[Traditional Research Paper] Engaging Students in Hands-On Experiences through Neighborhood Revitalization Projects

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Abstract

Community engagement in engineering education provides a key opportunity for students to gain valuable hands-on experience while enriching the live of residents and promoting a positive impact. Our institution, the University of Alabama at Birmingham (UAB), has recognized the significance of community engagement in education and has elevated it as one of our main priorities, ensuring that students have ample opportunities to apply their skills in real-world settings while making meaningful contributions to not only the communities adjacent to our campus, but communities across the state of Alabama.

Since 2020, UAB has been working on a transformative initiative known as Live HealthSmart Alabama, with the overarching goal of promoting active and healthy lifestyles and improving the quality of life of the residents. Through this initiative, faculty, staff, and students have been actively engaged in revitalization projects aimed at improving the built environment of the communities. This endeavor encompasses a wide range of improvements, from constructing new sidewalks and installing new crosswalks, to planting street trees, upgrading street lighting, and revitalizing green spaces among others. To attain this objective, we have established strong relationships with our city government, community organizations, and residents, to ensure that the project aligns with the community needs and goals.

Student involvement has been a key focus of this initiative. By actively participating in neighborhood revitalization projects, students gain real-world experience, develop practical skills, and build meaningful relationships with the community and with professionals and organizations involved in the project. Furthermore, students have the opportunity to see the tangible results of their efforts, motivating them to pursue careers in civil engineering with a commitment to make a positive impact on society.

This paper describes the framework developed for neighborhood revitalization projects, emphasizing the community engagement initiatives and student involvement efforts. Additionally, we discuss the methodology developed to assess the success of this program and how we plan to integrate community-based projects into the engineering curriculum. The ultimate goal is for this initiative to serve as a model and inspiration for universities and communities alike, highlighting the transformative power of collaboration between higher education institutions, industry, and community partners to drive meaningful improvements in our communities, fostering growth, innovation, and social well-being.

1. Introduction

Overview of Community Engagement in Engineering Education

In recent years, the field of community engagement in engineering education has been growing, reflecting a shift towards a more holistic approach that extends beyond theoretical knowledge. Building sustainable and resilient communities is a core purpose of civil engineering and effectively engaging with communities is vital. Such engagement is essential for fostering inclusive development, understanding the unique needs of the community, ensuring the long-term sustainability of the project, and ultimately enhancing the overall quality of life of the residents.

Accrediting bodies such as the Accreditation Board for Engineering and Technology (ABET) have emphasized the importance of incorporating aspects of community engagement and societal impact in engineering education. The revised ABET criteria, asks engineers to have "an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors" as well as an "an ability to communicate effectively with a range of audiences" [1].

There is ample evidence in the literature that demonstrates that community engagement generates a variety of benefits for higher education institutions, including student learning, faculty satisfaction, and the cultivation of a positive institutional relationship with surrounding communities. Students that participate in community engagement initiatives have the opportunity to work real-life problems, develop interdisciplinary skills and perspectives, and learn the impact that their work as engineers have on communities and society. In addition, students are exposed to hands-on experiences, a fundamental component of engineering education and professional development that bridges the gap between theory and practice.

In addition, communities and residents benefit not only from the project deliverables but also from actively participating in the decision-making processes and project implementation, increasing awareness and enhancing the understanding of engineering concepts.

Institutional Transformative Project Since 2020

University-community partnerships offers potential benefits to both the university and the communities which host them. Higher education institutions have a wide range of resources, encompassing intellectual, human, and financial assets, placing them in a distinctive position to create a lasting positive influence in local communities. American universities and colleges have seen a significant increase in initiatives centered around their civic and social purposes [2]. This trend is expected given that over half of the nation's higher education institutions are located in cities, and over 90 percent of all U.S. college students attend college in a city [2].

Our institution, The University of Alabama at Birmingham (UAB), launched a Grand Challenge initiative, under the visionary leaderships of the university's President, Dr. Ray L. Watts. This

initiative aimed to address a problem that is large, complex, and multi-faceted, in order to significantly improve the quality of life for a great number of people. This initiative served as an opportunity to unite UAB's activities (teaching, research, service) along with the capabilities of partnering organizations to solve large-scale problems. Our university provided substantial funding for this effort.

Live HealthSmart Alabama is the inaugural winner of the UAB Grand Challenge initiative, and since its inception, it has spearheaded a transformational movement to decrease the incidence of chronic disease in Alabama while eliminating barriers to making good health simple. This is a critical issue in our state, which struggles with low rankings in several public health metrics, including rates of chronic diseases such as diabetes and obesity. This initiative reflects UAB's commitment to tackling major societal challenges and making a lasting positive impact for our university, our students, our city, our state, and society overall.

2. Project Objectives

The health and well-being of individuals are shaped by the communities they inhabit, encompassing the places where they live, work, engage in recreational activities, and pursue education. This interaction between individuals and their surroundings, plays a key role in determining overall health outcomes of a community. In response to the rising rates of chronic diseases linked to sedentary lifestyles and poor dietary habits, researchers and community stakeholders have recognized the need to create built environments that facilitate nutritious eating habits and active lifestyles [3]. By designing neighborhoods that promote walkability, incorporating green spaces, and providing accessible recreational facilities, we can encourage physical activity and combat sedentary lifestyles.

As a key element of UAB's Live HealthSmart Alabama initiative, our Civil Engineering Department has been working on revitalizing underserved neighborhoods adjacent to the university. Our aim is to enhance the built environment to one that promotes active and healthy lifestyles.

In our neighborhood revitalization efforts, we have been working on a range of built environment improvements tailored to the specific needs and characteristics of each neighborhood. These enhancements include a variety of initiatives aimed at improving pedestrian infrastructure, improving connectivity, and enhancing the overall aesthetic appeal and functionality of the community. Figure 1 shows the range of built environment improvements that we have focused on.

Improved and accessible sidewalks have been a key focus of our revitalization efforts. This ensures that residents can safely navigate their neighborhood and have opportunities for walking and jogging, thus promoting physical activity and reducing sedentary behavior. The addition of new crosswalks, pedestrian signage, and upgraded street lighting also serves to enhance pedestrian safety and promote walkability. The installation of signage provides important wayfinding cues and enhances the overall sense of place within the neighborhood. We have also

prioritized the incorporation of street trees to enhance the visual appeal of the neighborhood, provide shade, mitigate urban heat island effects, and reduce stormwater runoff.

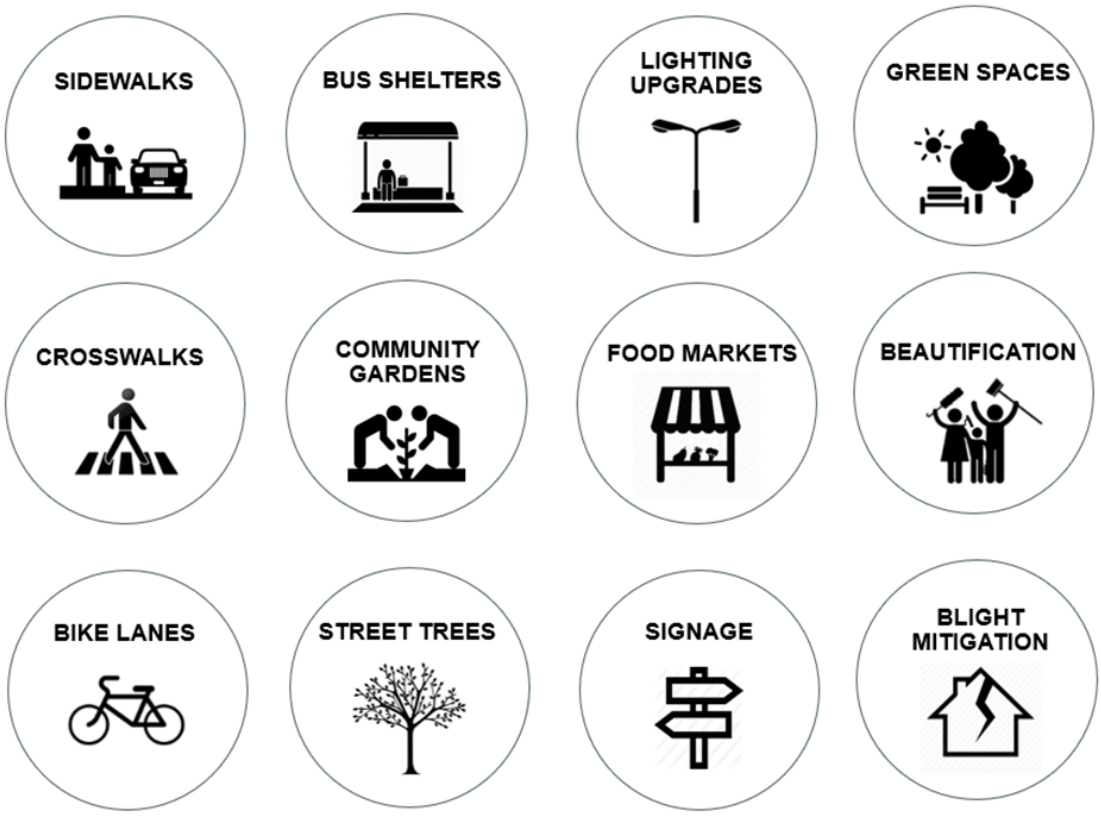

Figure 1. Built Environment Improvements

Additionally, we have adopted the goal of providing residents with access to parks or green spaces within a 10-minute walk. This initiative has been established and used by national organizations, and studies have found that living within a half a mile of a park or green space is associated with higher levels of moderate-to-vigorous physical activity [4]. Green spaces also serve as a social hub, have environmental benefits, and can contribute to economic development.

Community gardens and food markets provide residents access to fresh, healthy, local foods and increase consumption of vegetables and fruits. We have been working on enhancing existing community gardens and building new ones where needed. This improvement requires a strong community partner with the capacity to take ownership and maintain the infrastructure, ensuring the community garden's sustainability and long-term success.

The integration of bus shelters and bike lanes has been essential in our efforts to provide residents with mobility options and to encourage active transportation. Furthermore, beautification efforts, such as landscaping and public art installations, contribute to creating a more vibrant and inviting community atmosphere. Lastly, addressing blight through strategic interventions such as vacant lot revitalization and neighborhood clean ups, not only improves the physical appearance of neighborhoods but also addresses underlying social and economic

challenges. Blight mitigation has become an essential component of our comprehensive neighborhood revitalization efforts.

Figures 2,3,4 and 5 show before and after images of built environment improvements that have been completed as part of our neighborhood revitalization efforts.

Figure 2. New Sidewalk Along Neighborhood Park

Figure 3. Basketball Court Mural

Figure 4. New High Visibility Crosswalk

Figure 5. Lighting Improvements Along Pedestrian Corridor

3. Collaborative Partnerships

Our university-led neighborhood revitalization efforts and the implementation of the diverse built environment enhancements would not be possible without strong and lasting partnerships with our communities, local government, and industry partners. These partnerships are essential to ensure the program's success and they must be beneficial to all stakeholders, including the university, community organizations, community members, faculty, students, and industry partners.

The University as the Liaison for Community Engagement Initiatives

The synergy between academia, industry, government, and the community creates a network that allows our neighborhood revitalization efforts to have a positive impact in the community while also benefitting our students and faculty. Figure 6 shows how our university plays a key role as the main coordinator and liaison between the community, industry, and government. As a central hub, our institution leverages its academic resources, faculty expertise, and staff capabilities to facilitate seamless collaboration and communication among stakeholders. Faculty members contribute specialized knowledge, lending their expertise to the planning, evaluation, and implementation phases. Moreover, our students play a vital role in conducting community surveys, collecting data, and assisting with planning and implementation of improvements. We also mobilize our student body to participate as volunteers who actively engage in on-the-ground efforts. Serving as a bridge between the community and external partners, the university ensures that the project aligns with local needs and aspirations while also facilitating access to industry support and government resources.

The leadership from UAB's President Dr. Ray L. Watts and the dedication of funding have been critical for the success of the program. This support enabled the creation of a dedicated team within the university to focus their time and effort on this initiative.

Community Partnerships

Effective community revitalization efforts must start with listening to the residents. Forging strong bonds with community representatives and residents is the foundation for a successful community engagement program. By establishing strong relationships, we obtain a deep understanding of the needs, barriers, and aspirations of the residents. This understanding enables us to develop tailored improvement plans that will benefit each community, ensuring that our interventions are not only effective but also respectful and responsive to the community's priorities.

Involving the community throughout the revitalization process also fosters a sense of ownership, pride, and responsibility among the residents. When residents feel a sense of ownership, they are more likely to actively engage in the ongoing maintenance and upkeep of the improvements, promoting long-term sustainability of the project. This grassroots involvement ensures the project's success and strengthens the bonds between the community and our university, laying the groundwork for future collaborative endeavors.

Local Government Partnerships

Collaborating with the city government is essential for the success of neighborhood improvement projects. UAB has a long history of collaboration with our City of Birmingham government, which plays a pivotal role in many aspects including planning efforts, permitting, and implementation of improvements. In the planning phase the city provides knowledge of neighborhood's specific needs, demographics, historical context, and potential ongoing efforts. Awareness of other ongoing revitalization efforts allows us to align our improvement plans to maximize the impact on the community and leverage resources. Working closely with the city also streamlines bureaucratic procedures, facilitating the necessary approvals and ensuring compliance with regulations. In addition, our close collaboration with the City of Birmingham and the support from its departments its vital in the effective implementation of improvements. City departments such as Public Works, Transportation, Planning and Permits, and others provide essential infrastructure support, assisting with implementation and ensuring that construction and renovation efforts align with municipal standards.

Industry Partnerships

Moreover, securing support from the industry is crucial for the effective implementation of our neighborhood revitalization efforts. Industry partners provide resources that are instrumental in covering project costs, ranging from financial support for infrastructure development, to skilled personnel that provide the technical know-how and manpower necessary for the seamless execution of the projects. Our industry partners have provided a wide range of contributions, extending beyond financial support, including assistance with surveys, engineering drawings, and donating construction materials among others.

The support of our industry partners enhances the feasibility of our revitalization efforts and reflects our shared commitment to fostering positive change and enhancing the quality of life of our communities.

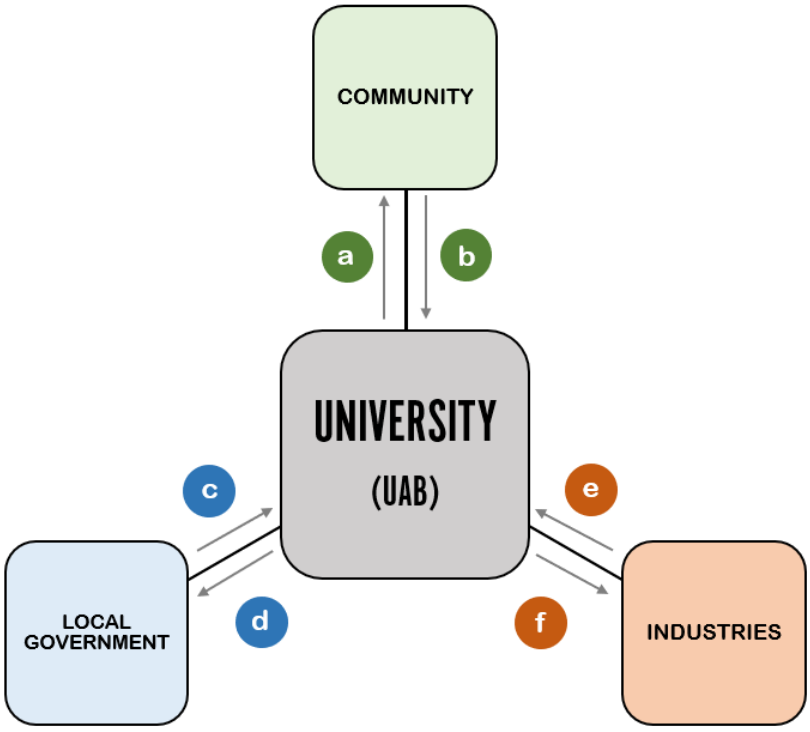

Figure 6. The University as the Liaison for Community Engagement Initiatives

a. **Capacity Building and Improved Infrastructure:** Universities provide communities with the technical expertise, resources, and energy that university students bring to revitalization projects, building local capacity for future initiatives. University led revitalization projects result in the renovation of public spaces, infrastructure, and amenities, enhancing the quality of life for residents.
b. **Experiential Learning and Community Engagement:** Involvement in community revitalization projects allows universities to engage with the local community, foster positive relationships, and provide students with real-world experience by applying classroom knowledge to address community needs. Universities that actively engage in community revitalization efforts bolster their standing as institutions committed to social responsibility, thus drawing students, faculty, and funding.
c. **Regulatory Guidance and Support:** City Governments play a crucial role in supporting universities' efforts to undertake community revitalization projects by providing guidance, data, regulatory, logistical, and collaborative assistance. Thanks to the support provided by City Government, universities can effectively contribute to the improvement and revitalization of local communities.
d. **Access to Resources, Partnerships, and Capacity Building**: Partnering with universities allows city governments to build local capacity for community revitalization efforts by leveraging the knowledge and skills of university students, faculty, and staff.

Universities augment the financial resources available for community revitalization projects by bringing funding raised through grants and partnerships with industries.

e. **Financial Support, Expertise, and Resources:** Industries provide financial support to universities through sponsorship, grants, or donations for community revitalization projects. This funding enables universities to conduct research, implement initiatives, and mobilize resources to address community needs effectively. Industries also bring expertise, technologies, and resources to community revitalization projects, complementing the academic knowledge and skills of university researchers and students. Industry professionals offer insights, best practices, and practical solutions to challenges, enriching the planning and implementation process.
f. **Community Engagement and Outreach:** By partnering with universities in community revitalization efforts, industries demonstrate corporate social responsibility, build positive relationships with residents, and contribute to the social and economic well-being of the community.

4. Student Involvement

As previously mentioned, community engagement in engineering education is key because it bridges the gap between theoretical knowledge and real-world applications. Student involvement is a key focus of our neighborhood revitalization initiative, and it offers a multitude of benefits to our students [5], including:

- Preparing students for professional practice by engaging them in some of the nation's most difficult and enduring challenges.
- Exposing students to interdisciplinary work fostering innovation and collaboration and encouraging students to think critically, creatively, and holistically.
- Developing students' research capacities and skills.
- Reinforcing students' team work skills and expose them to real-life meetings with the community, industry partners, and government representatives.
- Developing a sense of social responsibility and civic duty as they work to improve the quality of life and well-being of residents in underserved communities.
- Exposing students to applied research projects where they get to implement the skills that they have learned in the classroom.
- Providing students with networking opportunities with industry stakeholders and community leaders to establish connections that could result in post-graduation opportunities.

Student Recruitment, Program, and Tasks

Through the UAB's Civil Engineering department, a diverse group of undergraduate and graduate students have participated in our neighborhood revitalization program. Students can be involved through various avenues, including internships, capstone projects, thesis projects, and by registering in a civil engineering elective course titled "Principles of Sustainable Development". Regardless of the pathway chosen, it's essential to provide students with mentorship, guidance, and support throughout their involvement in the program. Faculty mentors

offer supervision, feedback, and resources to help students navigate their roles and maximize their impact on community projects.

To successfully engage students in this initiative, we established a program with the following steps:

1. **Develop Student Projects:** Identify specific tasks for each project where students can have meaningful impact and benefit the most from. Student projects vary depending on the level of involvement whether they are doing an internship, capstone project, thesis projects, or registered in a class.
2. **Student Recruitment:** Attract a diverse group of students who are interested in community engagement and solving challenges close to home. We employed a combination of strategies to engage students including hosting information sessions, presenting our work in front of student organizations, and encouraging faculty members to refer interested students.
3. **Training and Orientation:** Provide students with training and orientation sessions, explain the goal of our neighborhood revitalization work, and prepare students for their roles in this community engagement initiative. During these training and orientation sessions we provided students with tours of the neighborhoods and communities where we are working on and showcased some of our completed work.
4. **Mentorship:** Assign students with a faculty or staff mentor who can provide guidance, support, and supervision throughout the project duration.
5. **Partnerships and Collaboration:** Invite students to meet our community, government, and industry partners and attend our regular meetings.
6. **Reporting:** Schedule weekly meetings for the students to report on their progress to their assigned mentor and track students' progress.
7. **Evaluation:** Gather feedback from students, faculty mentors, and community partners to assess the impact of the program and identity opportunities for improvement.

Student Tasks

Throughout their involvement in this program, students performed a wide range of tasks including the following:

- **Literature Review:** Students conducted thorough literature reviews on the built environment, exploring its impact on public health, and examining various strategies for enhancing community infrastructure. Students also reviewed previous planning efforts and revitalization plans that pertain to the selected neighborhoods.
- **Neighborhood Assessment and Data Gathering:** Students gathered multiple sets of data to understand the current conditions of the community and the residents' needs. As part of this task, students obtained demographic, socioeconomic, and health data. Attended community meetings and learned about what the citizens of the community need and want. Conducted walk audits and utilized audit tools that identifies the strengths and weaknesses of a community. Students also collected information regarding built

environment elements such as sidewalks, crosswalks, lighting, and trees among others. In addition, students collected baseline data related to community activity. These included pedestrian counts, vehicle counts, collection of speed data, park activity counts, and counts of transit users.

- **Software Application**: as part of this program students learned how to use Geographic Information Systems (GIS) and StreetLight Data. GIS is a powerful tool that enables students to analyze and visualize spatial data. By incorporating GIS into the project, students mapped out key features, demographic trends, and potential areas for improvement within the neighborhood. This proficiency in GIS not only enhances students' technical skill sets but also provides a practical application of technology in our neighborhood revitalization efforts. StreetLight Data is also a powerful tool for students to learn and apply in our neighborhood revitalization work. StreetLight Data is a web-based analytics platform that harnesses connected device and IoT data to measure vehicle, transit, bike, and foot traffic. This software provides transportation metrics that are key for planning purposes and to assess the impact of our improvements in the community.
- **Plan Development:** Based on the literature review and the data collected, the students, assembled a list of proposed key community priorities that served as the initial foundation of the revitalization efforts. The students, with assistance from faculty and external stakeholders, developed a proposed improvement plan with cost estimates for the selected neighborhoods.
- **Present Plan to Community Leaders and Industry Stakeholders**: The students developed presentations to deliver their work to community representatives and industry stakeholders. During these presentations students obtained valuable feedback from the community and industry.
- **Hands-on Implementation:** Students also contributed their time and energy as volunteers, engaging in hands-on activities such as community clean-ups, mural paintings, and tree planting events. This direct involvement fosters a sense of connection and ownership among the student body, and not only benefits the community but also provides students with valuable experiential learning.
- **Planning Meetings:** In addition to the previously listed tasks, students gained invaluable knowledge by participating in meetings with the city, community representatives, and industry partners. Students acquired a firsthand understanding of the intricacies involved in neighborhood revitalization initiatives and became familiar with zoning regulations, permit applications, and urban planning principles among others. This exposure broadened students' academic knowledge and equipped them with practical skills that are essential for navigating real-world challenges. Furthermore, joining these meetings allowed students to witness the collaborative efforts required for successful neighborhood revitalization initiatives. Attending these meetings also provided students with networking opportunities with industry stakeholders and community leaders. As an example, since 2020, five civil engineering students who participated in this community engagement program received offers to work in our City’s Department of Transportation.

Figures 7,8, 9, and 10 show examples of students participating in different hands-on activities implementing some of our neighborhood revitalization plans.

Figure 7. Students Installing a Traffic Calming Initiative, Painting a Bike Lane and a Bus Stop Bulb Out in Collaboration with the City of Birmingham Department of Transportation

Figure 8. Students Removing Graffiti and Painting Murals to Beautify the Neighborhood

Figure 9. Students and their Faculty Mentors Planting Trees

Figure 10. Students, Faculty Mentors, and Community Representatives Planting Daffodilds in Neighborhood Park

As our project progresses, we have seen the significant value that participation in this community-based research initiative adds to students' education. Aligning students' learning objectives with community needs proves to be a mutually beneficial approach, fostering student growth while having a positive impact in the community. Throughout their involvement, students have gained insights into the role of civil engineers in society and the impact their work can have on communities. Students have also expanded their knowledge and skills and have cultivated an understanding of the importance of interdisciplinary teamwork and interpersonal relationships.

5. Integration into Engineering Curriculum

Due to the success of the program and to formalize our efforts and be able to offer similar experiences to a broader group of students, we decided to create a 3-credit hour civil engineering elective course titled “Principles of Sustainable Development”. The course combines classroom learning and real-world interaction with our city and provides the opportunity for undergraduate students to participate in hands-on research in a project related to their community.

Based on our work with the UAB Grand Challenge initiative, this course examines the complex interaction of the built environment, urban sustainability, and health. The course was reviewed, approved, and adopted as a “City as Classroom’ course in our institution. The course is open to all students, regardless of major, and is taught at a level that is accessible to students from diverse backgrounds.

The design of the built environment has implications well beyond the fields of engineering and urban planning. How we design and build our cities affects all aspects of our lives. It affects the natural environment, influences energy use and global warming, drives our consumption of natural resources, and has impacts on physical health, mental well-being, quality of life, and our economy. Students should understand these impacts as they grow into their roles as members of society, as caretakers of the environment, and as champions for social justice. The overarching

goal of this courses is to create informed citizens who will help shape healthy, vibrant, and sustainable communities.

During this course, students learn how the built environment affects a variety of quality-of-life factors, including the natural environment, personal health, and broader measures of community health and well-being. Classroom lectures are reinforced through field activities, data collection, and direct interaction with the city government and community organizations. Classes focus on built environment elements such as urban design, building materials, green building design, green spaces, transportation infrastructure, and advanced technologies. Students are required a final project that combines course topics with data collection/activities conducted in one of the selected Grand Challenge communities.

6. Framework for Neighborhood Revitalization

Our neighborhood revitalization efforts began in 2020 with four underserved neighborhoods in the City of Birmingham, located adjacent to our university. Based on the knowledge and insights gained through these efforts, we developed a comprehensive framework delineating the step-by-step process for neighborhood revitalization within the context of a university-lead initiative. We dedicated between 10 to 12 months to complete our work in each neighborhood. During this timeframe, we actively engaged with residents, local organizations, and key stakeholders, while also involving students in all phases of the revitalization process. Figure 11 shows our framework and highlights the steps where students are actively involved.

We found that each neighborhood had its unique challenges, opportunities, and goals. As we moved forward with our revitalization efforts, our framework continued to evolve based on lessons learned, feedback from stakeholders, and best practices. This framework provides a structured approach to community engagement, data analysis, project implementation, and evaluation, ensuring that our efforts are strategic, inclusive, and responsive to the needs of residents.

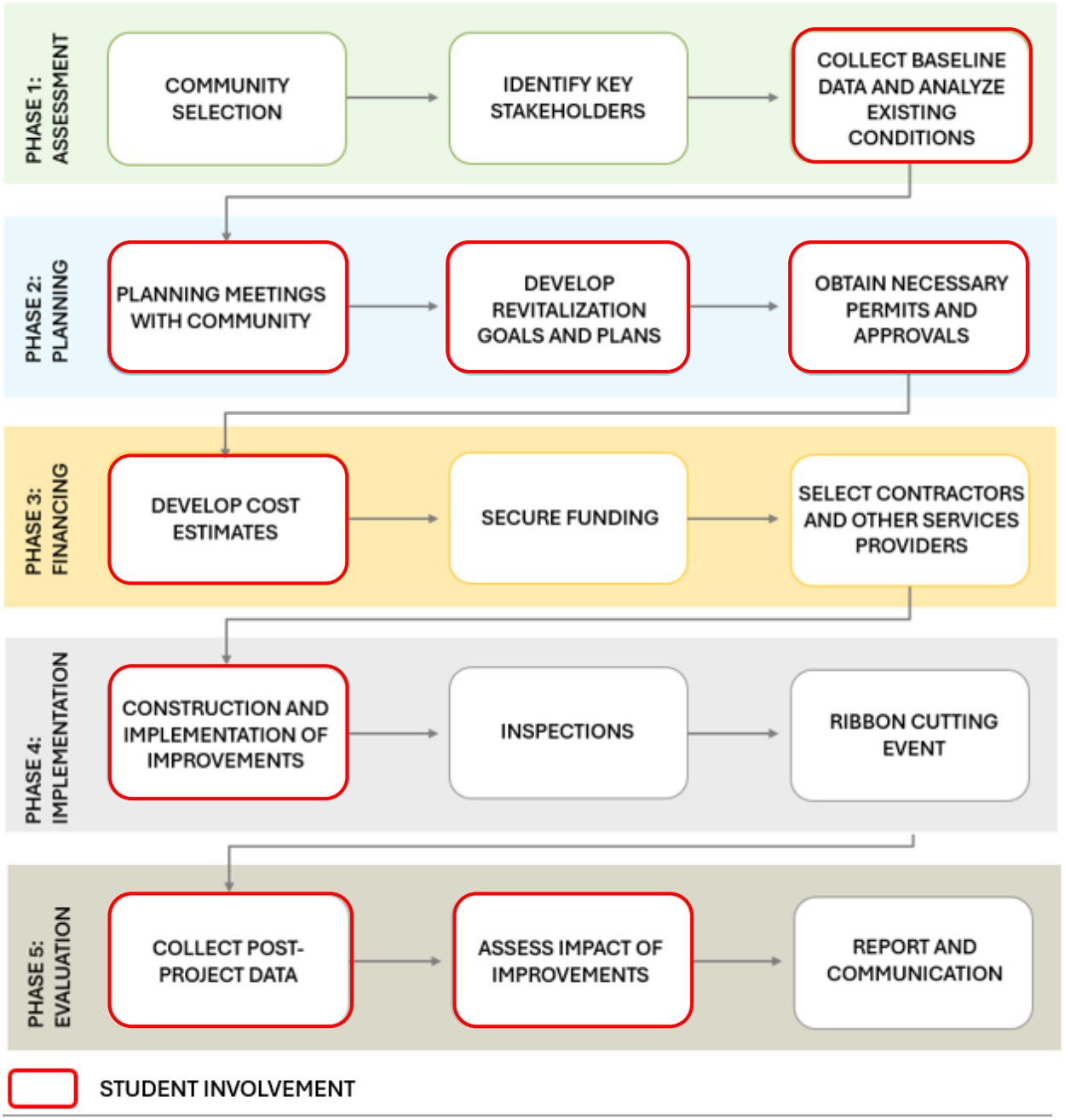

Figure 11. Neighborhood Revitalization Framework for University-led Program

7. Methodology for Program Assessment

Measuring the impact of the neighborhood revitalization improvements in each neighborhood requires a multidisciplinary and multiscale approach and methodology so that the many benefits can be captured. We have developed a three-part assessment to better understand and capture the impact of our improvements. Our assessment focuses on physical changes, shifts in use, as well as the impact on the residents and their level of satisfaction.

1. **Physical changes:** Physical changes quantifies new or improved facilities and infrastructure to promote physical activity and to enhance the residents' quality of life. In this category we collect quantitative information such as increased length of sidewalks, increased number of bus shelters, and number of new trees planted among others. (Appendix A)
2. **Utilization**: Utilization aims to measure shifts in use and function as a result of the improvements. In this category we compare information such as pedestrian volumes and pedestrian traffic patterns before and after the improvements take place. We utilize StreetLight Data software, data collected by our students and faculty, and ridership data from our City's Transportation Department. StreetLight Data offers valuable insights into transportation patterns, traffic flows, and mobility trends. (Appendix B)
3. **Satisfaction Survey**: It is critical to know how residents perceive and feel about their neighborhoods and the improvements that have been implemented. Residents were surveyed before any neighborhood revitalization effort took place. The goal of the satisfaction survey is to gauge the effectiveness of the changes made, gather feedback from the residents who are directly impacted by these improvements, and to measure the overall satisfaction of the residents.

Currently, we are in the process of diligently collecting data following the completion of the neighborhood revitalization improvements. Assessing the impact of our efforts is a crucial step in our commitment to enhancing the health and quality of life of residents. We want to ensure that the revitalization efforts align with the needs of the residents, encourage physical activity, and promote healthier lifestyles.

8. Conclusion

Since 2020, our institution has been dedicated to revitalizing neighboring communities, with the aim of enhancing the built environment and improving the quality of life for residents. Through strategic partnerships with city government, community organizations, industry partners, and residents, we have developed a comprehensive framework for neighborhood revitalization projects that prioritizes community needs and goals, while involving our students to a large degree. By fostering a culture of engagement, innovation, and social responsibility, we aspire to create lasting improvements in our communities, foster growth, resilience, and well-being for all.

Central to our initiative has been the active involvement of students, who have gained invaluable hands-on experience, practical skills, and a deeper understanding of the role of civil engineering in societal progress. By participating in real-world projects, students have not only contributed to tangible improvements in their communities but have also been inspired to pursue careers dedicated to positive social impact.

Ultimately, our goal is for this initiative is to serve as a model for other universities and communities nationwide, demonstrating the transformative potential of collaboration between academia, government, industry, and community partners.

References:

[1] Natarajarathinam, M., Qiu, S., & Zoghi, B. (2021). "Community engagement in engineering education: A systematic literature review". *Journal of Engineering Education*, 110(4), 1049–1077. https://doi.org/10.1002/jee.20424

[2] J. Yates, and M. Accardi "Field Guide for Urban University-Community Partnerships. (n.d.)". *Institute for Advanced Studies in Culture.* https://iasculture.org/research/publications/thriving-cities-field-guide

[3] V. Lee, L. Mikkelsen, J. Srikantharajah, and L. Cohen (2008) "Strategies for enhancing the built environment to support Healthy eating and Active living" *Prevention Institute*. https://www.preventioninstitute.org/publications/strategies-for-enhancing-the-built-environment-to-support-healthy-eating-and-active-living

[4] J. Thompson and B. Jesiek (2014) "Motivation of Community Partners and Advisors to Participate in Community Engagement Engineering Programs" *121st ASEE Annual Conference & Exposition* https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1041&context=enegs

[5] F. Fouad, P. Alvarez Pino, A. Sullivan, and M. Fouad (2020) "Urban Universities and Community Revitalization Efforts: Opportunities for Student Engagement and Education" *ASEE Annual Conference & Exposition* https://peer.asee.org/urban-universities-and-community-revitalization-efforts-opportunities-for-student-engagement-and-education.pdf

Appendix A

1. PHYSICAL CHANGE

IMPROVEMENT	METRIC	EVALUATION/ METHODOLOGY
SIDEWALKS	Sidewalk dimensions (Number of LF of sidewalk improvements/additions)	• Walk Surveys • Drone Surveys • Before and After pictures
ADA RAMPS	Number of accessible ramps installed	• Walk Surveys • Drone Surveys • Before and After pictures
CROSSWALKS	Number, dimension, and type of crosswalks installed	• Walk Surveys • Before and After pictures
BUS SHELTERS	Number of stops with shelter and seating	• Walk Surveys • BJCTA Data • Before and After pictures
PAVING	Area of road resurfacing	• Walk Surveys • Before and After pictures
LIGHTING	Number of light fixtures installed	• Drone Night Survey • Walks Survey • APCO Data • Before and After pictures
TREES	Numbers of trees planted	• Walk Survey • CPAT Data • Before and After pictures
FACILITIES	Number of waster receptacles, picnic tables, and benches	• Walk Survey • CPAT Data • Before and After pictures
BEAUTIFICATION	Number of murals and public art installed	• Walk Survey • CPAT Data • Before and After pictures
SIGNAGE	Number of signs installed	• Walk Survey • CPAT Data • Before and After pictures

Appendix B

2. UTILIZATION

CATEGORY	METRIC	EVALUATION
CORRIDORS ENHACEMENTS	Compare volume of pedestrians walking along selected corridors before and after sidewalk improvements	• StreetLight Data (2019 – 2022)
TRAFFIC CALMING	Compare vehicle speeds in key intersections before and after high visibility crosswalks were installed	• Pre/post speed measurements
GREEN SPACES/PARKS	Compare volume of residents using parks and green spaces before and after improvements	• StreetLight Data (2019 – 2022)
BUS SHELTERS	Compare ridership volumes at bus stops before and after bus shelters were installed	• BJCTA – Ridership Data