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TRANSFORMATIVE LEARNING THROUGH INTERNATIONAL SERVICE: A QUALITATIVE ANALYSIS OF ENGINEERING AND HEALTH STUDENTS' REFLECTIONS IN MEXICO

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ABSTRACT. This paper presents the results of a qualitative study exploring the reflections of twenty undergraduate students who participated in a one-week Service-Learning (SL) activity in Morelia, Mexico. The programme was embedded in an international, interdisciplinary initiative within the Erasmus+ Project G.I.R.L.S. (Generation for Innovation, Resilience, Leadership and Sustainability) that involved engineering and health sciences students from the partners' countries participating in the project, with activities ranging from hygiene education to collaborative community interventions. Using a deductive coding framework and descriptive qualitative analysis, the study identifies key themes including ethical awareness, cultural adaptation, social impact, and personal transformation. Students' reflections reveal a heightened sense of civic responsibility, professional identity, and emotional growth. The results provide strong evidence of the pedagogical power of SL, particularly when implemented in intercultural and transdisciplinary contexts where authentic community engagement is central.

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1. INTRODUCTION

Service-Learning (SL) is increasingly recognised as a transformative pedagogical approach that integrates academic instruction with meaningful community engagement. In engineering and health education, SL has been shown to enhance not only technical competencies but also interpersonal skills, ethical reasoning, and civic responsibility. This paper presents a qualitative analysis of a one-week international SL project conducted in Morelia, Mexico, involving students from engineering and health sciences. The initiative was part of the Erasmus+ project G.I.R.L.S. (Generation for Innovation, Resilience, Leadership and Sustainability), co-funded by the European Union. The central aim was to assess the educational impact of the experience through the lens of students' reflections, collected immediately after the activity. Grounded

in experiential learning theory ([?]), transformative learning theory ([15]), and critical service-learning ([16]), this study explores how short-term international SL contributes to students' cognitive, emotional, and social development. The research questions guiding the analysis were:

- (1) What themes emerge from students' reflections on their SL experience in Mexico?
- (2) 2. How do these themes reflect the learning outcomes associated with transformative and experiential education?

2. METHODOLOGY

2.1. Context and Participants. The SL project was conducted over one week in Morelia, Mexico, in partnership with local community associations and Universidad Vasco de Quiroga. This educational institution is also a partner of the G.I.R.L.S. project. Twenty students from four different countries (Portugal, Spain, Romania and Mexico) participated in the initiative, thirteen from engineering, four from health sciences and three from Translation Interpretation and Language Teaching. Activities included hygiene education, public health campaigns, and collaborative problem-solving, using Statistical Analysis, with community members. The pedagogical design followed the principles of active learning and intercultural exchange. These students have previously participated in SL projects in their universities.

2.2. Data Collection. The reflection prompts and structure followed by the students were drawn from an internally developed handbook produced within the scope of the GIRLS Erasmus+ project ([9]). This handbook provided the pedagogical scaffolding for pre-reflection, structured action, and post-activity reflection. Although only published at the project website, https://girlsproject.eu/wp-content/uploads/Service-learning-guide_EN.pdf, it is a validated internal project deliverable used to guide students' engagement with Service-Learning activities. Students were invited to submit written reflections in response to guided prompts at the end of the SL week. The reflections were transcribed and compiled into a single Excel file. Participation was voluntary, and all students provided informed consent for the use of their data in this study.

2.3. Analytical Approach. A qualitative content analysis was conducted using both deductive and inductive coding methods. The SL literature informed deductive codes, while inductive codes emerged from the dataset through iterative rounds of analysis. Following best practices in thematic saturation, coding proceeded across five rounds until no new themes were identified, consistent with the approach described by Guest, Bunce, and Johnson (2006), [10], who reported that thematic saturation is typically achieved within eight to twelve interviews. This contributed to the internal coherence and analytic rigour of our findings. The coding was supported using Microsoft Excel for data structuring and Python (version 3.10) for data visualisation and frequency analysis. Libraries such as Pandas and WordCloud were employed to generate summary tables and word cloud visualisations, enhancing the transparency and reproducibility of the analysis. To complement the qualitative analysis presented in this study, a parallel investigation was conducted to assess the health issues that motivated the Service-Learning activity quantitatively. Anciones-Polo et al. (2025), [1], explored the patterns of water consumption and the level of awareness concerning renal health among residents of Ciudad Hidalgo, revealing critical insights into local vulnerabilities. Their study, based on a structured questionnaire completed by 491 participants, identified insufficient water intake, high consumption of sugar-sweetened beverages, and widespread lack of knowledge about renal health as pressing concerns. These findings reinforced the need for interdisciplinary, community-engaged initiatives like the one described in

the present study. They contributed to the design and implementation of targeted educational activities during the intervention. Taken together, the two studies offer a comprehensive picture of both the socio-health context and the pedagogical impact of the Service-Learning experience.

3. RESULTS

The qualitative analysis of written reflections by twenty students who participated in the one-week SL experience in Mexico revealed a rich landscape of learning processes, emotional responses, and ethical awareness. Using a deductive coding framework informed by the literature (e.g., [8], [3]), nine major thematic categories were identified as can be observed in Figure 1: Learning Outcome, Social Impact, Challenges and Adaptation, Ethical Awareness, Transformation, Cultural Awareness, Emotional Responses, Civic Engagement, and Communication Skills.

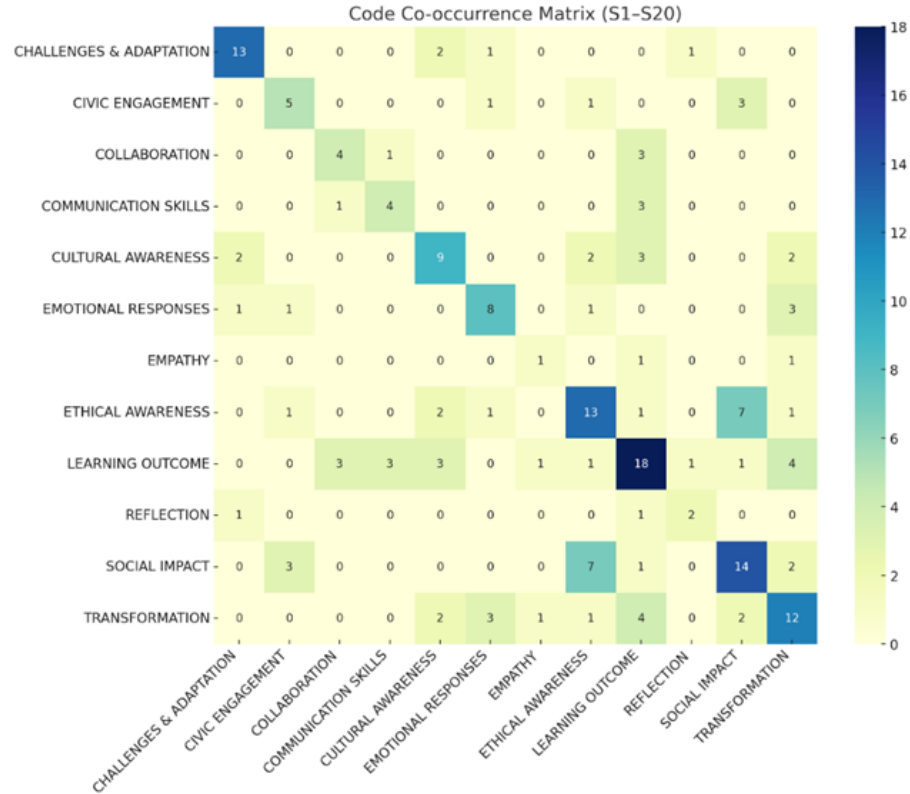


FIGURE 1. Thematic categories provided by the collected data

The analysis highlights how this international SL experience served as a powerful catalyst for both intellectual development and civic consciousness. The most prevalent theme across all student responses was Learning Outcome, appearing in the reflections of seventeen students. Students demonstrated growth in statistical literacy, public health awareness, and soft skills such as listening and teamwork. For instance, Student 5 reflected: “I learned the importance of organisation, to listen, because otherwise people lose attention.”. Similarly, Student 8 noted: “We learned how to ask the right questions, optimise work, and be efficient.”. The second most

frequent theme was Ethical Awareness, expressed by fifteen students. These reflections showed sensitivity to social injustice, healthcare inequality, and the structural challenges faced by the Mexican community. Student 14, who worked on health education, wrote: “It is important to help people without expecting anything in return.”. Student 16 emphasised the lack of accessible health education: “There are not enough programs dedicated to real education about health.”. Challenges and Adaptation emerged in the reflections of fourteen students. These challenges spanned logistical issues, cultural misunderstandings, and difficulties in survey implementation. For instance, Student 6 reported: “We had many difficulties, among them communication, culture and even technical issues.”. Social Impact was also a dominant theme, with thirteen students reflecting on the perceived benefit of the activity for the local community. Student 1 wrote: “My motivation is to help people in a more meaningful way.”. Student 9 linked the project directly to awareness-building: “The importance of people knowing basic healthcare practices and acting preventively.”. Transformation, as described in the accounts of twelve students, was often linked to emotional change or a re-evaluation of values. Student 9 stated powerfully: “Everything. I feel like a completely different person now.”. Student 13 reflected on personal growth through discomfort: “I think we have carried out the project in a very decent way, even with these taboos.”. Cultural Awareness was present in eleven reflections. Students became aware of both contrasts and commonalities between their home and host cultures. Student 20 described: “How to properly collaborate with and understand people with very different views.”. Civic Engagement and Communication Skills were coded in ten and nine reflections, respectively. These included moments where students identified themselves as actors of change and improved their ability to convey technical information. Student 7 remarked: “We tried to explain everything as simply as possible to make sure the community understood.”. Several codes frequently appeared in combination. Learning outcomes were often linked to Transformation and cultural awareness, as students described gaining new knowledge while navigating culturally unfamiliar contexts. Student 18 exemplified this by saying: “Learning new things every day from the data, from people, and from myself.”. Ethical Awareness often co-occurred with both Social Impact and Civic Engagement, suggesting that ethical reflection was not abstract but grounded in students’ direct action and observation. For example, Student 3 stated: “To work with the population of Cd. Hidalgo to understand their problems with kidney health.”. While most students exhibited multidimensional engagement, the depth and scope varied. Students 9 and 20 showed the widest thematic spread, being coded across nearly all categories, including Transformation, Cultural Awareness, Collaboration, and Ethical Awareness. Their reflections were introspective and holistic. Others, such as Student 2 or Student 4, provided more concise accounts that focused primarily on technical or operational aspects, including stress during data collection or the need for better preparation. This diversity is typical of SL interventions and reflects different styles of reflection, cultural fluency, or emotional readiness. Many students expressed a range of emotional responses, from pride to frustration and surprise. Student 5 shared: “I feel really proud and grateful for being part of this experience.”. Student 16 acknowledged discomfort and responsibility: “It was overwhelming at first, taking so much responsibility in a new culture.”. Reflections often revealed a high degree of empathy, particularly when students perceived structural injustices. Student 17 remarked: “Kidney failure in people without access to care is unacceptable.”. To complement the thematic analysis and coding of students’ reflections, a word cloud (see Figure 2) was created to visualise the most frequent individual terms used by participants in their written responses. This graphical representation helps capture the affective and conceptual density of the Service-Learning experience by foregrounding prominent terms

linked to ethical reflection and social justice suggests that the activity succeeded in sensitising students to community needs, inequalities, and their own role as potential changemakers. This also corresponds with critical frameworks in SL literature, which argue that authentic community engagement, particularly in cross-cultural contexts, promotes a deeper understanding of systemic injustice ([16]). Experiential learning in unfamiliar environments provides opportunities for critical thinking, innovation, and flexibility, which are essential qualities in engineering and healthcare practice ([12], [11]). Emotional dimensions were prominent, suggesting that SL is uniquely capable of triggering transformative learning episodes ([15]). The integration of scientific content (e.g., kidney health, health education) with local realities enabled students to see how technical knowledge applies in real-world environments, thereby reinforcing the social embeddedness of engineering and health sciences. In sum, the Mexican SL experience did not merely enhance technical or soft skills. It served as a complex pedagogical space where ethical, emotional, and intercultural learning took place. Collaboration between disciplines also proved enriching, aligning with Vygotsky’s social constructivist theory ([22], [13]). Ultimately, students observed direct connections between theory and practice, thereby validating the arguments for the pedagogical effectiveness of SL in STEM curricula ([5]). Future work should continue exploring how structured reflection, preparatory training, and sustained partnerships with community organisations can maximise these learning outcomes.

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