their variety of abilities to solve real-world problems. PBL facilitates the development of critical tools for the workforce and can establish an entrepreneurial mindset in students. Therefore implementing PBL creates a better outcome and more opportunities for students.

WPI

PROJECT BASED LEARNING

Benefits of PBL

Connection to Reality
PBL creates a focus on real-world issues through the inclusion of realistic problems.

Entrepreneurial Mindset
PBL fosters the curiosity, connections, and creation of value that define an entrepreneurial mindset.

Increased Student Interest and Engagement
PBL encourages students to hone their critical thinking skills to better their academic performance and real world experiences.

Critical Thinking and 21st Century Skills
PBL develops proficiency in inquiry and problem-solving as students must work autonomously to come up with a solution.

Improved Student Abilities and Performance
PBL students outperform students from similar backgrounds because of the engaging and effective project curriculum.

DISCOVER PBL. GET INSPIRED.

THE PROJECT BASED LEARNING APPROACH.

Impacts of PBL

The WPI Alumni Study researched the long term impacts of PBL. This study was conducted through surveying previous undergraduates of Worcester Polytechnic Institute (WPI), varying in graduation year from 1974 to 2011. Respondents answered questions concerning how their experience with PBL as an undergraduate affected them after graduation.

WPI Alumni Study Data

Appendix D: Interviews with Faculty at ENSIAS

We are a group of students from Worcester Polytechnic Institute in Massachusetts. We are conducting interviews to gather information for our research project. We are looking at the possibility of introducing project-based learning into the curriculum of ENSIAS in Rabat. The goal of our project is to develop recommendations on how universities can implement project-based learning (PBL). This research will fundamentally enhance student engagement and potential future implementation of PBL at ENSIAS. You do not have to answer any questions you do not wish to. All of your answers will remain anonymous. No identifying information will be recorded or appear in the results of our project reports. This is a collaboration between Worcester Polytechnic Institute and ENSIAS, and your participation is greatly appreciated. If interested, a copy of our results will be provided.

For more information about this research contact the PBL team at gr-ProjectLearning-C20@wpi.edu or WPI's IRB Manager, Ruth McKeogh, Tel. 508-831-6699, Email: irb@wpi.edu or WPI's University Human Protection Administrator: Gabriel Johnson, Tel. +1 508-831-4989, Email: gjohnson@wpi.edu.

Faculty Member #1

Can you compare the French system you use here at ENSIAS with the US?

- ENSIAS
    - Students take preparatory core classes for two years and then choose 1 of 8 majors they can take here
    - Take 3 semesters of core curriculum that everyone takes
    - Then every student follows their own major path until they get their diploma
- US schools
    - Very different and more flexible
    - Less theory and more practice
    - Many choices in courses
    - Double majors and minors
    - Many projects
    - More opportunities for research

Do you like flexibility in a university?

- Yes, I think it's the best you can get
- There is a lot of good teamwork that comes from it

Do you give your students projects here?

- Students have three final projects, one at the end of each year
- There is a maximum of two students working on the project

Do students like these projects?

- They do not have a choice
- Either must complete them in order to graduate

Do you think these projects help students learn better?

- Students here are already smart and good at math and theory

- Students have to pass a lot of tests to be able to come here
- Students are not good at communication and soft skills when they come

How do you structure your classes?
- I give lectures and then tutorials
- Sometimes I give workshops in enterprise creation and entrepreneurship
- Students do these in their second year

Do students do well in your classes?
- Yes, students are good here
- Students have good grades in math and physics to come here
- The best or nearly best students are here at ENSIAS
- Students come here based on tests they take in high school and in the previous years

What challenges do you face here at ENSIAS? With teachers or students
- There are not really challenges here
- Communication is unilateral; just from teacher to student
- We don't have good feedback from the students and don't know how they see their classes and the teaching here

Do you think there should be feedback?
- Yes, I think it's very important

Have you talked to anyone about this?
- No, I haven't, I'm still new here
- The whole country needs to work on the education system

Can you describe how you communicate with your students in your lectures?
- Yes, I try to have a conversation with my students
- I ask them questions

Who do you teach?
- First, second, and third-semester students

Do you like teaching?
- I do
- It makes me read and learn new information all the time
- It keeps me feeling younger

Faculty Member #2

What do you do at Mohammed 5/ENSIAS?
- In 2009 began a new program in embedded systems

What are some challenges with projects at ENSIAS?
- Gone through problems from before- a lot of problems

- Every professor has many projects, in every semester a student has 8 or 9 projects, students just distribute the projects amongst the group
- If there are 25-30 students in the class, the professor cannot work with all of them
- The professors are not multidisciplinary
- The professors wants to work on what they know
- In 8 projects there are 2-3 good projects but the rest of the projects fail

What do you think professors should do?

- There should be one project for all of the courses instead of a project per class, a project that is more like a capstone for the whole year or semester- the project is multidisciplinary, focuses on the courses that he/she has but will work on other aspects outside of the courses as well
- We can share all of the teams together, and all of the teachers would work on what they know
- Multidisciplinary projects would be interesting for the students

Can you describe your teaching at ENSIAS?

- I teach 2-3 times per week
- I used to teach 5 modules per semester, this was a lot of courses
- I dropped for 5 to 3 because it was too much
- I redesign courses every year, cannot work with past material because every year it changes
- Assignments outside of class- 1 or 2, not a lot
    - Problems with students preparing the work for class, students need to learn to work outside of the classroom
    - 8 modules for a student- each module can have 1-2 elements, so 16 or more
    - 20 hours is small

What is your average class size? How long are your classes?

- 2 hours, 20-30 students but it depends can be 90 students

How well do you feel like your students do in your classes? Do you think they are preforming the way they should at ENSIAS?

- More or less, not enough
- They should do better
- What we give them is what they need in that space
- They would get successful in Europe

Have you thought about student engagement?

- There are students who are always active and students who are not
- It is difficult to make everyone active

How important is student engagement to you?

- Important

How much control do you have over what you teach and how you teach material?
- Not really any control over what we teach but control over how we teach material

What challenges do you face in the classroom?
- The courses are not based on textbooks
- Classrooms should be based on a textbook so the students can work off of the textbook
- The language- taught in French, not a lot of French resources, and if the student does not speak English well then it is hard for them
- Will change from 8 to 6 modules- with more time in the module and 1 course per module, will try to test if it is more interesting for the student
- Difficult for the student to have this many courses

Have you ever advised a capstone or group projects?
- Yes

Do you feel like it would be easy for you to implement projects into your current curriculum?
- Projects are in the curriculum but not PBL, projects outside of class

Can you tell us about your PBL workshop experience at WPI?
- Was interesting but did not teach how to build a course that was PBL
- I have seen workshops but it is not sufficient to help professors build a course around it
- A workshop needs to be given from scratch vs. at Wpi where there is already background on PBL

Can you tell us more about projects here?
- We have done projects on environmental, etc
- The problem is how to engage many students
- One of the professors at WPI said that a professor can meet with a students one or 2 times a day- cannot do that here with the courses there isn't enough time
- Office hours- my office hours are open and I talk with students, but office hours are not common in Morocco, professors usually do not have them
- I am not for 100% PBL or the traditional methods of teaching
- I don't like slides because it bores the students
    - I still do them
    - Teaches for 10-15 minutes and then you can see the energy go down
    - Lots of concentration of information in slides, hard for students to learn all of the information, got to give them work during class
- Want to integrate this vision of an entrepreneurial mindset
- My vision is how to create a PBL course, and then do other things such as innovation

-

Is there an online system to share notes?
- Not online but we have a space to share documents on campus

Are there teaching assistants in courses?

- There are no teaching assistants for courses

Have you thought about having teaching assistants?

- No, the teacher does everything
- There is not enough staff
- This is very time consuming

Is there a professor interest in PBL?

- I know professors who are interested in more projects but not PBL
- I think there should be a workshop with the whole university, not just ENSIAS
- You will not find PBL at ENSIAS
- You can talk with professors to try to explain to them what PBL is and compare with them

If you would design a course on PBL what would be the difficulties?

- Everyone knowing what PBL is
- Knowing the difference between projects and PBL
- Projects create change
    - Not just for the course, but how to implement
    - Who will want to work with you?
- Engineering PBL courses are multidisciplinary, or else you cannot succeed
- Professors do not want to give a project outside of their field and it would hard to get them to

Can you detail student resources available on campus?

- Students have access to power points out of class
- There is no recording of lectures
- There is no on-campus jobs for students, no un-paid research opportunities
- There are PhD students paid a small amount and receive some experience in teaching

Can you describe how staffing works at ENSIAS?

- ENSIAS is a public school
- We want more staff but the government hires 100 professors every year and spread them across, his department will get a are professor 1 year out of every 5 years

Technology

- Students have laptops, do not work on desktops anymore, engineering students work on their laptops
- Engineering students have an exam at the end of the course —> **every 3 months, every trimester**

Faculty Member #3

How do you evaluate students?

- Through a combination of projects and exams
- Students understand the discipline and practical information because of this

Can you describe the student and professor relationship?

- Morocco does not have relationships between students and professors
- I hope one day Morocco can have this relationship
- I ask if students like my course
- I asked for feedback from the students and used student evaluations
- I completed student evaluations in Canada and have carried that over to Morocco
- I want to improve myself each time I teach a course

Which class do you like teaching the most?

- Morocco we do not have like and not like (they do not get to choose what they teach)
- We teach what we are asked
- You do not have a choice like the US or Canada
- When I came back to Morocco, I taught classes he never had experience with before
- This was difficult for me
- Eventually, I taught most of the courses in my department and it got easier

Have you thought about student engagement?

- I "forces" students to talk with me
- Students discuss the difficulties they have in the class with me
- I provoke students to talk to me
- Students have reached out through email but not compared to students in the US and Canada
- Students in morocco like to work alone (without the teacher)
- Students are more resistant in the beginning
- I have to push students by asking them what is it they need
- Students do not usually come to talk to me about their problems
- Each student works alone/ very competitive
- These students all want to be "first"

How much control do you have over what you teach and how you teach material?

- I have full control over how I teach material
- In Canada I did what I wanted
- I go to class 10 minutes early to prepare for the day
- I've never had problems controlling the class
- It depends on the class whether I give a syllabus or not
- Students do not have access to the textbooks so I have to provide all of the information
- I only provides the books or resources when I know students can access them for free
- In Morocco, we cannot gives books out or ask students to buy them

What challenges do you face in the classroom?

- In Morocco the system is different
- There is high school engineering sepaate from the university
- Teachers do not have the help they need in their courses
- In Morocco PHD students do not help, in the states they can assist or do exercise
- I do everything on my own and do not have much time
- The system does not have the money to pay the PhD students

- I had problems with my French accent when I came back to Morocco
- It is very hard for him to switch languages
- I don't think this is as difficult for students
- The big problem is there are different tongues of French/ accents and ways they say things
- People can interpret the words differently/ pronunciations are different
- Does not have trouble with understanding the language in France or Canada
- It is difficult to understand sometimes in Morocco

Do you use technology in your classes?

- I love to teach and feel happy when doing so
- It was my dream to become a professor like my father
- Technology depends on the course
    - For specific courses you need certain software
    - Some courses have not as much programming
- Optimization
    - We need to use other software and not just one software to solve problem
    - The objective is to encourage the students to develop new software and not just use what is out there already
- In machine learning you have python: but in my course I use it when they need just applications
    - But for new softwar, students work by themselves

What projects do you have in your courses?

- I have PhD students, master's students, and undergraduates
- All students work on applications and small problems
- PhD students have more difficult projects

Faculty Member #4

Can you tell us about your classes and students at ENSIAS?

- The general English classes are not enough for the students
- Students have the hard skills but not the soft skills
- Students cannot speak in public or have a professional phone call typically
- I focus more on adding soft skills
- Worked on communication projects for first years- communication project
- The aim was to have an open eye on the outside world and not just stick to what they see in the classroom
    - For example, topics depended on the student majors/ orientations
    - They picked a topic and had to do the communication project
    - This project deliverable was a play, short movie, roundtable, documentary, or something original
    - They had 7 weeks to complete it and it was very hard for them to complete
- One topic was *brain drain* where they had to go out and ask experts for research to learn more about the topic
    - The students ended up making a movie
- ENSIAS to work on stuff like with communication and expanding soft skills

- Students are more likely to present when they are together

What is your average class size?

- At first, it was 15 students
- The class now is 42 students
- My class is split up into two groups
- I like to combine both groups for larger class

Can you tell us about your teaching history?

- I like my students are my classes
- I had the opportunity to retire early but I have a warm relationship with my students, I feel like the students are my kids
- I like my job
- I wrote a book in collaboration with other coaches

Do you ever meet with students outside of class?

- Yes, I am responsible for student activities amongst the students at ENSIAS
- I help students solve many problems
- These include personal problems like cigarette addiction and procrastination
- If I see something wrong with a student, I will ask them if they are okay
- I show concern with my students

What do you want for your students?

- I want my students to be the best engineering students in the world
- After my training, I was confident and positive in teaching and I try to promote positivity towards my students
- I do not think this is carried on in other classes
- For example, other teachers have trouble with student participation
- It is about making your class more attractive
- One time some of my students could not come at 8 am, and I made a project that would work on that and their procrastination

Do you ever use technology in your classrooms?

- I use PowerPoint
- I do research on the internet
- I use the basic tech used in classes
- I use WhatsApp to organize seminars and interact with the students
- I use what I can to help students achieve their goals
- I believe students perform better because of my teaching
- I don’t want to just give a project
- I want students to understand the impact of what they are doing
- Other professors do not do projects like these

.

What do your students do if they need assistance with your class?

- I have no assistance in this level of communication courses
- I do everything on my own/ with the students

- Some other classes do

What is a project in your current curriculum?
- Students are working on creating a professional portfolio
- Students try to elaborate a document where they speak on their professional project and what they like to do
- Then create an identity card for a company like Maroc telecom and complete research
- They have the prepared letter of motivation, cv, cultural background of the company
- Make this an e-portfolio

Faculty Member #5

How is it here at ENSIAS compared to other schools?
- There are differences here at ENSIAS
- In ENSIAS, I have to do more on my own
- In ENSIAS, the teaching is the same as the french system/ same methodology
- He likes teaching here the same way he did in France

Was there a difference in the students at ENSIAS compared to the French school?
- There were not as many students in the French school as the maximum amount of students was 20
- It was easier to see when students did or did not understand the material
- Compared to the classes at ENSIAS which can reach 120 studeents

What is your average class size?
- 120 students

How well do you feel like your students do in your classes?
- Not all students do well
- Some students do not have a background in CS
- Students come worn out from previous exams and then they have to go to ENSIAS
- But there are different type of students
- The students who come to see me are generally doing average in my class
- Those not doing well do not come to receive help from me
- Those low average student will show up for the final exam and I don't recognize them
- I think it is from having too many classes and lack of free time to schedule activities related to the classes
- They cannot work on the projects until late at night or weekends
- Projects work is done on their own outside of class while in class they discuss parallel ideas

Have you thought about student engagement?
- It is hard because I do not get feedback in the moment
- In smaller working sections it is easier to see if students understand or struggle with the material
- I try to make students express their needs or any problems they have
- Some teachers can see that as a rebellion of the students
- Students just want to express themselves

- I want students to come and talk to me freely
- The biggest challenges for students is that they spend too many hours in class compared to other institutions
- The students do not feel they have to attend classes in certain obligations, for example, an 8 am class
- In CS, some resources are available online
- Some students have some skills already
- Students get work with companies online and can get paid for this
- I think this is good but they work late and it is hard for them to show up for courses when they already work on similar or harder projects on their own

How important is student engagement to you?

- I want to have smaller classes
- I teach for 35 minutes and then apply what students have learned for the rest of the class (theory and practice)
- I use a platform for students where I make a private account to track their work and monitor their projects
- I am able to provide feedback through the app Slack
- Slack doesn't provide instant responses but it avoids emails

Do you meet with students outside of the classroom?

- Students come to me in my office for help
- For example, first and second-year students for a specific project schedule weekly meeting to discuss their projects

What is the most difficult thing for you as a professor?

- The amount of class time students have
- I asked Essaaidi to change some aspects of the education system
- But they are required to teach for a certain amount of hours
- This has to be changed from higher up
- Students are required to do a certain amount of work weekly
- I believe it should change so students can focus more on the classes they are interested in

What challenges do you face in the classroom?

- I would like student evaluations where students can create an account and keep the information confidential
- I do not know if students are afraid, I think they do not trust the teachers
- There is still a problem with students expressing their needs
- There needs to be another technique to have them express themselves
- As a professor, I believe this is important
- I use platforms/websites to put up the syllabus, rubric, and the rules ahead of time for my classes
- It is like a contract that the students all agree to

What projects do you have in your courses?

- I work on a project with plants that collect data and tell you when to water plants or waters the plants itself
- Students made an app that goes with it
- It will automatically water the plants
- They presented this at the entrepreneurship competition and got first place/ they are moving on to another presentation in August

Faculty Member #6

Do students meet you outside of your class?

- Yes students come in groups
- I help prepare students for exams
- Students reach out mostly by email

Do you have projects in your courses and if so, can you give an example of one?

- Yes
- I have a project for second-year engineering students
    - It is divided into two parts: there is the same project for the whole class related to CS and completes activities and looks at other societies besides rabat.
    - This project has 4 students per group.
    - Ask the students whats the need the network for
    - There are levels in each group: they need a business plan and length of cables to connect the network
    - Students use real-world simulations
    - Then they are given a challenge and examples
    - Once they have provided all the materials, they can develop their projects
- Students develop applications in Arabic as well
- I give students many ideas but they can discuss their own with me as well
- I leave the class open for students to discuss their own ideas

What is your average class size?

- About 300 students in Engineering
- Each year approx 300 students come to ENSIAS for undergraduate
- Then students come for masters degree programs
- About 50 -60 students in each program each year
- There are two groups: normal students and then late classes for other students who work during the day
- In the engineering department: there is a program that has 60 students each year in CS and web and mobile system engineering (masters?)

How much control do you have over what you teach and how you teach material/ how well do you structure your classes?

- Uses powerpoint/ projectors
- Explains ideas and does not just rely on the slides
- If the idea is not very clear, I explain it on the board
- If using software, I explain what it is and how to use it
- After that I opens the floor for students to react

- Majority of the course is interactive
- I ask the students questions
- I know if the students are following and understanding the material
- I can see if it is okay or not okay
- I do not have a set method for teaching, it depends on the course
- I primarily use powerpoint, examples, exercises, ask questions for student engagement, students can always ask questions anytime throughout the class
- I try to be very open for my students
- Majority of students do not take advantage of emailing
- Only before exams students will email and ask questions

What challenges do you face in the classroom?

- Not all students have the necessary background material needed to succeed
- Students are not motivated in creating products
- At ENSIAS they do not have a lot of materials/ resources but they have the minimum
- There is initiative in the university to create good projects
- In engineering, each year they have 1-3 startups that are produced from the school of engineering
- I think students are not motivated because all people prefer to have a [stable] job
- Startups have several risks that many students do not want to take
- Morocco's platform for startups is not great
- In US, it is very good and accepted to change but in Morocco there is a risk with changing domains
- In Morocco you have the private sector: it is not structured well or always good organizations
- People are not guaranteed to have success, keeping in mind that basis of a startup is no guarantee for success

Do the students succeed in your courses and projects?

- Yes, I teach many courses and I have many projects
- In the last year, I included projects in the program
- Previous projects have not been very strong
- ENSIAS began to include the project model for undergraduate and masters degrees
- Explains the idea output for each problem
- Gives students 2-3 weeks to design a solution
- Students propose the methodology for their output
- Then they compare and correct their approach and question their methodology/ achievement
- Each project has 2-4 students in a group it depends on the project but it is normally 2 students
- The following 3 weeks is the first realization and proposition and then he explains ways that they can improve
- This applies for both undergrad engineering and masters
- They have typical teaching where they include practice and exercises
- I give students an idea for research by proposing a model: innovation and research

- In this module you do not have research: speakers are invited to speak similar to a conference in different topics that relate to their field
- Another aspect is they invite other professors from Morocco to help motivate students to create start-ups/ creations

Faculty Member #7

Can you tell us about the teaching students at ENSIAS?

- In the beginning, students in the first year only know STEM, have a lot of hard skills
- They lacked the ability to speak in their communication classes
- Do not have the ability to communicate in English or French

Can you tell us about projects in your classes?

- I give a project to help them improve their communications
- I give them scenarios to practice communication though a communication project
- I give the students freedom to choose any topic to make a project about
    - Art, sports, et
- Students are very creative and take advantage of the projects and have very good ideas
- I wanted the students to be able to share their experiences
- I gave students a project with technology
- Students went to another city, in an open space to meet people or work with companies
- The students need to see themselves as a solution
- The students are encouraged to be able to find solutions for problems and be able to be social with others
- Try to encourage the students
- Non-STEM subjects are considered non-important and other professors do not see the benefits of the projects
- I think the students learn from reality and not just in the class

Do students like the projects?

- Students, from the projects, are able to grow and increase their knowledge and abilities in the language
- Students appreciate the project
    - They talk about it in their interviews and CVs
    - When they go for a job interview it is important for them to talk about
    - Makes students more open minded
- Very easy to create this project as I am sociable
- I do not like things that can not be changed
- I like when things are dynamic and flexible
- Students were motivated because the class offered a change from their normal work day
- ENSIAS is for the hard skills and it is hard for students to be able to get the soft skills required from them
- The professors and administrators to not like the project because it is not hard skills
- Retrospectively, they open up to the projects because they see the joy of the students and the results
- The students were able to be successful due to the fact that they enjoy the topic they are working on
- There is passion and motivation from the students
- A lot of people from ENSIAS come to see the project presentations and the results

What are the difficulties you face at ENSIAS?

- A lack of money. The admin does not give this dept any money to be able to run their projects
- Push back from the other professors

Faculty Member #8

Can you tell us about English classes here at ENSIAS?

- The majority of students level of english is increasing/improving
- Students are taught Business English they need in the workplace
- Students are prepared for an English test, often taken in their third year
- Masters students are given courses on how to write research papers in English

Is ENSIAS going to use the 4 year education program other universities are adopting?

- Normally a student would spend 4 years to get a BA, now it is 3 years, next year there is a new program for "free access" educations but not engineering institutions

What challenges do you face as a professor at ENSIAS?

- The lack of motivation from the students, and when there is a lack of motivation in the students the teachers have the same problem
    - This problem is in the majority of institutions
- Enrolled in 2 years of preparatory courses, for a national test and then get placed in a university based on this placement
- When you succeed at ENSIAS you will be an engineer anyways, the most important thing is to get a degree
    - If the system changes, then things will change
- Unfortunately students repeat years, but "anyways will get a degree"

What challenges do you face regarding teaching in English?

- Communication skills differ greatly one student to another
- You may feel that a student could be an American because they are very good at English
    - Some prioritize learning the language
- Some students think that mathematics are more important and do not prioritize language and therefore have a lower level of communication
- You have to play in the middle of these students
- You give the opportunity for anyone to talk

How often do you do class discussions like the one we participated in?

- Every class I propose a topic, and the discussion depends on the situation
- Sometimes the topic is random and sometimes it is chosen on purpose
- The class is divided into 3 activities
    - Business english, things you need in the workforce- presentation, job interview
    - Listening or video activity, followed by exercises
    - Debate, prepared questions and give slides for the students to read and use the words they see on the slides
- I chose topics that generate disagreement, whether or not you can not speak English well, students who do not usually speak still want to propose their opinion

- No textbook, just slides

Do you think the students enjoy these discussions?

- Yes there is engagement when you force the students to speak and give them the floor to speak
- I propose a number of topics, for example:
    - The place of women in society- give a fixed author who are saying women should go back home- you hear someone who never speak
- Some people who say if anyone is supposed to follow the copyright it is the US. and that is why he had the discussion with us

Have you ever collaborated with a professor in a different department?

- Indirectly
- Students have to do some internship, when they come for the 2nd year they propose the project as a presentation to a jury in English
- I worked with Pr. Berbia to prepare students for a competition, helped the students communicate well, and gave them presentation skills
- Professors are randomly assigned, I am assigned with Prof Berbia in his track in embedded systems
- Do you have PhD students help you with your classes?
    - No we don't
    - Phd students should collaborate in the university, a professor proposed that students that PhD students should grade papers
    - As a teacher, if I am told to teach for 200 hours, I should be the one teaching for 200 hours and not another

If your students need assistance with your class, what do they do?

- Send emails or have face-to-face conversations
- I don't have office hours but I am here in the afternoons
- I have a website that students are able to interact with me, most of the questions are on the platform

Do students take advantage of this platform?

- Yes they use it
- The platform gives an opportunity for students to get involved
- Questions motivate students
- I can get information on all the students through the platform
- Students are publically ranked in the platform
    - Can compare to each other
    - Students are motivated through this

What projects do you have in your courses?

- There is an oral presentation which students prepare for outside of the classroom
- Students work together when preparing the oral presentation
- In my courses, students are able to work together when I give them exercises, but other courses are a bit different

- Oral presentations
    - Students greet the audience, present, and ask for questions
    - Students can choose the topic
    - Topics depend on what the student is motivated in
    - These presentations are just about practicing presentation skills and being able to give a good presentation

Do you give a syllabus to your students?

- During the first class I describe what we are going to have in the term, what we will have in every class, and how I will evaluate students
- Class participation is the most important, 2nd is an exam that you have to take, and 3rd is a bonus for students who volunteer to give presentations (up to the students to volunteer- they should be seekers, do not force students to give presentations)

Can you describe the module system at ENSIAS?

- Take embedded systems, every track is composed of 3 years
- Each track is divided into terms/semesters
- Each term is composed of 8 modules
- Modules is just a name that is composed of 1-3 courses
- An element of a module is a course
    - Ex: Language and communication is composed of 2nd year English and French
- Every semester is composed of 6-8 modules
- Access is restricted because students need to take exams

Appendix E: Faculty Survey Results

We would like to thank ENSIAS for this collaboration opportunity and continued support throughout this project.

Nous tenons à remercier ENSIAS pour cette opportunité de collaboration et pour son soutien continu tout au long de ce projet.

We are a group of students from Worcester Polytechnic Institute in Massachusetts. We are working on a research project with ENSIAS. The project focuses on the differences between the Moroccan and American education systems.

You do not have to answer any questions you do not wish to. All of your answers will remain anonymous. No identifying information will be recorded or appear in the results of our project reports. This is a collaboration between Worcester Polytechnic Institute and ENSIAS, and your participation is greatly appreciated.

Nous sommes un groupe d'étudiants de l'Institut polytechnique de Worcester, situé en Massachusetts. Nous travaillons sur un projet de recherche avec l'ENSIAS. Le projet se concentre sur les différences entre les systèmes éducatifs marocain et américain.

Vous n'avez pas besoin de répondre aux questions qui son inconfortable pour vous. Toutes vos réponses resteront anonymes. Aucune information d'identification ne sera enregistrée ou n'apparaîtra dans les résultats dans notre rapports. Il s'agit d'une collaboration entre Worcester Polytechnic Institute et ENSIAS, et votre participation est très appréciée.

There are 19 questions in this survey. You cannot move backwards through the survey.

Cette enquête comporte 19 questions. Vous ne pouvez pas revenir en arrière dans l'enquête.

→

WPI

1. How many years have you been working at Mohammad 5?

Depuis combien d'années travaillez-vous chez Mohammad 5?

0 8 17 25 33 42 50

Years worked/années de travail

2. What age did you start teaching?

A quel âge avez-vous commencé à enseigner ?

3. Did you, or do you currently work at another university?

Avez-vous travaillé, ou travaillez-vous actuellement, dans une autre université?

- Yes/Oui
- No/Non

4. What classes do you teach?

Quels sont les cours que vous assurez?

5. What is your average class size?

Quelle est la taille moyenne de votre classe?

0 15 30 45 60 75 90 105 120 135 150

Class size/Taille de la classe

6. Which classes do you enjoy teaching the most and why?

Quelles sont les classes que vous aimez le plus enseigner et pourquoi?

7. How well do you feel your students do in your class?

Comment jugez-vous les résultats de vos élèves dans votre classe?

	Extremely well/Extrêmement bien	Very well/Très bien	Moderately well/Moyennement bien	Slightly Well/Légèrement bien	Poor/Pauvre
Level of success of your students/Niveau de réussite de vos élèves	○	○	○	○	○

8. How important is student engagement to you? For example, asking/answering questions in class or group discussions.

Selon vous, quelle est l'importance de l'engagement des étudiants? Par exemple, poser/répondre à des questions en classe ou lors de discussions de groupe.

	Extremely Important/Extrêmement important	Very Important/Très important	Moderately Important/Modérément important	Slightly Important/Légèrement important	Not Important/Sans importance
Importance of Student Engagement/Importance de l'engagement des étudiants	○	○	○	○	○

9. What does student engagement look like in your class?

10. Do you ever meet with students outside of class?

Vous arrive-t-il de rencontrer des étudiants en dehors des cours?

	A Lot/Beaucoup	Often/Souvent	Sometimes/Parfois	Rarely/Rarement	Never/Jamais
Meet with students outside of class	○	○	○	○	○

11. How much control do you have over what you teach and how you teach material?

Quel est le degré de contrôle que vous avez sur ce que vous enseignez et sur la manière dont vous enseignez le matériel?

	Full control/Contrôle total	A lot of control/Beaucoup de contrôle	A moderate amount/Un montant modéré	A little control/Un peu de contrôle	None at all/Aucune
Level of control/Niveau de contrôle	○	○	○	○	○

12. Have you ever thought about changing your teaching style?

Avez-vous déjà pensé à changer votre style d'enseignement?

13. What is the most challenging thing for you as a professor?

Quelle est la chose la plus difficile pour vous en tant que professeur?

14. What other challenges do you face in your classroom?

Quels sont les autres défis auxquels vous êtes confrontés dans votre classe?

15. Do you ever use technology in your classrooms such as a projector or lab equipment?

Vous arrive-t-il d'utiliser dans vos salles de classe des technologies telles qu'un projecteur ou du matériel de laboratoire ?

- ○ Yes/Oui
- ○ No/Non

16. Have you ever advised a student project, such as a capstone project - a project done in student's final year that encompasses everything the student has been studying?

Avez-vous déjà conseillé un projet d'étudiant, tel qu'un projet capstone - un projet réalisé au cours de la dernière année de l'étudiant qui englobe tout ce que l'étudiant a étudié?

- ○ Yes/Oui
- ○ No/Non

17. Do you have anyone, such as a PhD student, to assist you with your classes?

Avez-vous quelqu'un, par exemple un doctorant, pour vous aider dans vos cours?

- ○ Yes/Oui
- ○ No/Non

18. How easily do you feel it would be for you to implement projects into your current classes?

Pensez vous qu'il serait facile de mettre en œuvre des projets dans vos classes actuelles ?

	Very Easy/Très facile	Somewhat Easy/Assez facile	Unsure/Incertain	Somewhat Difficult/Un peu difficile	Very Difficult/Très difficile
Implementation of projects/Mise en œuvre des projets	○	○	○	○	○

19. Are there any professors that you know utilizes projects in their classes that we should talk to?

Y a-t-il des professeurs dont vous savez qu'ils utilisent des projets dans leurs cours et auxquels nous devrions parler?

→

Thank you for your responses. This is the end of the survey. We would like to follow up with you. Please provide us with the following contact information. As a reminder, no identifying information will appear in the final report.

L'enquête est terminée.
Merci pour vos réponses. Nous aimerions assurer un suivi avec vous. Veuillez nous fournir les informations de contact suivantes. Pour rappel, aucune information d'identification n'apparaîtra dans le rapport final.

Your name:

Votre nom :

Your email:

Votre adresse électronique :

Your title/position:

Votre titre/position :

→

Survey Results

Question	Answer
How many years have you been working at Mohammad 5?	14
What age did you start teaching?	34
Did you, or do you work at any other university?	No
What classes do you teach?	Business English, Scientific Communication
What is your average class size?	30
What classes do you enjoy teaching the most and why?	Engineering and Masters programs
How well do you feel your students do in your class?	Extremely Well
How important is student engagement to you?	Moderately Important
What does student engagement look like in your class?	It depends on classes and levels
Do you ever meet with students outside of class?	Sometimes
How much control do you have over what you teach and how you teach material?	Full Control
Have you ever thought about changing your teaching style?	Of course yes.
What is the most challenging thing for you as a professor?	To meet the needs of 21 centuty students
What other challenges do you face in the classroom?	To get students engaged more in learning.
Do you ever use technology in your classrooms?	Yes
Have you ever advised a student project, such as a capstone project?	No
Do you have anyone, such as a PhD student, to assist you with your classes?	No
How easily do you feel it would be for you to implement projects into your current classes?	-
Are there any professors that we should talk to?	-

Appendix F: Interviews with Faculty at UIR

We are a group of students from Worcester Polytechnic Institute in Massachusetts. We are conducting interviews to gather information for our research project. We are looking at the possibility of introducing project-based learning into the curriculum of ENSIAS in Rabat. The goal of our project is to develop recommendations on how universities can implement project-based learning (PBL). This research will fundamentally enhance student engagement and potential future implementation of PBL at ENSIAS. You do not have to answer any questions you do not wish to. All of your answers will remain anonymous. No identifying information will be recorded or appear in the results of our project reports. This is a collaboration between Worcester Polytechnic Institute and ENSIAS, and your participation is greatly appreciated. If interested, a copy of our results will be provided.

For more information about this research contact the PBL team at gr-ProjectLearning-C20@wpi.edu or WPI's IRB Manager, Ruth McKeogh, Tel. 508-831-6699, Email: irb@wpi.edu or WPI's University Human Protection Administrator: Gabriel Johnson, Tel. +1 508-831-4989, Email: gjohnson@wpi.edu.

Faculty member #1

What is your average class size?

- 32 students
- Divide the class into 2, 1st being the lecture which is up to 100, 2nd is the max 20 students

Have you thought about student engagement?

- Cares to add projects to the curriculum

Do you meet with students outside of the classroom?

- I have to push them to meet by emailing them
- We have a forum where students ask questions
- I need to push the students to work hard

How much control do you have over what you teach and how you teach material?

- Have complete control over the course here at UIR
- Here we are teaching a bachelor of 5 years, we have the program and it is advised by the ministry
- It is mandatory to have 50% of the grade be a final
- The rest of the grade is flexible, some professors do 50% or labs, etc.
- If he has a course with labs, 30% labs, 20% projects
- If is it not hands on (probability/stats) – he does quizzes – 10-15%, 30-35% midterm

Do your students succeed/do well in your courses?

- Not all of the students do well, 1/3 excellent, 1/3 so-so, and 1/3 we have to push them
- In CS all of the students work CS Students go to other countries, there is not a lot of CS work in Morocco so they get hired elsewhere
- Salary is considered what you put into your pocket, after taxes
- Engineers make $1000 a month in Casablanca, but in France it is $3000- students want to leave to build their families outside of the country

Do you use technology in your classes?

- We have simulations, we have classed with pcs, students have laptops
- We don't have an issue with this here because we are a computer science school
- We have very equipped labs
- Technology is not a problem, no mechanical machines
- We are fortunate, school dedicates resources to the technology

Have you ever advised a capstone or group projects?

- Mandatory internships
- 1 in the 2nd year- a general internship, 1 in 3rd year- technician, 1 in 4th year- a longer internship, last year- go work for the entire semester
- Some universities have project design, ex. Project – automation home
- Most projects are in the development of applications- applying the studies in coding, UML
    - We detect the weaknesses and it helps us improve these weaknesses

Do you have PhD students help you with your classes?

- We have just opened a phD college, they will help teach the hands on approach
- They will teach labs and help with grading
- They are paid because they teach in the labs
- There is no center for tutoring

What do you know about PBL?

- Was professor at the American school in Ifrane
- Chair of the faculty committee
- Did a seminar about PBL, could not implement it in that time
- PbL is grouping classes together to create multidisciplinary projects
- Cannot only implement for only 2 years
- You need a lot of resources
- You need a flexible system, need to supervise and advise
- You have to give a project that will combine multiple courses
- We can apply it here but we need to give seminars to professors about the advantage of PBL
    - Professors will ask how we can account for the hours, have to teach 240 hours vs. how
      many courses/credits to teach
- Pbl consumes a lot of time but it is very important for students to learn à students learn more in projects and internships
- I am not doing PBL but I always give a project, this gives a chance to the students for hands on
- In one course there are 32 students, and 13 presentations
    - this is why professors do not want to do projects
- ave to give incentives especially about pbl

Do you think the students benefited more from the projects?

- Yes, they complained a lot at first
- They learned a lot from working, and just watching the other presentations by Attending
- Asked the students for milestones and plan of the projects, you cannot just give them the project to do on their own
- Students have a lot class hours 32-36 hours of class per week, so it is hard to get the students to work outside of the classroom since they do not have time

Faculty Member #2

How many years have you been teaching? Where?

- Logistics and supply chain management
- Statistics applied to economics and management
- Manufacturing processes and quality control from a statistical perspective

What is your average class size?

- Bac- 60 students, sometimes more
- Masters- 35-40 students
- All at the same time in the main lecture, and then smaller amounts around 30 for practical/practice sessions

How well do you feel like your students do in your classes?

- The students who work hard do well
- Normal distribution
- At a certain point, there is only so much you can do
- You cannot force people to work
- Gives everyone the same opportunity
- If you don't work for the money they are paying, they don't like it

Have you thought about student engagement/student engagement in class?

- Depends on which class
- In some cases this is helpful
- Groups of four or five
- Students are often very shy asking questions in front of others
- Sometimes gives bonus questions
    - Really wants students to answer questions
- Sometimes they are focused on their phones
- The pace that the lectures go sometimes don't allow for
- Takes attendance

Do you meet with students outside of the classroom?

- Students can come to some office hours
- Students don't have a lot of free time outside of class
    - A lot of contact hours
- Has an open door policy

    - Not everyone takes him up on this, often the ones who need help are not the ones who come anyways
    - Students have a bit of shame when they come in and they haven't done well in the course
    - It is challenging for him to follow everyone and push everyone
    - The students who work hard are the ones who come
    - He is usually here and sometimes students just come, he is very open
- Field trips
    - Has lunch and coffee with students sometimes
    - Removes boundaries sometimes in the educational process
    - Wants students to feel more comfortable around him
    - Goes for company visits as well
- Meeting outside of the professional scope
    - May be wrongly seen because it can be uncomfortable
    - Not something you can do (hanging out of students)

How much control do you have over what you teach and how you teach material?

- 50% of the grade is the final, the other 50% is up to the teacher
- You are free to structure it the way you want
- Grades are out of 100, but sometimes grades are out of 20
- A around an 80, there is no – or +, failure is below 50%

What challenges do you face in the classroom?

- Undergrads don't have an autonomy that is needed in education
    - They do not get introduced to study skills or independent learning
    - Plagiarism is a common thing here because students don't know that there's nothing wrong with it
    - Avoids giving projects because it is a large process to advise students on how to operate under independent learning expectations
    - In master's programs
        - Develop survey
        - Gather data
        - Interpret results
        - Go online and fetch secondary data
    - Industrial/management
        - You have to contact companies for data
        - Sometimes people only have access parts of data
    - Theoretical research
        - Not the best for students
- Getting the best project for students to work on is hard
    - Data isn't always available
    - Sometimes takes students on trips (not usually, not always)
    - Other disciplines-might be easier since other companies publish data on financial records and such
- Independent learning (or lack thereof) is the problem
    - Students don't do homework individually especially if it's graded

    - Students don't do the reading
    - Group projects are still a number of students and it's hard to evaluate them
    - Students don't do stuff just on their own
        - Everyone will have a perfect grade, which isn't the point
    - He believes the grade is not the most important thing, especially hard to explain because students are very focused on the grades and passing
- End result is the good grade, not the knowledge

Do you use technology in your classes?

- Do you have technology in your classrooms?
    - Yes
    - Standard thing is to project slide
    - Students have a textbook and practice sets
    - It depends sometimes when trying to explain things
    - You can have slides, but sometimes you need to use the board
    - Some courses use simulation software- Arduino
    - School has licenses
- Depends on the level of students
    - Beginning students need content
- Online
    - Office365
    - One Drive
    - Class notes are put on this
    - Microsoft Teams for the online assignments
    - Use because it's secure
    - Use turn-it-in

Have you ever advised a capstone or group projects?

- Does not do projects with undergrads
- There is one mandatory capstone project at the end of the undergrad, one mandatory capstone project at the end of the master's program
- One project that gathers the different courses
    - Try to come up with one project to combine because the project will need everything working together
    - Applying foundation courses to different fields
    - The grade represents a percentage in each course
    - Around 4 students
- Juice company
    - Around 4 students
    - They make the groups (you won't always work with people you like and appreciate)

Do you have PhD students help you with your classes?

- Yes
- In practice sessions there are PhD students
- Decision of the administration to allow students to teach the course
- The PhD students don't always have time themselves

- Don’t really have time to do anything else

Do you feel like it would be easy for you to implement projects into your current curriculum?

- Already uses projects

University improvements

- Independent learning
- In the country in general
- Bac from 3 years to 4 years
- Wants to dedicate time for interpersonal skills, study skills, independent learning skills
- Starting next year, something they will put in place
- University should always put effort into having smaller groups
  - Limited by money
- Objective is not to generate profit

Educational background

- Bachelor's Degree- infrane
- Master’s Degree- National School for Business and Economics
- Supply chain- Morocco undergrad
- Logistics management- Morocco undergrad
- PhD in the Netherlands/operations and logistics- life sciences school idk what called
  - Supply chain
- Started at UIR 7 years ago when finished master’s degree
- Started with practice sessions during the first year
- Netherlands and Morocco
  - Hard to compare
  - Netherlands
    - Much more available in the Netherlands
    - More flexibility in the Netherlands
    - Focused courses over a smaller period of time
    - Sessions are shorter
      - He tries to do the 50 min, 10 min break, another 50 min
    - They have computer lab sessions, laboratories, etc.
    - Sitting in class and solving problems is very French

Faculty Member #3

How many years have you been teaching at Mohammad 5?

- 25 years
- teaches business classes
- Got bachelors in Morocco
- Masters/phd in Orlando

What classes do you teach?

- Business, marketing classes, marketing research, strategies, sales, international sales

What is your average class size?

- 30-60 students
- teaches all levels

How well do you feel like your students do in your classes?

- Normal curved classes
- minority for the bad and excellent students.
- This is really common.
- Language might be one of the issues with why people do poor (masters). Teaches all classes in English

Have you thought about student engagement?

- Big part in the business school - every student in ba and ma have to get involved with associations that go beyond making money. Involved with being a good citizen.
- Example: go to south Morocco and help build a school or a caravan
- They feel Better about these and ask to do more

How important is student engagement to you?

- It is hard to hold the attention of students for a long period of time
- The attention span has diminished with the rise of technology.
- Very rare in the school will you ever have a 2 hour lecture
- 20 min lecture, video, vid discussion, connection back to lecture, article to read, read for 10, 10-15 to discuss the article, break, 15 minute lecture, go to a website, relate material back to lecture and have discussion, guest speakers at times
- Relate the material back to the students.
- It takes a lot of time to find the material for classes that relate to the subject/chapter that you are trying to teach.

Do you meet with students outside of the classroom?

- Yes. Every professor has to have office hours.
- If not available, students can make an appointment with professors.
- If students can avoid the professor during office hours they would. They don't take advantage of it.
- The office hours helps the professor understand what they are not teaching clearly so they can give extra information for everyone

Have you ever thought about changing your style of teaching?

- Midterms, quizzes (pop sometimes), projects, presentations, group work in the classroom are used.
- There should never be one type of evaluation.
- The point isn't to have a perfect presentation. Students are still in the process of learning
- You can see how well you are doing from the group/audience evals on your presentations

What is the most difficult thing for you as a professor?

- Students do not have the English ability or have been exposed to the English vocab or material. Spending the time on English will not happen if there is no grade/incentive to learn English outside of class. Students do not want to go out and study on their own when it is not tied to a grade. There are classes in the business school that teaches them about research. The students don't have any prior experience doing this. Students might think that they will be able to follow along even though they do not know the English well.
- Holding the attention of the students. Some profs say no phones, others try to use laptops and other things fun and included as ways to engage with students.

Have you ever advised a capstone or group projects?

- Students have advisors for internships as well as capstone projects (end of studying). Have to have one
- Report, presentation, and company from where they worked and those are the 3 parts of the grade of the internship experience (50, 25, 25 respectively).
- Bad evals cause a talk with students and tell them that it is not the grade that matters but the experience of the internship.

Faculty Member #4

How long have you been teaching?

- Teaching for 20 years

What classes do you teach?

- Teach physics
- masters and phd classes (electronics, dynamics, quantum mechanics, nano-materials)
- Teach the prep courses for first and second years

What are some challenges you face in the classroom?

- The problem is with high school
- No background in some of the material, statistical analysis, modeling. Lacking the skills from high schools that allow them to be successful in university.
- Grade breakdown: 50% final, labs and written exams (along with multiple choice) make up the other 50%
- no quizzes because the students have too many classes and can't keep track of everything
- Offer makeup exams - exams help see if students know the fundamentals
- Normal curved distribution for students.
    - The poorer performing students are the ones that have a not so great background.
    - Focuses on the middle of the curve. You can see the weaknesses of the group to see where you (as the professor) are lacking proficiency
    - Can focus on points that you did not cover in the lecture when students ask questions after class
    - Outside of lectures you can work in smaller groups
- Dynamic classes, stop to engage the students and can add on to the questions and elaborate on some of the topics in class

- Students have to memorize a lot of information
- Professors attempt to make illustrations to help students.

What are your normal class sizes?
- 80 student lectures with 30< for tutor and 16 with labs

Do you have any PhD students to assist you with your classes?
- PhD students only help with setup and troubleshooting with labs
- No background in helping with lecturing. No TAs
- Starting this year (hopefully with the new PhDs)
- Students are shy to ask questions, think they are stupid question. To solve this there should be a senior student mentoring/tutoring the younger students

What are some challenges you face in the classroom?
- The language is an issue. Classes taught in French and the AE classes are in English and they are difficult.
- Universities also go at a much faster pace than in high school. Like rapid pace for a lot of students
- Attitude and discipline is a problem. It gets hard due to the fact that there is limited time and students are disruptive.

Do you ever meet with students outside of class?
- Have office hours
- Students don't take advantage of them.
- Students only come to office hours around the time of exams

Can you tell us about your educational background?
- BA in Mohammad 5
- Masters and phd in France

Do you use projects in your classes?
- Tries to use the labs as the way to test students.
    - They have to write a report and this is one the first times they ever do anything like it.
- Starting doing "mini" projects in third year.
    - Groups of 3-5 students that work on a simple problem (matlab) and expand upon what they know in physics and model/represent it in technology
- In second year, have 1 month (6 weeks at most) internship. Go to a business and see how things work in real business.

Faculty Member #5

Educational Background
- ENSA in Morocco
- M5 PhD
- Mathematician/computer science

- Came here as an assistant professor
- Second year

Challenges about the Students

- There's a lot of challenges students face/bring upon themselves
- Sometimes students are more focused on partying
- Not engaged
- The students don't know the importance of education
- The students are here just because their parents told them to come
- Moroccan students are generally disruptive

How many years have you been teaching? Where?

- Two years
- Very lucky because he got a job right after

Did/do you teach at other universities? What classes do you teach?

- First semester
  - Networking
  - Operation systems
  - Computer forensics
- Second semester
  - Security of networks
  - Operation security
- Specialty is security

What is your average class size?

- 20-30 later years
- 60-70 first years
- 2 hour classes

Have you thought about student engagement?

- 40% of students are not engaged

Do you meet with students outside of the classroom?

- Has posted office hours
- Has an open door policy
- Students come often to his office
- If students ask for help, they can get it
- About 15 students come each week
- Exam weeks- more and more students

How much control do you have over what you teach and how you teach material?

- Breakdown of grades
  - Midterm exam, labs, project, mandatory final exam
- Restructures course every year

What is the most difficult thing for you as a professor?

- A lot of students in the same class (up to 100 students) this is difficult for him to manage
- There is a heavy load on students so they don't have a lot of control over the students
    - Nothing that he can do when people don't study

What challenges do you face in the classroom?

- It's a complicated subject
- Has to ask students to leave the class sometimes
- Small classes- easier to manage
- Big classes- very hard to manage people

Do you use technology in your classes?

- PowerPoint
- A lot of tools
- There are more resources here than others
- One of the best universities – give teachers everything
- Platform where teachers can ask for materials
- Other universities don't have this

Have you ever advised a capstone or group projects?

- Specialized projects in their field
- Students do labs
- Students pick projects from the professor
    - Students choose their subject and supervisor
- Supervisors about 6 or 7 projects

Do you have PhD students help you with your classes?

- Has two PhD students that help in labs
- 2-4 hours less bc the PhDs

Faculty Member #6

- Teaches machine learning
- Relation to computing for first year students
- For each module, a project at the end of the module

Challenges with Students

- Motivation issue
- Leave things to the end for projects and such
- Then the outcome isn't good
- Most of the students fall under this
- They leave everything till the end
- Complain about the load
    - The number of hours is just too many
    - Doesn't leave much time for things like projects and such

Projects

- Projects engage students more
- Students like data collection
- Projects require a bit of social skills to go and talk to strangers
- Let people choose the topic themselves
- Students can become more aware of the problems on campus

Project Engagement

- Projects provide this
- Always tries to motivate students before the lecture
- Need to get students hooked
- The Difference in teaching in England vs Morocco
    - No difference really in terms of the students
    - Better resources there in England
- Educational Background
- IEEE fellow
- Toulouse France
- Scotland for a post-doc
- England to Leits University

Grade Breakdown

- 50% final, 25-35% up to 50% projects

Faculty Member #7

UIR background

- We have sub schools at UIR: business, engineering
- In business: it a part of the university, we are the leaders of the strategy of UIR, 2000 students, more than 25% of the students
- Last year we have a new strategy, a new director with a new vision- our objective is to be one of the top 3 business schools in Africa
- Build this building in a year, we have new study rooms, offices, we are looking to recruit and hire more and more professors
- Now 35 professors with room for 15 more professors, we want to have 60 professors
- We are working to increase the number of students as well
- It is a matter of distinguishing this school from others, in this 2%
- Trying to build the accreditation, very prestigious
- Have a director and 3 sub directors that are leading the Rabat business school, also committees to ensure IOL- insurance of learning, take their opinion on courses and exams, and collect this data and pinpoint the weaknesses- they try to make corrections in the curricula

Educational Background

- Started directly in engineering school in logistics and transport
- Right after he went to France to get a research masters
- Phd in 4 years in logistics and transport
- Have been teaching here for 4 years

- Now the program director of international courses

Students

- 40 students in a cource
- Normal distribution of students who succeed
- Students who need help come to see him, open door policy
- Students are able to come see him frequently
- When you have a good relationship with the students, if they see if you are interested in them and want to help them they will ask for help
- We should work on weaknesses, office hours are open for students and you can make appointments

Courses

- Students like to follow a story, if you put what you want to say in a story the students follow
- If you talk about 2 different topics without a bridge of info they do not follow
- Our mission is to create new manners to explain what we want to say to them
- I create a story so the students don't know what the end of the story is- ex: economics, how are we going to bring this item from here to Arabia
- We have standards on how to teach our courses. Before going to a course you need to inform students on what you are going to teach, right after we can be creative
- In masters we have 500 students, we have 5 professors teaching the course, each professor has the same courses but teach in a different manner- discuss among each other
- 50% final exam, presentation/project (academic or research project) and push students to visit companies to get data and get explanation on how they are doing things
- The professor has the choice
- International logistics- push students to be near the companies and practitioners

Challenges

- The students
- Each year we notice that the ability of students are changing
- Maybe because of the secondary schools are teaching
- I don't know if the system is like this? But here we have these difficulties but we try to fix them
- Soft skills are challenging, teaching in French and some courses and English- some students do not have these abilities, makes the course harder
- In their background they do not have smart skills in school
- Technology- some do not have the ability to write on Microsoft word
- Have a course on excel
- Cannot ask a student to do a presentation if they do not know how to use powerpoint
- The first year we focus on soft skills- that allow them to permit further

3 years vs 4 years, does this allow for students to develop the soft skills more?

- Cannot say if it will help, but I think the students should have these things
- We have good students but not of soft skills, which means you will not succeed

- The students here are different, they should be able to speak another language in order to learn another language, their skills will not be valuable if they cannot speak another language

Resources
- UIR has the most resources, we have everything
- As professor I can demand a computer, if I need something for my course it is easy
- We have a little e-learning, we try to make 20% of courses online, especially for soft skills like Microsoft
- We have the system to share courses and for students to speak with professors
- We have everything that we need

Projects
- In our bachelor's degree, the students need to pass 6 internships
- We are introducing them to practical things, see the company, find a small problem and offer solutions
- In the courses it depends on the professors and it depends on the course
- It is a matter to push a student, they should speak, they should present à we give them projects and presentations in order to work outside
- We have 10 hours in each curriculum that are reserved to projects, “work at home” and professors use this time for projects

PhD students
- This is new, this is the first year we have received phD students
- 7 positions for phDs, I took 1 student we start in Jan
- We are thinking about having them help professors for somethings
- The most important is their research, in order to have international ranking it matters what we produce

Do you like working here?
- The environment is good in comparison to other places
- If you want to have a good career as a professor it is good to work here
- If you want to innovate this is the best place to do this

What pulled you back to Morocco after going to France?
- Here we have French culture, we are teaching in the same manner as they are in France
- When students go to France they find a similar education, they go to France to settle
- In Morocco companies they believe more in Students from other countries
- Students find that studying outside of the country will allow them to have a better job position
- It is very difficult to start here in Morocco, maybe the salary or other things
- The government is working on getting people
- We should push the students to create value, and we do not have that here. Everyone wants to work but no one wants to create their own company

Faculty Member #8

How many years have you been teaching? Where?

- Began teaching at UIR in September
- First month was really stressful

What classes do you teach?

- Theory- perspective (drawing)
- Structure of buildings for beginning (lots of students in one class- 187)
    - The students were not used to getting taught things
    - Found herself disciplining more than providing knowledge
- Public spaces for third years

How well do you feel like your student do in your classes?

- Normal curve
- 20% of students are really great
- Hard to motivate the others

How important is student engagement to you?

- Student engagement is very important
- Tries to get students to be more engaged by using active learning, a flipped classroom approach, and engaging students in class with pictures, questions, and assignments

How much control do you have over what you teach and how you teach material?

- Allowed to make own curriculum/use own style of teaching
- Flexible director for her department

What challenges do you face in the classroom? / What is the most difficult thing for you as a professor?

- Students are only doing their major because of their parents
- Students might not have to work in their life
    - Some students really do love what they're doing
    - 20% of the students are great
        1. They sit in the front
    - Other students are in the back, about average
    - She moves around the classroom
    - Doesn't talk the whole time but asks about students opinions
    - Students should do their research
    - The number of students was challenging
    - Students are young
- There were only 26 students in the 3rd year architecture course
    - All the students chose to take the course
    - Relied on group work rather than just lecturing
    - Architects always work with others because that's how it works in the field
    - Uses the flipped classroom technique
    - Groups react with each other
    - Wishes she could do this for all her classes
    - Students get the chance to criticize each other

        - Made students get creative
        - Wants students to do better and build a new Morocco
            1. Building up a new image of the country
    - Big believer in sensitivity and create an equal space for students to share their ideas
    - Needed to break things down to make things easier to understand which was difficult for her
    - Quality over quantity
    - The French System
        - No critical thinking
        - Relied on papers and projects, designing, applied studio, etc.
    - Getting students to all work equally
        - There is always someone in the groups who doesn't come to class, doesn't work, or shows up to presentation and then
    - Really strict so students don't take advantage of her
        - Holds pop quizzes
        - Students tend to forget about this
    - Wants to push students to do well
        - Strict
        - Goes over things that they did a long time ago
        - Doesn't have the large percentage of the class confused
    - Gives homework for drawing
        - Gives plenty of time (15 days)
        - Students can work in groups
            1. Not about doing it right
            2. Can't erase lines
        - Students are told to redo drawings again at the end of the semester for the marks

Do you use technology in your classes?

- Students are pushed to make models and draw

Have you ever advised a capstone or group projects?

- Big interactor with students
- Real examples really help
    - Always starts with a building
- Wants students to have critical thinking skills
    - Wants students to guess and think hard through problems
    - Trying to push students from theory to something real

Grading

- Public space design (studio style) – each step had a percentage
    - Site analysis
    - Presentation
    - Concept phase
    - Finalizing
        - Technical stuff
    - Presentation

Faculty Member #9

Educational Background
PHD- Carnegie Mellon

- Mellon was tough and hard but changed her attitude towards things
    - Makes you feel you can do things
- Masters/undergrad from Switzerland
- Wasn't hard for her to get a job
- Taught with American system
    - Learning how to learn
    - You have to be able to learn by yourself

How many years have you been teaching? Where?

- Been here for 3.5 years

What classes do you teach?

- Cyber security and applied crypto

What is your average class size?

- 17 or 18
- This year 50

Do you meet with students outside of the classroom?

- Open door policy
- Most of the time, students only come because they want an extension or change their grade

What challenges do you face in the classroom?

- Struggle for students to complete extra projects
- Feels that students are used to being given material
- Independent learning isn't something that is used here
    - Students don't get exposure to that here
- Students don't take initiative
    - Tries to have discussions to get students thinking and working
- Students are paying for themselves
    - Some rich kids – don't have that drive to learn
    - Everyone has to pay, except maybe 30% of students are on scholarship
- The whole system is very hard to make change
- Soft skills are lacking
- Independent learning is something

Projects

- 25% of grade
- Used a lot bc it's the security
- Thinks people learn through doing

Do PhD students help with your work?

She has PhD students help her with her work
- Not normal to have this assistance
- She does it for research purposes so she's not overburdened with her classes

Faculty Member #10

What do you teach here at UIR?
- I teach communication, public speaking, and English

What language do you teach in?
- English

How long have you been teaching here?
- Since 2015

Do you use projects or any other form of engaging work in your classes? Classes in activities other than lectures?
- Yeah, of course, I do that a lot. I do that so much, in almost every class
  - I use a lot of projects in our course
  - I do a project on kindness and practicing kindness for a sense of well-being
  - Project
    - Come up with a kindness project
    - Choosing an association in Rabat and spending a day there, volunteering, bringing food, planning activities with the kids
    - Working on gratitude and the impact of gratitude
      - Writing gratitude letters, expressing gratitude to their loved ones, friends, and families
  - Healthy lifestyle habits for the wellness class
    - How do we develop healthy habits, for example:
      - Nutrition, sleep, meditation, exercise
    - Students choose one area and then choose a partner in class who is your mentor
  - Communication class
    - Student is the trainer for the class
    - Students choose a project
      - Ex. emotional and social intelligence
    - Students give a presentation and facilitate activities/workshops

Do you face challenges here at UIR?
- Of course, there are all kinds of challenges
- I face challenges with the students as there is a lack of commitment
- In the beginning students are motivated and excited to be there
- There is no commitment week to week
- This is challenging with some students but not everyone

Is language a challenge?
- American and Moroccan/French education system

    - Morocco- they don't have a lot of free time. They start at 8 am and finish at 5 or 6 pm
    - They don't always have the time to do independent work outside of this
- We should give them more time to go to the library and go and interact with other students

Do projects help engage students in the class time they have?

- Definitely, yes

Does it help them develop more skills like critical thinking, presentation, talking to people?

- Yes, definitely. But I have some students who actually appreciate this format but ask for more balance with lectures and interactive/PBL things

Do you have office hours outside of class?

- Yes, but students don't really take advantage of this properly. Since sometimes my students need to lead the class, I tell them they have to stop by my class before their session and meet with me. This is how I have them prepare.

How flexible is your curriculum for the courses?

- I have flexibility. I do change things each year. I ask students what their needs are expectations are. I usually change the syllabus a bit.

Faculty Member #11

What do you teach here at UIR?

- I teach communication, gender, religion, and introduction to anthropology

What language do you teach in?

- English

How long have you been teaching here?

- 2017

Do you use projects or any other form of engaging work in your classes? Classes in activities other than lectures?

- We teach with the political science department
    - Instead of final exams, we do final projects
    - Students are in a mixed class
    - Students work together on a project
    - Students working on projects related to social issues
    - Students interview people off campus to collect their data
    - Students observe people off campus and interact with them
- In terms of class activities
    - Guest lecturers who are experts in the area and come in to share their perspectives

Do you face challenges here at UIR?

- Students don't like to read outside of class

- Students make excuses and we have to work around that
- Realistically, students are not committed enough
- We have to think about other things that students can consult so they can learn
- Different schools have different dynamics
- Discipline is an issue
- Discipline problems can impede the learning process

Is language a challenge?

- Language is a challenge sometimes yes
- Students are supposed to be strong in English and French
- Some students are strong enough and others aren't
- It's hard to work with this and navigate through this issue

Do projects help engage students in the class time they have?

- 100%

Does it help them develop more skills like critical thinking, presentation, talking to people?

- Yeah. It also allows them to work on what they are most passionate about. They feel freer in the way they approach the subject and the way they communicate their ideas. They are more motivated through this

Do you have office hours outside of class?

- Yes, but usually they just come around exam times to try and negotiate things with you.

How flexible is your curriculum for the courses?

- For me, this is my third year, so I haven't really taught the same courses. I usually mix up my curriculum and syllabus. I have both international and Moroccan students. The first year Moroccan students need an introduction to research and methods of research. I do have total flexibility

Appendix G: Interviews with Other Professors

We are a group of students from Worcester Polytechnic Institute in Massachusetts. We are conducting surveys to gather information for our research project. We are looking at the possibility of introducing project-based learning into the curriculum of ENSIAS in Rabat. The goal of our project is to develop recommendations on how universities can implement project-based learning (PBL). This research will fundamentally enhance student engagement and potential future implementation of PBL at ENSIAS. You do not have to answer any questions you do not wish to. All of your answers will remain anonymous. No identifying information will be recorded or appear in the results of our project reports. This is a collaboration between Worcester Polytechnic Institute and ENSIAS, and your participation is greatly appreciated. If interested, a copy of our results will be provided.

For more information about this research contact the PBL team at gr-ProjectLearning-C20@wpi.edu or WPI's IRB Manager, Ruth McKeogh, Tel. 508-831-6699, Email: irb@wpi.edu or WPI's University Human Protection Administrator: Gabriel Johnson, Tel. +1 508-831-4989, Email: gjohnson@wpi.edu.

Professor #1:

Where did you go to school?

- Moved to many small cities in the Northern Mountain
- Went to secondary education schools in smaller towns
- Very strict with larger classes ~80 per class
- Taught French and Arabic at early age (1st grade)
- Went to undergrad at Mohammad 5th

What did you study?

- English BA (Mohammad 5th): 3 years and chose literature as the concentration
- Business
- Business management in one year (special year) MB in France after studying one year here at Mohammad 5th

Are you a teacher? Have you taught before?

- Came back in 2016 and applied to teach Arabic as a foregin language

Does she know anything about ENSIAS?

- Went to Mohammad 5th

Have you worked on projects before?

- Use projects to teach language
    - Video about making food
    - Video about experience or friends during internship/hosts/study abroad
    - Have students go talk to the locals to get immersed in the experience of the language

Have you seen others use projects as a learning method before?

- Very few projects succeed because everything relies on theory

- Labs are not well equipped or staffed, the environments do not encourage learning
- Professors might show resistance to the idea of PBL
- The PhD researchers are the ones that help assist undergrads with their classes
- Most professors/depts will not hold office hours to help students, those that do are usually the ones who can be identified as those who are willing to help students

Difficulties

- A large number of students are pushed by their parents but they are only there to "get
  the paper" (degree for a job)
- Those that succeed on their own work very hard; There is no motivation for students to succeed
- Blame the "System"
- They are not paid well and why would they teach well if there is no investment in
  professors
- Blame makes it way to the government for most of their issues or compare Morocco to
- other poorer nations
- The professors know this would be beneficial but do not want to implement it; extra
- work
- Tell professors that we are here to help the students
- There have been many education reforms and it has come to the point where
  Moroccans believe we need "magic" to fix the education system
- There are laptops in schools but a lack of understanding as well as people to teach
  professors how to use them
- Professors get a sense of pride and don't wish to learn

What difficulties do you think face students today?

- Students just need somewhere to work, lack of space
- A lot of resources that are available are private
- There is no variation in the way students learn so they would love to talk with us and participate in our research
- Those Moroccans that go abroad say classes are easier due to the fact that they are
- able to have the resources (TAs, prof. offices hours, etc)
- It's a cycle; Students are just a product of the System

What is your opinion on projects and implementing more into schools?

- Resistance from professors; Have materials that they don't want to change
- Instead of telling them to change, tell them how to improve their current curriculum with
- the resources they already have; add, don't change

- Stress the fact that we are helping students
- Don't try to make a global impact. Start small with this community
- English speaking departments are more open to change than those taught in French

Should we talk to anyone specific?

- 13 faculty members that can help us and we can meet with all of them and talk with them. Talk with Iman
    - We could sit in on their classes
    - Don't assume their issues
    - Tell them we are here to help as part of our academic project
- Ask about working with ENS - Teacher training school in Rabat
    - Use what we have prepared and evaluate what works well
    - Do research before hand to be able to day "We know that your classes run
    - like..."
    - Tell them we are here to help as part of our academic project
    - Meet with an educational inspector - evaluates the level at which the teachers
    - Teach
- Look at the PhD system. They go through a lot of mental hard times
    - Moroccans experience their advisors telling them that they have average work;
    - Advisors get jealous that younger, smarter people might become peers

Other notes:

- Next week is their break for one week
- National library's coffee shop will have a lot of university students
    - -5 dhs for the year - they can help us get a card but we can get in without it (bring passport) and go as visitor
- Connect Cafe is similar
- Museum of Contemporary Arts has coffee shop behind it
- ENSIAS is sorta like an Ivy - they know what they want and are not afraid to speak their mind; They want someone to talk to
- Management schools are in between humanities and engineering; Study more about the market/economy and might have more interesting things to say
- Engineering schools have a capstone/practicum - some schools help with it, some need to find something to work on on their own
- Cycle; people do not like those who are ambitious, they do what they can to get by and blame the government. The government does not want to fix things so they don't invest in education
- Space for IT field nearby open for projects and for people to work (she will get back to us with the name)
- Possibly interview someone from a private university to see what resources that they have and if they do projects

Professor #2:

Can you tell us about your educational experience?

- Received Bachelors of Arts in English Studies from Mohammed 5 University
    - Started tutoring high school and middle school students
    - Began teaching communication classes as well
- Master's program in Rabat on teaching Arabic as a foreign language
    - Took 2 years
    - Participated in internship at Mohammad 5 in 2016 at a center to teach Arabic as a foregin language

What courses do you teach?

- Taught in both Arabic and English schools
- Taught Arabic as a foreign language for 6 years (MSA and Darija) to both high school and college level students
- Participated in internship at Mohammad 5 in 2016 at a center to teach Arabic as a foregin language
    - Taught students from Malaysia and China
    - Focused on their communication skills
    - Students had a wide range of experience in Arabic but were not good at communication
- In the U.S, taught for 2 months at Middlebury in Oakland, California
- Teaching English now for communication and tutoring high school students
- Supposed to be a teaching assistant, then got moved up to be the primary teacher
    - 2010 and 2011

Have you studied outside of Morocco?

- Received Fulbright Scholar
- Studied for 1 year towards his Masters degree in English studies and Culture
- Taught Arabic in America for 1 year
    - Felt as though he did not receive enough preparation to teach the classes in the U.S.
- Studied his second year to receive his Masters in English studies and Culture
- Went through similar problems that Moroccan students face today
- Didn't lose his English after focusing on Arabic for many years (8)
- CELTA
    - Certificate of English Language Teaching for Adults
    - Expensive (more than $2000 dollars)
    - Paid just so he can improve himself more and more
    - If you get it you can teach anywhere in the world
- Believes that teachers should always be improving themselves
    - Always learning
    - Learning through students and their questions
    - Respects his students
    - Lets his students know if he doesn't know the answer or if they are unsure
    - Teachers should be frank, honest, and straight-forward
    - Take training, etc

Can you tell us about the job market in Morocco for college graduates?

- There is currently an unemployment crisis in Morocco

Do you consider these jobs very competitive?

- The job market is very competitive, even for engineering students
- The struggle of young people is finding what to do after graduation
- Many people are focused on working in the government
    - Receive many benefits from the government
        - Retirement
        - Fixed salary
        - Job stability
        - Insurance
- Issues with private sector
    - Little job stability, can be fired easily
- The government stopped hiring teachers as they did before
    - People work with contracts
    - Jobs are therefore more insecure than they were before
    - The terms aren't very agreeable
- STEM majors are more likely to get jobs than other majors, yet they still are highly competitive
- English majors get job opportunities in language centers in the private sector
    - More institutions that are adopting English
    - People are turning more to English even though the government is pushing French in the schools
    - Benefits of being an English teacher
        - Can teach Arabic
        - Can apply for American lottery
    - The majority of people from the English department often work with the government
        - Can work for other centers at the same time
        - Doing tutoring
        - Use English for other purposes
- Law
    - Very difficult to find jobs after law school
    - Lack of support in the government for these students
- Arabic Language Major
    - In a bit more demand than before because foreigners are coming to study Arabic here in Morocco

What are some challenges you see students face with the current education system?

- Some teachers lack teaching training
    - You have written and oral exams
    - 1 year of teaching theories
    - Class observation and training in classes of your major
    - After that, you get appointed to a school in one of the cities
    - Before teachers used to get 2 years of training, now they only get 1 year

    - Other teachers with contracts only get 6 months of training
- For example, the public institution that trains teachers
        - You apply and get in based on your grades
- The majority of teachers are not teaching
    - They do not want to adopt new teaching techniques
    - Overloaded with the number of lessons they must teach
    - Makes their classes all memorization which is not good for students
- Moroccan teachers
    - Meant to be respected
    - Not approachable
    - Things are changing, however
        - Teachers are not being respected like before
    - Not adopting the latest approaches
    - Different than American professors that are more open and friendly
- Students forget everything after the exams
    - The curriculum is not up-to-date or well designed
    - Textbooks are not well designed
- Government
    - Government does not deign well thought out learning objectives
    - Doesn't want the people to succeed
    - Doesn't want people to become aware of what's going on
    - People buy into a conspiracy
- Extra Hours tutoring is becoming a business
    - Schools open more however they are turning into a business
    - A "miracle teacher" in Morocco
        - Opened a lot of schools
        - Teaching history and geography
        - Doing live videos and putting them on youtube
            - Made a lot of money
            - Explained lessons as if he is telling a story
        - Wanted students to succeed, motivated and encouraged them
        - He was encouraging them financially
        - Asking questions and answering lots of questions
        - Student excelled
        - The government closed his institutions and said he doesn't have a license
            - Put him in prison for wanting the student to do well and having free education that help students succeed
- Teachers are not trained well on purpose
    - Jobs are not given on purpose
    - The curriculum is not updated
- Students are victims
- Moroccans think that Americans are rich and that life is easier for them
    - He found that a lot of Americans work hard and study at the same time
        - Found more respect for people who are our age in America
        - In Morocco, teenagers are more dependent on their parents
    - Thinks that younger people are more spoiled

        - They don't have to work the same way they used to
        - Girls don't have this pressure to work
        - Boys get the pressure
            - Father/boy is supposed to be supporting the family and the women in the family and providing for them
- Students worked hard to get a scholarship
    - If his evaluations were not good, he would leave
    - Students pay for private institutions, so they should get something good in return

Teachers challenges

- Don't have projectors, TVs, ACs, heaters, well-designed or well thought out content for textbooks, not a lot of money (done on purpose), tables, blackboards, whiteboards, PCs, etc
- Teachers are blaming students, students are blaming teachers
- The people in charge of all of this are sitting back and watch
- Put your nerves in the fridge and be very patient
    - Or insulting teachers and losing their cool
- Teachers in the mountains have this much worse
    - Students are poor, cold, hungry
    - It's really heartbreaking for them
- A large number of students in one room
- No good conditions of a good learning environment and classroom
    - He knows what he is talking about
- Applied to become a teacher in 2008
    - Applied just because his friends applied
    - Doesn't feel he has the patience for Moroccan students
        - Not respectful to teachers anymore
    - Wasn't prepared for applying
    - Did succeed on the exam, but didn't on the oral interview
        - Was it his problem or the corruption of the system
        - There are bribes, there are connections existing in the country
- Applied again and didn't succeed again
- His friends and family didn't want him working in the private sector
    - No insurance (medical, etc.)
- Was not convinced and did not apply again
- He started entertaining the idea again
    - He is married and has a kid
    - Pushed to do something he doesn't like because he needs the stability
- A lot of teachers are patient just because they need money
- Knows teachers with contracts who are looking to go abroad to escape Morocco
- Teachers are suffering from bad training, bad time of training, low salary (pushes teachers to do extra hours), students, classroom equipment
- Students don't wanna put in the effort day in and day out because they don't want to go through all that effort and then not get a job
    - PhDs not hired by the government
- Teachers don't always take care of their students

- A focus put on students who do the work, but students who don't aren't really punished, just kind of put to the side
- Teachers only get 5000 Dh per month
    - Making teachers lives harder, they hate their jobs, they don't teach their students well, the students stay uneducated
    - Government's fault

His Experience in the US

- He enjoyed his time in the US
    - There is a peace of mind
    - People were more friendly
- In Morocco, everything is so complicated
    - He was really on edge
- Had housing and a dorm
- The classroom is well equipped
- The supervisor was understanding and helpful

What are some things we should keep in mind when working with Moroccan students and professors?

- Ask questions
- Don't feel limited

Projects with students

- Difficult at the beginning because he did not have the training he wanted
- Like being thrown in the deep end
- Grammar and vocab is the main focus here
- Used to be hit by the teachers about grammar
    - Put a lot of pressure on students
- Teaching apprenticeship
    - Good for him
    - Knew what everything was because of this
- Wants students to be comfortable
    - Tries to set up a comfortable atmosphere
- Good teachers
    - Teachers should be smart and aware
- Enclosed place
    - You have to say hi
- Cultural aspects are very important to be successful here in Morocco

Professor #3:

Can you tell us your educational experience?

- 3 years in BA, went to university for 4 years (going back to that again),
- 3 years is not enough, ba in english language and lit, went to teaching training school (always wanted to become a teacher) to become a hs teacher (really hated the training),
- applied for Fulbright, took courses and taught arabic in the US, teachers don't choose where they go (he was ok with this and believes that everyone deserves a new teacher)

- went to UNE, then went to Al ha wa university in ifrane with an american system, very difficult to go to and teach there, then applied to go to italy on a scholarship with his wife to go to Italy with a masters at university of bologna to do masters 1 year in philanthropy
- Came back to ifrane and taught arabic
- Went back with a scholarship in Germany, england, poland, and vienna for a 2 years masters (2 masters) in global studies and ir
- Then came back to morocco to work, applied for job with wife at fulbright in morocco
- Received a scholarship to receive a phd in six different countries

Why did you make the choice to come back to Morocco?

- He initially did not want to go back to morocco until the age of 40 (wanted lots of experience and then have a good job in morocco where he can go make decisions
- When you're too good it means you have more problems
- He wanted a good education so he could get a good leadership job with more education

Can you tell us about the job market in Morocco for college graduates?

- Had 3 masters degrees
- Applied to a lot of government and nongovernmental ministries, no one responded
- Worked at Fulbright commission
- Then got IES job for the past 6 years (paid 3x more
- Struggle between work-life balance
    - Does not feel like he is gaining much growth
    - Hard to grow in the same job

Do you consider these jobs very competitive?

- Very hard to leave morocco
- People don’t have a lot of money
    - Even if you have the “necessary” stuff
- Leave really only if they could
- Government jobs
    - People do whatever they want
    - Doesn’t have the same restrictions as a private-sector job
- Labor unions support the teacher all the time, don’t always behave ethically
- Big communication and ethics problems
- Big trust problems
- Government is paying a high price because there are big trust problems
- The very limited job market
- Uni is just producing more unemployable people
    - Not ENSIAS necessarily
        - Easier for them because they are engineering students

What do you know about Mohammed 5 University?

- Still are many ambitious students
- People would say they need direct recruitment
    - Teachers were demonstrating because they didn’t want to sit for exams or interviews

    - He doesn't agree with this- not everyone is good

Can you compare your relationship with Moroccan professors to US professors?

- Course descriptions
- No Syllabus
- Hard to enforce and get a clear syllabus and course descriptions
    - Difficult to explain
    - Need to have one for the courses you teach
- Need connections to make things happen
- The curriculum changed every 5 years
- Professors can change things willy nilly and there's no controlling them sometimes
- If the Dean or President has not been elected yet, everything stops
- Rarely student strikes at ENSIAS
- Many strikes at Mohammed V
- Can't have the victim mentality
- When you're young, you're not always allowed to have big leadership jobs or a Ph.D.
- "Why do you have to treat me like this?"
- Very revengeful people
- Grades aren't always determined objectively
- Some favoritism
- Also, they have a lot of students
- (May be different in private or engineering schools)
- Working in student groups

  Other notes:
- Hates injustice
    - Racism is a big sticking point
- Found racism in Germany
    - Felt that he had to double his efforts to prove himself
    - Felt that he had to prove himself
    - Very difficult psychologically
- Poland
    - Lovely
- Austria
    - Hard courses
- London school of economics
    - Hard courses
- UNE
    - Great experience
    - Fulbright Scholar
    - Everyone wanted to talk to him, let him speak, lots of opportunities
- Prof-student
    - The US more approachable
    - Morocco "I'm the teacher"
        - Professors are treating really intelligent and ambitious students like they are shitty
- People don't make objective decisions easily in parts of education

    - Lacking a bit of common sense
    - People have to prove they have a strong personality
    - "Some people are just too much"
    - Just a lot of injustice
    - "Sometimes you have to fight"
- Make the process extremely difficult even for the best students
- The system is poor and then you are making it even more difficult
- "Here they don't help you until you lose hope"
- Government/system doesn't provide you help
- The system forces you to be strong (!)
- Ask prof amouri about his Ph.D. experience
- When you sit with professors
    - Focus the interview on them and whether they are happy, then ask about the students
    - Do they want to save the students
- "The myth of the framework and the defense of science
    - Get rid of miserable professors
    - You need profs who respect their students because they are the future
    - Profs should make an effort to look presentable and be their model
    - A lot of people don't care enough to take care of themselves
- Students
    - The government should do more
    - Try to meet with them more than once
    - Important for you to know why it's a problem
- Everyone is going to tell you a completely different story
- Profs think their students are bad, lazy, etc
    - Even though there are new challenges
- The administration will blame both
- No one is going to assume responsibility

Professor #4:

Can you tell us about your background in education, such as where you went to school, what you went to school for, and your jobs held previously?

- Went to Columbia for graduate school
- Was a student teacher in Japan after college instead of joining the peace corp
- Moved around/ went to Texas and then ended up in NY
- Got is Masters in applied linguistics
- NY was fun so he stayed and got master's in education and teaching English literature
- Stayed and then went to the Doctors program and worked at the university
- Was hired as a technology assistant for a NY magazine for 4 years
- Was laid off and went to work for readers' digest for 10 years in various parts of IT
- Wanted to go overseas so he went to India and stayed for 4 years to teach at a boarding school and he wife also taught
- Then to Saudi Arabia, then Korea to teach at international schools (either in tech or teaching English)

- In rabat, he is an English Language Fellow (ELF)
- It is an exchange program run by Georgetown through a grant from the state department and local embassy
- The people at Georgetown are the managers/ pay the fellows and the ones they report to
- Most ELF and professors work at teacher training schools for English
- Want to help countries improve their teaching English language abilities
- English language (in morocco) is not up to date
- Teachers in morocco Use regular tradition and teaching models
- Need a native speaker to help teach English/ US culture class
- He helps to support teaching English in Morocco

.

Can you tell us about the English Language Program and your role in it?

- In his position, he was assigned to the ministry of education and not a specific university like most ELF
- With the hope to help update their curriculum
- He does not think he can help update it because he is sort of just an "starter to the entree"
- Other group of people are taking over to bring in consultants to specialize in updating the curriculum

Results of the workshop

- Does critical thinking and PBL
- Discusses the concept and models PBL in the workshop
- In the next session, this is where the teachers develop a project for their students
- In the workshops he wants teachers to change their minds and want their students to succeed and have a more positive outlook

What are some challenges you have seen within the Moroccan education system?

- Specializations are very separated
- The rubric is not something they can change
- They use something that is foreign and boring
- In the workshops they focus more on rubrics and changing them
- It is hard to move from the traditional approach
- The rubric is the biggest stumbling block
- Also breaking PBL into steps and assessing them
- "How can you be sure students finish the stage? "
- Teachers do not know how to assess' students after PBL and the modeling is not good
- Focus is in schools in morocco are mainly on exams
- Teachers cannot focus on other stuff
- Grading is subjective
- Americans give high grades but the morocco Government doesn't agree students can go that high
- The culture is seen through lens from only one side
- The US wants everyone to succeed/ has a positive attitude
- Opposite to morocco where only the best people survive
- "The French system is for the survival of the fittest"
- it is a completely different approach

Have you discussed universities with teachers or students here?

- It is a big issue in the country
- The teachers he deals with through the ELF are very motivated and self-selective. Not like most teachers you see in Morocco
- Parents and students see learning English as a way to help them with learning jobs
- Most students expect to go attend the universities after high school
- There is a very high number of high school dropouts in Morocco
- School attendance is required up until the age of 15
- After 9th grade there are a lot of dropouts especially on the countryside
- Large unemployment rate after high school graduates
- The Government Is Increasing the amount of money for education
- The money is not being divided evenly
- Give similar and familiar schools more money
- Do not know what smaller "kingdoms" do with money

What are some things we should keep in mind about the educational system in Morocco when completing our project?

- There is a move to English
- The French set up the whole education system but there was really nothing else set up in Morocco
- It has been running like this for 100 years
- The French style and teaching and grading system is very deeply embedded
- There are good and bad things
- System was already set up by 1957 when Morocco became independent
- When Morocco got independence there was no backlash to the French
- Language issues involved trying to unify the country because there are two language groups
- There was the bunch for Arabization and the government said that they are with the people
- They made declaration to learn Arabic but the Berber people were upset
- They did not have enough teacher trainings to do the training for Arabic because they didn't fully know the language
- Other people wanted the language to just be French and not both French and Arabic
- There was disappointment with these promises
- There were French nationals teaching in the 70s but they got kicked out
- But there was no training involved
- Darija has ever been clarified as a language
- Every document has to be submitted in Arabic or French
- The Moroccan Government wanted to introduce "global languages"
- Some high schools in Morocco have started to implement Spanish and Italian as options of languages to learn
- Government also recently declared 30% of university courses will be taught in English
- Science and math will be taught in English
- Very soon English will be required in 7th grade instead of 9th
- ·He started working on this ^ 10 years ago

- They developed textbooks but didn't do it because they didn't have the teachers and couldn't change the curriculum
- The textbooks were made for 7_{th} graders but used for 9_{th} graders and is too simplified for them
- They are still trying to figure out what to do
- There is no in-between in the educational structure of the people to help bring change. This is referring to people. You only have someone who is higher like a director and the someone much lower/ like the secretary
- Or to make things go from a to b
- There is no one there to make things happen
- There is no one writing research papers
- They are trying to develop a credit system instead of the groups where you move through
- The practice of the moving in groups in a consequence of student protest
- Student unions complained students should stay together and average the grades so that more students can move on

What is your opinion about teachers being on contracts here in Morocco?

- They want to produced several English teachers from French teachers
- Doesn't know for sure but it is hard to say
- It could be to fire/ no renew specific teachers easier
- But there have been complaints and strikes and protest
- But he hasn't seen any and people he talks to haven't expressed it
- Contracts can be easier to maintain the attendance of teachers
- Government jobs are not as secure as before
- So they go towards private sector for more security
- He asked "Do they offer ten year to teachers anymore?"

Appendix H: Observations of Classrooms

We are a group of students from Worcester Polytechnic Institute in Massachusetts. We are observing classrooms to gather information for our research project. We are looking at the possibility of introducing project-based learning into the curriculum of ENSIAS in Rabat. The goal of our project is to develop recommendations on how universities can implement project-based learning (PBL). This research will fundamentally enhance student engagement and potential future implementation of PBL at ENSIAS. Your participation in this observation is for the class period and completely voluntary you may withdraw from the focus group at any time. No identifying information will be recorded or appear in the results of the focus groups or in any of our project reports. This is a collaboration between Worcester Polytechnic Institute and ENSIAS, and your participation is greatly appreciated. If interested, a copy of our results will be provided.

For more information about this research contact the PBL team at gr-ProjectLearning-C20@wpi.edu or WPI's IRB Manager, Ruth McKeogh, Tel. 508-831-6699, Email: irb@wpi.edu or WPI's University Human Protection Administrator: Gabriel Johnson, Tel. +1 508-831-4989, Email: gjohnson@wpi.edu.

What the professor will state to students: "This is a group of students from Worcester Polytechnic Institute in the United States of America. They are completing a project for their school with a partnership with ENSIAS. They will be observing our classroom for the day. The students will be taking notes, but no identifying information will be recorded for their report. Feel free to ask them questions after class."
While observing the classroom for student engagement, we will be keeping track of the following:

- The number of times that a student ask questions
- The number of times that the professor stops for engagement from students
- The number of times that students answer the professor's questions
- The total time that students are talking versus the professor
- The total time that students are collaborating with one another
- The amount/extent at which technology is used in the classroom

Thank them for their time

Appendix I: Class Discussion Questions

Topic: Copyright Law: to break or not to break?

Questions:

1. Are you for swapping copyrighted materials ? Why or why not?
2. Only developed countries, who have the means the resources, should respect the copyright law. Do you agree?
3. Some people often argue that intellectual property laws hinder innovation since competitors can be indefinitely discouraged from further research expenditures in the area covered. Do you agree? Why/why not.
4. As IT specialists, would you care about programs or applications you designed to be shared on the net?
5. Is it possible to stop illegal file sharing? If so how?

Appendix J: Interviews with Students

We are a group of students from Worcester Polytechnic Institute in Massachusetts. We are conducting interviews to gather information for our research project. We are looking at the possibility of introducing project-based learning into the curriculum of ENSIAS in Rabat. The goal of our project is to develop recommendations on how universities can implement project-based learning (PBL).This research will fundamentally enhance student engagement and potential future implementation of PBL at ENSIAS. You do not have to answer any questions you do not wish to. All of your answers will remain anonymous. No identifying information will be recorded or appear in the results of our project reports. This is a collaboration between Worcester Polytechnic Institute and ENSIAS, and your participation is greatly appreciated. If interested, a copy of our results will be provided.

For more information about this research contact the PBL team at gr-ProjectLearning-C20@wpi.edu or WPI's IRB Manager, Ruth McKeogh, Tel. 508-831-6699, Email: irb@wpi.edu or WPI's University Human Protection Administrator: Gabriel Johnson, Tel. +1 508-831-4989, Email: gjohnson@wpi.edu.

Questions to ask students:

1. How many years have you been in ENSIAS/what year are you?
2. What is your major and how long does it take to complete your degree?

a. If Master's student: Did you attend ENSIAS for your undergraduate degree?

3. How many hours a week do you spend in class?

. Can we look at a copy of your class schedule?

4. Can you explain the module system?
5. What has been your favorite class and what aspects of the class did you enjoy the most?
6. What has been your least favorite class and why?
7. Do you receive a syllabus in your courses?

. Does your professor follow the syllabus?

8. What kinds of difficulties do you face as a student here at ENSIAS?
9. Who is your favorite professor and why?
10. Who is your least favorite professor and why?
11. Do you have a lot of professors like this?
12. Where do you seek assistance if you need help with your classes?
13. Do you feel comfortable going to your professors for help?
14. Would you consider your independent study skills strong?
15. Do you remember information from your classes after you complete them?

. If you don't- Why don't you remember this information?

a. If you do- Why do you remember this information?

16. How are you evaluated when completing a group project? What is your deliverable?
17. What is an example of a deliverable for a lab you have completed?

. What is your favorite project that you have completed at ENSIAS?

18. When are you expected to graduate? What are you planning on doing after graduation?

. Are you worried about finding a job after graduation?

19. Do you ever present in class?

. Do you feel comfortable presenting in class?

20. Is there anyone else you know of that we should talk to?

Student #1

How many years have you been in ENSIAS/what year are you?

- She is a junior it is her second year here at ENSIAS
- Web/mobile design engineering
- This is the first year of her completing her specialization
- Spends 8 hours a day in classes / the subjects change every week (modules)
- An example, for today's she had coding, crypto, this afternoon she has client server supervising class
- She specializes in web and mobile development
- Then there are parts in the courses devoted to other majors such as English

How many hours a week do you spend in class?

Can we look at a copy of your class schedule?

- Saw a copy and she sent it through whatsapp
- 30-40 hours a week

What kinds of difficulties do you face as a student here at ENSIAS?

- She would want to make the classes more interactive and less theory based
- She likes theory but she believes since they are studying CS it is best if learned through practicing
- They cannot bring their laptops to most classes and can only bring paper lectures
- It makes it harder when learning coding
- But says it's understandable because students will not focus
- But it is a just a generalization professors have, students need their laptops in the classroom
- When using papers, it should be to do exercises in class
- Some courses are not focused on CS for example statics and analysis which do not need laptops/ But it would be better to include exercise instead of paper for written notes
- It happens everywhere - in most classes
- If they start with those two things then it can slowly lead to change
- There are a lot of young professors who just got their Phds and they can reach the students better with helping and assisting them with asking questions
- With approaching older professors it is seen more as a threat to the students
- Some challenges are with the amount of time she has
- Also with the dorms provided even though she does not live on campus
- They have mini projects but they do not have the time to do them
- They get evaluated on the projects midweek but they have to do because it evaluated and they receive a grade
- They will go online to find templates and code just to get the work done
- The exams are mostly recycled the professors use the same exams they just use different data and numbers
- They are more in the "learning and recycling" instead of the" learning and understanding" process
- They do not get enough information in their courses

Who is your favorite professor and why?

- Do not have a class she likes most

- Some of the subjects are good but the teacher cannot explain it well
- But in data class was good because the teacher was able to teach it well
- The students are kind of cold and students do not interact
- Information gets lost when students do no ask questions in class
- As a general observation most students do not go to office hours/ but cannot speak for all students
- There is 60 students in her specialty but most days only 7-20 students show up to class
- Many do not show up because they do not like the professors on the class
- They do not like the professors because they have an academic approach, they do not engage with the students or the subjects
- Their teaching methods are old and outdated
- They have been teaching the same way and the same course from years ago - many professors she has started around 1992
- This year they had the opportunity to do teacher evaluations since the dean of the school is also a professor within her specialty/ major
- He asked students what they wanted to see change
- But she is unsure if the dean and staff fully understand what the students want
- The professor and student relationship is not that open to where students can express themselves

How are you evaluated when completing a group project? What is your deliverable? What kinds of projects do you complete?

- In her first year they did one project with all the specialities with programming in c and the teacher assigned topics
- Her topic was managing the administration of birth certificates
- They generated the birth certificates to manage it on one system to easily access them
- Another group made a version a sudoku for children
- There was a project about a game that includes number and letters that the player has to link and guess the words
- Another project she completed was the end of the year main project based on her specialty
- Looked on dashboard and trace the processes of the project and worked in groups of 2 (using a website)
- Teacher restricted them to the library and one other room to the design and work with other students
- Space was limited to create
- For the first semester this year they got to create their own idea and tracked pregnancy of women until birth to monitor when they would give birth and any complications they may have
- This project was one of the first instances where her and other students got to be creative and show their personality
- They were not restricted by technology or design restraints
- They were the ones in control and got the teachers to listen to them
- For this semester it is a mobile application where the teacher gives the students the topics/ ideas
- They will try and make their own company and figure out ways the link it to the internet by completing market research

- There was additionally a mini project that was voted on by the class
- Students suggested making an application to help communicate with the professor and one another better
- Helped the web people better communicated with the professors and the students privately
- Where they will have the syllabus and schedule based on the the courses they are going to take
- These are the major projects for this year
- Each year they have projects for other things such as english/ economics (we observed some of the projects for the english/ communications class)
- They have to do the same thing but think more about the clients and the target audience - (look at it as a product)
- They work on projects outside of class except for the specialities where the professor will help them
- They are evaluated on a weekly basis
- Sometimes they work in groups or in pairs it depends on the professor
- The evaluation is running the code and seeing if it is works
- They will receive anywhere between an A- F which is 30% of their grade
- They try to see if students use something outside of their knowledge when completing this project
- She suggested they use an online application to track everything (application she uses on her own to track the progress of her group)
- The students at ENSIAS are mass producers since they have to make them fast and efficient
- She creates the schedules and meetings and merges the other modules for the project together
- Then she gives feedback and tells students if they can move on or if it needs to redone
- Sometimes the professor sees this and sometimes they do not
- If they have freedom in the report she will add this
- The team will all get the same grade no matter if one person did more than the other
- Sometimes there are circumstances where students cannot work on certain projects but there are also people who a lazy and still get the same grade
- They professors cannot evaluate the work of every single person
- Usually the professors do not care

Student #2

How many years have you been in ENSIAS/what year are you?

- We are trying to research the kinds of projects that ENSIAS currently has
- He is in 2nd year of web dev
- first year of speciality
- last year it was a combination of different specialities
- it is a 6 month program

How many hours a week do you spend in class?

- There is usually some connection between students and professors
- ~16 to ~30 based on specialization

- No fixed amount of time every day but between 4 and 8 hours per day
- Need to complete work outside of the class - gets the min of info in class and have to complete the rest outside
- Takes notes in class and outside they review the material
- 2 hour classes
- Classes hard to concentrate
- Classes in French

What has been your least favorite class and why?

- Found the web dev classes interesting and attempts to find it interesting
- Any Java or PHP class is interesting. The communication classes are interesting but not enjoyable. Does not interest every student
- The activities are not as interesting
- Example - professor asked to make presentation about topics that she wanted them to work on but they found the topics and the overall idea of the presentations useless
- Very repetitive
- Least favorite: Network class
- He just doesn't like networking

What kinds of difficulties do you face as a student here at ENSIAS?

- No places to be able to eat here
- ENSIAS should be able to think of their education and not being hungry but they do not have the time to be able to spend to go get lunch or prepare food
- 8 hours min to study and they do not have time to be able to get food
- The students who live in their houses do not have this issue - but it is here at ENSIAS. 2 Hours for meal prep here
- Effects school work, other schools do not have this issue; no stress for other schools
- Lack of time to be able to study and make food and do all of the projects
- They get 2 hours for lunch but it takes 2 hours to make it
- A lot of students have to get expensive, fast food - there are a lot of poorer students here and they do not have to money to be able to buy food
- Administration is not very professional with exam planning
- Make a plan but do not stick to the plan
- Supposed to get grades back 2 weeks ago but still do not have grades
- Exams are supposed to be this week but they do not have the results from the first assignment to be able to see if they have to stress about the upcoming test
- Do not know what the issues is, no reason is given, feels as though the professors do not care
- Will try to get a contact to email us for more references

Would you consider your independent study skills strong?

- Some professors attempted to introduce English but it wasn't too successful because of the language barrier for the students
- He learned english in school, he practiced it mainly ALC back in Marrakech
- He switched to reading and watching movies to help learn english
- Professor introduces the plan and objectives but it is not in one central place

- Learning goals and objectives are only explained out loud - would prefer if it were written down
- Students do not look at the website of the school and so the students do not know what is on there - "is useless"

How are you evaluated when completing a group project? What is your deliverable?

- For projects he had 2 projects - one in C and the other was a capstone where they could program in any language - used PHP
- Had internship and used PHP
- This year he finished his first project using Java
- Worked with other students - usually 2 per project
- Other specialities have 3+, web only has 2 person teams
- Usually split up the work but depends on each pair, what each team wants to do: share the work or work on the same thing together
- Only specific courses have projects, some have specific projects on languages or on network projects
- Communication subject also has projects
- In pairs, each individual gets the same grade however if it is clear someone did not work the professor can give different grades
- Gets help from professor if you need help but in reality professors just google their issues
- When the students find the solutions online, they only find a temporary fix, they don't know why they are doing it/putting the code in
- If there was a professor who was there, they would be able to tell the students why the code works

Are you worried about finding a job after graduation?

- 2nd year - does not want a masters but wants to get a BE and go work for 3 years and then attempt to get out of Morocco
- Might want to get Masters outside of Morocco.
- Tired of Morocco and a good start to career is to get a Masters
- Interested in Data Science and Web Development

Student #3

How many years have you been in ENSIAS/what year are you?-in 2nd year

- major is IWIM
- web design and mobile engineering

How many hours a week do you spend in class?

- maximum is 35 hrs
- modules
- exams passed in sub modules
- sub modules can be used to compensate if students do poorly in one class and then the other
- don’t always know which module contains which courses

What has been your favorite class and what aspects of the class did you enjoy the most?

- the teacher is having fun teaching, when students can laugh at simple matters, she likes the teachers in classes

What has been your least favorite class and why?
- teachers that are serious all the time
- some may have had different prep
- this creates an imbalance in the class

Do you receive a syllabus in your courses? Does your professor follow the syllabus?
- paper version (you have to buy)
- electronic copy can be sent by email
- passes onto Facebook group
- some teachers don't want to give it to you
- paper version will be missing a lot of stuff
- sometimes teachers do it for students to have to come to class every day

What kinds of difficulties do you face as a student here at ENSIAS?
- lots of work
- Homework
- projects
- mini projects
- not yet real application of things
- just using the theory of things, just studying to pass the exam, not studying for understanding
- time schedule is weird
- exams are very hard
- they might give you a section on things you haven't learned before to "see if you're a real engineer"
- dorm life
- no restaurants/cafeteria
- people have to cook for themselves
- 1 1/2 hour to get to the dorms, cook, and eat
- cooking is the major problem

Where do you seek assistance if you need help with your classes?
- YouTube
- Stack Overflow
- other students and friends
- feels comfortable going to her professors for help, she would ask in class or at the end of class, if she really needs help

Would you consider your independent study skills strong?
- ENSIAS students would have strong independent study skills
- Students are forced to learn things by themselves quickly
- disconnect between first and second year students
- having to do things they haven't learned properly yet in school

Do you remember information from your classes after you complete them?

a. If you don't- Why don't you remember this information?
b. If you do- Why do you remember this information?
    - grasps the most important thing
    - if it's simple, she will just review it later on

How are you evaluated when completing a group project? What is your deliverable?

- two students
- give a pretty serious presentation in front of you judging you
- you show your final results
- there is a final report, it is most of the mark
- emailed to us

When are you expected to graduate? What are you planning on doing after graduation?

- graduates next year, 2021
- wants to have another year of specialization

Do you ever present in class? Do you feel comfortable presenting in class?

- yes, there is presenting in class
- feels comfortable presenting in class

Group Interview #1:

How many years have you been in ENSIAS/ what year are you?

- Masters students in data science, bachelors in Agadir
- Got bachelors in Casablanca and Meknes
- ENSIAS is a good school in morocco that can help with jobs and internships
- It was not difficult for one student to get into this school - others did not agree
- They have to work more outside of class and do the research o n their own
- They do not study CS languages in class so they have to learn it outside of class
- Experience comes from what they do outside of class instead of inside of class
- They used Python

What is your major and how long does it take to complete your degree?
If Master's student: Did you attend ENSIAS for your undergraduate degree?

- 2 years at ENSIAS, 1 year here
- Do you like it? Like the people, education a little bit, there is a different system
- Don't like being in the same place, professors focus on exams

How many hours a week do you spend in class?

- Average 5 or 6 hours a day, with the professors
- Usually work more outside of the classroom that in the class

What has been your favorite class and what aspects of the class did you enjoy the most?

- Image processing, like because of the subject- have already worked on the project before we came here

- Students have the freedom to express themselves
- Image statement, atmosphere of the class- we feel like we are at home, the relationship between the students and professor (no protocols, can express and feel however we want)

What has been your least favorite class and why?

- Adv. databases - the professor didn't care about the students
- Seek help from other professors, but in this course just spoke with each other
- Optimization is not difficult but they can't see where the material can be applied
- There is not project applied to using it in real world applications
- The class is not practical - "we are CS not mathematics"
- More concerns about the delivery of the material

Do you receive a syllabus in your courses?

- The professor gives a piece of paper that has the schedule of tests and assignments and when they are due

What kinds of difficulties do you face as a student here at ENSIAS?

- Data science everything is in English, so it is hard
- Have to take that English you find and translate it to French to present- think they should get rid of French, wish they were getting their masters in English
- Rabat is expensive and students cannot afford housing and friends suffer from this
- Travel time
- Hard to organize your time- eat sleep, school work, study
- They do not have a normal life- cannot even have a normal breakfast
- Spend most time in the classroom (4 hours
- No breaks to eat or take a break or rest
- Schedule was normal at home
- NOT ANY MORE, everything is about school
- Learn English from movies and shows Al Pacino, game of thrones, the beautiful mind, British
- They learn English in school but not as much
- They enjoy learning through movies more since it isn't forced like in school
- It is common this way to learn the grammar and form in school but learn the words for movies
- You will forget the material if you do not have projects

Who is your favorite professor and why?

- A professor who is nice

Who is your least favorite professor and why?

- A professor who did not treat the students well and treated them poorly
- A professor who did not show up to class

Do you have a lot of professors like this?

- Like the professors for the most part
- Respect the professors

- Professors try to get students engaged in courses

What is an example of a deliverable for a lab you have completed?

- Individual papers
- Presentations
- Some projects require us to work in groups of 4 or 5, meet by getting coffee
- Web application in a group of 3, 1 should do the database, 1 user interface/ UX, 1 writes the paper, and each person presents the part they completed
- Not comfortable with both presentation skills and writing skills

When are you expected to graduate? What are you planning on doing after graduation?

- Did not originally think about school as a future, but was convinced by other students
- Want to work 2-3 years and then do phD in Canada, Canada has a better education in Canada
- Are you worried about finding a job after graduation?
- Hard to find a data science job, not a lot in this domain, not impossible
- Common for students to want to go to other countries for phD
- Do not know if they are competing for the same jobs
- Some want a job for 2-3 years first and then they go back to school to complete their PHD
- Some want to get experience first/ wants to apply all that they learned in the classroom
- Deal with real problems in data science
- Mix between staying in Morocco and going abroad for work and/ or PhD
- Very common (for CS) for students to get a PhD, it is not hard to get a job with it
- Data science job offers are there
- Want to get PHD because they feel like they have more "value"
- Not all want to become professors
- WORK is important

Projects

- Often done by myself
- Complete a lot of individual projects outside of their classes to help them with material in their classes
- Only one project by myself- predict you have brain cancer by comparing imaging- output is yes or no
- Most projects are done by myself
- Most are done by a professor (depends on the student)
- Individual papers done on the projects
- They used python but never got taught python: they learned on their own, it's a tool that they can use and it is important for them to understand it
- Most work is done individually
- If you know one CS language, it is easier to learn more
- They work in small groups to complete assignments
- "Everybody wants something" - some students work individually on it and so it is very competitive

Appendix K: Student Survey Results

WPI

We would like to thank ENSIAS for this collaboration opportunity and continued support throughout this project.

Nous tenons à remercier ENSIAS pour cette opportunité de collaboration et pour son soutien continu tout au long de ce projet.

ENSIAS

We are a group of students from Worcester Polytechnic Institute in Massachusetts. We are working on a research project with ENSIAS. The project focuses on the differences between the Moroccan and American education systems.

You do not have to answer any questions you do not wish to. All of your answers will remain anonymous. No identifying information will be recorded or appear in the results of our project reports. This is a collaboration between Worcester Polytechnic Institute and ENSIAS, and your participation is greatly appreciated.

Nous sommes un groupe d'étudiants de l'Institut polytechnique de Worcester, situé en Massachusetts. Nous travaillons sur un projet de recherche avec l'ENSIAS. Le projet se concentre sur les différences entre les systèmes éducatifs marocain et américain.

Vous n'avez pas besoin de répondre aux questions qui son inconfortable pour vous. Toutes vos réponses resteront anonymes. Aucune information d'identification ne sera enregistrée ou n'apparaîtra dans les résultats dans notre rapports. Il s'agit d'une collaboration entre Worcester Polytechnic Institute et ENSIAS, et votre participation est très appréciée.

There are 13 questions in this survey. You cannot move backwards through the survey.

Cette enquête comporte 13 questions. Vous ne pouvez pas revenir en arrière dans l'enquête.

→

1. How many years have you been studying at ENSIAS?

Depuis combien d'années étudiez-vous à l'ENSIAS?

2. What are you majoring in?

Qu'est-ce que vous étudiez?

3. What degree are you perusing?

quel est le niveau de votre diplôme que vous poursuivez

- ○ Bachelors Degree/Baccalauréat
- ○ Masters Degree/une maîtrise
- ○ Doctoral Degree/diplôme de doctorat

→

4. How many years does it take to complete your degree?

Combien d'années faut-il pour obtenir votre diplôme?

5. On average, how many hours do you spend in classes per week

En moyenne, combien d'heures par semaine passez-vous en classe?

0 5 10 15 20 25 30 35 40 45 50

Hours per week/Heures par semaine

→

6. Think of a class that you have **enjoyed** here at ENSIAS. Please answer the following questions with the frequency at which you participated in given tasks in that class.

Pensez à un cours que vous **avez apprécié** ici à l'ENSIAS. Veuillez répondre aux questions suivantes er indiquant la fréquence à laquelle vous avez participé à des tâches données dans cette classe.

	Very often/Très souvent	Often/Souvent	Sometimes/Parfois	Infrequently/Rarement	Never/Jamais
Asked questions or contributed to course discussions in other ways/A posé des questions ou contribué aux discussions du cours d'une autre manière	○	○	○	○	○
Asked another student to help you understand course material/A demandé à un autre étudiant de vous aider à comprendre le matériel de cours	○	○	○	○	○
Helped another student understand course material/A aidé un autre étudiant à comprendre le matériel de cours	○	○	○	○	○
Worked with a partner or group on a course project or assignment/A travaillé avec un partenaire ou un groupe sur un projet de cours ou une mission	○	○	○	○	○
Was intellectually challenged by the course material/A été handicapé intellectuellement par le matériel du cours	○	○	○	○	○

7. Think of a class that you have **enjoyed** here at ENSIAS. Please answer the following questions basec on how much you agree to each statement.

Pensez à un cours que vous **avez apprécié** ici à l'ENSIAS. Veuillez répondre aux questions suivantes e fonction de votre degré d'accord avec chaque affirmation.

	Strongly agree/Tout à fait d'accord	Somewhat agree/Plutôt d'accord	Neither agree nor disagree/Ni d'accord ni en désaccord	Somewhat disagree/Quelque peu en désaccord	Strongly disagree/Pas du tout d'accord
The professor was prepared to each every class/Le professeur a été préparé à chaque classe	○	○	○	○	○

The professor stimulated my interest of the subject/Le professeur a stimulé mon intérêt pour le sujet	○	○	○	○	○
The professor took interest in helping students learn the material/Le professeur s'est intéressé à aider les étudiants à apprendre la matière	○	○	○	○	○
The professor treated students with respect in the classroom/Le professeur a traité les étudiants avec respect dans la salle de classe	○	○	○	○	○
The professor encouraged students to ask questions/Le professeur a encouragé les étudiants à poser des questions	○	○	○	○	○
The course met my learning expectations/Le cours a répondu à mes attentes en matière d'apprentissage	○	○	○	○	○

8. Think of a class that you **did not like** here at ENSIAS. Please answer the following questions with the frequency at which you participated in given tasks in that class.

Pensez à un cours que vous **n'avez pas aimé** ici à l'ENSIAS. Veuillez répondre aux questions suivantes en indiquant la fréquence à laquelle vous avez participé à des tâches données dans cette classe.

	Very often/Très souvent	Often/Souvent	Sometimes/Parfois	Infrequently/Rarement	Never/Jamais
Asked questions or contributed to course discussions in other ways/A posé des questions ou contribué aux discussions du cours d'une autre manière	○	○	○	○	○
Asked another student to help you understand course material/A demandé à un autre étudiant de vous aider à comprendre le matériel de cours	○	○	○	○	○
Helped another student understand course material/A aidé un autre étudiant à comprendre le matériel de cours	○	○	○	○	○

Worked with a partner or group on a course project or assignment/A travaillé avec un partenaire ou un groupe sur un projet de cours ou une mission	○	○	○	○	○
Was intellectually challenged by the course material/A été handicapé intellectuellement par le matériel du cours	○	○	○	○	○

9. Think of a class that you **did not like** here at ENSIAS. Please answer the following questions based on how much you agree to each statement.

Pensez à un cours que vous **n'avez pas aimé** ici à l'ENSIAS. Veuillez répondre aux questions suivantes en fonction de votre degré d'accord avec chaque affirmation.

	Strongly agree/Tout à fait d'accord	Somewhat agree/Plutôt d'accord	Neither agree nor disagree/Ni d'accord ni en désaccord	Somewhat disagree/Quelque peu en désaccord	Strongly disagree/Pas du tout d'accord
The professor was prepared to each every class/Le professeur a été préparé à chaque classe	○	○	○	○	○
The professor stimulated my interest of the subject/Le professeur a stimulé mon intérêt pour le sujet	○	○	○	○	○
The professor took interest in helping students learn the material/Le professeur s'est intéressé à aider les étudiants à apprendre la matière	○	○	○	○	○
The professor treated students with respect in the classroom/Le professeur a traité les étudiants avec respect dans la salle de classe	○	○	○	○	○
The professor encouraged students to ask questions/Le professeur a encouragé les étudiants à poser des questions	○	○	○	○	○
The course met my learning expectations/Le cours a répondu à mes attentes en matière d'apprentissage	○	○	○	○	○

→

10. Please respond based on how much you agree with the following statements while being a student here at ENSIAS.

Veuillez répondre en fonction de votre degré d'accord avec les déclarations suivantes lorsque vous étiez étudiant à l'ENSIAS.

	Strongly agree/Tout à fait d'accord	Somewhat agree/Plutôt d'accord	Neither agree nor disagree/Ni d'accord ni en désaccord	Somewhat disagree/Quelque peu en désaccord	Strongly disagree/Pas du tout d'accord
I feel that I have at least one teacher who makes me excited about my classwork work/J'ai l'impression d'avoir au moins un professeur qui me rend enthousiaste pour mon travail en classe	○	○	○	○	○
I feel that my school helps me obtain internships/J'ai le sentiment que mon école m'aide à obtenir des stages	○	○	○	○	○
I feel as though there are resources available to help me find post-graduate /J'ai l'impression qu'il existe des ressources pour m'aider à trouver une éducation de troisième cycle	○	○	○	○	○
I feel as though I will find a job easily after graduation/J'ai l'impression que je trouverai facilement un emploi après l'obtention de mon diplôme	○	○	○	○	○
I am receiving a good education at ENSIAS/Je reçois une bonne éducation à l'ENSIAS	○	○	○	○	○
I feel like I am achieving my academic goals by coming to ENSIAS/J'ai l'impression d'atteindre mes objectifs académiques en venant à l'ENSIAS	○	○	○	○	○

I feel like I am doing my best work at ENSIAS/J'ai l'impression de faire mon meilleur travail à l'ENSIAS	○	○	○	○	○

→

11. How well would you rate your independent study skills (being able to find information on your own)?

Comment évaluez-vous vos compétences en matière d'études indépendantes (être capable de trouver des informations par vous-même)?

0 1 2 3 4 5 6 7 8 9 10

Level of Study skills/Niveau de compétence des études

12. What was your **favorite class** you have taken at ENSIAS and what aspects did you enjoy?

Quel est le cours que vous **classe favorite** suivre à l'ENSIAS et quels sont les aspects que vous avez appréciés?

13. What was your **least favorite class** you have taken at ENSIAS and what did you not like about it?

Quel est le cours que vous avez **le moins aimé** à l'ENSIAS et qu'est-ce qui ne vous a pas plu?

→

This is the end of the survey. Thank you for participating, your responses are very helpful. We would like to leave you with our email address. If you have any additional comments that you would like to share with us please send us an email.
Our email is gr-projectlearning-c20@wpi.edu. Once again, thank you for your responses.

Merci d'avoir participé à l'enquête, vos réponses sont très utiles. Nous aimerions vous laisser notre adresse électronique. Si vous avez des commentaires supplémentaires que vous souhaitez nous faire parvenir, veuillez nous envoyer un courriel.
Notre adresse électronique est gr-projectlearning-c20@wpi.edu. Encore une fois, nous vous remercions de vos réponses.

→

Student Survey Results

	Q9	Q10	Q11	Q12	Q14	Q13_1	Q5_1	Q5_2	Q5_3	Q5_4	Q5_5	Q18_1	Q18_2	Q18_3	Q18_4	Q18_5	Q18_6	Q17_1	Q17_2	Q17_3	Q17_4	Q17_5	Q19_1
1	1	Sécurité des Systém...	3	1	3	50.00	2	3	1	1	5	2	2	1	1	1	2	2	2	1	1	5	2
2	2	IWIM	3	2	3	32.00	1	2	2	3	3	1	4	2	1	1	2	4	5	5	4	2	3
3	2	Web Engineering and ...	1	.	3	34.00	2	1	1	1	4	4	4	5	3	2	5	4	1	4	3	4	4
4	3	web	1	.	5	10.00	3	4	2	2	4	4	5	4	4	3	5	5	5	5	5	5	5
5	2	computer science	3	1	3	30.00	5	3	3	2	2	2	4	2	5	2	3	5	1	1	2	1	4
6	3 ans	Informatique	3	1	3 ans	32.00	1	4	1	1	4	1	1	1	1	1	2	4	2	3	1	5	2
7	1 year and half	IWIM (Web developm...	3	1	3 years	33.00	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8	2	Software engineering	3	1	3	12.00	3	3	4	1	3	4	4	4	2	3	4	.	.	.	.	.	.
9	4	Embi	3	1	3	23.00	3	1	1	1	3	2	1	1	1	3	3	5	1	2	1	1	5
10	3	Software engineering	3	2	3	39.00	3	3	2	1	1	1	2	1	1	1	1	4	2	1	2	1	5
11	Since september 2019	E-Management and B...	1	.	3 years	28.00	1	3	2	2	3	1	2	2	1	1	1	3	2	4	3	2	3
12	2 ans	Genie Logiciel	3	2	3 ans	30.00	1	3	3	1	5	1	1	1	1	1	1	5	2	4	2	2	2
13	First year	Software engineering	3	1	3	40.00	1	2	1	3	3	4	5	4	5	4	4	4	1	1	3	5	5
14	1	e-Management & Bus...	3	1	3	32.00	1	1	1	1	3	1	1	1	1	1	2	1	1	5	1	1	4
15	2	software engineering	3	2	3	26.00	2	1	1	1	5	3	3	3	2	4	3	2	2	2	2	5	3
16	3	software enginnering	3	1	3	32.00	3	2	3	3	1	2	3	4	4	3	5	3	2	4	3	2	4
17	2	Software Engineering ...	3	2	3	32.00	4	3	1	1	2	2	2	2	1	2	2	5	2	3	1	5	5
18	2 years	Business intelligence	1	.	3	27.00	4	2	2	2	3	2	2	2	1	2	3	5	1	1	3	4	3
19	2		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20	2	e-MBI	1	.	3	26.00	4	3	3	2	2	2	1	1	1	1	2	4	2	2	2	3	2
21	3	sécurité des systèmes	4	1	3	15.00	2	3	3	2	4	3	4	3	2	4	3	.	.	.	.	.	.
22	2	Software Engineering	3	2	3	20.00	4	3	2	3	2	2	3	4	3	2	4	.	.	.	.	.	.
23	3	Genie logiciel	3	1	3	17.00	3	2	3	1	4	2	1	1	1	1	1	5	2	5	1	5	5
24	2	Embedded systems	3	1	3	35.00	2	2	1	1	1	1	2	2	2	1	2	5	1	4	5	4	2
25	2	Software Engineering	3	2	3	30.00	1	1	2	2	1	2	1	1	1	1	2	1	2	2	1	1	1
26	2	cyber security	3																				
27	2	Embedded and mobil...	3	2	3	40.00	1	3	2	1	2	1	2	1	1	2	2	5	1	5	1	3	4
28	1 year	Les bases de l'inform...	3	1	3 ans	20.00	3	2	2	3	3	1	1	1	1	2	3	2	2	2	3	3	3
29	One year	C/database/java/python	3	1	2 years	14.00	4	3	3	2	3	1	2	1	3	2	4	4	1	4	2	2	3
30	0.5	Computer Science	3	2	3	30.00	1	4	3	3	5	1	1	1	2	2	2	3	5	4	5	5	2
31	3 years	E-MBI	3	1	4 years	36.00	3	3	4	1	3	3	3	4	3	3	4	3					2
32	5 months	Software engineering	3	2	3	32.00	4	3	2	2	2	3	4	2	3	4	3	5	3	4	3	2	3
33	2	Data science and big ...	3	2	2	18.00	1	3	3	2	5	2	2	2	1	1	2	3	4	3	2	3	2
34	3	e-Managament & Bus...	3	2	3	36.00	3	1	1	2	.	4	4	4	2	2	5	4	4	4	2	2	5

	Q9	Q10	Q11	Q12	Q14	Q13_1	Q5_1	Q5_2	Q5_3	Q5_4	Q5_5	Q18_1	Q18_2	Q18_3	Q18_4	Q18_5	Q18_6
28	1 year	Les bases de l'inform...	3	1	3 ans	20.00	3	2	2	3	3	1	1	1	1	1	2
29	One year	C/database/java/python	3	1	2 years	14.00	4	3	3	2	3	1	2	1	3	2	4
30	0.5	Computer Science	3	2	3	30.00	1	4	3	3	5	1	1	1	2	2	2
31	3 years	E-MBI	3	1	4 years	36.00	3	3	4	1	3	3	3	4	3	3	4
32	5 months	Software engineering	3	2	3	32.00	4	3	2	2	2	3	4	2	3	4	3
33	2	Data science and big ...	3	2	2	18.00	1	3	3	2	5	2	2	2	1	1	2
34	3	e-Managament & Bus...	3	2	3	36.00	3	1	1	2	.	4	4	4	2	2	5
35	2		.	.	3	33.00	.	.	.	.	.	.	.	.	.	.	.
36	2	Iwim	3	2	3	26.00	2	4	3	1	2	3	1	2	4	4	4
37	2	iwim	1	.	1	49.00	5	2	2	2	5	5	5	5	4	4	5
38	1	Software engineering	3	2	3	32.00	2	4	3	2	4	1	2	2	1	1	.
39	3	Embedded systems	1	.	3	35.00	.	.	.	.	.	.	.	.	.	.	.
40	1st year	Bid data and data sci...	3	2	2years	30.00	.	.	.	.	.	.	.	.	.	.	.
41	this is my first year		.	.	3	.	.	.	.	.	.	.	.	.	.	.	.
42	2	Embedded systems	3	2	3	36.00	.	.	.	.	.	.	.	.	.	.	.
43	2	Génie logiciel	3	2	3	30.00	2	3	1	1	5	1	2	1	2	.	.
44	3	cybersecurity	4	1	3	30.00	.	.	.	.	.	.	.	.	.	.	.
45	1	Embedded systems	3	1	2 encore	20.00	1	1	.	1	1	2	1	4	1	4	4
46	2years	I'm studying Business...	3	.		.	.	.	.	.	.	.	.	.	.	.	.
47	3	mobile and web engin...	3	1	3	28.00	4	4	4	2	3	3	4	3	3	3	4
48	1	Software engeneering	.	.	3	32.00	4	4	3	3	3	2	3	3	1	1	3
49	1	SSI	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.
50	2	Software Engineering	3	2	2	27.00	.	.	.	.	.	.	.	.	.	.	.
51	5 months and half	Computer science	3	.	2 years	40.00	1	5	1	3	4	3	3	3	2	3	3
52	1	computer science	3	1	3	25.00	3	3	1	3	3	5	5	4	3	5	5
53	3 ans	Business intelligence	3	1	J'ai Dejà Mon diplome...	5.00	1	2	3	1	4	2	1	1	1	1	2
54	1	IWIM	3	.		.	.	.	.	.	.	.	.	.	.	.	.
55	3	IWIM	1	.	3	8.00	3	1	1	1	3	2	3	3	2	2	3
56	2	Software engineering	3	1	3	12.00	5	3	.	1	1	3	1	3	3	1	1
57	2	master big data t data...	3	2	2	6.00	.	.	.	.	.	.	.	.	.	.	.
58	1	WEB ENGINEERING	.	.	3	33.00	.	.	.	.	.	.	.	.	.	.	.

	Q17_1	Q17_2	Q17_3	Q17_4	Q17_5	Q19_1	Q19_2	Q19_3	Q19_4	Q19_5	Q19_6	Q1_1	Q1_2	Q1_3	Q1_4	Q1_5	Q1_6	Q1_7	Q18_1.0
1	2	2	1	1	5	2	1	1	1	1	2	1	2	2	2	1	1	1	10.00
2	4	5	5	4	2	3	2	2	1	3	3	1	4	4	3	3	3	1	7.00
3	4	1	4	3	4	4	5	4	4	4	5	2	2	2	1	4	1	3	10.00
4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	3	7.00
5	5	1	1	2	1	4	4	5	5	5	5	2	5	3	3	4	3	4	9.00
6	4	2	3	1	5	2	3	2	4	2	5	1	2	1	1	2	1	2	8.00
7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8	.	.	.	.	.	.	.	.	.	.	.	4	4	2	2	3	3	2	7.00
9	5	1	2	1	1	5	5	5	5	5	5	2	1	1	1	4	1	4	9.00
10	4	2	1	2	1	5	4	5	3	4	5	2	3	3	4	2	4	4	8.00
11	3	2	4	3	2	3	4	3	1	2	3	1	2	2	2	2	2	3	6.00
12	5	2	4	2	2	2	5	5	4	2	3	1	5	5	4	5	5	4	8.00
13	4	1	1	3	5	5	5	5	5	5	5	2	5	3	2	3	2	2	8.00
14	1	1	5	1	1	4	5	5	1	2	5	1	3	3	1	1	3	4	9.00
15	2	2	2	2	5	3	3	3	2	3	3	1	2	1	1	2	1	1	9.00
16	3	2	4	3	2	4	5	4	3	4	4	1	2	2	1	3	3	3	7.00
17	5	2	3	1	5	5	5	5	5	2	5	1	5	1	1	4	4	5	10.00
18	5	1	1	3	4	3	3	3	2	4	3	2	3	2	3	3	4	3	6.00
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20	4	2	2	2	3	2	4	2	3	3	4	2	5	1	3	1	2	3	9.00
21	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6.00
23	5	2	5	1	5	5	5	5	3	5	5	1	2	3	2	3	3	5	9.00
24	5	1	4	5	4	2	5	5	2	2	5	2	5	4	1	4	2	1	10.00
25	1	2	2	1	1	1	1	1	1	2	2	1	2	1	2	1	2	1	8.00
26	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27	5	1	5	1	3	4	5	5	4	5	5	1	5	4	2	3	1	4	9.00
28	3	2	2	3	3	3	4	4	2	3	3	2	2	2	2	2	2	3	6.00
29	4	1	4	2	2	3	3	3	3	3	5	1	2	3	1	3	2	3	8.00
30	3	5	4	5	5	2	3	3	4	4	3	2	3	2	1	2	2	1	8.00
31	3	.	.	.	.	2	5	5	5	5	5	1	5	4	2	3	3	4	9.00
32	5	3	4	3	2	3	3	3	3	3	3	2	2	2	2	2	2	2	8.00
33	3	4	3	2	3	2	2	2	2	3	4	1	4	3	2	2	2	2	9.00
34	5	1	1	1	1	5	5	5	5	5	5	2	5	5	2	5	5	5	9.00
35	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
37	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
38	4	4	3	4	4	3	5	4	4	2	5	1	3	4	2	3	3	2	10.00
39	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
40	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
41	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
43	3	2	2	1	5	1	1	1	1	1	1	1	2	1	2	1	1	1	.
44	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
45	1	1	1	1	1	1	3	4	4	4	2	1	4	1	3	4	4	3	7.00
46	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47	4	4	4	4	4	4	4	4	4	4	3	4	2	4	3	2	4	4	2	.
48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
50	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
52	1	2	1	3	1	5	5	5	5	5	5	4	5	4	2	4	5	2	8.00
53	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
54	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
55	5	1	1	1	5	3	5	5	5	5	5	2	4	2	3	3	3	3	8.00
56	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
57	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
58	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Q15	Q16	Liked_Professors	Not_Liked_Professors	Liked_Expect	Not_Liked_Expect
Les cours relatives à l...		4.00	5.00	4.00	4.00
1- Réseaux de premiè...	1-Probabilité (the wor...	2.00	4.00	4.00	3.00
Favourites :- PHP- An...		2.00	1.00	1.00	1.00
none	most	1.00	1.00	1.00	1.00
my favorite class yet i...	my least favorite clas...	2.00	2.00	3.00	1.00
Empirical software en...	Php, il y a plusieurs p...	5.00	3.00	4.00	1.00
		.	.	.	.
Compilation	Vision et perception n...	2.00	.	2.00	.
Data mining	Linux	5.00	1.00	3.00	1.00
Tcp/ip with mr. Koban	Big data	4.00	2.00	5.00	1.00
Graph theory. It was v...	Architecture of compu...	4.00	2.00	5.00	3.00
Actually there were e...	Except the 3 classes ...	5.00	1.00	5.00	3.00
	Simulation, i feel like t...	1.00	1.00	2.00	1.00
MySQL, I appreciated...	Simulation & probabili...	5.00	1.00	4.00	1.00
my favorite class was ...	my least favorite clas...	3.00	3.00	3.00	3.00
coding classes and al...	probabilities , i hate a...	3.00	1.00	1.00	2.00
- Jakarta EE & Frame...	- Android development...	4.00	1.00	4.00	1.00
		4.00	3.00	3.00	3.00
		.	.	.	.
IT System	Simulation	5.00	2.00	4.00	2.00
		2.00	.	3.00	.
		3.00	.	2.00	.
Ingénierie des modèle...	Android	5.00	1.00	5.00	1.00
My best class was Int...	My least favorite are a...	4.00	1.00	4.00	1.00
Personally, I like ENS...	Generally all suggest...	5.00	5.00	4.00	4.00
		.	.	.	.
Artificial intelligence a...	Probabilities and opti...	4.00	1.00	4.00	1.00
Linear programmationl...	Probability I didnt like ...	5.00	2.00	4.00	3.00
In general i liked progr...	Architecture des ordin...	4.00	3.00	2.00	1.00
		5.00	3.00	4.00	3.00
Systèmes d'informatio...	Prévisions temporelle...	3.00	1.00	2.00	1.00
My favourite classes ...	I had a hard time stud...	2.00	3.00	3.00	3.00
My favorite class is M...	I almost liked all the c...	4.00	4.00	4.00	2.00
Statistique et analyse...	Assembleur et Archit...	2.00	1.00	1.00	1.00
		.	.	.	.
		5.00	.	2.00	.
		1.00	.	1.00	.
		4.00	1.00	.	1.00
		.	.	.	.
		.	.	.	.
		.	.	.	.
		.	.	.	.
		4.00	5.00	.	5.00
		.	.	.	.
Machine learning	Similulation	5.00	3.00	2.00	4.00
		.	.	.	.
		2.00	2.00	2.00	2.00
		3.00	.	3.00	.
		.	.	.	.
		.	.	.	.
		3.00	.	3.00	.
technique de program...	architecture des ordin...	1.00	1.00	1.00	1.00
		5.00	.	4.00	.
		.	.	.	.
		3.00	1.00	3.00	1.00
		5.00	.	5.00	.
		.	.	.	.
		.	.	.	.

T-Tests for Finding Results

T-Test

```
[DataSet1] R:\IQP\IQP_Final_Student_Survey_Results.sav
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Prof_Enjoyed	3.5588	34	1.33010	.22811
	Prof_Not_Enjoyed	2.1176	34	1.32035	.22644
Pair 2	Expect_Enjoyed	3.1563	32	1.29787	.22943
	Expect_Not_Enjoyed	1.9063	32	1.08834	.19239

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Prof_Enjoyed & Prof_Not_Enjoyed	34	.220	.211
Pair 2	Expect_Enjoyed & Expect_Not_Enjoyed	32	.262	.148

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Prof_Enjoyed - Prof_Not_Enjoyed	1.44118	1.65495	.28382	.86374	2.01862	5.078	33	.000
Pair 2	Expect_Enjoyed - Expect_Not_Enjoyed	1.25000	1.45912	.25794	.72393	1.77607	4.846	31	.000

A dependent t-test for the difference in means was conducted on two pairs of data that were shown to show statistically significant results. Both t-tests were run with 26 degrees of freedom. Four new variables were created to reverse the option from the 5-point Likert scale. Two were from the question asking about classes that students enjoyed and the others were asked about classes students did not enjoy. The questions asked if each class met their learning expectations or if the professor helped sparked their interest in the class material. The means and standard deviations for each option are given.

Pair 1:

There is a significant difference in the level at which the professor sparked the interest in the subject matter in classes they enjoyed (M=3.559, SD=1.33) versus not enjoyed (M=2.118, SD=1.32), $t(26)$=5.078, p=0.

Conclusion

Students are more engaged and enjoy their classes much more when professors help them get more involved with material with real-world applications.

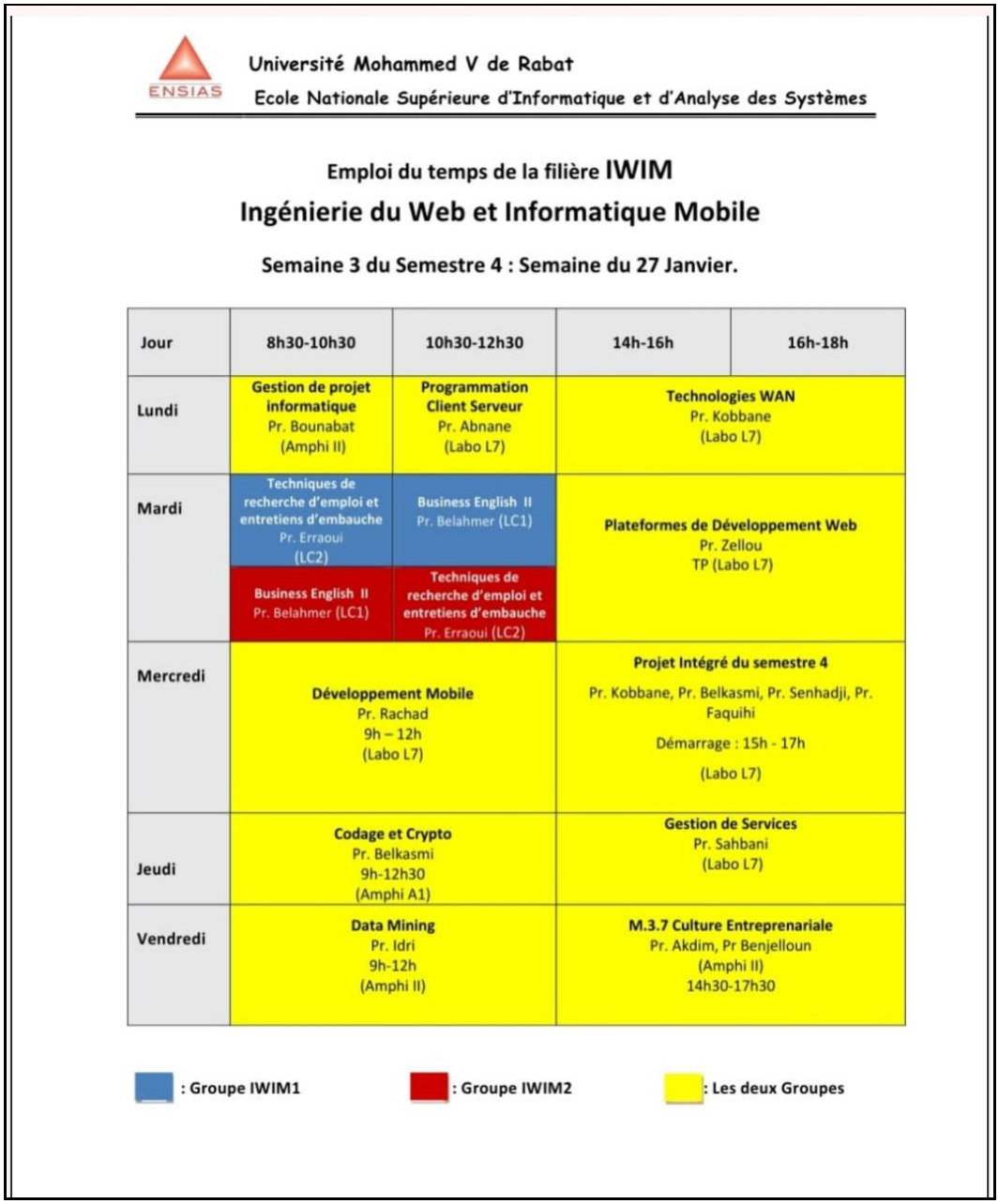
Pair 2:

There is a significant difference in the level at which their expectations were met for classes that they enjoyed (M=3.156, SD=1.298) versus did not enjoy (M=1.906, SD=1.088), $t(26)$=4.846, p=0.

Conclusion

Students are more engaged and enjoy their classes more when they meet their expectations of having real-world connections.

Appendix L: Examples of Student Class Schedule



Université Mohammed V de Rabat
Ecole Nationale Supérieure d'Informatique et d'Analyse des Systèmes

Emploi du temps de la filière **IWIM**

Ingénierie du Web et Informatique Mobile

Semaine 3 du Semestre 4 : Semaine du 27 Janvier.

Jour	8h30-10h30	10h30-12h30	14h-16h	16h-18h
Lundi	**Gestion de projet informatique** Pr. Bounabat (Amphi II)	**Programmation Client Serveur** Pr. Abnane (Labo L7)	**Technologies WAN** Pr. Kobbane (Labo L7)	
Mardi	**Techniques de recherche d'emploi et entretiens d'embauche** Pr. Erraoui (LC2)	**Business English II** Pr. Belahmer (LC1)	**Plateformes de Développement Web** Pr. Zellou TP (Labo L7)	
	Business English II Pr. Belahmer (LC1)	**Techniques de recherche d'emploi et entretiens d'embauche** Pr. Erraoui (LC2)		
Mercredi	**Développement Mobile** Pr. Rachad 9h – 12h (Labo L7)		**Projet Intégré du semestre 4** Pr. Kobbane, Pr. Belkasmi, Pr. Senhadji, Pr. Faquihi Démarrage : 15h - 17h (Labo L7)	
Jeudi	**Codage et Crypto** Pr. Belkasmi 9h-12h30 (Amphi A1)		**Gestion de Services** Pr. Sahbani (Labo L7)	
Vendredi	**Data Mining** Pr. Idri 9h-12h (Amphi II)		**M.3.7 Culture Entreprenariale** Pr. Akdim, Pr Benjelloun (Amphi II) 14h30-17h30	

: Groupe IWIM1 : Groupe IWIM2 : Les deux Groupes

This figure shows one of the schedules for an ENSIAS student in web and mobile design engineering.

Université Mohammed V de Rabat

Ecole Nationale Supérieure d'Informatique et d'Analyse des Systèmes

Emploi du temps de la filière **IWIM**

Ingénierie du Web et Informatique Mobile

Semaine 6 du Semestre 4 : Semaine du 17 Février.

Jour	8h30-10h30	10h30-12h30	14h-16h	16h-18h
Lundi	Gestion de projet informatique Pr. Bounabat (Amphi II)	Programmation Client Serveur Pr. Abnane (Labo L7)	TD Gestion de projet informatique Pr. Radouane (Amphi II)	
Mardi	Techniques de recherche d'emploi et entretiens d'embauche Pr. Erraoui (LC2) Business English II Pr. Belahmer (LC1)	Business English II Pr. Belahmer (LC1) Techniques de recherche d'emploi et entretiens d'embauche Pr. Erraoui (LC2)	Programmation Client Serveur Pr. Abnane (Labo L7) 14h - 17h	
Mercredi	Data Mining Pr. Idri 9h-12h (Amphi II)		Projet Intégré du semestre 4 Pr. Kobbane (Labo L7) 14h00 - 17h	
Jeudi	Codage et Crypto Pr. Belkasmi (Amphi A1) 9h-12h30		Gestion de Services Pr. Sahbani (Labo L7)	
Vendredi	Plateformes de Développement Web Pr. Zellou (Amphi II)		M.3.7 Culture Entreprenariale Pr. Akdim, Pr Benjelloun (Amphi II) 14h30-17h30	

: Groupe IWIM1 : Groupe IWIM2 : Les deux Groupes

This figure shows one of the schedules for an ENSIAS student in web and mobile design engineering.

Appendix M: Complied Deliverable

Project-Based Learning Deliverables for ENSIAS

Team Members
Olivia Furner
Jeffrey Harnois
Khadija Ibrahim
Lara Padir

Summary
Project-based learning (PBL) facilitates learning through the inclusion of projects in classes. Our project assists Dr. Mohamed Essaaidi in diagnosing the current state of teaching pedagogies used at L'École Nationale Supérieure d'Informatique et d'Analyse des Systèmes (ENSIAS) to provide recommendations on how Moroccan universities can implement PBL. We interviewed and surveyed faculty and students at ENSIAS to identify challenges faced by various stakeholders and current active learning approaches used at the University. From our data, we recommended for ENSIAS to form a PBL faculty committee, lead a training workshop on PBL, develop a first-year project-based course, complete course evaluations and complete project team evaluations. These recommendations will assist in the potential development of PBL at ENSIAS.

Purpose of deliverable
Based on our findings, we have created five recommendations that aim to assist ENSIAS in furthering the implementation of project-based learning (PBL). This zip file contains a compiled list of sources to give to ENSIAS for referral. Each folder contains a mixture of information graphics, presentations, in-class examples, and supporting research papers that ENSIAS can utilize. In an attempt to implement any of these recommendations, these files and presentations are resources ENSIAS

Contents

Included Sources			
Folder		File	Description
1	PBL Faulty Committee Resources	1. A Flipped Classroom Experiment	Description of the parts of a flipped classroom and how it is viewed by students
		2. FLIP Flipped Classroom Handout	A breakdown of what a flipped classroom looks like from FLIP Learning
2		1. Benefits of Project-Based Learning	A presentation that was given to ENSAIS describing the benefits of PBL

	Workshop Related Resources	2. British National Math Exam	Examines the effects of a PBL pedagogy on the British Nation Math Exam versus traditional teaching pedagogies
		3. Gold Standards of PBL	A set of standards given by PBLWorks for essential design elements of a project
		4. Entrepreneurial Mindset Using KEEN Framework	Using KEEN Institute's model as a way to the entrepreneurial mindset in a digital communications course
		5. Knowledge in Action Research	Comparing AP test scores to schools using pedagogy versus traditional teaching pedagogies
		6. PBL Course in Civil Engineering Design	A case study observing the effects of a PBL course to teach civil engineering in University of Dublin
		7. PBL in Entrepreneurial Education	A study of the creation and implementation of a first-year project-based course to teach entrepreneurship skills in University of Pretoria
		8. Sample Biology Rubric	Sample course project rubric outlining learning outcomes and delivery expectations
		9. Sample Project Syllabus Biology	Sample course project description referenced in the PBL Workshop; see 2.2
		10. Review of PBL Research	A review of strategies benefits and other implementations of PBL
		11. WPI Alumni Study	Review of a questionnaire sent to WPI alumni to measure specific elements of PBL
		12. WPI PBL Workshop	Slides provided by Paula Quinn, director of the Center for PBL at WPI, from a PBL workshop
3	First-Year Related Resources	1. Bio Gas As Heat	A sample poster given as a presentation at the end of a first-year project-based class
		2. Diversity Equity and Inclusion Tools for Teamwork	Contains multiple rubric and project examples for creating a first-year project-based course referenced in the WPI Workshop; see 2.2
		3. GPS Heal the World A19	Example syllabus from the first half of a first-year project-based class
		4. Heal the World B19	Example syllabus from the second half of the class

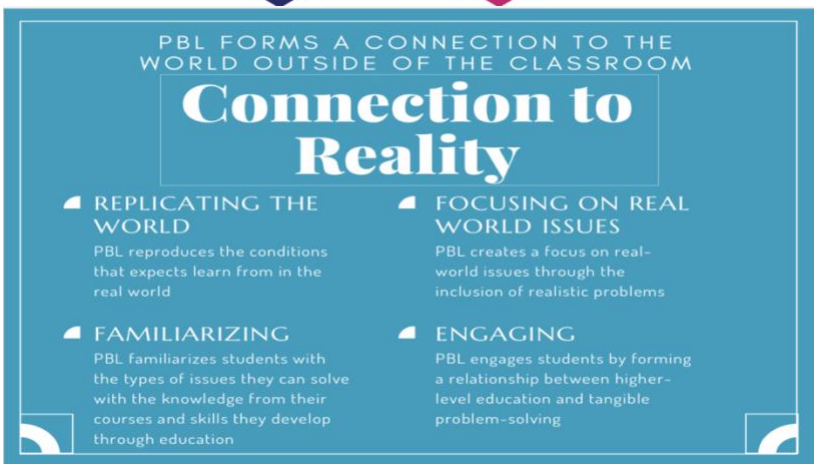
		5. Learning Outcomes and Assignment Goals	A break down of the learning outcomes and goals of a project given in a first-year project-based course
4	Peer Evaluation Resources	1. Rubric to Evaluate Team Process	An example peer review sheet that allows students to evaluate peers after working in groups
		2. Self and Peer Evaluation	A worksheet that allows students to reflect back on a group project and evaluate peer work along with their own; rubrics from group dynamic expectations also outlined
5	Teacher Evaluation Resources	1. WPI Class Review Report	A sheet given to students after taking a class at WPI to be able to give the teacher feedback about the class
6	Other resources	1. Accreditation Standard and PBL Matrix	Accreditation standards for engineering schools in Morocco and how each standard could be applied to PBL
		2. Introduction to PBL Brochure	Information graphic put together by the PBL team to outline an introduction to PBL; includes definitions, benefits, and impacts

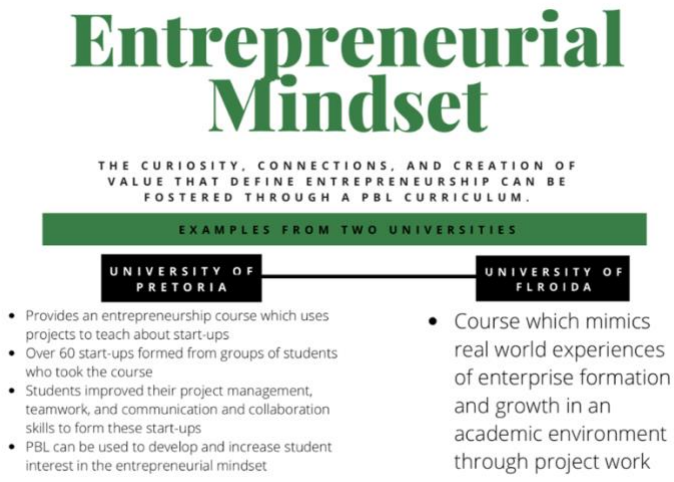
Notes
Academic papers referenced in informational graphics and presentations are included within the folders. ENSIAS can quickly access each source for any additional information the sources may contain.

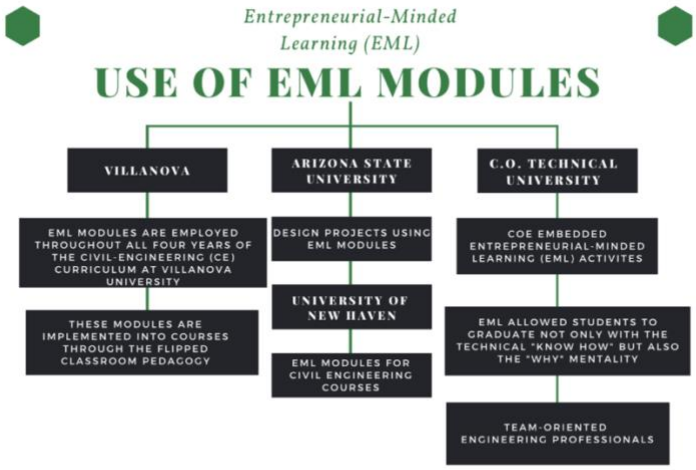
1.1 A Flipped Classroom Experiment
This source can be found at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2381282

1.2 FLIP Flipped Classroom Handout
This source can be found at: https://flippedlearning.org/wp-content/uploads/2016/07/FLIP_handout_FNL_Web.pdf

2.1 Benefits of Project-Based Learning Slides

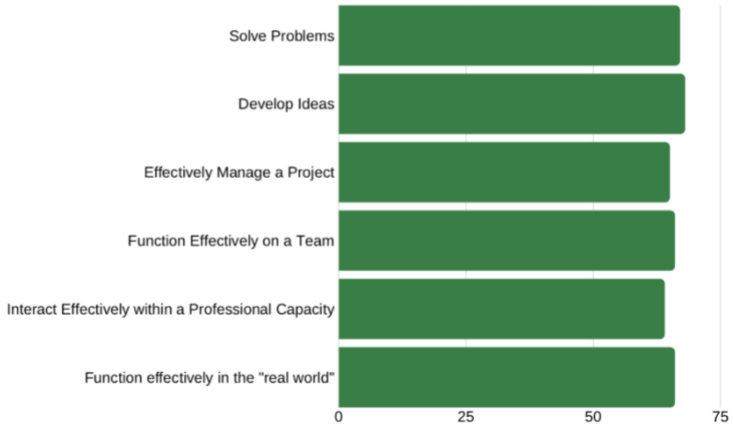




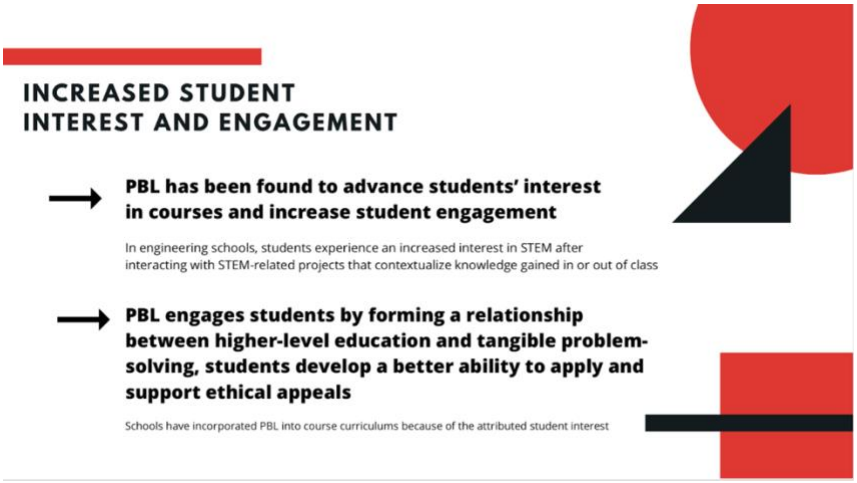


PBL and the Entrepreneurial Mindset

WPI Alumni, graduating between 1974 and 2011, were randomly selected and surveyed to find the long-term effects of PBL. The graph shows the percentage of respondents who answered that PBL allowed them to be able to either "Much" or "Very Much" gain the following skills related to the entrepreneurial mindset



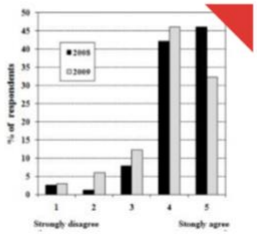
Data from survey of WPI Alumni



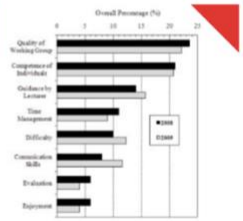
University College Dublin

WHAT WAS THE STUDY?

Researchers completed a case study at the University College Dublin where they looked at the effects of PBL on Civil Engineering masters students.Researchers designed their own PBL module that was catered to the CE design course The module was a holistic view of important elements that should be considered in PBL curriculum.



Response to survey question 1 - Does PBL improve your understanding of material covered in your design lectures?



Response to survey question 2- How would you rate the importance of the following elements of PBL?

Critical Thinking & 21st Century Skills

STUDENTS DEVELOP CRITICAL THINKING SKILLS AS THEY CONSIDER THE LARGE SCALE IMPACTS OF THEIR PROBLEM AND WORK TO FIND A SOLUTION.

THESE SKILLS INCLUDE:

- Synthesizing
- Forecasting
- Producing
- Evaluating
- Reflecting

Expanded and Improved Student Abilities

Many schools are incorporating PBL techniques in their coursework to enhance student abilities. Such abilities allow for student growth and development, inside and outside of the classroom.

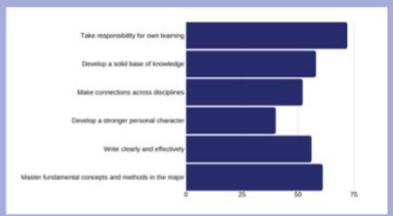
PBL Increases:

- Confidence
- Learning
- Social Skills
- Collaboration
- Initiation
- Ability to Manage
- Awareness

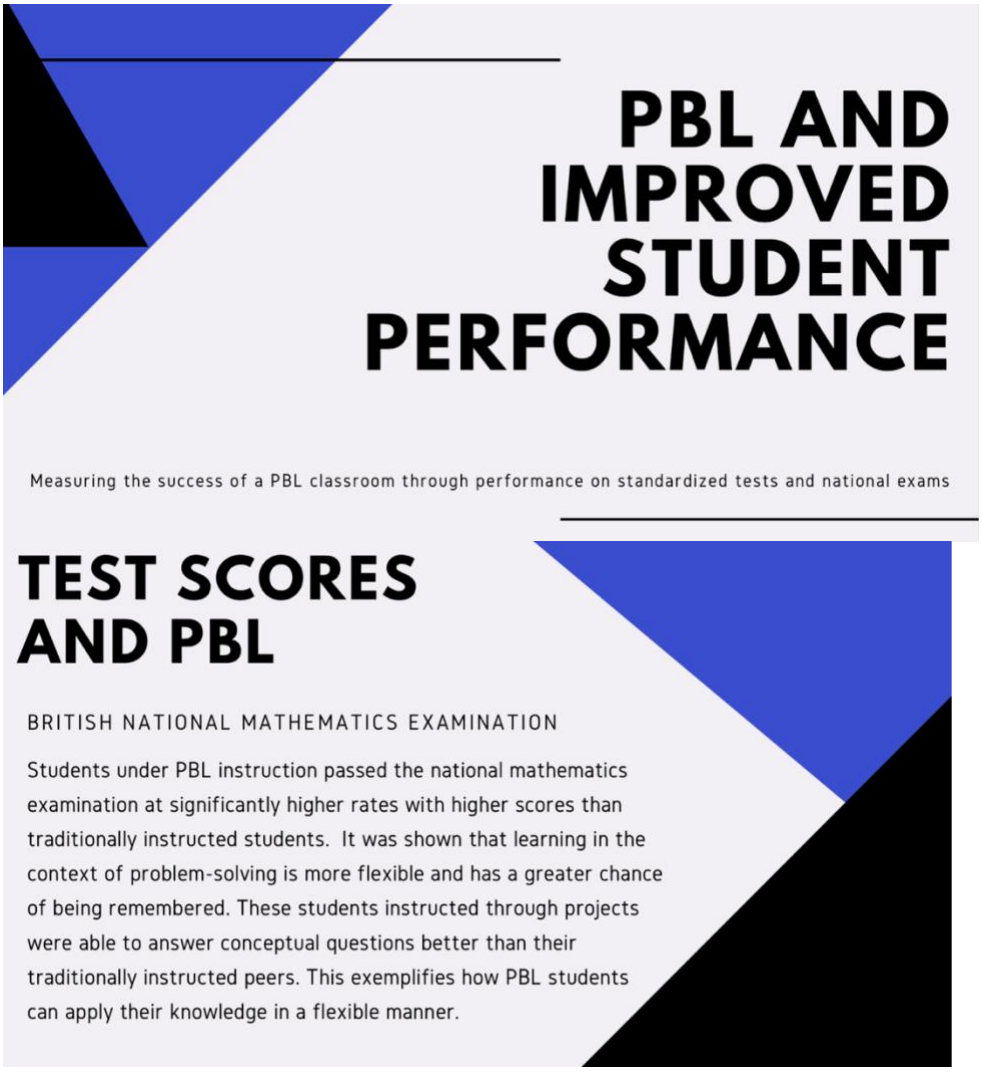
The WPI Alumni Study

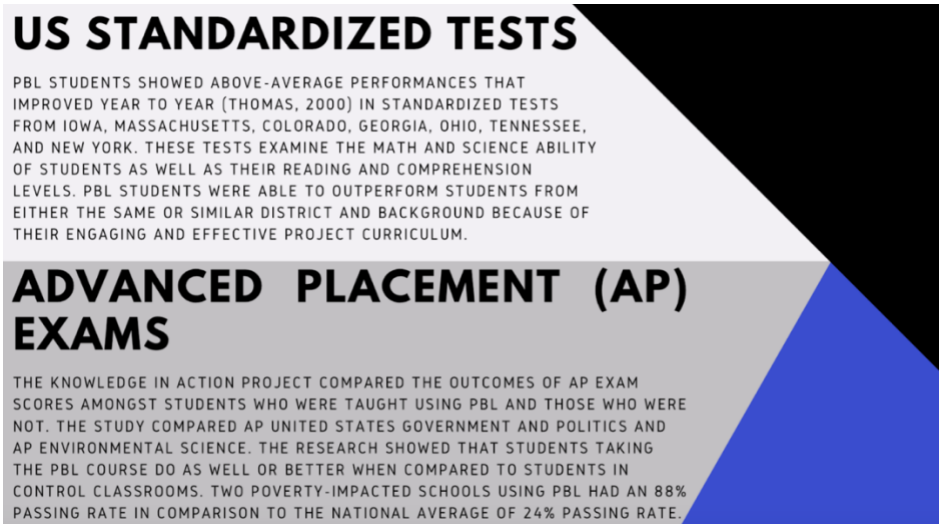
The WPI Alumni Study found that PBL had many impacts related to increased student interest and abilities.

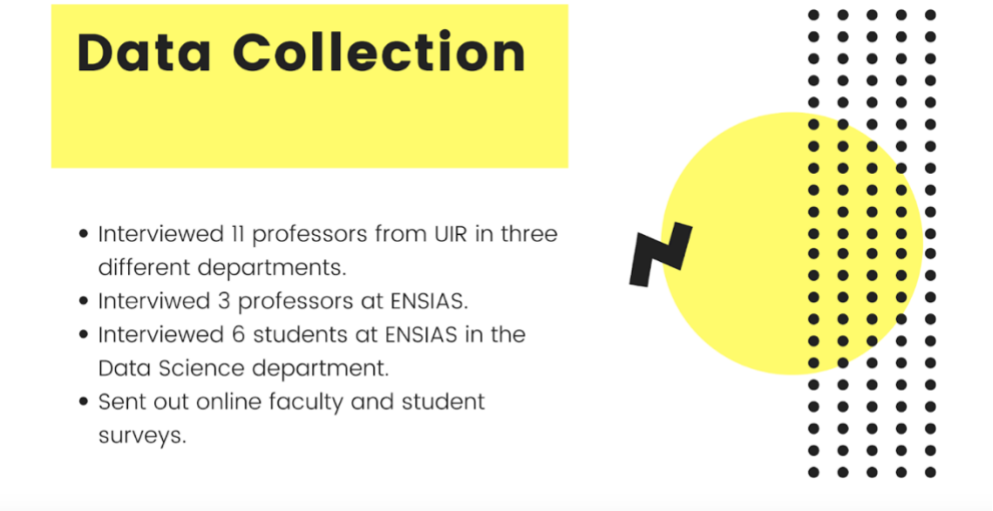
- 72% of respondents said that their experience with PBL either "Much" or "Very Much" positively impacted their ability to take responsibility for their own learning
- 66% of respondents said that PBL enabled them to develop a stronger personal character
- The majority of respondents reported that PBL either "Much" or "Very Much" positively impacted their ability to write clearly and effectively and deliver effective presentations



Previous WPI undergraduates responded on the impact of PBL on each of these characteristics.


PBL AND IMPROVED STUDENT PERFORMANCE
Measuring the success of a PBL classroom through performance on standardized tests and national exams
TEST SCORES AND PBL
BRITISH NATIONAL MATHEMATICS EXAMINATION
Students under PBL instruction passed the national mathematics examination at significantly higher rates with higher scores than traditionally instructed students. It was shown that learning in the context of problem-solving is more flexible and has a greater chance of being remembered. These students instructed through projects were able to answer conceptual questions better than their traditionally instructed peers. This exemplifies how PBL students can apply their knowledge in a flexible manner.





2.2 British National Math Exam

This source can be found at: https://www.researchgate.net/publication/332440982_Project_Based_Learning_in_Mathematics_Context

2.3 Gold Standards of PBL

This source can be found at: https://www.pblworks.org/what-is-pbl/gold-standard-project-design

2.4 Entrepreneurial Mindset Using KEEN Framework

This source can be found at: https://peer.asee.org/developing-an-entrepreneurial-mindset-using-the-keen-framework-for-a-digital-communication-system-course.pdf

2.5 Knowledge in Action Research

This source can be found at: https://www.edutopia.org/knowledge-in-action-PBL-research-results

2.6 PBL Course in Civil Engineering Design

This source can be found at:
https://www.tandfonline.com/doi/abs/10.1080/03043797.2011.624173

2.7 PBL in Entrepreneurial Education

This source can be found at: https://www.researchgate.net/publication/233084417_A_project-based_learning_approach_as_a_method_of_teaching_entrepreneurship_to_a_large_group_of_undergraduate_students_in_South_Africa

2.8 Sample Biology Rubric

Rubric for Group Assignment 1 (Topic and Hypothesis)

Group # _____

	Unacceptable	Needs Improvement	Acceptable	Very Good	Excellent
Article Summaries 4 points At least two popular articles from reasonable sources are identified, and an accurate summary of the contents of the articles are provided	0 Not completed, or clearly lacks effort.	1 Articles are inappropriate, or summaries are brief and uninformative	2 Appropriate articles identified. Summaries are inadequate or inaccurate, and show little insight.	3 Appropriate articles identified. Summaries are accurate, succinct, and informative.	4 Characteristics of "Very Good" category plus some additional element: additional sources identified, conflicting sources identified and a discussion of the conflict is provided, or other efforts beyond the basic description of this category
Worksheet (includes hypothesis) 10 points The assignment should narrow the project focus to a specific and scientifically valid hypothesis which the team will investigate. Experimental design worksheet should be fully completed.					10 one point awarded per question
Citations 1 points Please refer to the project description document for a detailed description of how to cite popular sources	0 Citations are present but do not conform to required format				1 Citations are correct

Rubric for Group Assignment 2 – Annotated Bibliography – 20 points

There should be a MINIMUM of three primary research articles, or ONE for EACH member of your group. Each one is worth 6 points (18 points total) If your group needs to submit more than three I'll count the best three for grading purposes but don't overdo it with a million articles. (If your group has only three people you can still submit 4-5 articles!) The remaining 2 points will be assigned for the correctness of the citation style.

Remember that the three articles that will be graded should be PRIMARY ORIGINAL RESEARCH. Review articles are useful and can be listed, but will not earn any points as one of the three mandatory articles that will be graded for this assignment.

Each article will be assigned points based on the rubric below:

Article Annotations (best three articles, 18 points total):

0 points	Not completed and/or completely lacking in effort, and/or does not follow the prescribed format
2 points	Needs improvement – (*includes any articles that are not primary literature regardless of how well the summary is written*) summaries lack in sufficient detail or are inaccurate assessments of the literature, and/or are not directly relevant to the hypothesis of the project, and/or relevance to the hypothesis is not articulated
4 points	Good – decent summary provided but may be confusing, poorly worded, or difficult to understand in a minor way, and/or explanation of the relevance to the project hypothesis is unclear or questionable
6 points	Excellent – completely conforms to the prescribed format and content, accurately summarizes the article content and provides a clear explanation of the relevance of the content to the project hypothesis

Citation (2 points):

0 points	Not completed, or prescribed citation format was completely ignored
1 point	Minor errors but attempted to adhere to prescribed format
2 points	All citations conform to prescribed format

Rubric for Group Assignment 3 – Video Script Assignment total = 30 points

	Not Completed	Unacceptable	Needs Improvement	Acceptable	Very Good	Excellent
Content: **Introduction to the topic** **5 points** The topic is clearly presented to the audience, and is easily understood	0	1 The topic of the project is not immediately evident.	2 It takes the reader some significant effort or time to understand the main topic.	3 The topic is mostly clear but could be better stated or better organized.	4 The topic is clear.	5 The topic is extremely clear and easily understood.
Content: **presentation of supporting evidence** **12 points** Key information from the primary literature is described in terms that a non-scientific audience can understand; the cited evidence is directly relevant to the topic. The evidence is properly interpreted and comes from reputable sources.	0	1 2 3 Supporting scientific evidence is scant, not explained, completely irrelevant to the topic, or not from a reputable source	4 5 6 Supporting evidence is not explained in non-scientific terms; the validity of the evidence is questionable; report is full of jargon that is not explained or evidence that is not relevant to the stated topic	7 8 9 Scientific evidence is presented, and is explained in non-scientific terms; the quantity of evidence or the quality of the explanation could be improved. One or two facts are not relevant to the topic.	10 11 Valid scientific evidence is presented in non-scientific terms that are easy to follow and convincing to the reader. The data seem relevant to the topic at hand.	12 Valid scientific evidence is presented in terms that are easy to follow and convincing to the reader. The team has shown extraordinary insight in identifying high-quality, relevant data, or in interpreting the specific shortcomings of the data that are available.
Content: Conclusion **5 points** An interpretation of the preponderance evidence is presented in terms that are understandable by a non-scientific audience; The conclusion is consistent with and supported by the evidence that is presented.	0	1 It is completely unclear how the students interpreted the factual data they have presented; the stated conclusion seems contradictory to the evidence presented.	2 The conclusion is very confusing; it is difficult to understand how the students arrived at the conclusion; elements of the presented data do not seem to support the conclusion.	3 A conclusion is stated, and mostly agrees with the given evidence but could be improved in language or clarity (too vague or too technical)	4 A clear conclusion is given that seems consistent with the evidence provided.	5 The conclusion is very clear; the chosen evidence is entirely consistent with the conclusion. The reader is convinced of the validity of this conclusion
Style: **4 points** Includes appropriate use of language, grammar, spelling and punctuation		0 Multiple errors, clear lack of proofreading detracts from the transcript; style is sloppy or inappropriately colloquial	1 Numerous errors; language is disorganized or difficult to follow	2 A few errors; word choice is awkward in a few places; language is difficult to follow in isolated spots	3 Very few errors; Generally well organized and easy to follow	4 No errors; language flows well and is very logical and easy to follow
Citations: **4 points** Source information is appropriately cited. Citations comply with the prescribed format.		0 Numerous facts are given without proper citation; Citation does not follow any appropriate format; References are not listed at the end of the document	1 Multiple errors in citation were made; Citations are inconsistent in format.	2 Several items that should have been cited were overlooked; A few errors were made in citation format	3 Most facts are appropriately cited; Citation style adheres to a prescribed format.	4 All facts are appropriately cited. Citation completely adheres to a prescribed format.

Rubric for Group Assignment 4: Video Presentation Assignment total: 35 points: Prof. Farny's rating = 25 points (using rubric below); 10 points from average of peer surveys

	Not Completed	Unacceptable	Needs Improvement	Acceptable	Very Good	Excellent
Content: **Introduction to the topic** **5 points** The topic is clearly presented to the audience, and is easily understood.	0 There is no explicit definition of the topic	1 The topic of the project is not immediately evident.	2 It takes the viewer some significant effort to understand the main topic.	3 The topic is mostly clear but could be better stated or better organized.	4 The topic is clear.	5 The topic is extremely clear and easily understood.
Content: **presentation of supporting evidence** **5 points** Key information from the primary literature is described in terms that a non-scientific audience can understand; the cited evidence is directly relevant to the topic. The evidence is properly interpreted and comes from reputable sources.	0 There is no supporting evidence presented	1 Supporting scientific evidence is scant, not explained, completely irrelevant to the topic, or not from a reputable source	2 Supporting evidence is not explained in non-scientific terms; the validity of the evidence is questionable; the team uses jargon that is not explained or evidence that is not relevant to the stated topic	3 Scientific evidence is presented, and is explained in non-scientific terms; the quantity of evidence or the quality of the explanation could be improved. One or two facts are not relevant to the topic.	4 Valid scientific evidence is presented in non-scientific terms that are easy to follow and convincing to the viewer. The data seem relevant to the topic at hand.	5 Valid scientific evidence is presented in terms that are easy to follow and convincing to the viewer. The team has shown extraordinary insight in identifying high-quality, relevant data, or in interpreting the specific shortcomings of the data that are available.
Content: Conclusion **5 points** An interpretation of the preponderance of evidence is presented in terms that are understandable by a non-scientific audience; The conclusion is consistent with and supported by the evidence that is presented.	0 No conclusion is stated	1 It is completely unclear how the students interpreted the factual data they have presented; the stated conclusion seems contradictory to the evidence presented.	2 The conclusion is very confusing; it is difficult to understand how the students arrived at the conclusion; elements of the presented data do not seem to support the conclusion.	3 A conclusion is stated, and mostly agrees with the given evidence but could be improved in language or clarity (too vague or too technical)	4 A clear conclusion is given that seems consistent with the evidence provided.	5 The conclusion is very clear; the chosen evidence is entirely consistent with the conclusion. The viewer is convinced of the validity of this conclusion
Production: **5 points** Includes editing, sound and light, special effects.	0 Unable to see and/or hear the video well enough to evaluate it.	1 Defects in sound and/or lighting quality make it difficult to watch and understand, and significantly detract from the final product.	2 Some defects in editing, sound quality or lighting quality detract somewhat from the viewer's experience.	3 Editing, sound and lighting do not interfere with the viewer's experience, but neither do they enhance it.	4 Students made an effort to enhance the quality of the finished product with sound, lighting, effects and/or editing.	5 Outstanding effort was clearly made to produce a polished product. Very easy to see and hear. The team went above and beyond in production, editing, and/or effects.
Creativity: **5 points** The team attempted to present the information from a new or different point of view. The finished product is entertaining and interesting to watch.	0 Clear lack of effort put into production of the final video.	1 Presentation lacks in creativity.	2 The presentation is dry, or is too complicated or abstract for the viewer to follow.	3 The team attempted to present the story from a new or different point of view.	4 Topic is prevented from an interesting or different point of view.	5 The presentation was both interesting and enjoyable to watch. The team truly went "outside-the-box" to create a fresh and innovative way to present their project.

The Qualtrics survey you will fill out will roughly follow the guidelines below. The average of the responses of your classmates will be combined to arrive at the final 10 points of the grade. (approximately 6-8 of your classmates will review your video.)

Your Name:

Group number of the video you are reviewing:

Your opinion of this video (you will click the appropriate buttons on the online survey form for each question):

Question	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
The topic is clear and easy to understand					
The evidence presented to support the argument is convincing					
The evidence is explained in a way that is easy for a non-scientific audience to understand					
The conclusion is clear and easy to understand					
I learned something from this video					
I feel that my classmates made an honest effort to do their best in creating this video					
I enjoyed watching this video					

Additional Comments:

2.9 Sample Project Syllabus Biology

BB1025 Project: The Truth Behind the Headlines

The goals of this project are:

- To encourage students to think critically about health information presented in the popular media
- To apply your knowledge of the basic function of human organ systems to understanding a human disease state
- To gain experience locating and reading appropriate primary scientific literature
- To gain experience in analyzing primary scientific information and drawing conclusions from potentially contradictory data
- To improve skill in accurately interpreting scientific information for a non-scientific audience
- Each group will research a health "fact" they may have heard in the media, and will create a short (2-4 minute) video about their findings. A list of potential topics is attached, or students may propose their own topics. You will use both popular media sources (newspapers, magazines, the Dr. Oz Show, etc) and primary scientific literature (journal articles) to clarify the facts and obtain the best scientific evidence to support or refute your chosen health "fact". Your video will present the results of your research in a way that is easy for non-scientists to understand while presenting the factual evidence you uncover.

Group Assignment (GA) project deliverables

There are several assignments along the way that each group will complete.

GA1: An exploration of your proposed topic in the popular media. Search the internet and read several articles relative to your proposed topic. This assignment will contain 4 distinct parts:

1) A summary of the proposed topic as you have read about it in popular media sources. 2-3 paragraphs will be sufficient. You should include various sources where you may have heard about the topic and details about the claim being made. ("according to the Dr. Oz website, carrots are good for your eyes because…. The Woman's Day website also adds that carrots contain vitamins such as beta carotene…..).

2) A scientifically valid hypothesis statement. This will be the hypothesis that you will test using the published scientific literature. "Eating a serving of carrots daily decreases your risk of developing degenerative eye disease, such as macular degeneration or glaucoma". Your hypothesis should be specific, scientifically stated, and directly testable by the scientific method. Nonspecific terms like "eating carrots improves your health" or "carrots boost your immunity" are not testable and are not acceptable hypotheses.

3) Fill out the posted activity to describe the ideal experiment that would prove or disprove (as appropriate) your hypothesis (posted in the Project Information folder of the course website)

4) Citations for the popular media articles you have read.

All citations will be completed in the Council of Science Editors (CSE) Name-Year format. Examples can be found at the following website:
https://writing.wisc.edu/Handbook/DocCSE_NameYear.html#internet

Your citations for GA1 will most likely be websites. When citing websites using CSE, use the following general information:

Author(s) name (if given). Date (if given use full date, months are given with three letter abbreviations). Title of the webpage [Internet]. Publisher; [cited date]. Available from: web address

**Note: When there is no author available for a work, the date of publication comes after the title in the name-year system.

Example:

Smith KA. 2013 Aug 13. A WWII propaganda campaign popularized the myth that carrots help you see in the dark. [Internet]. Smithsonian Magazine; [cited 2015 Apr 6]. Available from: http://www.smithsonianmag.com/arts-culture/a-wwii-propaganda-campaign-popularized-the-myth-that-carrots-help-you-see-in-the-dark-28812484/#KIUBGxUs47eJhUlf.99.

GA2: Annotated Bibliography. You will provide a list of 3-5 scientific sources (*THERE MUST BE AT LEAST ONE SOURCE PER GROUP MEMBER, so if your group has 4 people you will need 4 sources*) that you will use for the project. You will likely need to look into many more than 3-5 journal articles in order to select the best/most relevant ones for your project. You should provide a brief, 1 paragraph (3-4 sentence) summary of each article, which includes the important conclusion(s) of the article AND why this article is relevant to your project. (Example:

In this article by Jones *et al* in the American Journal of Nutrition, the researchers analyze the diets of mice fed with or without carrots, and perform histological analyses of the retinas of the study animals. They conclude that… This information is useful to our project because….).

In biology, the primary database for identifying scientific journal articles is PubMed. (http://www.ncbi.nlm.nih.gov/pubmed/).

Rebecca Ziino, a research librarian at the Gordon Library, will come to our class to talk about identifying good sources using PubMed. She will also be available for consultation about your source lists if you would like assistance. You can contact Rebecca for assistance at any time throughout the project at rziino@wpi.edu

Each of your brief article summaries should be followed by the appropriate citation. Again we will follow the CSE format for print journals: Author(s). Year (note: do not include other date info). Article title. Journal title (note: use appropriate abbreviations). Volume(issue):page numbers.

Example:

Manzi F, Flood V, Webb K, Mitchell P. 2002. The intake of carotenoids in an older Australian population: The Blue Mountains Eye Study. Public Health Nutr. 5(2):347-52.

Please note! In biology, we never use the "Journal Article Found Online" format. Even though you will likely be accessing and reading these articles online, we cite them as though they were in physical print, because the print version is identical (the online versions are simply .pdf files of the print versions). Please use the correct format.

GA3: Transcript with Citations. You will provide a written script of the film you are planning to create. The script should have appropriate citations of your popular media and scientific source material in the format described above. The text must be fully and accurately cited, to give proper credit to those sources where you obtained information. In-text citations should be identified with the author's name and year (see the CSE Name-Year format mentioned above). The reference list should appear at the end of the document in alphabetical order by the last name of the first author in the list, **not in the footnotes** (you can refer to any of your scientific articles as a model). Rebecca will also be available to assist with citations if you would like assistance.

Below is an example of a line in a video transcript that should be cited:

One baseline study of intake of beta-carotene, a vitamin A derivative that is metabolized into pigments used in the rod and cone cells of the retina, identified a population of adults with elevated beta-carotene levels which may be good subjects to study the relationship of beta-carotene to eye disease (Manzi et al. 2002). Furthermore… [text goes on]

Below is the way the reference list at the end of the document would look:

References:

Manzi F, Flood V, Webb K, Mitchell P. 2002. The intake of carotenoids in an older Australian population: The Blue Mountains Eye Study. Public Health Nutr. 5(2):347-52.

GA4: The Video Presentation. You will make an approximately 2-4 minute video of the written transcript. One member of your group should create a YouTube account (if one of you does not already have one) and upload your video. You may create a "dummy" YouTube account if you wish, using a generic e-mail address for your group (example: WPI.BB1025.Group7@yahoo.com). You may also select the option to keep your video out of the searchable YouTube database so that it does not appear in search results.

I realize that some of you may be a bit "camera shy". It is not necessary for everyone on the team to appear on camera. Members may participate by filming and editing, even if they are reluctant to perform on camera. Other alternatives to acting on camera include using animations, white board/chalk board drawings, puppets, talking animals, voice-overs of other video footage, whatever! Get creative!

Jim Monaco is an Instructional Media Specialist at the ATC. He will come to our class to discuss the options for videography and film editing, and can provide assistance throughout the project as necessary. Cameras, tripods, and film editing software are all available through the ATC, or you may use your own camcorder or even your phone if it takes decent video. I do not expect professional quality videography, but you must make an attempt at a decent quality product. I cannot properly evaluate a video that is out of focus, or is too dark to see your faces, or I can't hear you over the wind noise!

You may contact Jim for assistance at any point at jmonaco@wpi.edu

You will finally upload a Word document to the dropbox on the course website that contains: your group number, your names, your YouTube link, and whether or not you permit me to show the video in class as part of our video contest.

On the final day of class, I will show several of my favorite videos, and the class will vote for their favorite. The winning team will receive a prize!

Assessment

Rubrics for each group assignment will be distributed before the assignment is due. Please pay careful attention to the rubrics! They tell you EXACTLY what you should do to receive full credit, and also will explain EXACTLY why you may have lost points on an assignment. Check your assignment against the rubric before turning it in for best results!

Twice over the course of the project, you will use the CATME system to evaluate yourself and your group members. This will be your opportunity to give feedback about your opinion of the performance of your team members. If there are certain team members that are clearly not pulling their weight, or who are doing more than their share of the work, the individual's final project grade may be adjusted to reflect this at my discretion.

Your videos will be evaluated by your professor as well as 6-8 of your classmates.

As part of your grade, you will use a posted rubric to evaluate two other groups' videos. You will be assigned other groups to evaluate once the videos are posted. Information will be collected using the Qualtrics survey system. You will receive a survey link after the videos are posted.

The project will consist of 100 cumulative points, which are worth 25% of your final grade. The allotted points and due dates of the various items can be found in the table below:

Project Schedule:

Item	**Due Date**	**Points**
GA1:Topic Summary, Hypothesis, Questions	Mon 3/28, uploaded to myWPI by 11:59pm	15 points
GA2: Annotated bibliography	Mon 4/4 Uploaded to myWPI by 11:59pm	20 points
Team assessment 1 (CATME)	Friday 4/8 Surveys close at 11:59pm	Must be completed. 5% deduction in final project grade if not completed
GA3: Transcript	Fri 4/15 Uploaded to myWPI by 11:59pm	30 points
GA4: Final Video	Fri 4/29 Uploaded to youtube and document to drop box by 11:59pm	35 points (Instructor's evaluations = 25 points, peer evals = 10 points)
Team assessment 2 (CATME)	Tue 5/3 Surveys close at 11:59pm	Must be completed. 5% deduction in final project grade if not completed
Peer Evaluation of 2 other videos (Qualtrics survey)	Tue 5/3 Surveys close at 11:59pm	Must be completed. 5% deduction in final project grade if not completed.
Video Contest	In Class on Tue 5/3	Win a fabulous prize!

List of potential topics

These are some suggestions, but you are welcome to research and propose your own topic as well. There are many, many websites out there with quasi-scientific health headlines that you can use to come up with your own ideas.

Causes Cancer:
- power lines, pesticides, fluoridated water, processed meat/nitrates, artificial sweeteners, any others

Entertainment:
- TV makes you dumber, ruins your eyesight
- Video games lead to aggressive behavior

Heart disease:
- Foods that are good for your heart (but, see banned list)
- Good dental hygiene reduces heart disease

Health benefits of consuming (though you must focus on a SPECIFIC health benefit, like blood pressure, weight loss, metabolism, cancer, dementia, etc)
- organic food, gluten-free diet, daily multivitamin, fish oil, various herbal teas or other pills/supplements, antioxidant-rich foods

Weight loss properties of (but see banned list):
- acai berry, teas, particular daily exercise regimens (8 minute workouts, etc)

Babies and Children:
- breastfeeding is healthier/better than formula/bottle
- classical music makes babies smarter
- television programs designed for infants or toddlers improve early learning
- Alcohol, caffeine is bad for a developing fetus

Immunity (but see banned list):
- cures for the common cold: zinc, lysine, Echinacea
- foods or supplements that confer resistances to infection or disease
- role of the microbiome or microbial supplements/probiotics in preventing infection or disease

Other misc:
- Ginger, peppermint, slippery elm as a cure for stomach cramps/nausea
- Ginko biloba improves memory
- Effectiveness of "neural training" games (eg. Lumosity) or use in combatting dementia or neurodegenerative disease
- Relationships between mental health and exercise, other non-strenuous activity, yoga, tai-chi, or effects on physical wellness (cholesterol, blood pressure, cancer, etc)

Banned topics (these have been patently disproven and/or have been done too many times in this class): Chocolate or red wine and heart disease, vitamin C and colds, vaccines and autism, green tea or caffeine and weight loss, oatmeal and cholesterol, and the example of carrots and eyesight used herein

2.10 Review of PBL Research

This source can be found at: http://www.bobpearlman.org/BestPractices/PBL_Research.pdf

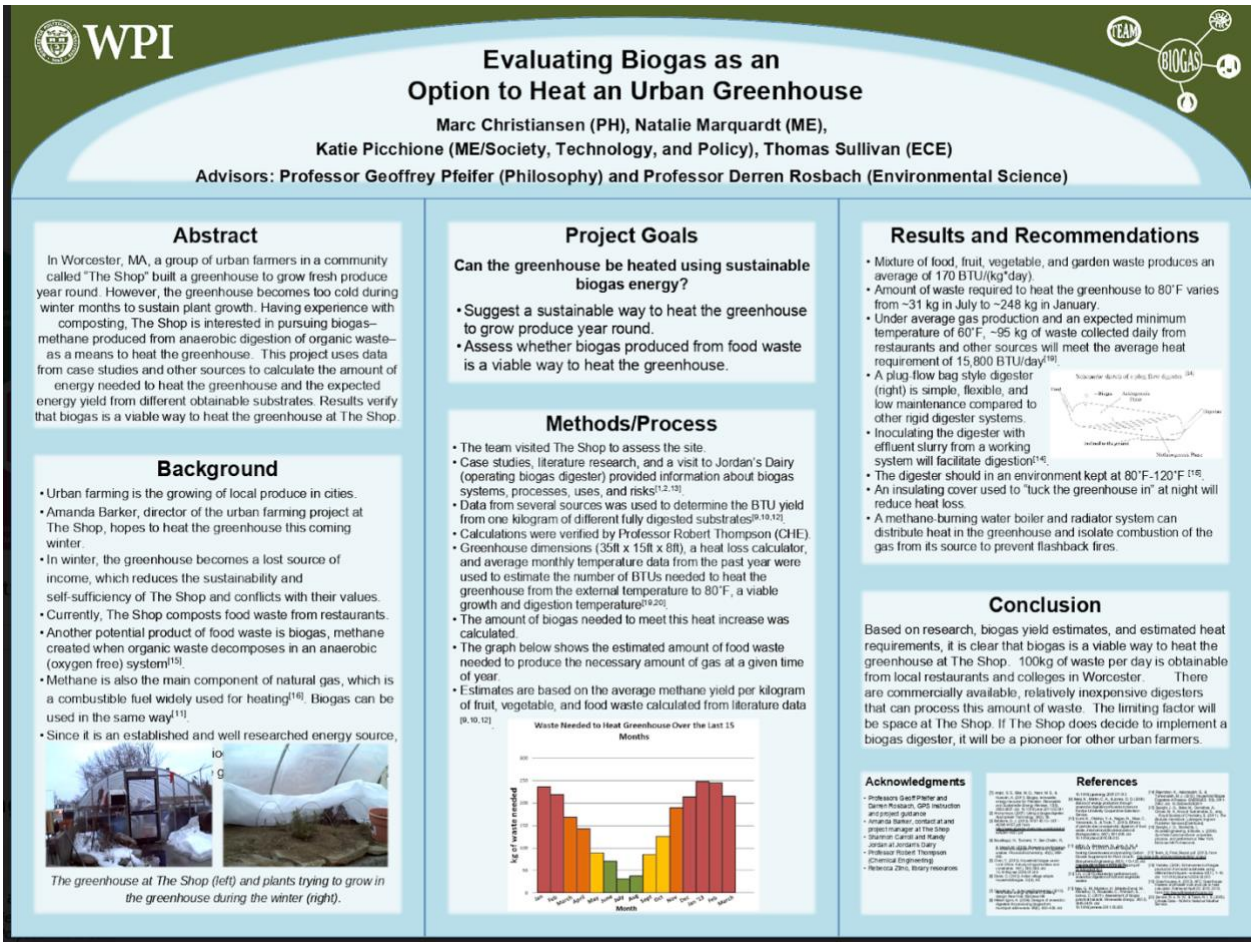
2.11 WPI Alumni Study

This source can be found at: https://www.asee.org/public/conferences/20/papers/7159/download

2.12 WPI PBL Workshop

This source can be found at: Slides taken from presentation provided by the Center for Project-Based Learning at WPI

3.1 Bio Gas As Heat



3.2 Diversity Equity and Inclusion Tools for Teamwork

This source can be found at: https://digitalcommons.wpi.edu/cgi/viewcontent.cgi?article=1014&context=gps-research

3.3 GPS Heal the World A19

GPS: Heal the World, A19

Jump to Today

Great Problems Seminar: Heal the World A-term – Fall 2019
Class Location: Foise Innovation Studio (FI) 105
Class Meetings: Tuesday/Friday 11-12:50 am

Teaching Team

Professors

Professor: Dr. Elisabeth Stoddard
Office: Salisbury Labs (SL) 310 F
Email: eastoddard@wpi.edu
Office Hours: By appointment

Professor: Dr. Reeta Rao
Office: Gateway Park 1 (GP1) 4013
Email: rpr@wpi.edu
Office Hours: By appointment

Peer Learning Assistants

Minh Anh Kieu	mkieu@wpi.edu
Leslie Mateo	lmateo@wpi.edu
Alex Nieto	anieto@wpi.edu
Laura Staugler	lstaugler@wpi.edu

Graduate Assistant

Bo Yang	byang2@wpi.edu

Research and Instruction Librarian
Ms. Paige Neumann, peneumann@wpi.edu, 508-831-4958

Course Overview, Learning Objectives, and Policies

Course Schedule (*The schedule is subject to change.*)

Date	Topic	Assignment Due
WEEK 1		

Fri 8/23	• Course Introduction (https://docs.google.com/presentation/d/1poYNgVURo4wlRcZs2duP6HpXzBil2T8MtnWXS5etXEE/edit?usp=sharing)
	• Notecards - we learn from you
	• Syllabus and Canvas Calendar
	• Microproject 1: Global Communities and Health Problems
	• Teams rank interest in project topics (https://docs.google.com/document/d/1NM_HQgzN56EiFtw7SPk_-QHiEu5-G_rTj21VKKlx4RU/edit?usp=sharing)
	• **Your assigned community.** (https://docs.google.com/document/d/1uS7x1zJBccQrOTDP6Dz-gXSf0lY7CHslVixgm-ow9B0/edit?usp=sharing)
	• **Assigned Today**
	  ◦ Due Tues. 8/27, Readings and Associated Questions
	  ◦ Due Tues. 8/27, Personal Asset Mapping Assignment	

WEEK 2		
Tue 8/27	• Team Activity-Share Asset Maps and **Fill out Team Asset Chart** • Mini-lecture: disease types • Case Activity • The CRAP test **(https://docs.google.com/document/d/13QUZyAMwMjGGgJMhMrhWQ7trCMmDWnoZghbuv-RjK9w/edit?usp=sharing)** , **keyword, database, peer review search activity (https://docs.google.com/document/d/1cbt3X_5K4VM7qCGYtbJ4q7xhu6aoE1Bv64OGPQbpyhU/edit?usp=sharing)** • **Assigned Today**	• **Due Today** ◦ Due Tues. 8/27, Readings and Associat ◦ Due Tues. 8/27, Asset Mapping Assignn

	◦ Due Fri. 8/30, Annotated bibliographies for two articles ◦ Due Fri. 8/30, Team Contract	
Fri 8/30	• Jim Monaco, ATC, Presentation on Presenting • Presentation Rules to Live By **(https://docs.google.com/document/d/1U4-W7Fz_6sVbsFmgABy1yvRg6nEKT2zpZCP6cbH6Ywg/edit?usp=sharing)** • **ATC Resources** • Mapping Case Communities' Assets, Vulnerabilities, and Threats **(https://docs.google.com/document/d/1wrY1ThlXnLR2lWdT_2zHvJQK9Sc-nej8xqlGGGyxkPQ/edit?usp=sharing)** • Health and Climate Change introduction • Health and Climate Change detail **(https://docs.google.com/document/d/1USJaBH43D5sDJZK_oltgkOJX9V-zUtqiP68ByOHlW2c/edit?usp=sharing)** • Disaster Scenario and Root Cause Analysis **(https://docs.google.com/document/d/1Snqaf5kaGVhGmoqWBLlUssJJFoX46hAWehhQWXbiA4c/edit?usp=sharing)** • **Sample Fishbone Analysis of Disaster.pdf**	• **Due Today** ◦ Due Fri. 8/30, Annotated bibliographies ◦ Due Fri. 8/30, Team Contract
WEEK 3		
Tue 9/3	• **HERE IS A SAMPLE PRESENTATION from GPS: The World's Water. They were looking at community assets, water vulnerabilities, and water threats. (https://docs.google.com/presentation/d/16lbBNn9B88zMV8E-XU7EzhO4e0s9Zmn4wimnnQthKMs/edit?usp=sharing)** • Global Communities and Health Problems Micro Project Presentations Groups 4, 6, 5, 3, and 7 • Peer Review Activity	• **Due today** ◦ Global Communities and Health Problen
Fri 9/6	• **HERE IS A SAMPLE PRESENTATION from GPS: The World's Water. They were looking at community assets, water vulnerabilities, and water threats. (https://docs.google.com/presentation/d/16lbBNn9B88zMV8E-XU7EzhO4e0s9Zmn4wimnnQthKMs/edit?usp=sharing)** • Global Communities and Health Problems Micro Project Presentations Groups 8, 9, 10, 11, 12, 2, 13, and 1 • Peer Review Activity, including **peer mentor advice for 2020 GPS students (https://docs.google.com/document/d/1_4uebiVkSsaEMEsGml_0mk_E3pzF72q7i6OsBHF3gGo/edit?usp=sharing)**	• **Due today** ◦ Global Communities and Health Problen

	• Assigned today ◦ **Due Tues. 9/10, Reading and Associated Questions** ◦ Due Fri. 9/13, Documentary and Associated Questions	
WEEK 4		
Tue 9/10	Field Trip Turn Back Time Farm • **Assigned today** ◦ Due Fri. 9/13, Documentary and Associated Questions	• **Due today** ◦ Due Tues. 9/10, Reading and Associate
Fri 9/13	• Health and (In)Justice • Call from Julia Koehler: immigrant (in)justice and access to health care in Boston • Assigned today ◦ Due Tues. 9/17, **Critical Reflection on Health InJustice due Tues, 9/17 by 10:30am** ◦ Due Tues. 9/17, **Reading on CRISPR due 9/17 by class time** ◦ Dues Tues. 9/17, **Due, Tues, 9/17 by 10:30am - Revise your asset map for the next project**	• **Due today** ◦ Due Fri. 9/13, Documentary and Associ

WEEK 5		
Tue 9/17	• **Microproject #2: Infographics, Innovative Technologies, and Bioethics** • Innovative technologies and bioethics - **visit from Natalie Kofler (https://morse.yalecollege.yale.edu/natalie-kofler)** • Teams meet, share assets, choose topic • Assigned today ◦ Teamwork styles assessment and questions ◦ Two annotated bibliographies on your infographic topic	• **Due today** ◦ Due Tues. 9/17, **Critical Reflection on** ◦ Due Tues. 9/17, **Reading on CRISPR d** ◦ Dues Tues. 9/17, **Due, Tues, 9/17 by 1(** ◦

Fri 9/20	• How to create a powerful infographic
	• Team asset chart
	• Review examples
	• Assigned today
	  ◦ Due Tues, 9/24, draft of infographic
	  ◦ EXTRA CREDIT - 3 points on final infographic, Due Monday at 10:30am, Infographic Quiz (individual)
		• **Due today**
		  ◦ Two annotated bibliographies on you

WEEK 6		

Tue 9/24	Infographic Draft Display and Feedback
	• Assigned today
	  ◦ Due Friday, 9/27, final draft of infographic
		• **Due today**
		  ◦ Infographic DRAFT 1 due by Tues, 9/
		  ◦ Submit Final Team Preferences by Tu

Fri 9/27	• Presentation of Final Infographic Draft
	• Why asset charts to divide up work? Why show distribution of labor?
	• Review of Major Project Problem Proposal
	• Assigned today
	  ◦ Due Tues, 10/1, each member submits 3 ideas
		• **Due today**
		  ◦ Due Tues, 9/27, final draft of infograp

WEEK 7		

Tue 10/1	• Teams meet and share maps
	• Work day: problem identification and development
	• Paige Neumann on Refworks
	• Assigned today
	  ◦ Due at the end of class: topic 2 project ideas, each with potential cases
	  ◦ Due Fri., 10/4, Annotated Bibliography for Problem Proposal
		• **Due today**
		  ◦ Due Tues, 10/1, Each member submit

Fri 10/4	• Share asset maps
	• Share research from annotated bibliographies
	• Develop fish bone cause, effect, & evidence
	• Transitioning from fishbone (https://docs.google.com/presentation/d/1i9EmLeRlltWUbqjvkJ3g_cp2rlM2VljGL7V1_g0lqeA/edit?
		• Due today
		  ◦ Due Fri., 10/4, Annotated Bibliograph
		  ◦ Due Fri., 10/4 Activity Feedback Form
		  ◦ Course Evaluation and Survey Confir (https://docs.google.com/spreadsheets/d

	usp=sharing) to Written Problem Proposal Development - Claims and Evidence • Team asset chart and team contract • Assigned today ◦ Due Tues, 10/8, @ 10:30am, Presentation of Problem Proposal	usp=sharing)

WEEK 8		
Tue 10/8	Problem Proposal Presentations Course Evaluations and Survey (extra credit)	• Due today ◦ Due Tues, 10/8, @ 10:30am, Presenta ◦ Written Problem Proposal Developme

Course Grading Summary

1. **Presentations** (**45%**)
   - Microproject #1 Presentation
   - Microproject #2 Infographic
   - Major Project Problem Proposal Presentation
2. **Annotated Bibliographies for Three Projects** (**15%**)
   - Microproject #1
   - Microproject #2
   - Major Project Problem Proposal
3. **In class activities assignments, readings** (25%)
   - Asset-based cover sheet
   - Team Asset Chart
   - Infographic draft
   - Readings and questions
4. **Written Project Problem Proposal** (**15%**)

Course Summary:

Date	Details	
Tue Aug 27, 2019	Due Tues. 8/27, Personal Asset Mapping Assignment (https://canvas.wpi.edu/courses/14911/assignments/97214)	due by 10:30am
	Due Tuesday, 8/27, by 10:45am, Readings and Associated Questions (individual assignment) (https://canvas.wpi.edu/courses/14911/assignments/101724)	due by 10:45am
	Team Asset Chart: Microproject #1 (https://canvas.wpi.edu/courses/14911/assignments/102690)	due by 11:59pm
Fri Aug 30, 2019	Due 8/30 by 10:45am Team Contract-Microproject #1 (https://canvas.wpi.edu/courses/14911/assignments/102661)	due by 10:45am
	Due Friday, 8/30, by 10:45am: Complete an annotated bibliography for two sources (individual assignment) (https://canvas.wpi.edu/courses/14911/assignments/101958)	due by 10:45am
Tue Sep 10, 2019	Due Tues, 9/10 by 10:30am - Reading and questions (https://canvas.wpi.edu/courses/14911/assignments/103730)	due by 10:30am
Fri Sep 13, 2019	Readings- Health Injustice-due Friday, 9/13, by 10:45 am (https://canvas.wpi.edu/courses/14911/assignments/97219)	due by 10:45am
Tue Sep 17, 2019	Critical Reflection on Health InJustice due Tues, 9/17 by 10:30am (https://canvas.wpi.edu/courses/14911/assignments/97201)	due by 10:30am
	Due, Tues, 9/17 by 10:30am - Revise your asset map for the next project (https://canvas.wpi.edu/courses/14911/assignments/104382)	due by 10:30am
	Reading due 9/17 by class time (https://canvas.wpi.edu/courses/14911/assignments/104383)	due by 11am

	Due, Tues, 9/17, by end of class - team contract for Microproject #2 (team assignment) (https://canvas.wpi.edu/courses/14911/assignments/104534)	due by 11:59pm

Date	Details	
Fri Sep 20, 2019	Due Friday, 9/20, by 10:30am, Annotated Bibliographies for Two Sources (individual assignment)- Microproject 2 (https://canvas.wpi.edu/courses/14911/assignments/97213)	due by 10:30am
	Due Fri, 9/20 by end of class, Infographic Team Asset Chart (team assignment) (https://canvas.wpi.edu/courses/14911/assignments/97206)	due by 11:59pm
Tue Sep 24, 2019	Infographic Assignment-Draft 1- due Tues, 9/24 @10:30am (team) (https://canvas.wpi.edu/courses/14911/assignments/97217)	due by 10:30am
Fri Sep 27, 2019	Infographic Assignment-Final Draft - due Fri, 9/27 @10:30am (team) (https://canvas.wpi.edu/courses/14911/assignments/97204)	due by 10:30am
Tue Oct 1, 2019	Due Tues, 10/1, Each individual member submits 1-3 ideas (https://canvas.wpi.edu/courses/14911/assignments/105870)	due by 10:30am
Fri Oct 4, 2019	Due Fri, 10/4, @ 10:45am, Annotated Bibliography for Problem Proposal (https://canvas.wpi.edu/courses/14911/assignments/97208)	due by 10:45am
	Team Asset Chart - Problem Proposal (https://canvas.wpi.edu/courses/14911/assignments/106448)	due by 11:59pm
	Team Contract - Final Problem Proposal (https://canvas.wpi.edu/courses/14911/assignments/106082)	due by 11:59pm
Tue Oct 8, 2019	Due Tues, 10/8, @ 10:30am, Presentation of Problem Proposal (https://canvas.wpi.edu/courses/14911/assignments/97209)	due by 10:30am
	Written Problem Proposal Development - Claims and Evidence (https://canvas.wpi.edu/courses/14911/assignments/106049)	due by 10:30am

3.4 Heal the World B19

Heal the World: B19

Jump to Today

Heal the World Course Schedule: B Term, 2019

Date	Topic	Assignments Due Today or Around this Date
Sessions 1&2: Introduction to B term & Project Goal and Objectives		
Tues 10/22	**Agenda:** -Overview of B term (https://docs.google.com/presentation/d/1foINSLiNyfFVA9BlSryiKdsU87WFojHU52lu9C0LhQE/edit?usp=sharing) - Most common errors in problem outline -Meet with Team, Faculty, and PLAs to Discuss Problem Proposal Outline -Review upcoming assignments ---------- **Assigned Today:** *Individual assignments:* - project goal and objectives due Thursday, 10/24 by 10am -identify potential interview participants due Thursday, 10/24 by 10am - source analysis #1 **due Tuesday, 10/29 by 10:30am** *Team assignments:* *NONE*	**Nothing Due**
Fri 10/25	**Agenda:** 1) Teams meet to discuss: feedback on goals and objectives. Then work on Team draft of goals and objectives. 2) Discuss ongoing research for source analysis, and submit plan for source analysis- who will focus on what and why. 3) Define your research population (https://docs.google.com/document/d/1odW93P9o-X0i5Wl5O1FIc5oQFZzVwk5HesPW1z-9EIQ/edit?usp=sharing) 4) Discuss the feedback on your potential interview participants, and choose your favorite 3-4. Aim for a group who is diverse in knowledge and experience, and those who your members are	**Due Thursday, 10/24 by 10am:** - Project Goal and Objectives (individual) - Identification of Two Potential

	most excited about talking to. Consider how difficult it may be to get in touch with potential participants, and choose backups. --- **Assigned Today:** *Individual:* Keep working on your source analysis #1 **due Tuesday, 10/29 by 10:30am** *Team* Team draft of goals and objectives due Tues, 10/29 by 10:30am	Interview Participants (individual)
Sessions 3&4: Revising Drafts and Developing Solutions		
Tues 10/29	**Agenda:** 1) Review introduction and background assignment. 2) Discuss results of source analysis , and add to outline - activity (https://docs.google.com/document/d/1blVcaxX85dnR0vPxU5Say55SMPYC3VOZPhKb8QrVeDE/edit?usp=sharing) 3) Complete the Asset-Based Cover Sheet for Intro & Background (team) 4) Activity: finalize research population, and start to map their assets and vulnerabilities (https://docs.google.com/document/d/1wzQ242Tndojubjh6Q8JxogkcjK64rEnid3O4AW6i8pw/edit?usp=sharing) 4) Work on interviews: a. Email favorite 3-4 interview participants - one participant per team member b. As a team, and then individually, begin writing up first draft of interview questions **Assigned Today:** *Team:* Introduction and Background due Friday, 11/1 at 10:30am (team) First Draft of Interview Questions for One Participant due Tuesday, 11/5 (Individual)	**Due Tuesday, 10/29 by 10:30am** -second draft of goals and objectives (team) -source analysis #1
Fri 11/1	**Agenda:** Solutions - Review types of solutions - Review two ways to analyze solutions -Review solutions presentation assignment	**Due Friday, 11/1, by 10:30am** Introduction and

	Assigned Today: *Individual:* Readings and Questions on Team Dynamics *Team:* Solutions Presentation Assignment	**Background**
Sessions 5&6: Discussing Team Dynamics and Presenting Potential Solutions		
Tues 11/5	**Agenda:** **Workshop on team dynamics and conflict (https://docs.google.com/presentation/d/1qNBnZXfiWZQJkfZS-GpcZZ42VSQn4U7g8lWuQuq-e8U/edit?usp=sharing)** **Assigned Today:** *Team:* **-Asset/Growth-Based Work Plan Solutions Assignment (team) due Wed, 11/6 by 11:59pm** - Work on Solutions Presentations	**Due Tuesday, 11/5, by 10:30am** - Team Dynamics Readings and Questions (individual) **First Draft of Interview Questions for One Participant (Individual)**
Fri 11/8	**Agenda**: Solutions Presentations. **Assigned Today:** *Individual:* Critical Reflection on Team Dynamics (individual) due Tues, 11/12	**Due Wednesday, 11/6 by 11:59 pm:** **Asset/Growth-Based Work Plan Solutions Assignment (team)** **Due Friday, 11/8, by start of class**

		Solutions presentations (team)
Sessions 7&8: Identifying gaps in research through concept mapping and individual team meetings		
Tues 11/12	**Agenda:** 1) Two presentations **2) Revised Team Agreement** 2) Methods - **Data analysis and** strategies - Qualitative Coding activity **(https://docs.google.com/document/d/1NVNqbCFRzEiqVl7oViKuPqJ0d6V9P2r8uh13zJnz3QM/edit?usp=sharing)** 2) Faculty and PLAs meet with teams **Assigned Today:** *Individual:* *-Source analysis #2 due Tues, 11/19* *Team:* - Outline draft of Methods (team) due Fri, 11/15	**Due Tuesday, 11/12 by 10:30am:** Critical Reflection on Team Dynamics (individual)
Fri 11/15	**Agenda:** 1) Concept mapping of project progress 2) **Plan for Source analysis #2** 3) Discuss progress on interviews 4) Review Progress on Final Report Assignment **Assigned Today:** *Individual:* continue to work on source analysis #2	**Due Friday, 11/15, by 10:30am** - **Outline Draft of Methods (team)**
Sessions 9&10: Peer Review and Poster Design		
Tues	**Agenda:**	

11/19	1) Discuss findings of second source analysis 2) Review and work on preliminary results assignment (team) 3) Visit Sarah Piella, and translating your GPS experience into your resume **Assigned Today:** *Individual:* none *Team:* Preliminary Results due Tues 11/26 at 10:30am	**Due Tuesday, 11/19 by 10:30am:** Second source analysis (individual)
Fri 11/22	ATC Workshop on Poster Design (Jim Monaco, 11-11:30am) Work on Preliminary Results Asset-Based Work Plan for Preliminary Results Compile drafts into one document, including comments (https://docs.google.com/document/d/1Jgvrve-sQx1QS3lp__O_P6985yvXcaKAXdoLxuBDfag/edit?usp=sharing) Work on Poster	
Sessions 11&12: Developing Poster and Working on Drafts		
Tues 11/26	Agenda: (https://docs.google.com/spreadsheets/d/1bkC5CEIVjlfa46gKPE16yll5a4z6OCG0ozpKoKMh0GQ/edit?usp=sharing) Review Recommendations, Implementation, and Assessment Assignment (https://docs.google.com/spreadsheets/d/1bkC5CEIVjlfa46gKPE16yll5a4z6OCG0ozpKoKMh0GQ/edit?usp=sharing) PLAs discuss poster day: presenting and dress (https://docs.google.com/spreadsheets/d/1bkC5CEIVjlfa46gKPE16yll5a4z6OCG0ozpKoKMh0GQ/edit?usp=sharing) Examples of good posters from last year (https://docs.google.com/spreadsheets/d/1bkC5CEIVjlfa46gKPE16yll5a4z6OCG0ozpKoKMh0GQ/edit?usp=sharing) Work on poster: outline written narrative, work on visual narrative (https://docs.google.com/spreadsheets/d/1bkC5CEIVjlfa46gKPE16yll5a4z6OCG0ozpKoKMh0GQ/edit?usp=sharing)	Due Tues 11/26: Preliminary Results (team) at 10:30am

	Sign up for poster check-in sessions with Professor Stoddard on Monday 12/02 (https://docs.google.com/spreadsheets/d/1bkC5CEIVjlfa46gKPE16yll5a4z6OCG0ozpKoKMh0GQ/edit?usp=sharing) **Final Poster Title** (https://docs.google.com/spreadsheets/d/1qWxT-TX_lDeKtrbD_jOrX3QbCvPSrAgpoNsAtduY4D8/edit?usp=sharing) **Assigned today:** *Individual:* none *Team:* Recommendations, Implementation, and Assessment Draft posters and presentation	
Fri 11/29	**NO CLASS**	
Sessions 13&14: Practice and Mock Poster Presentations		
Tues 12/3	**Agenda:** Teams Display Posters to class for Feedback **Assigned today:** *Individual:* none *Team:* - M**ock presentation-important note!:** you will be projecting your poster onto the wall with your laptop and a projector we will provide. If you do not have laptops with either HDMI or VGA ports, you will need to supply your own adapters. Asset-Based Cover Sheet for Executive Summary (team) - First draft Executive Summary	**Due Tuesday, 12/3, by start of class** Poster Draft (team)

	Sign up for poster check-in sessions with Professor Stoddard on Wednesday 12/04 (https://docs.google.com/spreadsheets/d/1bkC5CEIVjlfa46gKPE16yll5a4z6OCG0ozpKoKMh0GQ/edit?usp=sharing)	
Fri 12/6	**Agenda:** Mock Poster Presentations with "outsiders" - M**ock presentation-important note!:** you will be projecting your poster onto the wall with your laptop and a projector we will provide. If you do not have laptops with either HDMI or VGA ports, you will need to supply your own adapters. **Assigned today:** *Individual:* none *Team:* 1. **Report Abstract, see instruction in Final Report Assignment** 2. **Report Conclusion, see instructions in Final Report Assignment** 3. Final Project Report	**Due Friday, 12/6, by the start of class** - Mock Poster Presentations in class (team) **Poster Drop Off** window at ATC, Fuller Labs, Rm 117, Friday, 12/6 until 5pm. **Submit final draft to Canvas**
Poster Day, Final Work Day, and Final Report Due		
Tues 12/10	**Poster Presentation Day 10am-12pm**	**Poster Presentation Day 10am-12pm**

Fri 12/13	**Agenda:** 1) project awards and feedback 2) professors will edit your abstract in class 3) **final assignment - reflection: statement of learning** 4) ask professors questions about report-final work time	**Due Friday, 12/13, by 12:50pm** - **Critical Reflection: Statement of Learning (individual)** **Due Friday, 12/13, by 11:59 pm** - Final Project Report (team)

Course Summary:

Date	Details	
Thu Oct 24, 2019	**First Draft Project Goal and Objectives (individual)** (https://canvas.wpi.edu/courses/16654/assignments/97237)	due by 10am
	Identify Two Potential Interview Participants (individual) (https://canvas.wpi.edu/courses/16654/assignments/97239)	due by 10am
Fri Oct 25, 2019	**Team Plan for Source Analysis #1 (team)** (https://canvas.wpi.edu/courses/16654/assignments/97252)	due by 1pm

Date	Details	
Tue Oct 29, 2019	Second Draft Project Goal and Objectives (team) (https://canvas.wpi.edu/courses/16654/assignments/97244)	due by 10:30am
	Source Analysis #1 (individual) (https://canvas.wpi.edu/courses/16654/assignments/97246)	due by 10:30am
	Asset-Based Cover Sheet for Intro & Background (team) (https://canvas.wpi.edu/courses/16654/assignments/97226)	due by 1pm
	Email Top 3 Interview Participants (team) (https://canvas.wpi.edu/courses/16654/assignments/97233)	due by 1pm
Fri Nov 1, 2019	Draft of Introduction and Literature Review of Project Report (team) (https://canvas.wpi.edu/courses/16654/assignments/97231)	due by 10:30am
Tue Nov 5, 2019	First Draft of Interview Questions for One Participant (Individual) (https://canvas.wpi.edu/courses/16654/assignments/97236)	due by 10:30am
	Readings and Questions on Team Dynamics, Conflict, and Bias (https://canvas.wpi.edu/courses/16654/assignments/97241)	due by 10:30am
Wed Nov 6, 2019	Asset/Growth-Based Work Plan Solutions Assignment (team) (https://canvas.wpi.edu/courses/16654/assignments/97221)	due by 11:59pm
Fri Nov 8, 2019	Solutions Presentation (https://canvas.wpi.edu/courses/16654/assignments/97245)	due by 10:45am
Tue Nov 12, 2019	Critical Reflection: Team Dynamics, Conflict, and Bias (individual) (https://canvas.wpi.edu/courses/16654/assignments/97229)	due by 10:30am
	Revised Team Agreement (https://canvas.wpi.edu/courses/16654/assignments/97243)	due by 1pm
Fri Nov 15, 2019	Draft 1 Methodology Assignment: Data Collection and Analysis Outline (team) (https://canvas.wpi.edu/courses/16654/assignments/97230)	due by 10:30am
	Plan for Source Analysis #2 (team) (https://canvas.wpi.edu/courses/16654/assignments/97240)	due by 1pm
Tue Nov 19, 2019	Source Analysis #2 (individual) (https://canvas.wpi.edu/courses/16654/assignments/97247)	due by 10:30am
Fri Nov 22, 2019	Asset-Based Work Plan for Preliminary Results (team) (https://canvas.wpi.edu/courses/16654/assignments/97228)	due by 1pm
Tue Nov 26, 2019	Draft of Preliminary Results (team) (https://canvas.wpi.edu/courses/16654/assignments/97232)	due by 10:30am
Fri Dec 6, 2019	Recommendations, Implementation, and Assessment-Draft 1 (team) (https://canvas.wpi.edu/courses/16654/assignments/97242)	due by 10:30am
	Submit Final Poster (team) (https://canvas.wpi.edu/courses/16654/assignments/97249)	due by 11:59pm

Date	Details	
Fri Dec 13, 2019	Statement of Learning (individual) (https://canvas.wpi.edu/courses/16654/assignments/97248)	due by 1pm
	Final Project Report (team) (https://canvas.wpi.edu/courses/16654/assignments/97235)	due by 11:59pm
	Poster Draft 1 (https://canvas.wpi.edu/courses/16654/assignments/113920)	

3.5 Learning Outcomes and Assignment Goals

Learning Outcomes, Assignment Goals, and Project Overview

Targeted Learning Outcomes

- teamwork
- research
- presenting
- cultural awareness

Assignment Goals

- To learn about major health issues across the globe in different communities.
- To learn how health issues can be impacted by discrimination, and linked to our environments, economies, politics, and cultures.

Project Overview

You and your team will be learning about a particular community, their health resources and vulnerabilities, and then you will work together to develop a community asset map, as well as a list of your community's health vulnerabilities and potential threats. With this map, you will work with your team to assess how your community can address particular health disasters, with a focus on infectious disease outbreaks and climate disasters. You will then present your findings in a 7 minute presentation to the class.

1. **On Friday, 8/23:** to start, you and your team will rank your interest in potential project topics. (https://docs.google.com/document/d/1NM_HQgzN56EiFtw7SPk_-QHiEu5-G_rTj21VKKlx4RU/edit?usp=sharing) At the end of that day, you will be assigned a project topic, based on your rankings. (https://docs.google.com/document/d/1uS7x1zJBccQrOTDP6Dz-qXSf0lY7CHslVixgm-ow9B0/edit?usp=sharing)
2. **Due Tuesday, 8/27, by 10:45am:** each member of your team will read the assigned introductory case study on your community of focus and answer some questions about your community. Each member of your team will also read one assigned article on health and poverty. This is an individual assignment. (https://canvas.wpi.edu/courses/14911/assignments/101724)
3. Due Friday, 8/30, by 10:45am: next, each member of your team will complete an annotated bibliography for two sources on your community that you find on your own through research. This is an individual assignment. (https://canvas.wpi.edu/courses/14911/assignments/97207) Each source must pass the CRAP test. (https://canvas.wpi.edu/courses/9837/pages/crap-test-determining-if-a-source-is-valid)

4. **In class on Friday, 8/30**, each member will share their **annotated bibliographies** (https://canvas.wpi.edu/courses/14911/assignments/97207), and the team will use the combined information to **create a community asset map, as well as a list of water vulnerabilities and potential water threats.** Each team will then be presented with a disaster, and you will use your map and list to determine the threats to your community and how you might use your community's resources to address them. At the end of class, complete the **Asset-Based Work Plan for Microproject #1 Presentation** (https://canvas.wpi.edu/courses/14911/assignments/101966), in order to discuss who will do what to create and prepare for the presentation.
5. **Due on Tuesday, 9/3 for Microproject teams 8, 4, 6, 5, 3, and 7, you will give a compelling 7 min presentation** (https://canvas.wpi.edu/courses/14911/assignments/101965) to share your community's asset map, vulnerabilities, potential threats, the disaster you faced, it's impacts, and how you used your community's resources to address it. Your peers presenting on Friday will provide you with feedback on your presentation, and your team will give them advice, based on what you learned from your experience.
6. **Due on Friday, 9/6 for Microproject teams 9, 10, 11, 12, 2, 13, and 1, you will give a compelling 7 min presentation** (https://canvas.wpi.edu/courses/14911/assignments/101965) to share your community's asset map, vulnerabilities, potential threats, one of the disasters you faced, it's impacts, and how you used your community's resources to address it. Your peers who presented on Tuesday will provide you with feedback on your presentation, and your team will give advice based to next year's GPS students, based on what you learned from your experience.

4.1 Rubric to Evaluate Team Process

This source can be found at:
https://llu.instructure.com/courses/1110674/files/56647221/download?verifier=6ZCtiFZ7cXzDCCmxSx72rUwGYN6xqgLn8kQbZEBW&wrap=1

4.2 Self and Peer Evaluation

This source can be found at:
https://www.northwestern.edu/searle/docs/History%20and%20Philosphy%20Self%20and%20Peer%20Evaulation.pdf

5.1 WPI Class Review Report

WPI

Student Course Report

Academic Year 2017-2018

CS-3733 SOFTWARE ENGINEERING **Section D01** **CRN 20072** **Spring 2018**

General Impressions

								Avg.	#Resp
1. My overall rating of the quality of this course is	**Very Poor (1)**	0	1	0	11	29	**(5) Excellent**	4.66	41
2. My overall rating of the instructor's teaching is	**(1)**	0	2	4	14	22	**(5)**	4.33	42
3. The educational value of the textbook and/or assigned reading was	**(1)**	0	6	17	8	10	**(5)**	3.54	41
4. The educational value of the assigned work was	**(1)**	0	1	1	7	33	**(5)**	4.71	42
5. The instructor's organization of the course was	**(1)**	0	2	1	13	26	**(5)**	4.50	42
6. The instructor's clarity in communicating course objectives was	**(1)**	0	1	3	11	26	**(5)**	4.51	41
7. The instructor's skill in providing understandable explanations was	**(1)**	0	2	3	12	24	**(5)**	4.41	41
8. The instructor's skill in speaking clearly and audibly was	**(1)**	0	1	1	4	36	**(5)**	4.79	42

Relative to other college courses I have taken:

								Avg.	#Resp
9. The amount I learned from the course was	**Much less (1)**	0	0	1	8	32	**(5) Much more**	4.76	41
10. The intellectual challenge presented by the course was	**(1)**	0	0	1	7	34	**(5)**	4.79	42
11. The instructor's personal interest in helping students learn was	**(1)**	1	1	3	12	25	**(5)**	4.40	42
12. The instructor stimulated my interest in the subject matter	**(1)**	1	1	5	13	22	**(5)**	4.29	42
13. The instructor encouraged communication outside of regular contact hours	**(1)**	0	1	9	13	19	**(5)**	4.19	42
14. The amount of reading, homework, and other assigned work was	**(1)**	0	1	1	3	37	**(5)**	4.81	42
15. My attendance and participation for this course was	**(1)**	0	0	10	5	27	**(5)**	4.40	42
16. The amount of effort I put into this course was	**(1)**	0	0	2	2	38	**(5)**	4.86	42

How frequently were the following statements true in this course?

Avg. #Resp

17. The instructor was well prepared to teach class.	**Never (1)**	0	1	1	7	33	**(5) Always**	4.71	42
18. My instructor used course time effectively.	**(1)**	0	2	1	12	27	**(5)**	4.52	42
19. The instructor encouraged students to ask questions.	**(1)**	0	2	3	9	27	**(5)**	4.49	41
20. The instructor treated students with respect.	**(1)**	0	0	2	5	34	**(5)**	4.78	41
21. Instructor feedback on exams/assignments was timely and helpful.	**(1)**	2	6	11	12	11	**(5)**	3.57	42
22. The exams and/or evaluations were good measures of the material covered.	**(1)**	0	1	7	9	24	**(5)**	4.37	41
23. My grades were determined in a fair and impartial manner.	**(1)**	0	1	1	13	26	**(5)**	4.56	41

24. What grade do you think you will receive in this course?

	# Resp
A	31
B	4
C	0
NR/D/F	0
Other/Don't know	5

25. Which of the following best describes the role of this course in your academic program?

	# Resp
In your major field	23
Required for major	13
Free elective	0
Required for minor	1
Other Requirement	2

26A. On average, how many hours of the formally scheduled hours for lecture, conference, and labs did you ATTEND each week?

	# Resp
3 hr/wk or less	2
4 hr/wk	8
5 hr/wk	4
6 hr/wk	22

7 hr/wk or more	4

26B. On average, what were the total hours spent in each 7-day week OUTSIDE of formally scheduled class time in work related to this course (including studying, reading, writing, homework, rehearsal, etc)?

	# Resp
0 hr/wk	0
1-5 hr/wk	0
6-10 hr/wk	0
11-15 hr/wk	1
16-20 hr/wk	5
21 hr/wk or more	34

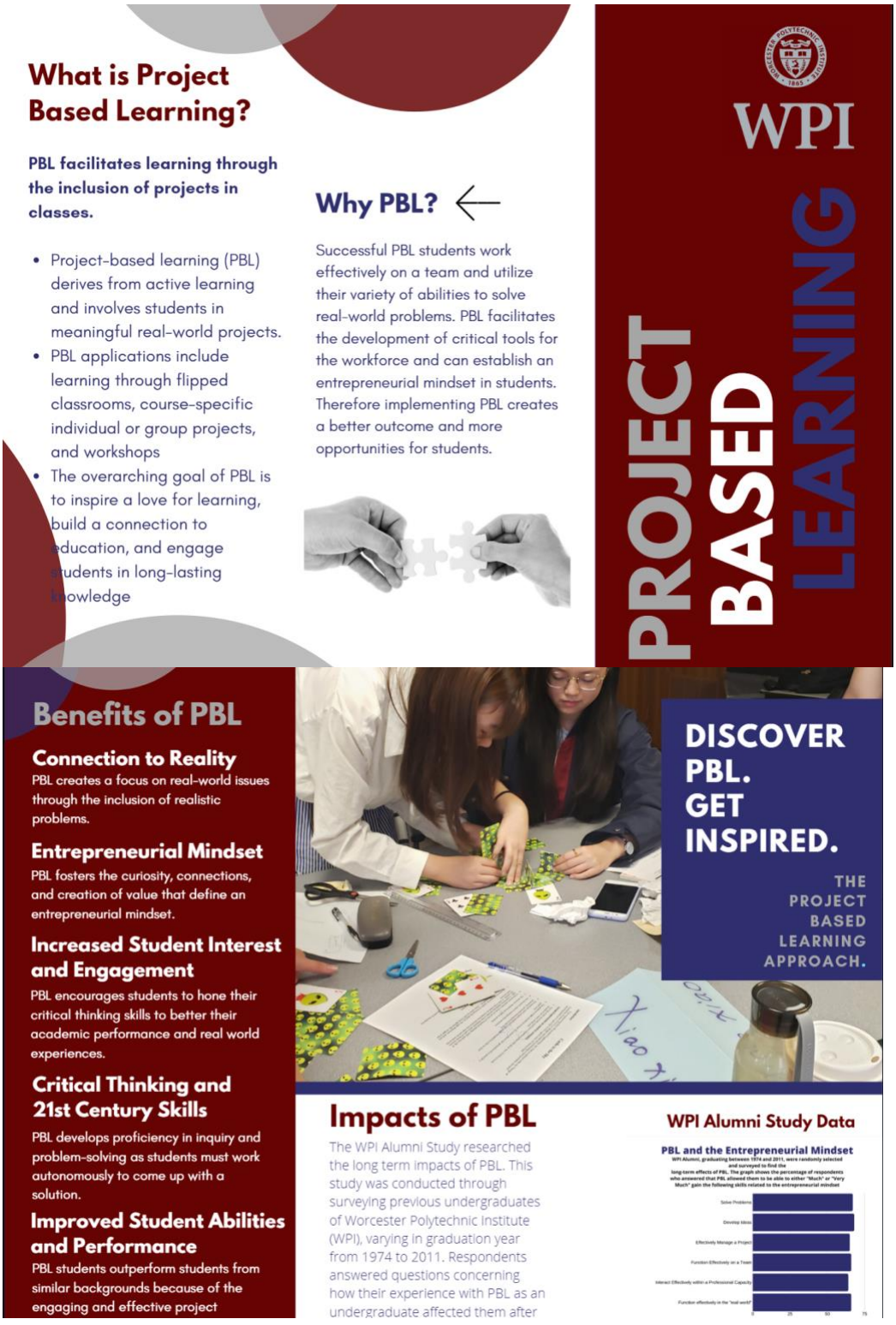
6.1 Accreditation Standard and PBL Matrix

ANEAQ Engineering Cycle	How it could relate to PBL
Modules of your choice can be added during the course of the training.	Modules are customizable and could include a PBL module.
The block of Management modules, consisting essentially of modules of project management, business management ... It represents 10 to 20% of the volume overall schedule for the first five semesters of the course.	PBL could be used in a management module.
The block of language, communication and ICT modules representing 10 to 20% of the total number of modules in the first five semesters of the course.	PBL could be used in the language, communication, and ICT modules.
The objectives and contents of the modules making up a stream are consistent with the objectives of the sector.	PBL can be used to meet the objectives of the sector.

A stream is administratively attached to an institution of higher education, and it is consistent with the missions of this institution. Its modules can be provided by a or several departments or even several higher education institutions or by socio-economic stakeholders.	Modules can be provided by a or several departments. This means that departments can work together on projects in a module for a stream.
The module is the fundamental unit of the training system. It consists of one to three elements of modules that can be taught in one or more languages; a module element can be taught in one or more languages; a module element can be either a subject taught in the form of theoretical courses accompanied or not by assignments, or tutorials and/or practical work, either a practical activity consisting of fieldwork, or project. The individual elements of a module form a coherent unit.	A module element can be a practical activity consisting of fieldwork or a project, meaning PBL could be used in the modules. Individual elements of a module form a coherent unit. A project element could be used to link two other elements of a module, meaning PBL can be used in the modules to link elements together and expand
A hands-on activity can be part of a module, a whole module, or several modules.	This hands-on activity could be a project that could be part of a module or be the module itself.
A part of a module can be taught remotely and/or by alternating within the limit set by the institution.	The project can be taught remotely if it is part of the module.
A teaching module is spread over one semester and corresponds to an hourly volume. There is a minimum of 48 hours of teaching and evaluation per module.	A project could be designed to be incorporated into this minimum of 48 hours of teaching and evaluation.
The practical activity can take different forms: • Internships. • Projects outside the EFP • Fieldwork • Study visits	The practical activity for a module or module element could be a project or fieldwork instead of an internship. Fieldwork, or an internship, and a project could be tied together for an interdisciplinary approach.

• Other forms of outreach activities specified in the description The practical activity may constitute all or part of a module.	
The internship can be carried out in a private, public or semi-public company, in a administration, local authorities, etc. A minimum of two internships is required during the first four semesters. The minimum duration of the internship per year is 20 working days.	The internship could double count as a project if they could take a module or module element where they went more in-depth into their internship work and wrote about their experiences, or connected their internship work with another course they are doing.
Reportable projects can be carried out as part of the training. The project can be carried out in the home institution of the sector or in a company. private, public or semi-public, in an administration, in local authorities, etc.	Projects can be at ENSIAS or in various types of companies so students gain more experience. This is considered PBL.
Assessment of knowledge, skills, and competencies for each module is carried out in the form of continuous monitoring, which may take the form of examinations, tests, assignments, presentations, internship reports or any other means of control.	Continuous monitoring could be provided by projects, where knowledge, skills, and competencies are checked on a regular basis Projects that are often assessed fit this guideline and are an example of how PBL is supported by the accreditation.
Each institution shall develop regulations for the assessment of knowledge, skills, and abilities and of competences,	ENSIAS can develop regulations for the knowledge/skills/abilities/competencies gained through projects. ENSIAS can develop their own regulations for how to assess projects within a PBL curriculum.

6.2 Introduction to PBL Brochure



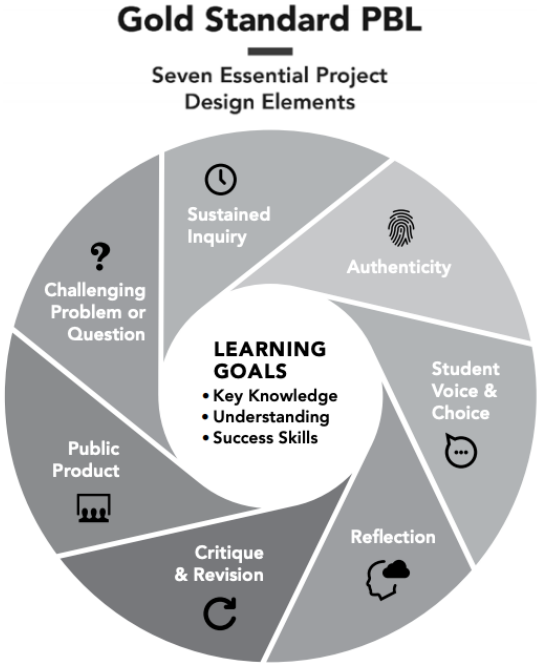
Appendix N: Gold Standard of PBL

Gold Standard PBL: Essential Project Design Elements

PBLworks
BUCK INSTITUTE FOR EDUCATION

We're glad to see Project Based Learning becoming popular, but popularity can bring problems. At PBLWorks, we're concerned that the recent upsurge of interest in PBL will lead to wide variation in the quality of project design and classroom implementation.

If done well, PBL yields great results. But if PBL is not done well, two problems are likely to arise. First, we will see a lot of assignments and activities that are labeled as "projects" but which are not rigorous PBL, and student learning will suffer. Or, we will see projects backfire on underprepared teachers and result in wasted time, frustration, and failure to understand the possibilities of PBL. Then PBL runs the risk of becoming another one of yesterday's educational fads — vaguely remembered and rarely practiced.



To help teachers do PBL well, we created a comprehensive, research-based model for PBL — a "gold standard" to help teachers, schools, and organizations to measure, calibrate, and improve their practice. This term is used in many industries and fields to indicate the highest quality process or product. Our conception of Gold Standard PBL has three parts: 1) Student Learning Goals (in the center of the diagram at left) 2) Essential Project Design Elements (shown in the shaded sections of the diagram), and 3) Project Based Teaching Practices (which we explain elsewhere).

Student Learning Goals

Student learning of academic content and skill development are at the center of any well-designed project. Like the lens of a camera, our diagram puts the focus of PBL on preparing students for successful school and life experiences.

Key Knowledge and Understanding

Gold Standard PBL teaches students the important content standards, concepts, and in-depth understandings that are fundamental to school subject areas and academic disciplines. In good projects, students learn how to apply knowledge to the real world, and use it to solve problems, answer complex questions, and create high-quality products.

Key Success Skills

Content knowledge and conceptual understanding, by themselves, are not enough in today's world. In school and college, in the modern workplace, as citizens and in their lives generally, people need to be able to think

critically and solve problems, work well with others, and manage their work effectively. We call these kinds of competencies "success skills." They are also known as "21st Century Skills" or "College and Career Readiness Skills."

It's important to note that success skills can only be taught through the acquisition of content knowledge and understanding. For example, students don't learn critical thinking skills in the abstract, isolated from subject matter; they gain them by thinking critically about math, science, history, English, career/tech subjects, and about how to accomplish project tasks.

We recommend all projects include a focus on these success skills: critical thinking/problem solving, collaboration, and project management. Projects may also help build other skills, habits of mind and work, and personal qualities (such as perseverance or creativity), based on what teachers, schools, parents and communities value, but we believe the fundamental ability to think critically, solve problems, work with others and manage projects are crucial stepping stones to future success.

7 Essential Project Design Elements

So what goes into a successful project? Based on an extensive literature review and the distilled experience of the many educators we have worked with over the past fifteen years, we believe the following Essential Project Design Elements outline what is necessary for a successful project that maximizes student learning and engagement.

Challenging Problem or Question

The heart of a project — what it is "about," if one were to sum it up — is a problem to investigate and solve, or a question to explore and answer. It could be concrete (the school needs to do a better job of recycling waste) or abstract (deciding if and when war is justified). An engaging problem or question makes learning more meaningful for students. They are not just gaining knowledge to remember it; they are learning because they have a real need to know something, so they can use this knowledge to solve a problem or answer a question that matters to them. The problem or question should challenge students without being intimidating. When teachers design and conduct a project, we suggest they (sometimes with students) write the central problem or question in the form of an open-ended, student-friendly "driving question" that focuses their task, like a thesis focuses an essay (e.g., "How can we improve our school's recycling system, so we can reduce waste?" or "Should the U.S. have fought the Vietnam War?").

Students are learning because they have a real need to know something, so they can use this knowledge to solve a problem or answer a question that matters to them.

Sustained Inquiry

To inquire is to seek information or to investigate — it's a more active, in-depth process than just "looking something up" in a book or online. The inquiry process takes time, which means a Gold Standard project lasts more than a few days. In PBL, inquiry is iterative; when confronted with a challenging problem or question, students ask questions, find resources to help answer them, then ask deeper questions — and the process repeats until a satisfactory solution or answer is developed. Projects can incorporate different information sources, mixing the traditional idea of "research" — reading a book or searching a website — with more real-world, field-based interviews with experts, service providers and users. Students also might inquire into the needs of the users of a product they're creating in a project, or the audience for a piece of writing or multimedia.

Authenticity

When people say something is authentic, they generally mean it is real or genuine, not fake. In education, the concept has to do with how "real-world" the learning or the task is. Authenticity increases student motivation and learning. A project can be authentic in several ways, often in combination. Projects can have an authentic *context*, such as when students solve problems like those faced by people in the world outside of school (e.g., entrepreneurs developing a business plan, engineers designing a bridge, or advisors to the President recommending policy). We should note that, to students, school is very "real," so projects can focus on authentic problems and issues *within* school too. Projects can involve the use of real-world *processes, tasks and tools, and quality standards*, such as when students plan an experimental investigation or use digital editing software to produce videos approaching professional quality. Authentic projects can have a real *impact* on others, such as when students address a need in their school or community (e.g., designing and building a school garden, improving a community park, helping local immigrants) or create something that will be used or experienced by others. Finally, a project can have *personal* authenticity when it speaks to students' own concerns, interests, cultures, identities, and issues in their lives.

Reflection on the content knowledge and understanding gained helps students solidify what they have learned and think about how it might apply elsewhere, beyond the project.

Student Voice & Choice

Having a say in a project creates a sense of ownership in students; they care more about the project and work harder. Students should feel like they are able to make their own voices heard—to speak freely in class discussions and during team work, to express themselves through the products they create, rather than trying to sound like they think their teacher wants them to. If students aren't able to use their judgment when solving a problem and answering a driving question, the project just feels like doing an exercise or following a set of directions. Students can have input and (some) control over many aspects of a project, from the questions they generate, to the resources they will use to find answers to their questions, to the tasks and roles they will take on as team members, to the products they will create. More advanced students may go even further and select the topic and nature of the project itself; they can write their own driving question and decide how they want to investigate it, demonstrate what they have learned, and make their work public.

Reflection

John Dewey, whose ideas continue to inform our thinking about PBL, wrote, "We do not learn from experience. We learn from reflecting on experience." Throughout a project, students — and the teacher — should reflect on what they're learning, how they're learning, and why they're learning. Reflection can occur informally, as part of classroom culture and dialogue, but should also be an explicit part of project journals, scheduled formative assessment, discussions at project checkpoints, and public presentations of student work. Reflection on the content knowledge and understanding gained helps students solidify what they have learned and think about how it might apply elsewhere, beyond the project. Reflection on success skill development helps students internalize what the skills mean and set goals for further growth. Reflection on the project itself — how it was designed and implemented — helps students decide how they might approach their next project, and helps teachers improve the quality of their PBL practice.

Critique & Revision

High quality student work is a hallmark of Gold Standard PBL, and such quality is attained through thoughtful critique and revision. Students should be taught how to give and receive constructive peer feedback that will improve project processes and products, guided by rubrics, models, and formal feedback/critique protocols. In addition to peers and teachers, outside adults and experts can also contribute to the critique process, bringing an authentic, real-world point of view. This common-sense acknowledgement of the importance of making student work and student products better is supported by research on the importance of "formative evaluation, " which not only means teachers giving feedback to students, but students evaluating the results of their learning.

Public Product

A "product" in PBL can be a tangible, media, or digital artifact, a presentation about the solution to a problem or answer to a driving question, or a performance or event. There are three reasons for making student work public. First, like authenticity, a public product adds greatly to PBL's motivating power and encourages high-quality work. Think of what often happens when students make presentations to their classmates and teacher. The stakes are not high, so they may slack off, not take it seriously, and not care as much about the quality of their work. But when students have to present (or display, since not every project has to include a formal presentation) their work to an audience beyond the classroom, the performance bar raises, since no one wants to look bad in public. A certain degree of anxiety can be a healthy motivator. But too much anxiety can of course detract from performance — the trick is to find the sweet spot, not the sweat spot — so it's important that students are well prepared to make their work public.

When students have to present or display their work to an audience beyond the classroom, the performance bar raises, since no one wants to look bad in public.

Second, by creating a product, students make what they have learned tangible and thus, when shared publicly, discussible. Instead of only being a private exchange between an individual student and teacher, the social dimension of learning becomes more important. This has an impact on classroom and school culture, helping create a "learning community," where students and teachers discuss what is being learned, how it is learned, what are acceptable standards of performance, and how student performance can be made better.

Finally, making student work public is an effective way to communicate with parents, community members, and the wider world about what PBL is and what it does for students. When a classroom, school, or district opens itself up to public scrutiny, the message is, "Here's what our students can *do* — we're about more than test scores." Many PBL schools and districts reinforce this message by repurposing the traditional "open house" into an exhibition of project work, which helps build understanding and support for PBL among stakeholders. When the public sees what high-quality products students can create, they're often surprised, and eager to see more.

Adapted from *Setting the Standard for Project Based Learning: A Proven Approach to Rigorous Classroom Instruction*, by John Larmer, John Mergendoller, Suzie Boss (ASCD 2015).

Appendix O: Course Evaluations

WPI

Student Course Report

Academic Year 2017-2018

CS-3733 SOFTWARE ENGINEERING **Section D01** **CRN 20072** **Spring 2018**

General Impressions

									Avg.	#Resp
1. My overall rating of the quality of this course is	**Very Poor (1)**	0	1	0	11	29	**(5) Excellent**		4.66	41
2. My overall rating of the instructor's teaching is	**(1)**	0	2	4	14	22	**(5)**		4.33	42
3. The educational value of the textbook and/or assigned reading was	**(1)**	0	6	17	8	10	**(5)**		3.54	41
4. The educational value of the assigned work was	**(1)**	0	1	1	7	33	**(5)**		4.71	42
5. The instructor's organization of the course was	**(1)**	0	2	1	13	26	**(5)**		4.50	42
6. The instructor's clarity in communicating course objectives was	**(1)**	0	1	3	11	26	**(5)**		4.51	41
7. The instructor's skill in providing understandable explanations was	**(1)**	0	2	3	12	24	**(5)**		4.41	41
8. The instructor's skill in speaking clearly and audibly was	**(1)**	0	1	1	4	36	**(5)**		4.79	42

Relative to other college courses I have taken:

									Avg.	#Resp
9. The amount I learned from the course was	**Much less (1)**	0	0	1	8	32	**(5) Much more**		4.76	41
10. The intellectual challenge presented by the course was	**(1)**	0	0	1	7	34	**(5)**		4.79	42
11. The instructor's personal interest in helping students learn was	**(1)**	1	1	3	12	25	**(5)**		4.40	42
12. The instructor stimulated my interest in the subject matter	**(1)**	1	1	5	13	22	**(5)**		4.29	42
13. The instructor encouraged communication outside of regular contact hours	**(1)**	0	1	9	13	19	**(5)**		4.19	42
14. The amount of reading, homework, and other assigned work was	**(1)**	0	1	1	3	37	**(5)**		4.81	42
15. My attendance and participation for this course was	**(1)**	0	0	10	5	27	**(5)**		4.40	42
16. The amount of effort I put into this course was	**(1)**	0	0	2	2	38	**(5)**		4.86	42

How frequently were the following statements true in this course?

	Avg.	#Resp

17. The instructor was well prepared to teach class.	**Never (1)**	0	1	1	7	33	**(5) Always**	4.71	42
18. My instructor used course time effectively.	**(1)**	0	2	1	12	27	**(5)**	4.52	42
19. The instructor encouraged students to ask questions.	**(1)**	0	2	3	9	27	**(5)**	4.49	41
20. The instructor treated students with respect.	**(1)**	0	0	2	5	34	**(5)**	4.78	41
21. Instructor feedback on exams/assignments was timely and helpful.	**(1)**	2	6	11	12	11	**(5)**	3.57	42
22. The exams and/or evaluations were good measures of the material covered.	**(1)**	0	1	7	9	24	**(5)**	4.37	41
23. My grades were determined in a fair and impartial manner.	**(1)**	0	1	1	13	26	**(5)**	4.56	41

24. What grade do you think you will receive in this course?

	# Resp
A	31
B	4
C	0
NR/D/F	0
Other/Don't know	5

25. Which of the following best describes the role of this course in your academic program?

	# Resp
In your major field	23
Required for major	13
Free elective	0
Required for minor	1
Other Requirement	2

26A. On average, how many hours of the formally scheduled hours for lecture, conference, and labs did you ATTEND each week?

	# Resp
3 hr/wk or less	2
4 hr/wk	8
5 hr/wk	4
6 hr/wk	22

7 hr/wk or more	4

26B. On average, what were the total hours spent in each 7-day week OUTSIDE of formally scheduled class time in work related to this course (including studying, reading, writing, homework, rehearsal, etc)?

	# Resp
0 hr/wk	0
1-5 hr/wk	0
6-10 hr/wk	0
11-15 hr/wk	1
16-20 hr/wk	5
21 hr/wk or more	34

Appendix P: Self and Peer Evaluations

Self and Peer Evaluation of Group Project
MSED 467

Please assess the work of you and your colleagues by using the following criteria. We will consider your feedback in assigning the grade for the project. Please try to be as honest and fair as possible in your assessment.

5 = Excellent work; was crucial component to group's success
4 = Very strong work; contributed significantly to group
3 = Sufficient effort; contributed adequately to group
2 = Insufficient effort; met minimal standards of group
1 = Little or weak effort; was detrimental to group*

SELF Evaluation (Name: _____):

_____ Participation in developing ideas and planning project

_____ Willingness to discuss the ideas of others

_____ Cooperation with other group members

_____ Interest and enthusiasm in project

_____ Participation in leading/facilitating discussion

_____ Ease and familiarity with discussion material

PEER Evaluation (Partner 1: _____):

_____ Participation in developing ideas and planning project

_____ Willingness to discuss the ideas of others

_____ Cooperation with other group members

_____ Interest and enthusiasm in project

_____ Participation in leading/facilitating discussion

_____ Ease and familiarity with discussion material

_____

* An assessment of "1" or "0"requires a written explanation.

PEER Evaluation (Partner 2: _____):

_____ Participation in developing ideas and planning project

_____ Willingness to discuss the ideas of others

_____ Cooperation with other group members

_____ Interest and enthusiasm in project

_____ Participation in leading/facilitating discussion

_____ Ease and familiarity with discussion material

PEER Evaluation (Partner 3: _____):

_____ Participation in developing ideas and planning project

_____ Willingness to discuss the ideas of others

_____ Cooperation with other group members

_____ Interest and enthusiasm in project

_____ Participation in leading/facilitating discussion

_____ Ease and familiarity with discussion material

Self-Reflection

What did you learn from the experience?

What do you think went well?

What would you have done differently, given the opportunity?

Do you have any other comments or suggestions about the project?

Appendix Q: Rubric to Evaluate the Team Process

Rubric to Evaluate Team Process[2]

Process (Team Activity)	Below Avg.	Satisfactory	Excellent	Score—50 Pts. Possible
1. Team has clear vision of the problem(s)	1, 2, 3	4, 5, 6, 7	8, 9, 10	
2. Team is properly organized to complete task and cooperates well	1, 2, 3	4, 5, 6, 7	8, 9, 10	
3. Managed time wisely	1, 2, 3	4, 5, 6, 7	8, 9, 10	
4. Acquired needed knowledge base	1, 2, 3	4, 5, 6, 7	8, 9, 10	
5. Efforts communicated well within group	1, 2, 3	4, 5, 6, 7	8, 9, 10	

Rubric to Evaluate Team Product

Process (Project Report)	Below Avg.	Satisfactory	Excellent	Score—50 Pts. Possible
6. Meets minimum project requirements per syllabus	1, 2, 3	4, 5, 6, 7	8, 9, 10	
7. Well-organized, logical sequencing	1, 2, 3	4, 5, 6, 7	8, 9, 10	
8. Shows creativity, solves the problem(s)	1, 2, 3	4, 5, 6, 7	8, 9, 10	
9. Demonstrates knowledge, conclusion(s) reached	1, 2, 3	4, 5, 6, 7	8, 9, 10	
10. Distinguishes between fact, opinion, and value judgments	1, 2, 3	4, 5, 6, 7	8, 9, 10	

[2] Adapted from: Ko, S. and Rossen, S. (2010). *Teaching Online: A Practical Guide*. New York, NY: Taylor and Francis, p. 186.

Team Member Evaluation Form[3]

Team member name:
Using your best, objective, and fair professional analysis, complete the following evaluation form concerning your team member's performance on your team project.

	Below Expectation	Met Expectation	Above Expectation
1. The LEVEL of effort this team member gave toward the project was…			
2. The QUALITY of that effort was…			
3. The INPUT this team member contributed to the team discussions was…			
4. How would you rate this team member's level of participation?			
5. How would you rate this team member's level of time on the project?			
6. This team member participated in team meetings and work:			
7. This team member met team deadlines:			
8. How would you rate this team member's OVERALL work and contribution to this project?			
Additional comments regarding this team member's work on this presentation/project:			

[3] Adapted from: Boettcher, J. V., and Conrad, R. M. (2010). *The Online Teaching Survival Guide: Simple and Practical Pedagogical Tips*. San Francisco, CA: Jossey-Bass.

Rubric for Individual Performance on a Team[1]

General Attitude	Needs Improvement: 1	Developing: 2	Accomplished: 3	Exemplary: 4
General Attitude	Often is publicly critical of the project or the work of other members of the group. Often has a negative attitude about the task(s).	Occasionally is publicly critical of the project or the work of other members of the group but most of the time has a positive attitude about the task(s).	Rarely is publicly critical of the project or the work of others. Often has a positive attitude about the task(s).	Never is publicly critical of the project or the work of others. Always has a positive attitude about the task(s).
Working with Others	Rarely listens to, shares with, or supports the efforts of others. Often is not a good team player.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team member.	Usually listens to, shares with, and supports the efforts of others. Does not cause "waves" in the group.	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.
Collaboration	Rarely provides useful ideas when participating in a group and in classroom discussion. May refuse to participate.	Sometimes provides useful ideas when participating in the group and in classroom discussion.	Usually provides useful ideas when participating in the group and in classroom discussion. A strong group member who tries hard.	Routinely provides useful ideas when participating in the group and in classroom discussion. A definite leader who contributes a lot of effort.
Preparedness	Often forgets needed materials or is rarely ready to get to work.	Almost always brings needed materials but sometimes needs to settle down and get to work	Almost always brings needed materials to class and is ready to work.	Brings needed materials to class is always ready to work.
Focus on Task and Time Management	Rarely focuses on the task and what needs to be done, and does not respect deadlines. Lets others do the work. Group has to adjust deadlines or work responsibilities because of this person's inadequate time management and lack of collaboration.	Focuses on the task and what needs to be done some of the time. Other group members must sometimes nag, prod, and remind to keep this person on task. Tends to procrastinate, but finally always gets things done by the deadlines.	Focuses on the task and what needs to be done most of the time and uses time well throughout the project. Other group members can count on this person. However, may have procrastinated on one thing or another.	Consistently stays focused on the task and what needs to be done. Very self-directed. Uses time well throughout the project to ensure things get done on time. Does not procrastinate.

[1] Adapted from: Palloff, R. M., and Pratt, K. (2005). *Collaborating Online: Learning Together in Community*. San Francisco, CA: Jossey-Bass.

Sample Rubrics for Collaborative Work[4]

Objectives	Low Performance	At or Below Average	At or Above Average	Exemplary Performance
Teamwork	**1 point** Online one person presented. Unclear team roles.	**2 points** Clear team roles but unequal contributions	**3 points** Clear roles, equal contributions.	**4 points** Clear roles, balanced contributions, good transitions between presenters.
Presentation Style/Delivery	**1 point** No introduction or overview. Poor style (disorganized, difficult to follow). Went above or below page limits.	**2 points** Appropriate introduction to topic but opinions expressed inadequately or vaguely. Barely met page limits.	**3 points** Generally good delivery, presents arguments or opinions in a convincing manner.	**4 points** Excellent style, involving matching written and nonverbal styles (graphics). Creative and imaginative.
Information/ Content	**1 point** Does not have grasp of information, opinions stated but not supported by information.	**2 points** Incorporates few facts or little information to support ideas or opinions.	**3 points** Demonstrates grasp of knowledge. Incorporates ample hits or strategies.	**4 points** Complete and accurate presentation of important, related strategies or facts. Good use of technical or subject vocabulary.

[4] Adapted from: Palloff, R. M., and Pratt, K. (2005). *Collaborating Online: Learning Together in Community*. San Francisco, CA: Jossey-Bass.

Collaboration Questionnaire on Assessment[5]

Collaboration Factors	Strongly Agree: 1	Somewhat Agree: 2	Neither agree nor Disagree: 3	Somewhat Disagree: 4	Strongly Disagree: 5
We established common goals.					
We communicated well as a team.					
We chose a leader without difficulty.					
We assigned roles without difficulty.					
Everyone contributed equally to the process.					
Everyone contributed equally to the final product.					
We had adequate time and resources to complete our task.					
I was satisfied with the way we worked together.					
I was satisfied with the final outcome.					
I feel that I learned from this activity.					
Please add any comments below to explain your answers:					

[5] Adapted from: Palloff, R. M., and Pratt, K. (2005). *Collaborating Online: Learning Together in Community*. San Francisco, CA: Jossey-Bass.

Evaluate Team Participation for Group Problem-Based Learning Activity[6]

Self-assessment and Group Member Problem –Based Learning Activity

Score yourself and each of your group members based on the following criteria:

Criteria	0	2	3	4
Cooperation	Did not listen to and did not value the opinion of others	Listened to but did not value the opinion of others, or valued the opinions of others but did not listen to them	Actively listened to but it was not evident that he or she valued the opinion of others	Actively listened to and valued the opinions of others
Contribution	Did not contribute to the completion of the projects	Contributed to the project, but work was inferior or inadequate	Contributed to the completion of the project with adequate work	Contributed to the completion of the project and submitted high-quality work
Participation	Did not participate in the group	Occasionally participated in the group	Often participated in the group	Consistently participated in the group

Self-Assessment for Group Problem-Based Learning Activity

Share your reflections on the assignment as follows:

Question	Reflective Thoughts
What I learned about ….	
What I learned about working with others in an online group…	
The time and effort required to compete this assignment compared to what I learned was…	

[6] Conrad, R. M., and Donaldson, J. A. (2004). *Engaging the Online Learner: Activities and Resources for Creative Instruction*. San Francisco, CA: Jossey-Bass, p. 22.