Engineering Educators Bringing the World Together
2025 ASEE Annual Conference & Exposition
Palais des congrès de Montréal, Montréal, QC • June 22–25, 2025 ASEE
Paper ID #48442

The Historical Marker Project : A Collaboration between History, Math, and Engineering

Anna Fay Booker, Whatcom Community College
Prof. Tyler L Honeycutt, Whatcom Community College

Tyler Honeycutt teaches precalculus, statistics, and calculus for engineers (and others) at Whatcom Community College. Tyler is passionate about integrating mathematical concepts with real-world applications. As one of the math instructors in a placed-based engineering cohort, they are working collaboratively with history, english, and engineering instructors to connect precalculus principles with Pacific Northwest history and fundamental engineering concepts. Research interests include developing pedagogical approaches that bridge mathematical theory within a historical context, particularly through mapping projects and data analysis. They are exploring new opportunities to integrate geometry and data science with environmental and historical research in the Pacific Northwest region.

Mr. Pat Burnett, Whatcom Community College

Pat currently teaches engineering at Whatcom Community College.

Prof. Eric Davishahl, Whatcom Community College

Eric Davishahl serves as professor and engineering program coordinator at Whatcom Community College in northwest Washington state. His current project involves developing and piloting an integrated multidisciplinary learning community for first-year engineering. More general teaching and research interests include designing, implementing and assessing activities for first-year engineering, engineering mechanics, and scientific computing. Eric has been an active member of ASEE since 2001. He was the recipient of the 2008 Pacific Northwest Section Outstanding Teaching Award, chaired the PNW Section 2017-2019, served on the ASEE Board of Directors as Zone IV Chair 2022-2024. and currently serves as Program Chair for the Two-Year College Division.

Anna Wolff, Whatcom Community College

The Historical Marker Project: A Collaboration between History, Math, and Engineering

Abstract

The Engineering in Context learning community at Whatcom Community College seeks to welcome and onboard new engineering students with an integrated two-quarter cohort learning experience. This collaboration between engineering, mathematics, history, English, and physics faculty consists of a six-course curriculum that integrates contextualized precalculus, English composition, Pacific Northwest history, engineering orientation, and introductory problem-solving and computing skills. The program employs high-impact practices including place-based learning, community-engaged projects, and undergraduate research to motivate foundational skill development, emphasize social relevance, and develop students' engineering identity, sense of belonging, and academic readiness. The Historical Marker Project is a cornerstone of the learning community's first-quarter curriculum drawing on a multidisciplinary approach to reveal the layers of the built environment, from a natural to an engineered shoreline. This quarter-long project seeks to engage students with one of the essential questions of the overarching learning community experience: "How does the engineered world affect how we live?"

The project begins in Week 2 with a field trip to the city's waterfront, which is currently undergoing cleanup and re-envisioning of 137 acres of Bellingham's downtown core as part of a long-term process of deindustrialization coinciding with the closure of the Georgia Pacific's pulp, chemical, and tissue operations in 2007. The project culminates in Week 10 with a multi-media presentation evaluating aspects of the cumulative impacts of 150 years of development and alteration of an engineered shoreline. For the history portion, students do original research at the regional archives to identify changes to the landscape over time and evaluate historical sources to determine the causes of these alterations. In the process, students develop history course outcomes, including (1) analyzing primary and secondary sources to evaluate historical arguments for credibility, position, perspective, and relevance; (2) locating sources in their historical context; and (3) identifying the ways political economy have shaped land and resource use in the region. The blending of disciplines occurs in the latter half of the term when students write the story of a site using the methods of a historian while simultaneously using newfound math and engineering skills to analyze the system and create a visual representation. We share student feedback, reflections, and final assessment results demonstrating how skill acquisition in history, engineering, and mathematics can be woven together to foster connections between people and place while making the socially relevant connections crucial for students' sense of belonging.

The Historical Marker Project: Introduction

A historian, an engineer, and a mathematician designed a quarter-long Historical Marker Project (HMP) that integrates skills from all three disciplines by answering an essential historical question: "How does the engineered world affect how we live?" [1]. Before creating the transdisciplinary project, there were many hours of conversations, meetings, and discussions about how we, the faculty, work as teachers, learners, and collaborators. These conversations

revealed that for this collaboration to be successful, it would need to be relational, it would need to be flexible, and it would require iteration. We are now in year two of teaching HMP and are excited to share a pedagogical approach that blurs discipline boundaries in ways not typically permitted in academia.

While there might be a temptation to widen the scope and assess the larger goals of the program aimed at improving retention and reducing equity gaps in engineering transfer preparation, this paper focuses on the success of one interdisciplinary, tightly integrated, place-based project [1]. The assessment results presented at the end of this paper reflect the feedback of 18 students enrolled in the Fall 2023 and 11 students in the Fall 2024 Engineering in Content Learning community cohort. Although limited, the responses highlight the value of designing assignments that give students options about what they want to explore and "do," as opposed to asking them to merely sit and absorb. We believe this project might be one example of how to bring in different expertise to enhance student engagement in the classroom while preparing engineers to collaborate better across disciplinary and cultural differences [2].

Pedagogical approach

The HMP locates place, local context, and community at the center of its pedagogy. The project is premised on ample evidence that place-based learning is a powerful way to challenge knowledge hierarchies, integrate community values with academic goals, and connect local issues to global perspectives [3]. Place-based education fosters a deeper connection to local history and culture and helps students understand the broader implications of engineering work on their environment and society [4]. Students are prepared to develop contextually relevant solutions by prioritizing community values alongside academic goals [3]. The place-based approach helps students develop a more nuanced understanding of their role as engineers within society, asking critical questions like "Who is this design benefitting?" and "Who is being excluded?" [5]. Scaffolding students' development of understanding is the throughline for the design of this transdisciplinary project [6]. The faculty designed each project step to invite students to use teamwork and communication skills to leverage diverse skills, knowledge, experiences, and perspectives in a multidisciplinary team [1] [6] [7].

Place-Based

Like many two-year colleges, Whatcom Community College is a commuter college located on the edge of town in a newer subdevelopment. Many of our students commute over twenty miles from different parts of the county and have never been to the downtown core or the mouth of the creek that runs through town and for which our county is named (see "Student Self Perceptions of Learning" below). This disconnection between the campus and the historical part of the city is often reinforced, even in community college contexts, by faculty members who have little understanding of their local contexts, further marginalizing place and community in academic settings [3]. To counteract this placelessness, we launch the HMP early in the quarter with a field trip to the waterfront. Students are taken by school vans or invited to arrive independently at a designated historical marker to remove transportation barriers. We convene at a 200-ton metal "acid ball" turned art project that commemorates what was once the largest toilet paper facility on the West Coast. This first field trip aims to introduce pedagogy that awakens students'

curiosity about their surroundings and creates a shared experience outdoors that builds a sense of community indoors.

Walking the river that runs through town, now dense with native vegetation and trees that stabilize its banks and cool its water, students are guided to signage with historical photos indicating where the Port dredged to build a city, first on pilings and then on top of fill – much of it on the waste from the pulp and timber mills that came to dominate Bellingham's Waterfront. Smelling the briny waters of the estuary where the creek meets the bay, students are asked to take notes on a clipboard about the Indigenous uses of plants in the area and the thrilling experience of witnessing the Chinook salmon returning to their ancient spawning grounds, where they eventually decompose and nourish the microbes, stream invertebrates, mammals, and birds. During the break, students explored a digital map revealing that the current salmon hatchery tanks at the mouth of the creek were the site of a sewage treatment plant and the city dump until the 1970s. It's a striking example of the transformation from a natural to an industrial and then post-industrial shoreline, which students revisit when they embark on the research for the HMP.

Figure 1: A 1949 photo of the wastewater treatment plant. Next to it is a photo of the site taken from the same angle by one of the students as part of the HMP.

The field trip ends with a reflection at the historic granary building, newly repurposed as a retail and office building with a cozy café to seek shelter on a rainy day. Students are asked to write independently and then share in a circle their impression of the landscape and what it means to analyze the layers of history, imagining what these tide flats looked like before they were filled when the Coast Salish people migrated seasonally between the islands and the mainland to harvest salmon at the mouth of Whatcom Creek. Within the first week, the instructors have established two essential components of the HMP: 1) recognizing Indigenous expertise as a valid approach to knowing a place and 2) allowing students to create meaning by thinking reflectively about their experience and prior knowledge of the subject [8]. The walking tour is a crucial component of a non-traditional approach to a self-directed research project.

Back in the classroom, equipped with insights from their field trip, students compare interactive digital maps indicating where the U.S. Army Corps of Engineers dredged, channeled, and straightened the creek to facilitate shipping and to piece together an explanation of why salmon stopped returning to Whatcom Creek in the early 20th century. The maps reveal the various

industries that operated on the waterfront and the wastes produced by these operations: fish guts, sawmill debris, tin from the canneries, chemicals used in processing paper, and sewage from the treatment plant - all of it dumped directly into Bellingham Bay. The mapping component is part two of a five-part scaffolded research project that embeds reading, research, and writing skills.

During the next several weeks, the history portion of the HMP is dedicated to locating primary and secondary sources and workshopping those sources. The history instructor works one-on-one with students to vet sources online, annotating the sources with notes on why, when, and for whom the source was created. The goal of the research component is for students to practice locating sources that situate regional topics in their historical context. Sifting through sources also helps students to narrow things down and revise their questions. The practice of knowing how to *ask* a good historical question is the first part of knowing how to answer a good historical question [9].

Part three of the scaffolded HMP includes a field trip to the state and local archives. By this time, students are self-selected into four teams to investigate the causes of contamination at one of the waterfront sites. This is the first time that students have been to an archive (see "Student Self Perceptions of Learning" below), and there is enthusiasm for "seeing the volume of stuff" and the engineering infrastructure, like temperature-controlled rooms, involved in protecting these materials. Before the visit, the history instructor had contacted the archivists to pull specific materials for each of the five sites. A guided reading question facilitated analysis of these historical materials, circling back to how they could use this source to answer questions about the *how* and *why* of site usage and the legacy of contamination. By scaffolding the research process, students have multiple opportunities to practice analyzing primary and secondary sources for credibility, position, perspective, and relevance. The combination of experiential and place-based learning provides motivation and context for the course content, and the process becomes a mechanism for mastering the learning objectives as described in [7].

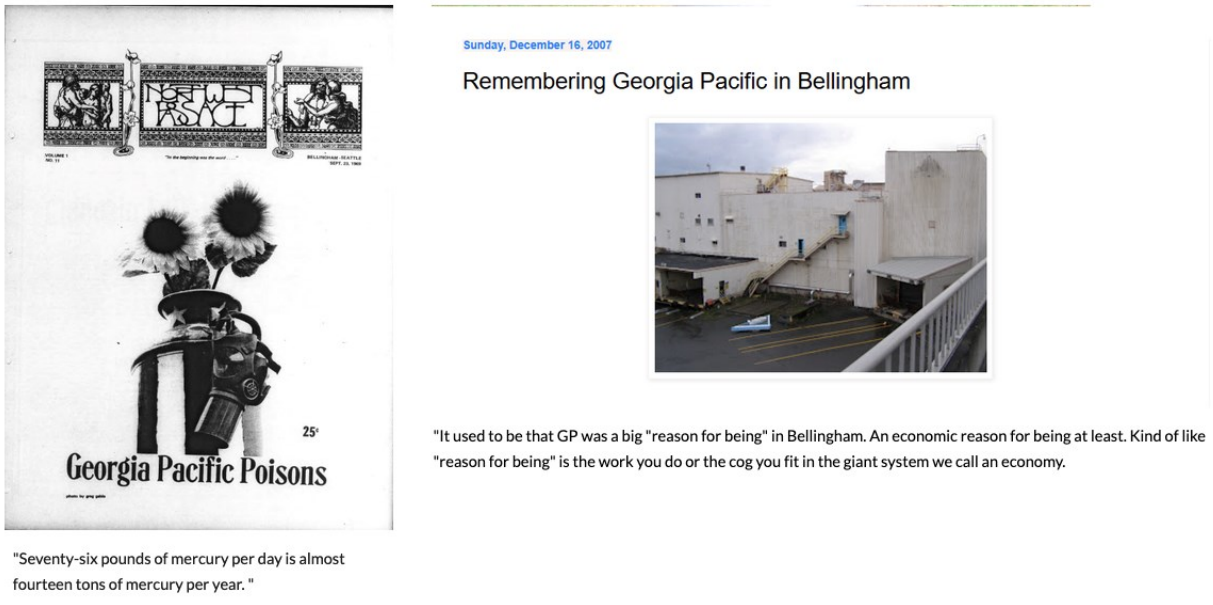

Figure 2: An image from a student paper showing the cover of a 1969 issue of *Northwest Passage*, an alternative local paper pulled at the archives, documenting the "poisons" that leaked

into Bellingham Bay as part of the industrial engineering operations on the waterfront. Next to it, a blog from 2007 shares what the paper mill meant to the people who worked there and why many felt “bittersweet” about its closure.

In Figure 2, a student frames engineering within ethical, societal, and cultural tensions. Identifying how engineers have shaped land and resource use in the region brought up uncertainties about how a community navigates sociotechnical conflicts and how to define technological progress. This reflective approach fosters technical proficiency and the criticality to decide when not to create, emphasizing responsible engineering practices as described in [5].

Communication

Brainstorming for the design component of the HMP begins in Week 7. By this point, students have completed the research portion of the project. They have enough content to start thinking about a design proposal visually representing their historical research. These are not your typical “historical markers.” One might imagine a bronze plaque, weathered and leaning after decades of standing along the state’s roadways, and maybe a short narrative cast in metal about an aspect of a site’s history. From the historical lens, that might have worked as a skill builder. Writing a tightly constructed narrative with a typical 120-word count can be a challenging way to build writing and synthesis skills. However, a plaque on a stick is lacking in design and innovation. Instead, the assignment challenges students to create an artistic proposal for visualizing their site’s history. This final presentation assignment aims to promote student growth in communicating effectively to various audiences using graphic, verbal, and written techniques [10]. The faculty hoped students would take ownership of their learning by focusing on process, *not* product, and aligning historical and technical content [7].

For the engineering component of the Historical Marker Project, students used professional communication practices while following the engineering design process. Utilizing Google sites, teams documented how their brainstorming evolved from individual concepts to a unified story, demonstrating how engineers must synthesize diverse perspectives. Figure 3 shows a screen snip from one team’s Google site. One team combined three distinct ideas – 3D printing a repair workshop, an artistic dumpster installation, and a sculptural trash can – by integrating their pieces into a laser-cut map of the area of interest. Their process exemplified engineering communication skills. They moved from hand sketches to CAD models in OnShape, used the city's GIS software for accurate scaling, and employed Adobe Illustrator for the map design. The team's documentation showed how they made technical decisions, like incorporating a removable roof for interactivity, while considering how to communicate both environmental regret and future hope to their audience. Documenting their journey allowed students to share their experiences utilizing engineering concepts and tools to communicate complex social ideas and demonstrate their growth across disciplines.

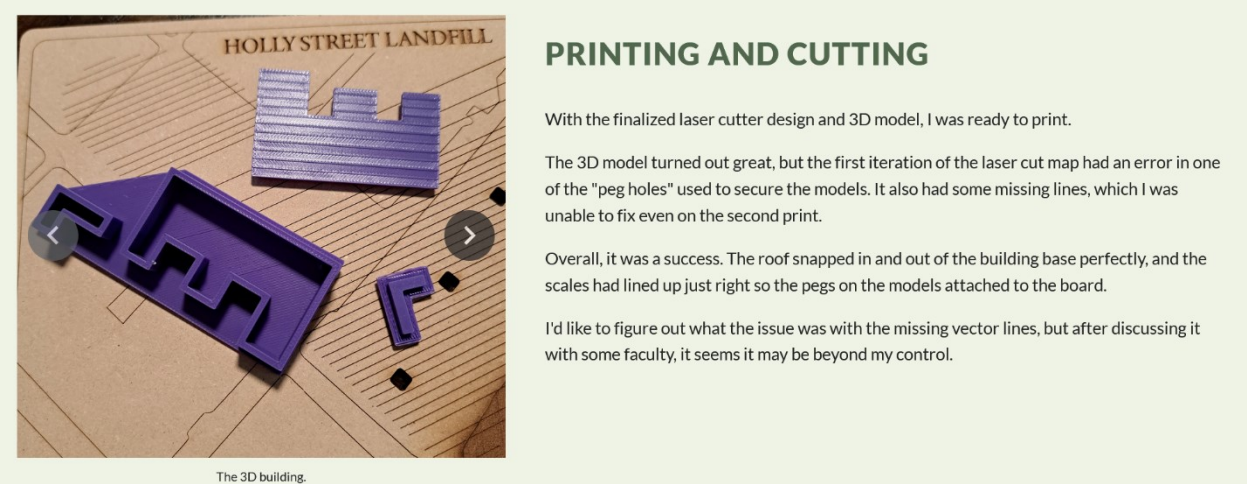

Figure 3: Sample work (Google site and 3D printing) from the Engineering portion of the HMP

The assignment prompt for the math component of HMP was left purposely vague but gave some potential starting points related to the different sites. After most of the students' HMP was completed (which was toward the end of the quarter, after most of their math outcomes were satisfied), students had time in math class to think about problems they might be interested in that, hopefully, related well to their project. The students were allowed to stray somewhat from their specific site if needed since finding historical data about their site was sometimes tricky.

Visual communication was the critical component of the math portion of these HMPs. In the students' end-of-class presentations, they had to synthesize their results and build graphical visuals describing their research. With some guidance from the math and history instructors, the four groups landed on the following topics/projects for the math component of the HMP:

1. Study a specific map focused on the part of the Bellingham shoreline that indicated dredged/displaced/replaced regions of the waterfront near Whatcom Creek. The students used Google Maps' polygon tools to compute the *area increase* of the new waterfront (after dredging the area and changing the profile of the original shorelines). Students learned to use the tool and then wrote a report describing *how* it makes the calculation (the students studied Heron's formula and used it to create/verify similar calculations).

2. From a report by RE-Sources that found the number of per- and poly-fluoroalkyl substances (PFAS) detected in different water outlets around Bellingham Bay, students in this group used Linear Regression in Excel or Desmos to compare the area of the drainage region associated with a given outlet and the number of PFAS compounds detected at that site (for a given year). The students in this group were initially interested in toxic waste that had been "capped" at their site. After having some difficulty finding data related to their site, they decided to "expand out" and use the research done by a local environmental group regarding pollutants for several sites across the bay (including nearby their site). These students' reports required similar Google Map polygon calculation tools to the first project indicated above, as well as additional sleuthing and comparisons between different maps. Figure 4 shows some of their work.

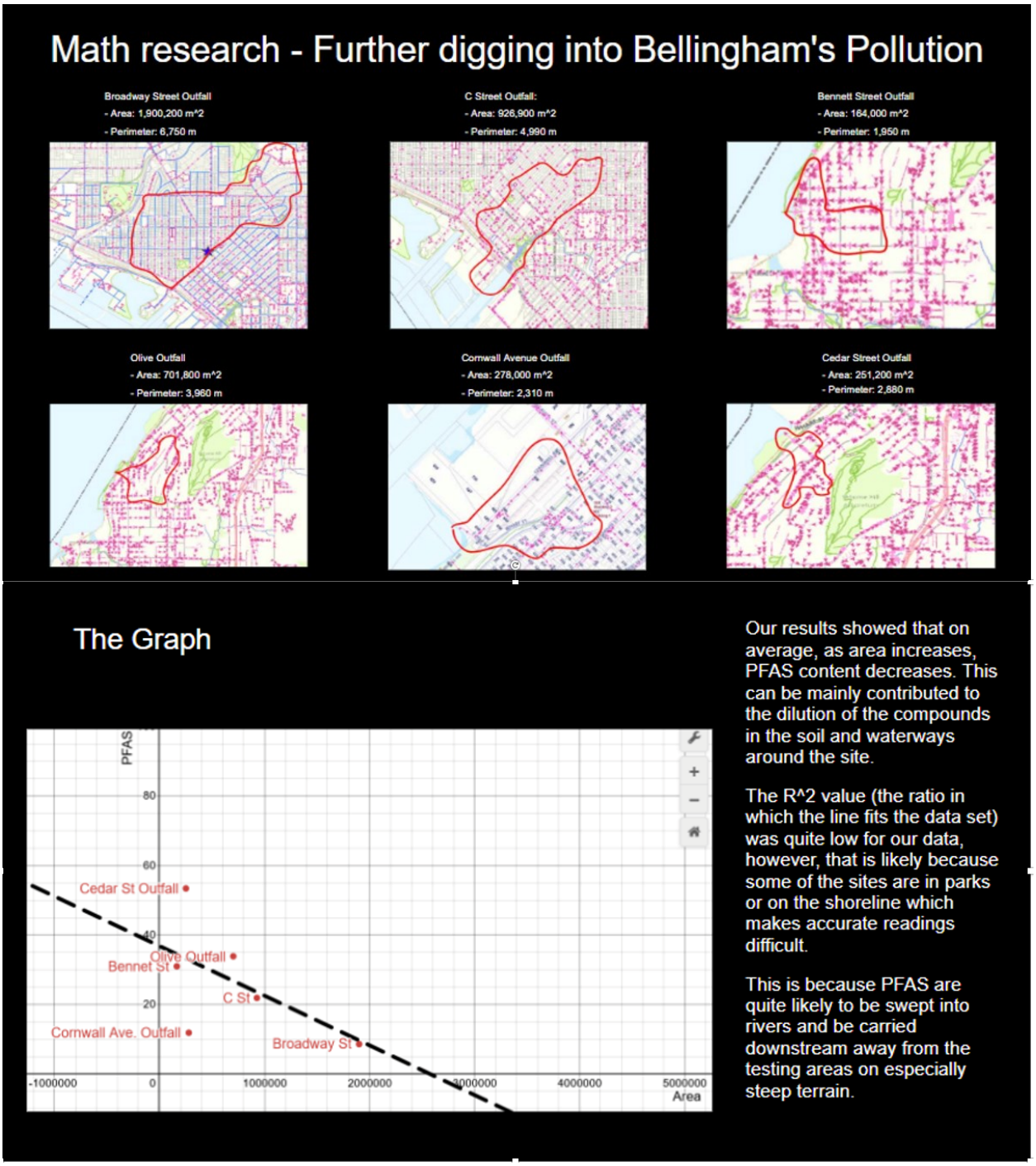

Figure 4: Pollution data for stormwater outfalls graphed with Google Map polygon tools.

3. Using salmon return data from Whatcom Creek Hatchery over multiple years, build a piecewise function using Excel or Desmos that roughly models the salmon returns for various species over a selection of years. Discuss why a piecewise model was appropriate. Write about the underlying reasons *why* salmon returns have behaved this way. The students in this group were initially studying a waste site that Whatcom Creek flowed over near its outlet. They had made the conjecture that, as pollution is removed

from the site, the salmon runs ought to increase again – they found some more underlying issues/factors that influence the runs and learned more about the purpose of salmon hatcheries.

4. Study historical maps of the GP site in Bellingham and find data indicating how the land use designations have changed over time. This group computed public-to-industrial land use ratios and built pie charts in Desmos (one chart before the Georgia Pacific plant closed and another afterward). The computation of the ratios was not complex for this group, but these students discovered several ways of making pie charts in Desmos, including programming them from scratch. This process required additional research regarding polar coordinates and the "snip" tool in Desmos, which allows the student to capture specific portions of a curve or some engaging portion of its domain.

Preliminary assessment

The results presented in this paper are limited to student self-perceptions of learning objectives. There were 18 students in the Fall 2023 and 11 students in the Fall 2024 learning community cohorts. The data below includes an aggregate of the written reflections and a bar graph representing the Fall 2024 end-of-course survey results. We conclude with faculty reflections and next steps.

Student self-perceptions of learning

Students were more engaged when given autonomy over their learning. Martello et al. elaborate on this truism in their paper, exploring ways to actively "pursue deep learning" by creating situations where "students feel control over their learning" and working on projects that feel authentic and relevant to their lives [11]. Written reactions to the HMP indicate student recognition and appreciation of self-directed place-based learning, evaluating historical sources for meaning, and the motivation to work in a collaborative team-based setting. Specific examples of positive student feedback on the HMP are as follows:

Student responses to engineering's societal impact

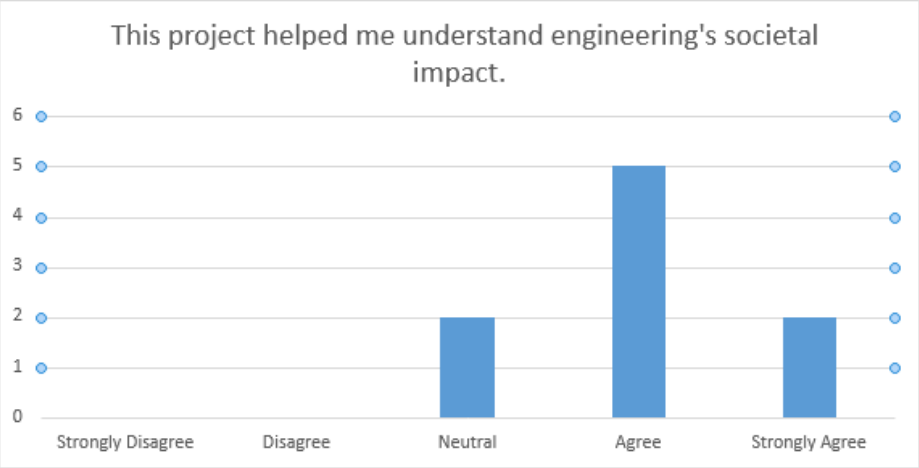

Figure 5: Fall 2024 end-of-quarter survey results**.**

"What I learned about the engineered world is to remember how much an impact you can leave. When these mills were first established there wasn't any thought as to what impact they could leave, and what the future residents of Bellingham could suffer from those consequences."

"This whole project really offered a great opportunity to investigate in depth the risks associated with engineering failures, and it's very sobering looking at how simple mistakes and errors in judgement lead to a tragedy of this scale."

"The third and final takeaway is that while creating a solution to a problem you need to look forwards to realize the problems that your original solution may create. What may seem like a permanent solution may end up being a temporary one due to lack of foresight."

"One thing I learned about the engineered world is that once you make something, that doesn't mean it's going to stay that way. Engineers need to make sure that what they make is going to carry out the right function for as long as it can. So, they need to maintain and take care of it, or else a problem might occur that could lead to devastating effects."

"A lot has changed in two decades, even though it seems like a short time- this shows that humans can change their environments given the right tools and the right motivation to construct and innovate their ideas onto the real world, which is what I find memorable while researching on this project."

Student responses to the impact of humans on the ecosystem over time

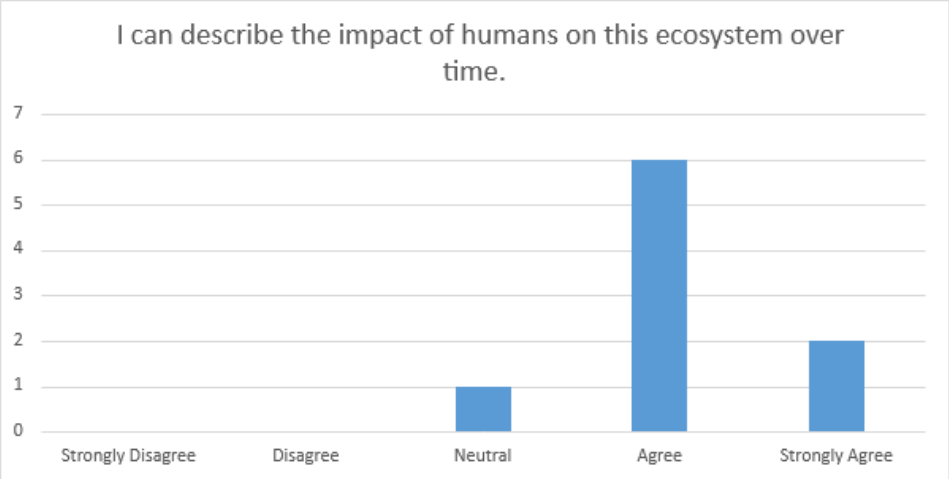

Figure 6: Fall 2024 end-of-quarter survey results continued**.**

"Experiencing Little Squalicum Park and Creek growing up, I never assumed that the stream had been rerouted as many times as it has. I assumed the creek had led somewhere

to another body of water, not stemming from dozens of culverts…it is important to recognize the natural history of an area and find out about how humans have shaped and used it."

"the most memorable aspect of this project is witnessing the transformation of Whatcom Creek over time, shaped by both natural forces and human actions… Whatcom Creek is a great example of the possibility of restoring and maintaining the balance between the engineered world and the natural environment."

"It was quite memorable to think about the early intentions of the railroads and the technology which was used at the time. While I did have a rudimental understanding of the "mill town" past, I didn't realize that Bellingham produced high-quality coal and continued to be a coal exporter well into the 1900s. Coal, as well as lumber, became prime exports to the south and fueled further by the gold rush in California."

"A lot has changed in two decades, even though it seems like a short time- this shows that humans can change their environments given the right tools and the right motivation to construct and innovate their ideas onto the real world, which is what I find memorable while researching on this project."

Student responses to locating archival sources

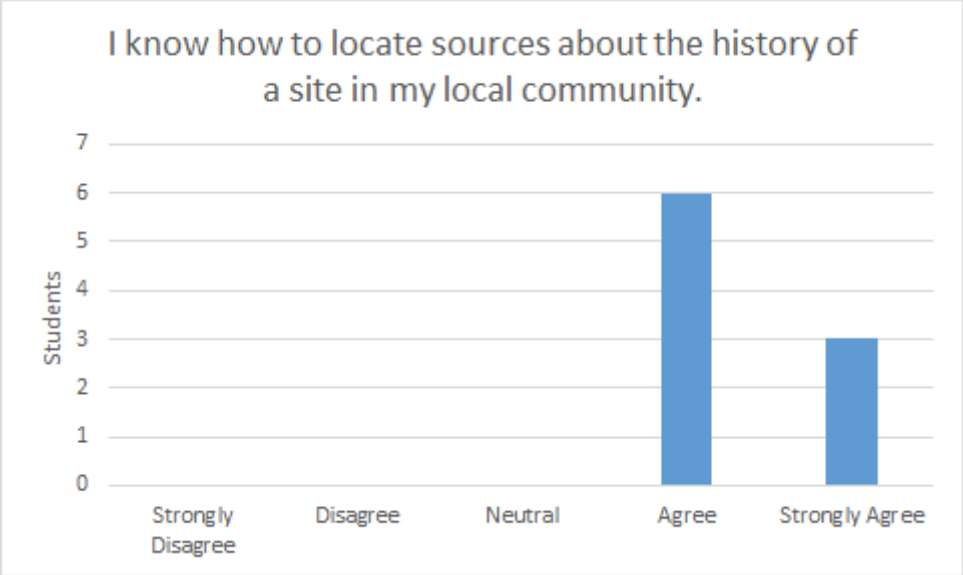

Figure 7: Fall 2024 end-of-quarter survey results continued**.**

"A new skill I learned from the project was using an archive to look at original documents and then using that information to create a research question. When I visited the archives, I was given the opportunity to look through lots of information, sort through what information was valuable for the project and then translate that information."

"This project definitely helped me think more about where I am getting my sources. In the past, I have always just looked at a bunch of websites and found information from

there. But this project showed me how to question the reliability of the source I'm looking at and make sure that what I'm reading is true…"

"…you had to dig deep into the website to actually find the name of the source, and most of the time they did not have much information on them either, so most of the time, the source was discarded."

"…the one that stuck out the most to me was vetting a source. Throughout my life I feel like I did not utilize this skill, and I would just take articles at face value. The process of learning this skill was quite aggravating, for the reason of how time consuming it felt, but after a while it felt like second nature."

"I came across a source in my early research that was markedly staunch about the lack of pollution on the Central Waterfront, and it turned out to be a paid source by one of the companies on the waterfront itself. Thinking like a historian helped me there as I thought to double check and cross reference that source to find out about its inaccuracies."

Student responses to connection to place

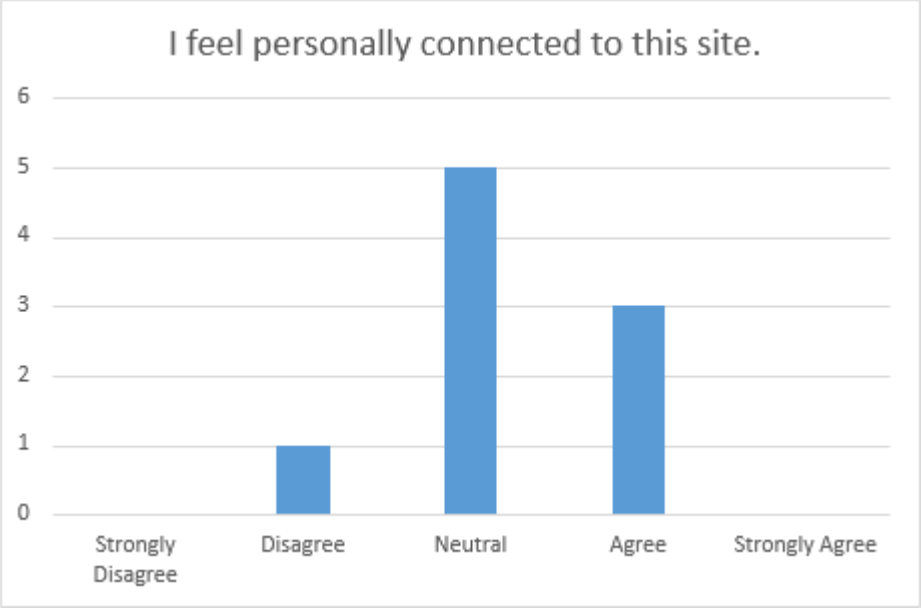

Figure 8: Fall 2024 end-of-quarter survey results**.**

"I think my favorite part of this project and what I will continue to explore is the history of my hometown. Before I took this class, I didn't question why the roads are laid out the way they are, but now I know that old highway infrastructure from one of the only passes to Canada ran right through the heart of Bellingham."

> "One of the most impactful aspects of this project was learning about the waterfront that I have always lived near and all the pollution that was once there …building, construction, designing, and also the clean-up of taking things out, capping, controlling toxic and hazardous gases so the area was safe to build on…living here all my life sometimes this area seems boring but digging deeper into the history and why or how things are the way they are bring up a lot more interests to the land that's always been right under my feet."

> "The most impactful part of the project for me was learning about the History of Bellingham. I have never been a huge fan of history, but to me learning about the local history of the place I live in is interesting. Coming into the class I had no previous knowledge of the extensive amount of logging and change that has happened to the Bellingham shoreline."

> "One of the aspects that struck me the most was the connection between the creek, the land surrounding it, and the Indigenous people. Before learning the in-depth history of America, I had no clear perspective on the relationship between the Native Americans and their homeland. From this project, I grasped the fact that the Creek played a crucial part in the Lummis culture. From how the ancestors of Lummi Nation built fishing encampments near the creek to fish salmon, women and children spread along the banks of the creek to gather berries and other food, to how the creek served as an important landmark where three important transportation and communication routes met."

Faculty Reflection and Next Steps

The instructors consider the first iteration of the HMP a success and the second even more so. The most evident benefit is that it provides a rare opportunity for students in the Engineering Context to develop academic readiness skills with a place-based project that encourages ownership of their learning. The HMP approach engages students by helping them identify what they know and care about, as well as a methodology for learning more about the things that matter to them. It builds foundational skills – communication, initiative, design process– through practice, reflection, peer review, and feedback. The faculty involved in developing the HMP are grateful to have had the time and resources to invest in creating a multidisciplinary place-based project that fosters an environment where students feel respected and listened to and view the instructors as allies in what, for most of them, is a first step on their educational path.

While not all students passed all three introductory courses, everyone in Fall 2023 submitted a final research paper, and only one failed to submit a final paper in Fall 2024. As mentioned, the scaffolded research paper includes one-on-one meetings, pooling resources, an annotated bibliography, and a draft with extensive feedback before final submission. By breaking the project into "doable" chunks, the history instructor assessed their progress and guided them in revising when they fell short of the HMP objectives. The final papers demonstrated growth in analytic skills (evaluating historical arguments for credibility, position, perspective, and relevance), research (locating sources), and contextualization of an engineered site. The HMP was also a way for students to grapple with the legacy of environmental contamination, allowing them to be part of the documentation and offering them the experience of seeing resilience in their communities.

The math portion of the HMP was initially challenging: *How can you integrate math into a history project?* Toward the end of the quarter, the different levels of the HMP were beginning to come together. The math faculty found it highly beneficial to be part of the field trips and readings for the history course, as well as the labs and requirements for the engineering course, as this allowed them to put together some reasonable requirements as to what to expect in terms of the math that the students would use specifically in the project (that fell within the math topics they learned during their math course). Since each group was working on different locations and had different themes picked out, it seemed natural that the students should analyze something about the "numbers" that surfaced during their research time. In the instructor's mind, math is extremely open-ended in a lot of ways – students need to get the idea that "math is everywhere." The HMP was an excellent opportunity! As we worked with the groups to guide their brainstorming, we soon realized that some interesting possibilities were coming up for each group as they wrapped their heads around what might constitute "math." The students studied geometry, functions, and modeling, and by the end of the quarter, they had some great experience with Desmos and Excel. We intentionally set time aside during the latter part of the math course timeframe to focus on the HMP project. After collecting several ideas for each group, it became clear what they should focus on.

One thing that benefited the process was for the instructors to be flexible enough to "run" with an idea that maybe didn't make sense at first or seemed like "not enough." The big realization for the math instructor was that we would allow the math portion of the project to be *tangentially* related to their project theme rather than binding ourselves to being *directly* related. This flexibility freed the students and allowed them to dive into data/research, make necessary adjustments, and not be bound to anything too particular. The math faculty had a great time collaborating with the history and engineering instructors and the students to figure out what would work best (and what is reasonable) for each group.

Similarly, the engineering faculty shared the benefits of working alongside colleagues from different disciplines and seeing how students tackled technical challenges connected to local history. The weekly meetings and classroom visits created genuine collaboration, and this blend of expertise allowed students to see engineering's broader impacts. Watching students get excited about historical research and then translating those stories into technical designs using CAD and data visualization tools was especially rewarding. This kind of integrated teaching enriches both the faculty and student experience in ways that wouldn't be possible working in isolation.

The engineering process explicitly lays out how people can work together. When assessing student work, the focus was not on the final products but on how teams documented their evolving ideas and decisions. This approach supported course outcomes around communication skills and team participation, as students learned that engineering isn't just about creating a finished product but about clearly showing your thinking and process along the way. Through their Google Sites documentation, teams demonstrated they could use software tools to communicate their design journey.

In the next iteration of this project, we hope to have better data about the students' self-perception of learning by including a pre-project survey with the same end-of-course survey

questions. We also expect the overall workload of the first two iterations to be slightly less intensive for the instructors now that we have attended each other's classes, met weekly, and have the master template for the HMP. More minor tweaks and revisions include compiling the historical data sets for the mathematics visualization component and designing an integrated rubric that students can access as they move through each project phase to self-assess and peer review in preparation for the final presentation.

On a more personal note, the history faculty shared her deep appreciation for all this grant has afforded the faculty. It is rare for faculty to have the time to collaborate and design a project that brings different expertise to a conversation about teaching and learning and to develop strategies, including the humanities approach, to help our students succeed in school, in work, and in life.

Acknowledgment

This material is based upon work supported by the National Science Foundation under grant number DUE #2147320. Any opinions, findings, and conclusions or recommendations expressed are those of the authors and do not necessarily reflect the views of the NSF.

Bibliography

[1] E. Davishahl, A. F. Booker and P. S. M.-I. a. P. Burnett, "Board 351: Preparing Early Engineers Through Context, Connections, and Community," in *2024 ASEE Annual Conference & Exposition*, Portland, 2024.

[2] E. A. Reddy, M. S. Kleine, M. Parsons and D. Nieusma, "Sociotechnical Integration: What Is It? Why Do We Need It? How Do We Do It?," in *ASEE Annual Conference & Exposition* , Baltimore, 2023.

[3] J. Stone, C. K. Siemers, S. Gramse and D. Reardon, "Re-Righting Writing Pedagogy through Place: Insights from Entry-Level Writing Instructors in Alaska," *Teaching English in the Two-Year College,* vol. 47, no. 2, pp. 195-212, 2019.

[4] A. S. Navickis-Brasch, A. L. Kern, J. R. Cadwell and L. L. Laumatia, "How Land Use Change, Changed Culture," in *120th ASEE Annual Conference & Exposition*, Atlanta, 2013.

[5] J. Tonn and A. Hira, " Engineering as Conflict: A Framing for Liberal Engineering Education (Paper ID# 43889)," in *The Future of Engineering Education, ASEE Annual Conference & Exposition*, Portland, 2024.

[6] G. Wiggins and J. McTighe, Understanding by Design, Alexandria: ascd, 2005.

[7] J. Stolk, R. Martello and S. Krumholz, "Student-Directed, Project-Based Learning in an Integrated Course Block," in *American Society for Engineering Education Annual Conference & Exposition*, Needham, 2005.

[8] L. e. a. King, "Careful with the Stories We Tell: Naming Survivance, Sovereignty, and Story," in *Survivance, Sovereignty, and Story: Teaching American Indian Rhetorics*, Colorado: UP, 2015.

[9] D. Trowbridge and e. al., ""Historian on": AI in Teaching and Research," American Historical Review, 18 December 2024. [Online]. Available:

https://www.historians.org/podcast/historians-on-ai-in-teaching-and-research/. [Accessed December 2024].

[10] K. L. S. Bernhardt and J. S. Rossman, "An Integrative Education in Engineering and the Liberal Arts: An Institutional Case Study (Paper ID #25682)," in *126th ASEE Conference Exposition*, 2019.

[11] R. Martello and J. Stolk, "AC 2007-787: Paul Revere in the Science Lab: Integrating Humanities and Engineering Pedagogies to Develop Skills in Contextual Understanding and Self-Directed Learning," 2007.