

# Community Service and Professional Development in Civil Engineering: Experiences and Reflections of University Students

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**Abstract:** This research explores the intrinsic relationship between participation in community service activities and the professional development of civil engineering students in the university setting. It aims to examine the experiences, reflections, and perceptions of students who have dedicated their time to community service programs, focusing on understanding how these experiences have impacted their personal growth and professional skill development. Additionally, the study seeks to identify areas for improvement in integrating community service programs within the civil engineering curriculum. Through a mixed-methods approach, including survey analysis and qualitative data examination, the research quantifies the impact of community service on students' professional development, highlighting activities undertaken, community cooperation levels, and perceived impact. The findings underscore a substantial positive influence on students' personal and professional development, underscoring the critical need to incorporate community service into the curriculum to cultivate socially responsible engineers. Moreover, the study advocates for ongoing research and collaboration to augment the efficacy of community service initiatives in civil engineering education, thereby advancing deeper civic engagement and fostering comprehensive student development.

**Keywords:** Civic engagement; community service; curriculum integration; professional development; social responsibility.

## 1. Introduction

Civil engineering is a discipline with a significant impact on society. Civil engineers are responsible for designing and building infrastructure that shapes people's lives, from essential roads and bridges to vital water and sanitation systems (Botero Echeverri and Marín Londoño 2023; Stukas and Dunlap 2002). Social responsibility is emphasised by merging community service with engineering education (Stukas and Dunlap 2002). Through their projects, students begin to understand that their work directly impacts the community and, therefore, they must consider the public welfare (Van den Beemt et al. 2020; Stukas and Dunlap 2002). Hence, it is vital to thoroughly analyse the relationship between community service and civil engineering education.

Community service represents a valuable opportunity for civil engineering students, allowing them to develop fundamental skills for their future professional practice (Terán González and Araujo 2016). On the one hand, it fosters teamwork and effective communication, crucial engineering aspects that require constant interdisciplinary collaboration (Botero Echeverri and Marín Londoño 2023). Moreover, community service projects often involve interaction with various stakeholders, such as residents, government authorities, and non-profit organisations, providing students with invaluable hands-on experience in relationship management and problem-solving in real-world contexts (García-

Puentes, Montaña-Santana, and Pérez-Rodríguez 2019). Research has shown that student engagement in institutional and experiential learning programs enhances their academic satisfaction and strengthens their connection with the university, leading to a greater sense of professional identity and long-term institutional loyalty (Mohammed et al. 2023). In this way, community service enriches academic learning and prepares future civil engineers to face the challenges of the working world with strong interpersonal skills and a deep understanding of their social responsibility (Akyazi et al. 2020).

Thus, community service provides students the unique opportunity to apply their theoretical knowledge in real-world situations, bridging the gap between theory and practice in civil engineering (Botero Echeverri and Marín Londoño 2023; Hoon et al. 2022; Stukas and Dunlap 2002). By facing real challenges and working on tangible projects, students can see firsthand how their skills and knowledge can be translated into concrete solutions that positively impact the quality of life of people and the community environment (García-Puentes et al. 2019). Similar findings have been observed in distance engineering education, where alternative learning methods have been shown to develop technical skills effectively. This direct application of their theoretical knowledge not only strengthens their understanding of academic concepts but also provides them with a sense of accomplishment and purpose, which in turn can significantly increase their motivation and commitment to their education and future career in civil engineering (Akyazi et al. 2020; García-Puentes et al. 2019; Hadgraft and Kolmos 2020).

Similarly, participation in community service not only boosts the academic and technical development of civil engineering students but also contributes to forging a solid and conscientious professional ethic (Christian, Kelly, and Bugallo 2021; Oakes and Spencer 2005; Terán González and Araujo 2016). Students face ethical and moral dilemmas during their involvement in community projects, especially regarding equity, sustainability, and safety in their initiatives (Gómez-Pérez, Ortiz Pérez, and Legañoa Ferrá 2019). This experience provides them with fertile ground to reflect on the responsibility of their actions as future civil engineers and cultivate values such as integrity and respect towards the community's welfare (Oakes and Spencer 2005; Tomas 2022). In this way, community service enriches their professional training. It nurtures their sense of social and ethical responsibility, preparing them to face ethical and moral challenges that may arise in their future professional practice (Maquera et al. 2019).

The skills students acquire through community services, such as project management, ethical decision-making, and problem-solving, are highly transferable to the work environment (Botero Echeverri and Marín Londoño 2023; Viáfara 2020). Employers recognise and value engineers who possess solid technical knowledge, are aware of their impact on society and can collaborate effectively in interdisciplinary teams (Manjarrés and Pickin, 2021). This combination of technical skills and interpersonal competencies enhances engineers' ability to meet complex workplace challenges and strengthens their ability to adapt to dynamic work environments and diverse professional demands (Christian et al. 2021; Shek, Ma, and Yang 2020). Consequently, community service enriches the academic training of civil engineering students and enhances their employability and ability to contribute meaningfully to society through their professional practice.

With this background, it is clear that fostering social responsibility and civic engagement among future civil engineers impacts the public perception of the profession (Botero Echeverri and Marín Londoño 2023; Stukas and Dunlap 2002). When the community perceives engineers as active advocates for public welfare, a more positive image of the profession is built, which can generate benefits for both individuals and society as a whole (Van den Beemt et al. 2020; Christian et al. 2021; Viáfara 2020). This improvement in public perception can translate into greater confidence in the ability of engineers to address social and environmental challenges, as well as a greater appreciation of their contribution to sustainable development and community progress. Furthermore, by promoting a more positive image of the profession, more young talent can be attracted to civil engineering, which in turn can drive innovation and advancement in the field, i.e., fostering social responsibility among future civil engineers not only benefits the profession itself but also contributes to the overall well-being of society.

The main objective of this research is to explore the intrinsic relationship between participation in community service activities and the professional development of civil engineering students at the university level. It seeks to examine in depth the experiences, reflections and perceptions of those students who have dedicated their time to community service programs. The

focus is understanding how these experiences have imprinted their personal growth and professional skills development.

Additionally, the study aims to identify areas for improvement in integrating community service programs within the civil engineering curriculum. Based on the findings, it aims to provide practical and meaningful recommendations that strengthen the connection between community service and the professional development of students in this field. This comprehensive analysis seeks to understand the individual impact of these experiences and advocate for systemic improvements that will enrich future civil engineers' academic and personal education.

## 2. Methods

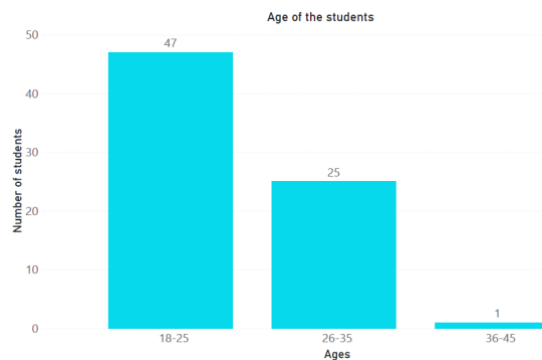
This research used a cross-sectional survey approach in a civil engineering course with a high student participation rate. The purpose was to examine the relationship between participation in community service activities and the professional development of civil engineering students to identify areas for improvement in integrating community service programs into the civil engineering curriculum. It focused on analysing the experiences, reflections, and perceptions of students who have participated in community service programs and identifying critical areas for improving the Integration of these programs into the civil engineering curriculum. For this purpose, a mixed methodology was used to analyse quantitative data and then contrast it with the qualitative data.

### 2.1 Population and sample

The study sample comprised 73 civil engineering students who completed the Community Service Internship course at the Salesian Polytechnic University of Ecuador between September 2023 and February 2024, during their third and fourth years of study. Participants ranged in age from 18 to 45, and most were male, as reflected in Figures 1 and 2.

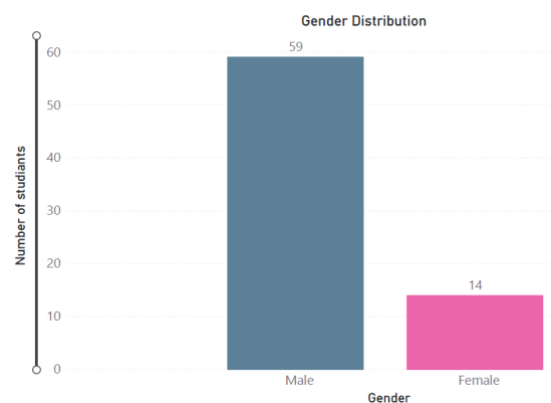
**Fig. 1**

*Number of students by age*



**Fig. 2**

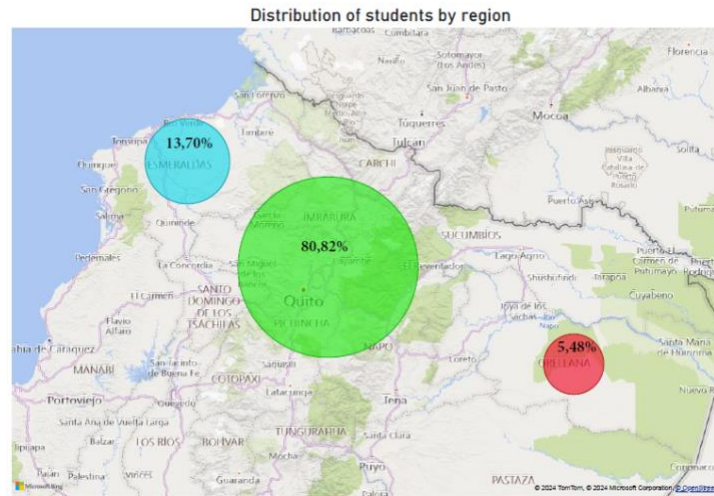
*Number of students by gender*



On average, the participants completed 148 hours of community service internships, which were carried out in different regions of Ecuador, such as the highlands, the Coast and the Amazon. Of the selected sample, 59 did their internships in the Sierra, 10 in the Coast and 4 in the Amazon. The locations where the internships were carried out were mainly influenced by the proximity of the students' places of residence to the internship sites. Figure 3 shows a geographic map of Ecuador that illustrates the percentage distribution of these locations.

**Fig. 3**

*Student distribution by region*



## 2.2 Data collection

An online questionnaire was administered using the *Microsoft Forms* platform to gather data on students' engagement in community service and its influence on their professional development. The questionnaire covered general demographics such as participants' age, gender, location, and academic level. Students were invited to complete the questionnaire voluntarily and anonymously, which was divided into specific sections addressing personal and educational involvement in community service activities, interactions with the community, and personal reflections. Comprising twelve questions, the questionnaire aimed to gather detailed insights into students' experiences with community service in civil engineering. These questions delved into various aspects, including personal information, academic background, community collaboration, community service's impact on professional growth, and suggestions for enhancing the Integration of such programmes into the civil engineering curriculum. The final question encouraged students to reflect on additional community service experiences within the context of their studies.

Tables 1 and 2 present the twelve questions in the online questionnaire, divided into closed and open questions. The closed-ended questions were subject to quantitative analysis to address the research objective, while the open-ended questions provided a complementary perspective and allowed contrasting quantitative findings.

**Table 1.**

*Closed-ended questions*

	Questions
1	What is your gender?
2	How old are you?
3	What level are you in your career?
4	Have you completed the Community Service Practice course in civil engineering at the University Polytechnical Salesian?
5	In which region of Ecuador did you carry out your community service practices?
6	Approximately how many hours did you dedicate to community service during the course?
7	Mark the community service activities in which you participated (you can select multiple)
8	How would you describe the collaboration between civil engineering students and the communities where community service was conducted? (you can select only one)
9	On a scale of 1 to 10, how would you rate the impact of community service on your professional development in civil engineering? (1 = Minimum impact, 10 = Maximum impact)

**Table 2.**

*Open-ended questions*

	Questions
10	Share a specific community service experience that you consider significant for your professional and/or personal development.
11	What suggestions do you have for improving the Integration of community service programs into the civil engineering curriculum as part of your professional development?
12	Is there anything else you would like to share about your experiences or reflections related to community service in the context of your civil engineering studies?

### 2.3 Data Analysis

A statistical analysis of the sample was carried out using the first nine questions of the questionnaire to obtain relevant information on variables such as gender, age, year of study, region where the internship was performed, and the number of hours dedicated to the internship (questions 1 to 6). Subsequently, responses to questions 7 and 8, which explored the activities performed during community service and the perception of collaboration between students and communities, respectively, were examined. These variables were correlated with the response to question 9, which assessed the impact of community service on professional development.

A qualitative analysis used open questions 10, 11 and 12 to complement the quantitative results. These questions were classified according to the thematic axes identified from the answers provided by the participants. This in-depth analysis provided a richer understanding of the participants' experiences and perceptions. Table 3 presents a summary of this classification:

**Table 3.**

*Classification of responses according to thematic axes*

Question	Thematic Axis	Detail
10. Share a specific community service experience that you consider significant to your professional and personal development.	Personal and Professional Development	This thematic axis covers responses that focus on personal growth, skill acquisition, and applying knowledge gained from community service experiences in civil engineering.
	Social Awareness and Empathy	This thematic strand includes responses that highlight increased awareness of social issues, understanding of the challenges faced by others, and the development of empathy for people with disabilities and disadvantaged communities.
	Integration into the Curriculum and Value	This thematic strand involves responses emphasising the importance of integrating community service programs into the civil engineering curriculum, promoting values such as solidarity and compassion, and prioritising the needs of specific groups, such

Question	Thematic Axis	Detail
		as people with disabilities.
11. What suggestions do you have for improving the Integration of community service programs into the civil engineering curriculum as part of your professional development?	Simplification and Gratuitousness	This thematic axis focuses on suggestions related to making community service internships free of charge and simplifying bureaucratic procedures.
	Career Relevance and Focus	This thematic axis addresses suggestions related to the relevance and focus of internships in civil engineering careers.
	Collaboration and Communication	This thematic axis focuses on suggestions related to collaboration, communication and enhancing the community service internship experience.
12. Is there anything else you would like to share about your experiences or reflections regarding community service in the context of your civil engineering studies?	Personal Impact and Learning	This axis focuses on community service internships' personal and professional impact on students.
	Collaboration and Potential Improvements	This axis focuses on the collaboration between the university and the organisations where the internships are carried out.
	Reflections on Civil Engineering	This axis focuses on the perception of civil engineering as a relevant discipline for improving people's quality of life.

### 3. Results and Discussion

The closed-ended and open-ended questions provided relevant information that allowed for a broad view of the intricate relationship between participation in community service activities and the professional development of civil engineering students.

#### 3.1 Results and discussion about the closed questions

The quantitative results provided a first glimpse into the students' experience with community service and laid the groundwork for a deeper, qualitative analysis of their perceptions and reflections. Community service internships' average impact on professional development was evaluated on a scale of 1 to 10, with a value of 8.2055, indicating a considerably high impact.

Figure 4 classifies the activities the students carried out during their internships. The most frequent activities were rehabilitating existing structures and planning and managing urban development projects, followed by improving accessibility for people with disabilities.

**Fig. 4**

*Activities carried out by the students*

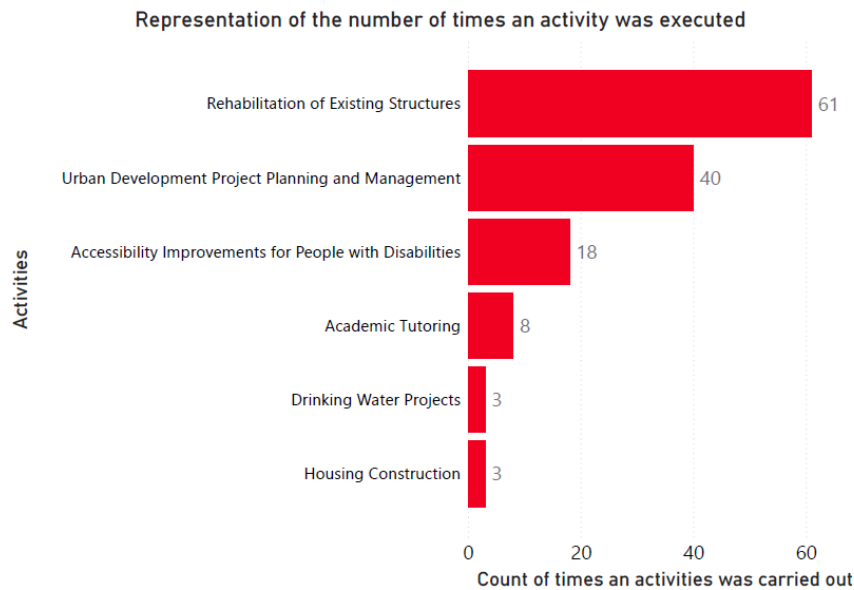
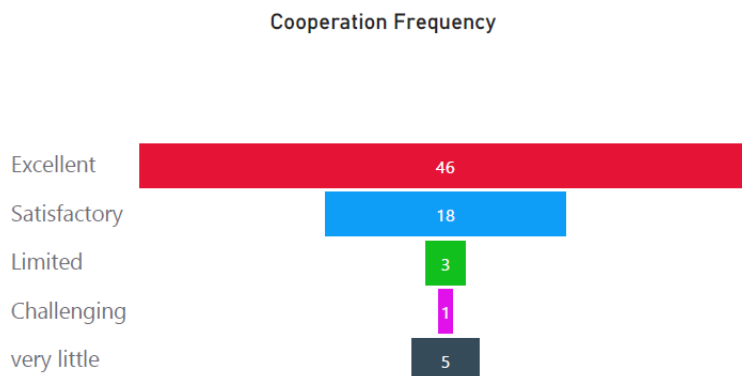


Figure 5 shows the evaluation of the quality of the communities' cooperation during the development of the practices. The cooperation of the communities was mainly evaluated as satisfactory and excellent.

**Fig. 5**

*Community cooperation*



Despite the remarkably high level of perceived impact of community service on the professional development of civil engineering students, the correlation results revealed a weak but positive association between the perception of collaboration and the level of impact of community service on the professional development of civil engineering students (correlation = 0.0373). Although a trend toward a more significant effect is observed with a more collaborative perception, this relationship does not reach statistical significance. On the other hand, a weak negative correlation was found between the diversity of activities performed during community service and the perceived level of impact (correlation = -0.0395), suggesting that a greater variety of activities may not necessarily increase the perception of impact. These results underscore the complexity of factors

influencing students' community service experience and highlight the importance of supplementing this study with qualitative data to understand these relationships better.

Considering the necessity for a more comprehensive analysis to comprehend the dynamics underlying these correlations, the participants' responses to open-ended questions were examined. This qualitative approach facilitated a more detailed exploration of students' experiences and perceptions of community service within the framework of their civil engineering studies.

### 3.2 Results and discussion about each open-ended question

The qualitative analysis plays a crucial role in comprehending study participants' experiences, perceptions, and perspectives, particularly in cases where quantitative results prove inconclusive, as observed in this study. Hence, the present study not only prioritised quantitative data collection and analysis but also delved deeply into the responses furnished by participants via open-ended questions. This qualitative methodology facilitated a more comprehensive and contextual understanding of the study's focal points, providing valuable insights that complement and enrich the quantitative findings.

In this section, the results of the qualitative analysis will be presented, with the participants' responses classified and grouped into the thematic axes mentioned above. This analysis allowed a detailed exploration of the experiences, reflections, and suggestions of civil engineering students about community service in the context of their studies. Through this approach, we sought to capture the complexity and richness of the individual narratives, providing a holistic and insightful view of the impact and importance of community service in the student's professional and personal formation.

The qualitative results derived from the student's responses to questions 10, 11 and 12 are presented below, organised, and classified according to the thematic axes mentioned above:

#### **Q-10. Share a specific community service experience that you consider significant to your professional and personal development.**

##### *a) Personal and Professional Development:*

In this axis, students emphasised the positive impact of community service experiences on their personal and professional development. They expressed a significant appreciation for the practical skills, such as teamwork and communication, they acquired, which are foundational for their future performance in civil engineering. One of the students mentioned:

*My best experience was sharing knowledge with many people since this is what the profession requires: living together and sharing ideas with a determined group of people.*

This response highlights the importance of collaborative work in the professional environment. Sharing knowledge and adapting to a team is paramount to success in engineering projects. Interaction with diverse people fosters the development of interpersonal skills that facilitate project management and problem-solving in real-world environments.

Furthermore, the opportunity to apply theoretical knowledge in practical situations, such as drawing up plans and improving community infrastructure, was highly valued, highlighting the relevance of community service in academic training.

The students also underscored the importance of sharing knowledge and collaborating with others, recognising these as essential for their future job placement. One participant expressed:

*To rehabilitate existing spaces through the knowledge acquired in my university career.*



**Fig 6.**

*Civil engineering students engage in various community service projects, including painting, measuring, and structural rehabilitation, demonstrating hands-on learning and professional skill development.*



Here, the relevance of applying academic learning to real situations is evident, reinforcing the idea that civil engineering is not only based on calculations and designs but also on improving people's quality of life through infrastructure. These experiences allow students to understand the social responsibility of their profession and the importance of designing accessible and functional spaces for the entire community.

**b) Social Awareness and Empathy:**

In this thematic axis, the responses highlighted a significant increase in social awareness and empathy towards people with disabilities and communities in need. One student shared his experience about the impact of disability on mobility:

*I was shocked that the person in charge of the centre for the disabled works with a significant disability. He is always very motivating and there; it makes me see that limitations are only mental.*

This commentary highlights how interaction with people with disabilities can transform perceptions of human limitations, fostering greater inclusion and social sensitivity in future engineers. Experiencing firsthand the barriers faced by people with disabilities helps students design more accessible and equitable solutions in their future professional practice.

Another student highlighted the importance of recognising economic and social inequalities within the community:

*Knowing the economic problems in my community, that children had to go to the foundation to eat and had no food at home, made me realise the reality of several families.*

This testimony highlights the need to approach community service from a holistic perspective. It is about improving infrastructure and understanding and responding to the community's economic and social needs. Exposure to these realities helps students develop a more profound social awareness and generate sustainable solutions.

*Helping an older adult whom his children abandoned. The most beautiful thing was to arrive and help him however I could. As a personal experience, it helped me value my parents and that I should always care for them until my days end.*

This story highlights the emotional impact that community service can have on students, helping them reflect on their values and the importance of intergenerational solidarity. Through these experiences, future engineers develop a stronger sense of social responsibility and a commitment to improving the quality of life of vulnerable people.

c) *Integration in the Curriculum and Values:*

This thematic axis 322ontextual integrating community service programs into the civil engineering curriculum. Students argued that this Integration would facilitate better preparation to address the needs of people with disabilities and the community by enabling them to apply their theoretical knowledge in practical, 322ontextualized situations. Similar adjustments in engineering education have been explored through remote and alternative learning methods, demonstrating that hands-on experiences—whether in labs or community settings—enhance students’ ability to apply theoretical concepts in real-world scenarios (Chiew et al. 2022). One of the students noted:

*Civil engineers should prioritise people with different disabilities and design everything around their needs.*

This reflection highlights the importance of inclusive design in civil engineering, which ensures that infrastructure is accessible to all sectors of society.

Additionally, the need to instil solidarity and compassion was emphasised. One student shared:

*Sharing with people in real need, with children who, just by seeing them smile, brighten your life and leave you with a great lesson. We leave our study routine to share and look for simple but necessary solutions.*

This response highlights the human value of community service. Beyond technical learning, these experiences allow students to develop a more profound social awareness and understanding that engineering is not only about building structures but also about improving people's lives.

Finally, some students expressed concern about the possibility of universities charging for community service, which could hinder their participation and limit the scope of these formative experiences, reinforcing the idea that community service should be accessible and without financial barriers so that students can focus on their learning and the positive impact of their actions in the community.

The analysis of the responses shows that community service is an enriching experience for civil engineering students, as it allows them to develop technical and personal skills, become aware of the community's needs, and strengthen their commitment to society. However, challenges are also identified, such as integrating these activities more effectively into the academic curriculum and ensuring they are accessible to all students. Similar results have been observed in STEM education research, where experiential learning is Necessary for developing professional skills and fostering more profound engagement with the discipline (Hoon et al. 2022).

**Q-11. What suggestions do you have for improving the Integration of community service programs into the civil engineering curriculum as part of your professional development?**

a) *Simplification and Gratuitousness:*

Students prefer free community service internships, stressing the importance of avoiding associated costs. In addition, they highlight the need to simplify and streamline the bureaucratic procedures and processes related to these internships to make them more accessible. Although some students have yet to offer specific suggestions, they emphasise the importance of these experiences not representing a financial burden for them.

Some students expressed their discontent with phrases such as:

*They do not charge for community service or professional practices.*

*Let them not charge tuition for that subject since we are not remunerated in those internships.*

These comments reflect students' concern about the accessibility of community service, indicating that universities should ensure that these experiences are equitable and feasible for all, regardless of their economic situation. One possible solution would be to reduce the tuition cost of this course or establish financial incentives that encourage student participation without compromising the program's sustainability. Research indicates that institutional initiatives that enhance student engagement, whether through academic programs or extracurricular activities, play a crucial role in fostering satisfaction and long-term commitment to their educational institutions (Mohammed et al. 2023). Others highlighted the need to simplify bureaucracy with comments such as:

*There should not be so much paperwork for accepting internships, and that bureaucracy should be simplified.*

*Streamline inter-cycle enrolments so that internships can be done on vacation.*

These testimonials highlight the importance of reducing administrative hurdles so students can focus on learning and applying knowledge rather than being constrained by cumbersome paperwork. Digitising processes and automating records could be effective strategies to streamline these procedures.

Although some students did not provide specific suggestions, they agreed that these experiences should be integrated so that they do not represent a financial burden and are in line with the need for professional training in civil engineering.

#### *b) Relevance and Career Focus:*

Some students suggest that internships should align more with their area of study in civil engineering. They propose the search for social projects and internship sites that are directly related to the career to make the experience more relevant. In addition, they express a desire for a more open approach and greater collaboration between students and engineering professionals to enrich the practical experience. Students have expressed concern with comments such as:

*Work at institutions that are more familiar with the career.*

*We need to focus on what we plan on majoring in.*

*Focus on the career area.*

These responses show that students seek experiences that allow them to apply their training in practical scenarios within their field of study, strengthening their professional competencies and preparation for the labour market. To this end, it would be advisable for universities to establish agreements with institutions and companies in the construction and infrastructure sector, ensuring that internships are relevant to the profession.

They also highlight the importance of internships allowing them to apply their knowledge, mentioning:

*Being more involved with our career and demonstrating our knowledge.*

*Activities based on the career.*

These statements underscore the need to structure community service programs that benefit the community and contribute to developing specific civil engineering skills. Implementing applied

projects, where students can work on real solutions within their field, would allow for more comprehensive and meaningful training.

In addition, it is suggested to strengthen the connection with community projects aligned with civil engineering, with proposals such as:

*Make agreements with foundations that are dedicated to the construction of housing for homeless people.*

*Search for places that need support in the areas of the career.*

These proposals reinforce the idea that community service can be an opportunity to develop projects with real impact on society. Establishing strategic alliances with organisations working to improve housing, public infrastructure, and accessibility would be an excellent way to maximise student learning and social engagement.

**Fig 7.**

*Student conducting topographic studies as part of a community service project, demonstrating the application of civil engineering skills in real-world settings. The student highlights the value of this experience in their professional and personal development.*



**c) Collaboration and Communication:**

The students highlight the need for greater collaboration between the university and the sites where the internships are carried out, proposing measures such as the university's monthly follow-up at the community service sites. In addition, they suggest establishing agreements with foundations and creating social aid projects to strengthen this collaboration. They also mention the importance of conducting orientation activities and informative meetings to improve communication and mutual understanding between students and community service institutions. The comments reflect these concerns with proposals such as:

*A monthly follow-up on the university's part to the place where community service is performed is also needed.*

*Hold Zoom meetings to learn more about the topic or discover any concerns.*

These suggestions highlight the importance of institutional accompaniment during community service. Proper guidance could enhance the learning experience and ensure better alignment with academic objectives. Implementing follow-up mechanisms, such as periodic visits and feedback meetings, would strengthen supervision and optimise learning processes.

In addition, the need for greater institutional coordination is highlighted with phrases such as:

*Be updated with the places where the university has an agreement.*

*Specify where it can be done and be more flexible on the sites.*

*I suggest that internships be done in places with agreements related to engineering.*

These comments suggest that better agreement planning and structuring allow students to access experiences that are more aligned with their training and professional expectations. Maintaining an updated database of available sites and providing advice on the best options for each student would be key actions to improve coordination.

*Regarding Integration with the community, students propose initiatives such as:*

*More social Integration should be implemented between hostel lords and students.*

*More efforts could be made to help foundations through the university.*

This experience reinforces the need for community service to be an academic practice and a meaningful experience that fosters empathy, social commitment, and teamwork among students and the community. Promoting participation in social responsibility activities inside and outside the university would strengthen the link with the community and the impact of the projects.

In addition, others mention the importance of previous activities that better prepare students for the experience, with comments such as:

*A small talk before starting the program.*

*Have a meeting with all the students and talk about their experiences.*

These suggestions show that better preparation in advance could help students better understand their roles and responsibilities in community service, thus optimising their impact on the community and their professional development. Including introductory training and orientation sessions would facilitate a greater understanding of the program's objectives and the commitment involved.

Student responses show a strong need to improve the accessibility, relevance, and coordination of community service programs within the civil engineering curriculum. Reducing bureaucracy, ensuring that internships are aligned with the profession, and strengthening communication between the university and internship sites could optimise the experience and maximise its impact on professional training.

**Q-12. Is there anything else you would like to share about your experiences or reflections regarding community service in the context of your civil engineering studies?**

**a) Impact and Personal Learning:**

Students reflect on how community service internships have contributed significantly to their personal and professional development by highlighting the importance of helping communities and applying their knowledge in real situations. For many of them, these experiences go beyond fulfilling an academic requirement, as they recognise an invaluable opportunity to grow personally and professionally, strengthening their sense of social responsibility and commitment to community welfare.

Several students expressed their thoughts on this matter, stating:

*Community service internships help us a lot as people and professionals.*

*It helped me grow and understand how to assist people who need our knowledge without requiring them to pay for help or consulting.  
A great help for personal and professional development.*

This comment reinforces the idea that community service is an academic experience and an opportunity to develop essential human values, such as solidarity, commitment and empathy. These experiences allow students to understand their societal role and strengthen their service vocation. Others emphasised the impact on their professional growth with statements such as:

*An excellent opportunity for professional development and gaining real-world work experience.*

*The experience of sharing the knowledge acquired during the internship.*

These responses underscore the value of community service as a venue for applying technical knowledge in real situations, which enhances students' preparation for the workplace.

Some students also stressed the importance of these experiences in shaping engineers committed to society, mentioning:

*We are training as professionals, but it should not just be about earning a degree. We should become professionals who are responsible citizens, helping those in need while setting an example for future generations.*

*If we do our part, civil engineers can help others in many ways. Community service is not just about financial rewards but also about becoming better people.*

These reflections highlight the need to instil a humanistic vision in civil engineering training, promoting a professional practice with social impact. Civil engineering involves designing and building infrastructure and ensuring that it is inclusive and benefits those who need it most.

Additionally, they emphasised that these internships have helped them develop a social conscience within the field of engineering, sharing reflections such as:

*It is important to highlight how civil engineering can contribute to community improvement.*

*This experience has made me more aware of the importance of considering accessibility for disabled individuals when designing structures.*

These testimonials highlight the relevance of integrating accessibility and inclusion principles in civil engineering. Doing so ensures that infrastructures are functional and equitable for the entire population. Exposure to these realities sensitises future professionals and motivates them to design fairer, more sustainable solutions.

#### *b) Collaboration and Potential Improvements:*

Students highlight the need to promote greater collaboration between the university and the organisations where community service internships are carried out. They propose measures to facilitate the acceptance of internship sites and suggest the importance of establishing agreements with foundations and developing joint projects to benefit society. In addition, they emphasise that community service should not be limited to fulfilling academic hours or requirements but should be a meaningful experience that fosters an active commitment to social welfare.

Student opinions reflect this concern with comments such as:

*The internship site should be approved quickly.*

*We can do a lot to help, but we should push for more partnerships with housing foundations to work together.*

These responses highlight the importance of the university facilitating the management of community service spaces and optimising logistics so that students can focus on their contributions to the community.

In addition, some students emphasise the importance of these experiences being aligned with their training, noting:

*As civil engineers, we have many ways to help others if we do our part. We should understand that community service isn't just about money—it's also about growing as individuals.*

This comment emphasises the need for universities to convey the importance of community service as an academic requirement and an opportunity for mutual learning between students and the community. Engineering education should include technical knowledge, ethical values, and social responsibility.

In general, students value the possibility of contributing to the community from their speciality but suggest improvements in the planning and execution of internships to make them more meaningful experiences aligned with their civil engineering education.

### c) Reflections on Civil Engineering:

Students underline the fundamental relevance of civil engineering in improving people's quality of life, highlighting its crucial role in solving concrete problems, such as cracks in buildings or the rehabilitation of schools. In addition, they express the need for greater interest and support from teachers, which would enable students to make more significant contributions to the community. They also emphasise the importance of sharing knowledge with the community and collaborating on projects that directly benefit people, thus strengthening the link between professional practice and service to society.

Student experiences reflect these points with comments such as:

*Engineering is present in all infrastructure and construction, and we can employ it by adapting it to existing needs.*

*It is important to emphasise how civil engineering can contribute to improvement.*

*Cracking is noticeable in many institutions, which caught my attention because it is generally not monitored or controlled.*

These testimonials reinforce the importance of civil engineering in social development, where inclusive design, infrastructure supervision and preventive maintenance are essential to ensure the safety and well-being of communities.

In addition, the importance of greater involvement of teachers in the process is highlighted, with observations such as:

*If teachers showed interest, we students could accomplish more and become great engineers.*

Students see community service as an opportunity to apply their knowledge concretely and helpfully. However, they emphasise that greater institutional and teacher support would allow these experiences to have an even more significant impact on them and the beneficiary communities.

The students' responses reflect the profound impact of community service on their formation as future civil engineers and citizens committed to social welfare. In addition to providing practical experience, these activities reinforce fundamental values such as solidarity, empathy, and responsibility. However, areas for improvement are identified, such as greater coordination with the organisations, the streamlining of procedures, and more active accompaniment by the university and teachers to maximise the impact of these experiences on the student's professional training.

#### **4. Conclusion**

The combination of quantitative and qualitative data provides a comprehensive perspective on students' community service experience within the context of their civil engineering studies. Consistent with previous research, the quantitative findings support the notion that community service significantly impacts students' professional development (Manjarrés & Pickin, 2021). However, the weak correlations between the perception of collaboration and level of service impact and between activities performed and level of impact raise interesting questions that merit further exploration.

From the perspective of previous studies (Van den Beemt et al. 2020; King et al. 2022; Manjarrés and Pickin, 2021; Shek et al. 2020), the qualitative results reinforce the idea that community service contributes to developing practical and technical skills among students and fosters social awareness and empathy towards communities in need. These findings highlight the importance of integrating community service programs into the civil engineering curriculum, ensuring accessibility and relevance to students.

Collaboration between universities and community organisations is crucial to improving community service internships, although it faces logistical and resource allocation challenges. Students desire free internships, but this may not be feasible due to the associated costs and benefits provided. Likewise, simplifying bureaucratic procedures is essential to make internships more accessible, although it must be balanced with the need to ensure the quality and safety of community service experiences.

On the other hand, the results suggest that collaboration between educational institutions and community organisations is essential to maximise the impact of these initiatives in forming committed citizens and improving the quality of life of communities. It highlights the need for future research that further explores the factors that influence the perception of collaboration and the impact of community service, as well as best practices for implementation and evaluation in civil engineering educational settings. These research efforts could contribute significantly to the design of more effective, student-centered community service programs.

In conclusion, the findings highlight the value of community service as an effective tool for civil engineering students' professional and personal development. Quantitative and qualitative data support the notion that these experiences provide meaningful opportunities to acquire practical skills, foster social awareness and empathy, and apply theoretical knowledge in real-world situations. The correlation between the perception of collaboration and the level of service impact underscores the importance of fostering a collaborative environment among students and communities. In addition, the findings highlight the need for greater integration of community service programs into the civil engineering curriculum, ensuring their accessibility and relevance to students.

More broadly, this study points to the importance of strengthening collaboration between educational institutions and community organisations to maximise the impact of community service in developing professional skills and improving the quality of life in communities. The implications of these findings extend beyond academia by highlighting the crucial role of civil engineering in addressing social problems and improving infrastructure and community well-being. Ultimately, these findings underscore the need for further research and development of innovative practices in community service in civil engineering to promote deeper civic engagement and more holistic, standard good-oriented education.

#### **5. Coauthor contribution**

The author was responsible for the complete writing of this article, including formulation of the study, development of the theoretical framework, data collection and analysis, and drafting and final revision of the manuscript. Coauthors did not participate in this work formally.

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