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Combining a First-Year Community course with an Introductory Engineering Course

Dr. Corrie Walton-Macaulay, Pacific University

With degrees in both Bachelor of Science and Master of Science from the University of Arkansas, and a doctoral degree from the University of Kentucky, Dr. Corrie Walton-Macaulay is a Geotechnical Engineering Associate Professor in the Engineering Physics department at Pacific University. Dr. Walton-Macaulay has extensive experience in the geotechnical and materials industry prior to becoming an academician and is a licensed professional engineer. Dr. Walton-Macaulay's has a passion to teach, to educate upcoming engineers in best practices and for them to look to alternative ways and new technology that will improve on current design methods. Dr. Walton-Macaulay believes that fostering diversity in teaching breeds innovation and is currently focused on engineering education research.

Bailey A Weber, Pacific University

Second year Pacific University student, majoring in engineering physics. Currently as a student I am preparing to step into an engineering career by participating in field related opportunities and gaining relevant course experience. Being career ready means having experience as a learner, leader, and teammate. The ability to step into a mentoring role opened many doors for myself and gave me the experience desired.

Combining a First-Year Community Course with an Introductory Engineering Course

Abstract

This complete research paper explores the administration of a novel course design that merged an introductory engineering course with a first-year community course. This unique approach was necessitated by the introduction of a new Engineering Physics program. The combined course aimed to align with the university's mission and vision by incorporating emerging pedagogical strategies. Key features of the course included: Interdisciplinary focus, active learning, information literacy, community resilience, and student peer mentorship. The interdisciplinary focus blends engineering and community-based learning to foster a holistic understanding of sustainability and inclusion. Active learning emphasized communication, teamwork, active reading, and participation to enhance student engagement and critical thinking. Information literacy promoted effective research and information evaluation skills. Community resilience addressed local and global challenges through project-based learning and the student peer mentorship was provided by a student who successfully completed the first-year community course. The paper delves into the course development process, implementation strategies, student outcomes, and assessments. Specifically, it examines how collaborative learning supported the achievement of both engineering and first year community-based learning objectives. Both direct and indirect assessments performed indicated students believed they contributed to their community, Pacific University, and progressed in educational development and personal growth. This paper provides valuable insights for educators seeking to integrate interdisciplinary and community-engaged approaches into their engineering curricula.

Introduction

In 2023, Pacific University (PU) started an Engineering-Physics program within which is the requirement to offer an introductory first year engineering course. This course was planned to be taught in the Fall of 2024, and initially, only three students interested in engineering registered for the course. The decision was made to open the course to other first year students from any discipline, thereby combining the introductory engineering course with one section of a Humanities First Year Community (FYC) course. The instructor was then asked to prepare for the combined course accommodating both course objectives as much as possible. A literature search showed the need for a framework or course design merging engineering with humanities for first-year students. Having some knowledge about the Kern Entrepreneurial Engineering Network (KEEN) framework [1] for Entrepreneurial Minded Learning (EML), and how this framework has worked for engineering students, and realizing that this framework can also work for any discipline, the instructor prepared the course based on the KEEN framework, and each of the individual course’s learning objectives. The unintended interdisciplinary nature of such a course, blending engineering and humanities presented an opportunity for the instructor to select a community-based approach with active learning and information literacy. A community based approach was chosen based on the course theme selected, Community Resilience, which helped to foster a holistic understanding of resilience, sustainability, and inclusion. The course content for community resilience addressed both local and global challenges with the local challenges

being the focus of the student project assigned in the course. Active learning helped promote communication, teamwork, active reading, and participation to enhance student engagement and critical thinking. Information literacy promoted effective research and information evaluation skills.

The efforts of the instructor and a student mentor assigned to the course show how collaborative-learning supported the achievement of both introductory engineering and first year community-based learning objectives. This paper delves into the course development process, implementation strategies, and student outcomes. Specifically, it shows how the results of the developed course can provide valuable insights for educators seeking to integrate interdisciplinary and community-engaged approaches into their engineering and/or humanities curricula.

Background

Course Interdisciplinary Makeup

This course was developed based on its interdisciplinary makeup of students. Given the option to register for either course, the resulting roster had 8 students enrolled in the FYC course and 13 students in the first year introductory engineering course. This course only had three students registered for the introductory engineering course initially, but an additional 18 students registered soon after the specific course description was posted. This indicated that these 18 additional students possibly registered for the course based solely on the specific description. The specific description fostered curiosity and is discussed later in the Course Approach section. To get a better understanding of the variation in the intended discipline or career path of these students, a survey was conducted asking the students to state their desired major and minor. Only 15 responses were received and they are shown in Figure 1. The results show that even though 13 students registered under the introductory engineering course number, only 5 of them had their discipline or intended career path already set as engineering or engineering-physics major. An additional 5 had already planned on a computer science major, with 2 in the natural sciences (biology and chemistry), 1 in Business Management and the last undecided.

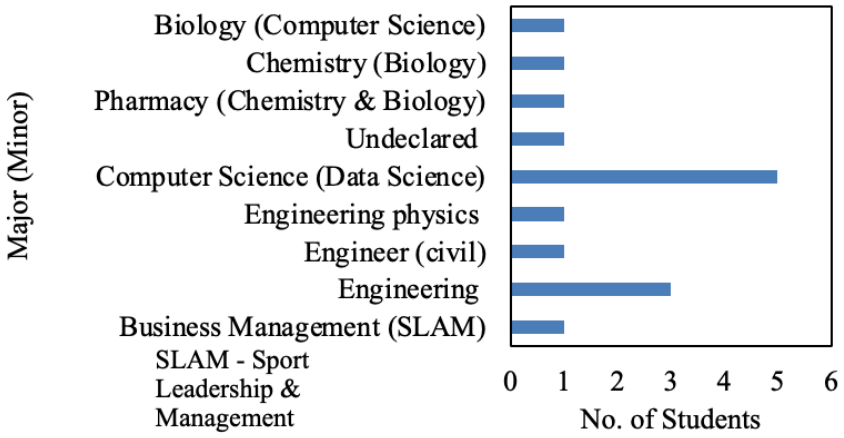

Figure 1. Desired Major and Minor of first-year students in the combined course.

Entrepreneurial Minded Learning (EML)

Engineers solve real world problems and by doing so they create value for society. Creating value is a key component of the KEEN framework for EML [1], therefore it aligns well when an engineering student is exposed to the EML environment. Furthermore, the EML environment can be extended to any student discipline and not only engineering disciplines. The entrepreneurial mindset (EM) is used in entrepreneurship education, which does focus on innovation and starting new ventures [2]. However, EM is not all about innovation, but it is a skillset that can be useful to many other disciplines including engineering. As such, EM has been used in many engineering programs [3], [4], [5], [6]. EML was used in this combined course as the end product was creating value for the identified customer, the community. EML outcomes are desired by the industry [6]. EML also intersects with the Accreditation Board for Engineering and Technology (ABET) Accreditation Criterion 3a-k [7], which is the old criteria. The old criterion aligns well with the new criterion as mapped in the 2019 ABET changes in definition and criterion [8]. Figure 2 depicts the conceptual guide to EML.

Figure 2. The KEEN Framework: A conceptual, adoptable, and adaptable guide to entrepreneurially minded learning (Adapted from [1]).

EML is based on combining the 3C's: Curiosity, Connections, and Creating Value concept with opportunity, design, and impact. The curiosity in the EML environment is epistemic curiosity defined as the motivation to acquire knowledge [9]. Curious students want to learn new things, they want to step outside of their comfort zones and explore the unknown with a divergent view. Connections is the concept of acquiring the ability to associate and integrate separate pieces of information, placing old ideas in new contexts to reveal solutions and solve real-world problems [4], [10]. Creating Value is providing a possible solution to a problem that positively impacts others or oneself. Creating Value stems from identified opportunities and persisting through and learning from failure [11]. Students who demonstrate Creating Value are determined and have a desire to benefit society through work; they can do so in practical, social, or emotional capacities [4]. Opportunity and Impact are clearly a mindset that portrays the need to find opportunities to create positive impacts. When Opportunity and Impact are complemented with Design, which is the act of creating, it enables a student to refine concepts, understand the customer, and have an eye for value creation [1]. In an EML environment, a student can transform their world.

FYC Course

PU aims to lessen the strain that students experience when transitioning into college. To achieve this, PU has created the FYC seminar, which is required for all incoming freshmen. Each FYC has a theme designed to engage student interest and involvement. The use of first-year seminars varies widely among individual institutions, but there is an implied operational definition: "One implication for an operational definition of first-year seminars would be if first-year seminars acknowledged and emphasized the self-regulatory process" [12], which is highlighted in the importance of community, support, available resources, and improvement of frequently used skills. Additionally, "Social support from teachers and frequently peers would be a key component with the expectation that the support generally be reduced and/or withdrawn…" [12]. FYC provides 1-2 peer mentors per section. The role of the mentors is to connect with the students, provide support, communicate events and opportunities on campus, and present and share knowledge about college life skills. To ensure mentors are successful in their pursuit of helping other students, they meet with the FYC director once a week as an accredited course for progress updates and to confirm that mentors are following their own set of student learning outcomes: foster inclusive community development specific to first-year college students; provide multiple strategies that guide first-year peers through their academic, social, and emotional transitions to college; strategically promote first-year peers' personal development and growth through healthy habits, attitudes, and behaviors; apply interpersonal skills to build relationships with first-year peers; and act as informed liaisons to campus services. This course is crucial for the successful transition of freshmen and contributes to improved student retention rates. Research conducted at another institution demonstrated that "The overall average retention rate prior to the implementation of the first-year seminar, based upon the population sample, is 54.0%, while the overall rate after implementation is 75.9%" [13]. In addition to providing a reliable student base, it allowed the administration of this combined course to use this self-regulatory focused structure to engage with engineering curricula more effectively.

Introduction to Engineering Course

The offering of the Introduction to Engineering course was planned to be offered this year for the first time at PU. Since no historic course data was available, it was developed by the instructor based on a review of other similar institutions' course offerings. The course, as a standalone design, includes typical introductory course topics that align with ABET Criteria, such as: innovative solutions to problems in the real world; the engineering design process; application of computer software to solving engineering problems; and an overview of engineering disciplines [14]. The Introduction to Engineering course was developed to serve as a cornerstone for undergraduate engineering education, providing a foundational understanding of the discipline. This course aims to familiarize students with the breadth of the engineering profession, encompassing various disciplines such as mechanical, civil, and environmental engineering, and computer science. Since PU only offers the general engineering (Engineering-Physics) degree, a project-based approach would be the best opportunity for achieving desired attributes (specific engineering skills, design process, design thinking, and project-based courses) and goals for the course [15]. Emphasis is placed on the engineering design process, guiding students through exploratory projects that involve defining needs, generating and evaluating solutions, and a view into possible prototyping. Collaborative teamwork is emphasized, fostering essential skills in

communication, coordination, and conflict resolution. Furthermore, the course instills a strong ethical foundation, encouraging students to consider the societal and environmental impact of their work and promoting professional responsibility. Students develop critical thinking and problem-solving skills through project-based learning, utilizing computer-aided design tools, and learning to employ computational methods such as spreadsheets and equation solvers for analysis and design. By exposing students to the diverse facets of the engineering profession and cultivating essential skills, this course would empower them to make informed decisions about their academic and career paths while fostering a strong foundation for subsequent engineering coursework.

Combined Course Approach

To combine these courses, a theme of Resilient Communities was introduced and a specific description developed for the students to help them select an FYC course section. The specific description stated that the theme this year is one of resilient communities and that students will research and learn of specific areas of resilient communities and try to apply that knowledge to areas of PU to enhance its resiliency. The complete specific description is included in a subsection within the Combined Course Approach section below. To guide the integrated approach of combining the courses with the unified theme, each program's objectives are analyzed for similarities. The program objectives for each of the separate courses are shown in Table 1.

Table 1. First Year Community (FYC) Student Learning Objectives and Engineering Physics Program Learning Outcomes.

FYC - SLO	Engineering Physics - PLO
1. Identify and describe a text's central idea, supporting evidence, as well as rhetorical concepts, such as audience, purpose and context.	1. an ability to communicate effectively with a range of audiences.
2. Relate course concepts to their own values and experiences and identify their own learning habits and practices.	2. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
3. Demonstrate active listening and civil discourse to engage in a learning community that values multiple perspectives.	3. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
4. Apply the foundational skills of the liberal arts in service to their academic, professional, and personal lives.	

The similarities among the program objectives are significant because they provide depth and perspective to the learning objectives during course administration. Figure 3 depicts the approach of combining the courses and shows the interconnected learning objectives that share common themes. In Engineering Physics PLO 1, the ability to communicate effectively includes active listening, which is listed in FYC SLO 3, and a range of audiences (from Engr PLO 1) would encompass multiple perspectives. Engr PLO 2 comprises the foundational skills of the liberal arts from FYC SLO 4.

Program objectives are utilized to assess the progress made by students, they provide a standardized goal for student learning achievement. These objectives led the instructor to utilize indirect assessment statements which helped students reflect on their growth, and direct assessment short-answer questions which helped students reflect on their values and experiences. Both the statements and questions (presented in the Methods of Assessment section of this paper) individually correlate with the learning objectives.

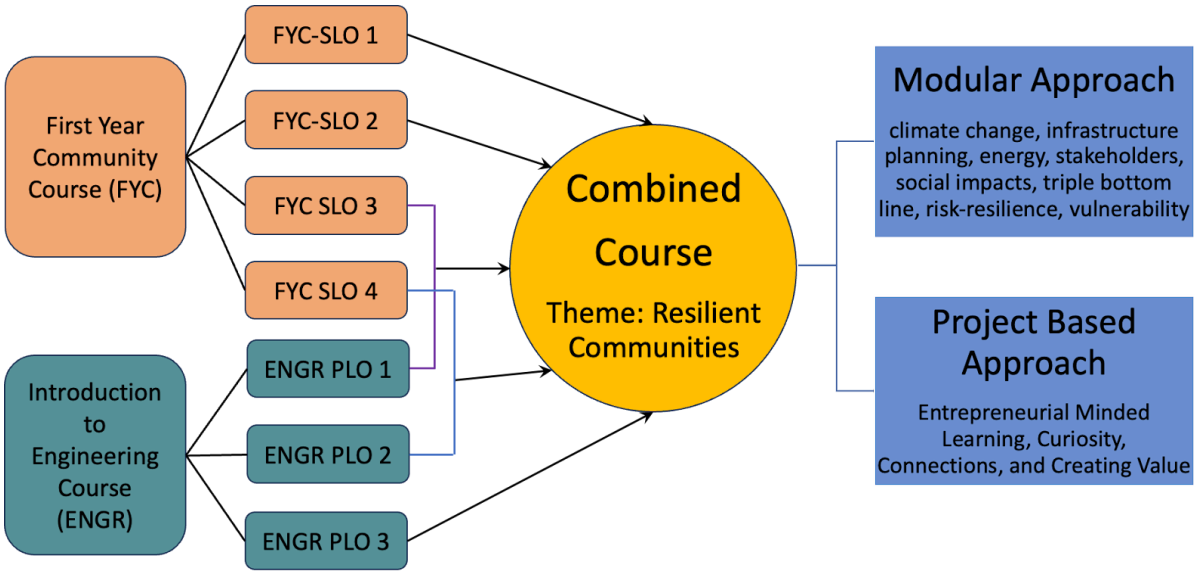

Figure 3. Visualization of the approach of combining the courses.

Table 1 and Figure 3 have two functions: they allow the use of indirect assessment, and create an instructor guideline. The indirect assessment wouldn't have any meaning without this index of objectives; additionally, they allow instructors to create unique objective assessments. Structure is provided through the process of providing specific definitions and outlines; moreover, they are adaptable to multiple disciplines.

An additional tool was the peer mentor assigned to each FYC section, which was a vital resource inside and outside of the classroom. Support in the classroom involved giving short presentations on college life skills. In this particular course, the mentor presented on topics that interested the students or key resources on campus, for example, how to utilize the Bureau of Labor Statistics' Occupational Outlook Handbook. Another example is the mentor provided a lesson on habits and requested that the students utilize a habit tracker to follow the progress they made together at the end of their required journal for each course session. Even though this was not a requirement,

many students saw the benefits of habit tracking and engaged in the activity for the duration of the course with their own internal motivation. Support outside of the classroom was the largest. Mentors aimed to meet and speak with each student personally, which meant one-on-one or group meetings outside of class time. To foster community and help the students feel at home on campus, the mentors were given a budget by their faculty to host a social event. This provided the students and mentor with a chance to develop trust and understanding of each other, which are powerful tools for growth of both parties. An additional expectation of outside-of-the-classroom support is that mentors often opened a line of communication, such as email, phone number, or social media, for the students to reach out when they are in need of assistance. Overall the presence of mentors provided students with a personalized and supported experience while accomplishing the specific goals.

The specific goals of this course were to achieve improvement and mastery in the learning objectives of FYC and ENGR 100. Two approaches were used, a modular approach, which is a seminar based approach, and the project-based approach.

Modular Approach

A modular approach was used to accomplish the course objectives and the course theme selected, which was Community Resilience. The modules allowed increased student faculty interactions, it also allowed the instructor to teach and the students to receive/learn concepts of community resilience to aid the students in their project development, addressing issues in their university community. The modules included concepts of climate change, resilient communities, infrastructure planning, energy, stakeholders, social impacts, triple bottom line, and risk-resilience-and vulnerability.

Project-based Approach

This course took place from August 23rd to December 2nd. Students met in the classroom three days a week for 65 minutes each session. Typically the FYC sections end on November 8th; the additional time was for students enrolled in Engr 100, whereas the students enrolled in FYC did not attend the normal class sessions after November 8th. November 8th is also a key deadline for the team resilience project to be presented and submitted. Due to the shortened semester, the project was introduced during the fourth week of the semester. The project assignment is included in Appendix A. The project addresses the 3Cs of the EM.

Curiosity was developed in a few ways. First, the course specific description that was posted included the heading “Ask what you can do for PU: Build a Resilient PU Community!” This may play into a student’s sense of pride towards their institution and wonder if they could help, thereby creating curiosity. The full specific description is as follows:

> Specific Description: Engineering PU’s Resilience. The theme this year is one of resilient communities. Students will research and learn of specific areas of community vulnerability and engineered resilient communities and try to apply that knowledge to areas of PU to enhance and nurture its resiliency.
>
> **Ask what you can do for PU: Build a Resilient PU Community!**

Is the future unpredictable? You bet! But what if your community could weather any storm? In this course, you'll transform into a resilience champion, learning of current resources, how to identify vulnerabilities and engineer solutions for a stronger PU. Sounds exciting? If you're ready to be a force for positive change and build a stronger future for our campus community, then this course is for YOU!

The Mission:

- **Crack the Code of Resilience:** Explore real-world examples of communities that bounce back from challenges. From natural disasters to social issues, you'll discover the secrets of building a more robust PU.
- **Become a Problem-Solver:** Put your inner engineering skills to the test! You'll identify areas where PU can be more resilient and develop innovative solutions to these challenges.
- **Leave Your Mark:** Your ideas matter! This course culminates in a project where you'll propose real, actionable changes to make PU even more resilient.

This resulted in more students registering for this particular section of the course, which was most likely due to their curiosity of the buzz word resilience and allowing them to realize that they will be giving something back to the university. Second, the project itself required brainstorming ideas of a resilient project for sectors of the university, engaging their epistemic curiosity to be creative, to learn new things and explore the unknown [9].

The project allows students to make connections by conducting research and analyzing the information. The research and analysis included three parts: Literature review, Risk assessment, and Stakeholder analysis. Students had to research existing resilience framework or best practices, identify potential threats and vulnerabilities associated with their chosen sector of the university and finally identify and engage with key stakeholders who have a vested interest in their chosen sector. To engage with the stakeholders, the students prepared interview and survey questions, connected with the stakeholders to gather their needed information. These help the students make connections by association, thereby creating relationships between disparate pieces of information [4]. The application of connecting relationships and pieces of information are noted in the students' work throughout the project especially during the brainstorming, and teamwork processes as they embody their resiliency goals.

Based on their curiosity, their motivation to acquire knowledge, and the connections they've made, the students then work on creating value. They become problem solvers and propose real, actionable changes to make PU even more resilient. Their proposed resilient plan includes goal setting to establish measurable objectives, strategy development to address identified risk and vulnerabilities, and implementation planning by assigning responsibilities, and allocating resources for implementing their resilient plan. Through their desire to benefit society through work, they leave their mark on the university in proposing these changes to the university to create a more resilient community for themselves and those behind them. To present their work, presentation posters were developed with three things in mind: Content organization for a poster structure with clear headings and subheadings; Visual elements to illustrate their key findings and recommendation, and their; Key Message to convey the project's purpose, findings, and proposed solutions.

Methods of Assessment

Indirect Assessment

A pre- and post-survey was administered to the students at the end of the course. This survey was based on the conceptualized KEEN framework for EML [1], [16] and used in part to assess the effect the project had on the students. To develop the survey statement, the 3Cs of EML were first related to the course learning objectives as shown in the Venn diagram in Figure 4. The relations to the 3C's were based on the framework presented by [11]. Each statement was then related to the course learning objectives, and the relations are shown in Table 2.

Students were asked to indicate their level of agreement with each statement on a five-point Likert-type scale between 5 (strongly agree) and 1 (strongly disagree). The pre- and post-survey included the same statements and was administered at the same time, which is a retrospective pre-post design administered at the end of the course. Though this is different from administration of pre- and post-surveys, this method allows for the students themselves to knowingly rate how they felt affected by the course, i.e, the change in their perception of their growth and skill sets; it is a reflection of sorts. A retrospective pre-post design reduces recall-bias and this purpose was explained to the students to encourage accurate recall.

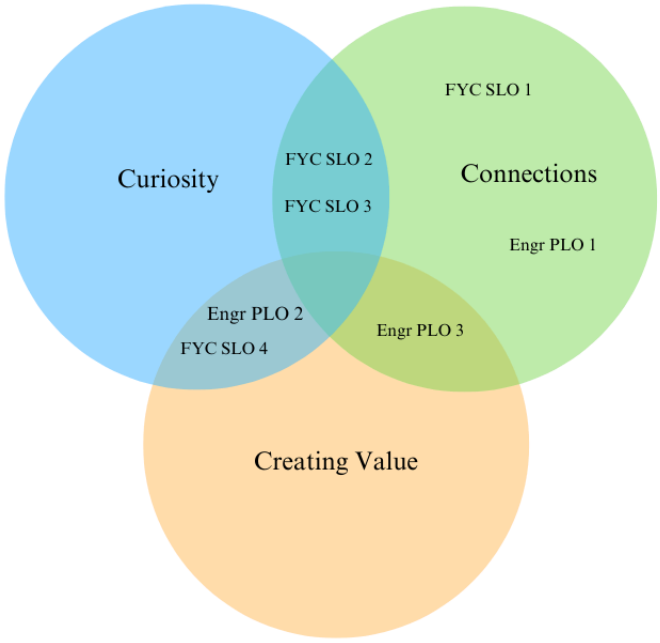

Figure 4. Visualization of learning objectives corresponding to the 3Cs.

Table 2. Indirect assessment statements with corresponding learning objectives

	Statements	Relation to objectives
1	I can demonstrate curiosity about our changing world.	Engr PLO 2 & FYC SLO 4
2	I integrate information from many sources to gain insight.	FYC SLO 1
3	I created a university community resilience project that I believe would be impactful to my institution if implemented	FYC SLO 4 & Engr PLO 2
4	I take risks when necessary.	N/A
5	I like new challenges.	N/A
6	I can effectively collaborate in a team setting.	FYC SLO 3 & Engr PLO 1
7	I can identify specific experiences where I have learned about the strengths, limitations, and/or biases inherent in my own perspective	FYC SLO 2
8	I ask myself, "Do my decisions contribute to my overall care, well being, or positive functioning of individuals, groups, organizations and communities that are a part of my life?"	FYC SLO 2 & FYC SLO 3
9	I understand the importance of creating economic and societal values.	Engr PLO 3
10	I can define problems, opportunities, and solutions in terms of value creation.	Engr PLO 3
11	I can construct and effectively communicate resilient solutions in economic terms.	Engr PLO 3

The Likert scale responses to each of the 11 behavior/skill statements were analyzed and the mean and standard error were determined for each statement and shown in Figure 5. The mean of the perception and skill set for the pre-survey ranges from 2.93 (Q11) to 4.53 (Q5) and ranges from 4.3 (Q7, Q11) to 4.73 (Q6) for the post-survey. The change in mean of the perception and skill set ranges from 0 (Q5) to 1.4 (Q11) indicating none to positive changes. To assess the change in student perception and skill set, a statistical t-test analysis was conducted on the pre- and post-survey mean scores to analyse true changes in the gains made in the students perception of their behavior and skill sets. The t-test was an unpaired t-test of unequal variances at a five percent level of significance ($p < 0.05$). This type of t-test was selected due to the unequal variances of the mean data sets, and also because the means were used and not the actual paired responses to the statements. The result showed that the p-value for a two-tailed t-test is 0.000969. This indicates that significant positive differences were found in the unpaired t-test of the pre- and post-survey mean scores, which further indicates that the students believed that their behavior and skill sets increased based on this course. Considering the standard errors shown on the mean values in Figure 5, the significant positive increases are noteworthy for Questions 1, 3, 6, 9, 10, and 11. Reviewing figure 4 and table 2 shows the most noteworthy change occurs under creating value. It is clear that this course touched on all aspects of the 3C's of EML and helped students to believe they created value for their community, PU. Increased confidence in these results was achieved by student observations and one-on-one interviews with each student.

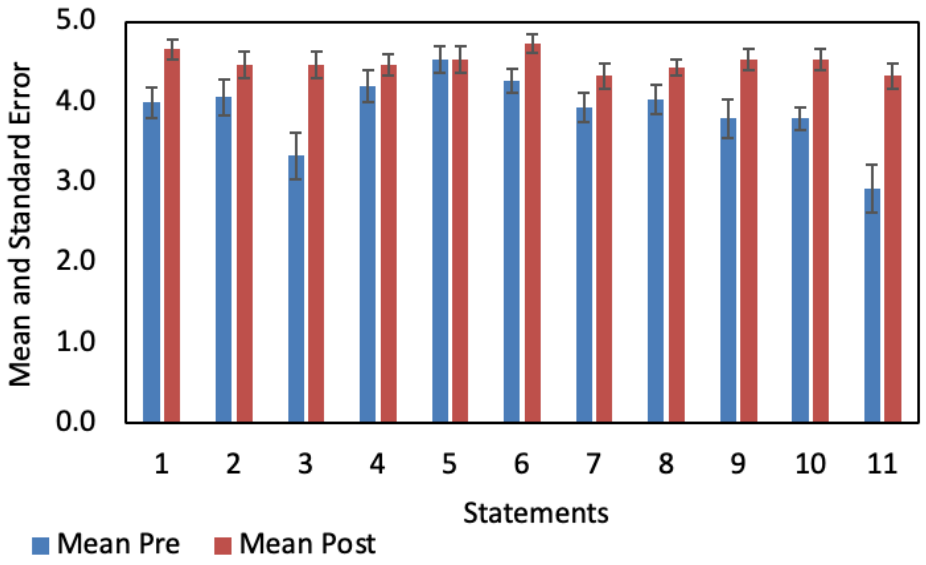

Figure 5. Mean and standard error of the Pre- and Post- Survey of students level of agreement with statements in Table 2.

Competency Assessment

The survey administered to students included a competency rating for 8 categories. The students were asked to rate the 8 categories of competency as best preferred to least preferred. Values of 1 through 8 were assigned to the ratings with 1 for the best preferred and 8 for the least preferred category. These 8 categories and their mean ratings are shown in Figure 6. Overall, with a mean value of 2.7, communication with the professor and student mentor was rated the best preferred competency and with a mean value of 6.7, literature review was rated the least preferred competency.

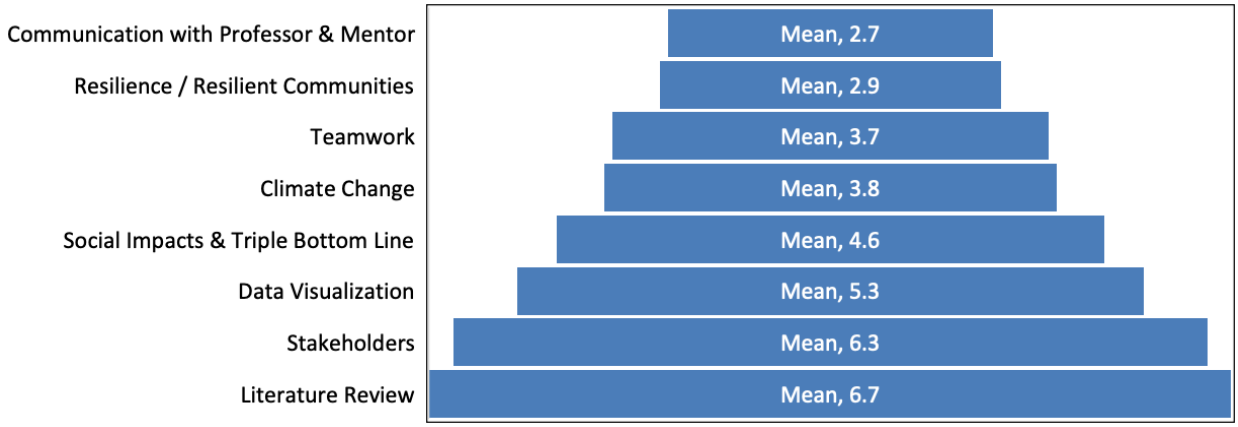

Figure 6. Student rating of 8 competencies used in the course and their mean scores.

Direct Assessment

Summative assessments, which measure a student's knowledge and skills at the end of a course were used to determine if the project was successful. The students were required to write a project report in a simplified format that includes three main sections: Introduction, Body paragraphs, and Conclusion. The body paragraphs include these sections: Brainstorming and Prioritization, Literature Review and Risk Assessment, Stakeholder Analysis and Engagement, Resilience Plan Development, and Reflection Questions. Unlike upper level engineering courses where technical writing may be emphasized, informal or non-technical writing was accepted for this project. Many students chose the informal writing format especially because of the self-reflection responses for the reflection questions. A rubric was used for the summative assessment for the project and it is included in Appendix B. The rubric includes scoring for 4 sections: Introduction, Process, Self-reflection, and Writing style. The scoring weighted the reflection questions section more than the other sections. The self-reflection questions were created as a direct assessment of the FYC student learning objectives, they are connected to the Engineering Physics program learning outcomes and also to KEEN 3Cs of curiosity, connections, and creating values. The reflection questions included in the direct assessments and their relationship to the learning outcomes are shown in Table 3.

Table 3. Direct assessment questions with corresponding learning objectives.

Direct Assessment Questions	Learning Objective
Describe how your final project incorporates central ideas and any supporting evidence from your course text (Bending the Curve: Climate Change Solutions). Also, describe how rhetorical concepts (audience, purpose, and context) inform your project and/or presentation.	FYC SLO 1
In what ways does your final project help you understand your values and beliefs in a deeper way and has that influenced how you approach learning, either in your process or thinking?	FYC SLO 2
Describe how you have engaged (listened, asked questions for understanding, shared) in this course/learning community to better understand and value multiple perspectives. How is that reflected in your project?	FYC SLO 3 & Engr PLO 1
In what ways does your final project help you understand the aims of liberal arts education for you personally, academically, or potentially professionally?	FYC SLO 4 & Engr PLO 2

The responses from the direct assessment questions are presented based on two parts: the frequency of the phrasing and content of the reflections.
Question 1:
14 responses recorded; 9 answered resilience, 3 climate change, 2 sustainability. Most answers had more than one of the responses above. This shows the focus on the course topic and that many students are applying central ideas of the text.

9 answers; 4 audience, 1 stakeholder, 3 purpose, 1 context. These answers also had more than one response. Some answers didn't reflect usage of rhetorical concepts but rather how the context of their project reflects them.
Question 2:
13 responses recorded; 10 answered that the project helped them reflect on their values/beliefs, some other responses said the project changed, challenged, and engaged them with their values/beliefs.
9 responded about how the project influenced their learning; 3 engaged in the community more, 2 became more organized, 3 became more open-minded or reflect critically more often, 1 became more self-sufficient.
Question 3:
12 responses recorded; 7 engaged in the course the most by listening and discussing with peers, some students engaged by asking questions, reflecting, and being mindful of others perspectives. These actions are reflected in projects in various ways, some highlights being: usage of interviews and discussions with peers, values and goals of the project, and the planning and execution with teamwork.
Question 4:
12 responses recorded; many responses consisted of values of the liberal art curriculum at this university, such as critical thinking skills, being open to multiple perspectives, and gaining information on global issues.
This assessment allows us to visualize the growth made from the students' perspective; there are accomplishments being made in the understanding and application of the learning objectives. Questions 1 and 2 reflect the students' skills of application the most; they are utilizing concepts from the course in a broader context and impacting their actions and learning habits by actively reflecting on and challenging their beliefs during the creation of the project. Questions 3 and 4 are of high quality and go in-depth into who they are as learners and what a liberal arts education environment means for them. The responses here are highly individualized and reveal a lot about the goals and motivations of each student. The qualitative responses also match the results of the indirect assessment. The application of central ideas, supporting evidence, and rhetorical concepts, in addition to changing actions and learning habits to incorporate enhanced or new values, shows that the students are creating value in their community and within themselves. Their understanding of who they are as learners and their liberal arts learning environment shows they are able to be curious and make connections between themselves and their education at this university and community. This assessment has highlighted the personal growth that has occurred alongside educational development.

Summary

Due to initial low first-year student registration into an introductory engineering course, the course was combined with a humanities course for first-year students. Given this seemingly (at least initially) daunting task, the courses were combined starting with a review of their respective learning objectives and outcomes for similarities for a more integrated approach. Pedagogies of EML, collaborative-learning and project-based learning were used to develop the course. Peer mentors played a crucial role in supporting students beyond the classroom. Mentors provided individualized guidance through one-on-one meetings and group activities, fostered community through social events, and equipped students with essential college life skills, such as career

exploration and habit formation. Two primary methods were employed: a modular seminar approach and a project-based approach. The project, focused on enhancing PU's resilience, encouraged student curiosity through a captivating course description and the challenge of developing solutions to real world problems. Students engaged in in-depth research, analyzed data, connected and collaborated with stakeholders to create valuable and actionable resilience plans. Direct and indirect assessments were conducted and the results indicated that students believed they created value for their community and that their behavior and skill sets increased based on this course. The use of the EML pedagogy integrated into the project, and the mentorship and self-regulatory focus were successful and beneficial for this combined introductory engineering and first-year communities humanities course.

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APPENDIX A

PROJECT ASSIGNMENT: A RESILIENT COMMUNITY APPROACH FOR PACIFIC UNIVERSITY

Purpose:

To engage with Pacific University's sectors and resources. In addition to the student learning outcomes, the following outcomes are specific to this project:

Core Skills Developed

- Apply knowledge - demonstrate knowledge of applicable concept of resilient communities
- Communication –
    - write a report in standard format.
    - develop a poster presentation and present your project
- Interpersonal skills - work together as a unit with your peers and colleagues to complete a project.

Learning Objectives

The learning objectives are tied to the first year community (FYC) student learning objectives (SLO) and to the engineering physics (EP) program learning objectives (PLO).

- FYC SLO - Relate course concepts to their own values and experiences and identify their own learning habits and practices.
- FYC SLO Apply the foundational skills of the liberal arts in service to their academic, professional, and personal lives.
- EP PLO - an ability to communicate effectively with a range of audiences.
- EP PLO an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Process

Schedule	Summary of Work Required	Notes / Comments
9/11/24 – 09/16/24	Sector or Resource Selection	
9/16/24 – 10/14/24	Research and Analysis	
9/23/24 -10/14/24	Engagement with Stakeholders	
9/30/24 – 10/21/24	Resilient Plan Development	
10/21/24 – 11/1/24	Presentation Poster Development	Posters to be critiqued by peers
On 11/8/24	Public Presentation	

Project Overview

Students will work in groups to identify a critical sector or resource within Pacific University and develop a comprehensive resilience plan. The goal is to enhance the university's capacity to withstand and recover from various challenges.

Project Steps

1. **Sector or Resource Selection:**
    - **Brainstorming:** Encourage students to identify potential sectors or resources that are crucial to Pacific University's operations and could be vulnerable to disruptions.
    - **Prioritization:** Guide students to select a sector or resource that aligns with their interests and has a significant impact on the university's resilience.
2. **Research and Analysis:**
    - **Literature Review:** Have students research existing resilience frameworks, methodologies, and best practices.
    - **Risk Assessment:** Guide students to identify potential threats, vulnerabilities, and consequences associated with the chosen sector or resource.
    - **Stakeholder Analysis:** Encourage students to identify key stakeholders within the university who have a vested interest in the sector or resource's resilience.
3. **Engagement with Stakeholders:**
    - **Interview Preparation:** Assist students in developing thoughtful questions to gather insights from relevant personnel within the sector or resource.
    - **Interviews:** Facilitate students' interactions with stakeholders to gain a deeper understanding of their perspectives, challenges, and needs.
4. **Resilience Plan Development:**
    - **Goal Setting:** Help students establish clear and measurable objectives for enhancing the sector or resource's resilience.
    - **Strategy Development:** Guide students in formulating strategies and action plans to address identified risks and vulnerabilities.
    - **Implementation Planning:** Assist students in creating timelines, assigning responsibilities, and allocating resources for implementing the resilience plan.
5. **Presentation Poster Development:**
    - **Content Organization:** Encourage students to structure their poster with clear headings and subheadings.
    - **Visual Elements:** Guide students to use effective visuals, such as diagrams, charts, and images, to illustrate their key findings and recommendations.
    - **Key Messages:** Ensure that the poster effectively conveys the project's purpose, findings, and proposed solutions.

Suggested Poster Content

- **Project Title:** A Resilient Community Approach for Pacific University
- **Sector or Resource:** Name of the chosen sector or resource
- **Problem Statement:** A concise description of the challenges or vulnerabilities faced by the sector or resource.
- **Research Findings:** Key insights from literature reviews, risk assessments, and stakeholder interviews.
- **Resilience Strategies:** Proposed solutions or interventions to enhance resilience.
- **Implementation Plan:** A brief overview of the proposed actions, timeline, and responsibilities.

- **Expected Outcomes:** The anticipated benefits of implementing the resilience plan.
- **Visuals:** Diagrams, charts, or images that support the presentation of findings and recommendations.

By following these steps and incorporating the suggested poster content, students will gain valuable experience in developing resilience plans and contributing to the overall well-being of Pacific University's community.

Write a report in a simplified standard format
The simplified standard format includes three main sections: Introduction, Body paragraphs, and Conclusion.

1. INTRODUCTION

- **Hook:** A captivating statement that grabs the reader's attention.
- **Thesis statement:** A clear and concise statement that outlines the main argument or purpose of your report.
- **Overview:** A brief summary of the key points you'll discuss.

2. BODY PARAGRAPHS

Brainstorming and Prioritization

- Discuss the process of brainstorming potential sectors or resources.
- Explain the criteria used to prioritize the chosen sector or resource based on its importance to the university's operations and vulnerability to disruptions.

Literature Review and Risk Assessment

- Summarize the key findings from the literature review on resilience frameworks, methodologies, and best practices.
- Describe the risk assessment process, including the identification of potential threats, vulnerabilities, and consequences.

Stakeholder Analysis and Engagement

- Explain the importance of stakeholder analysis in understanding the perspectives and needs of relevant personnel.
- Discuss the process of preparing for and conducting interviews with stakeholders.

Resilience Plan Development

- Outline the steps involved in setting goals for enhancing the sector or resource's resilience.
- Describe the process of developing strategies and action plans to address identified risks and vulnerabilities.
- Discuss the importance of implementation planning, including timelines, responsibilities, and resource allocation.

Reflection Questions

- Describe how your final project incorporates central ideas and any supporting evidence from your course text (Bending the Curve: Climate Change Solutions). Also, describe how rhetorical concepts (audience, purpose, and context) inform your project and/or presentation.

- In what ways does your final project help you understand your values and beliefs in a deeper way and has that influenced how you approach learning, either in your process or thinking?

- Describe how you have engaged (listened, asked questions for understanding, shared) in this course/learning community to better understand and value multiple perspectives. How is that reflected in your project?

- In what ways does your final project help you understand the aims of liberal arts education for you personally, academically, or potentially professionally?

3. CONCLUSION

- **Reiterate Thesis:** Restate your thesis statement in a new way.
- **Summarize Key Points:** Briefly recap the main arguments presented in your body paragraphs.
- **Final Thoughts:** Offer a concluding statement that leaves a lasting impression.

APPENDIX B

Rubric for Project Report

Introduction (15 points)	
• **Hook | 5 |** Engaging and relevant to the topic	
• **Thesis Statement | 5 |** Clear, concise, and directly stated.	
• **Overview | 5 |** Provides a clear roadmap of the report's content Body Paragraphs	
Process (30 points)	
• **Brainstorming and Prioritization | 5 |** Clear explanation of the process, criteria, and rationale	
• **Literature Review and Risk Assessment | 10 |** Comprehensive summary of key findings and detailed description of the risk assessment process	
• **Stakeholder Analysis and Engagement | 10 |** Clear explanation of the importance of stakeholder analysis and detailed description of the interview process	
• **Resilience Plan Development | 5 |** Clear outline of the steps involved, including goals, strategies, action plans, and implementation planning	
Self Reflection (40 points)	
• **Reflection Questions | 15 |** Thoughtful and insightful responses to all reflection questions • **Conclusion | Final Thoughts | 5 |** Provides a strong concluding statement	
Writing and Style (15 points)	
• **Clarity and conciseness:** Uses clear and concise language, avoiding unnecessary jargon or technical terms.	
• **Grammar and mechanics:** Contains minimal errors in grammar, punctuation, and spelling.	