Service-Learning Pedagogy: Student Experiences at a University of Technology

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Abstract: The changing educational landscape in the 21st century has seen higher education institutions (HEIs) focus more on innovation, flexibility, and adaptability. Despite these advances, there is still a need for innovative pedagogies like service learning (SL) to encourage students to critically examine their own contexts, beliefs, values, knowledge, and attitudes whilst empowering students to engage in self-reflection, appreciation of diversity, and critical thinking. However, to date, limited studies have sought to elicit the experiences of students within construction-related programmes in South African Universities of Technology alongside their lecturers concerning the utility of this pedagogy. As a contribution towards filling this gap, this paper used a quantitative research design to elicit the experiences of second year learners from the Built Environment Department at a University of Technology as it relates to the utility of the pedagogy. Integrated capstone projects were used in capturing the experiences in the form of engaged teaching. Data was collected using a survey administered to students to dig deeper into the experiences shared. Students were asked about their expectations and perceptions from the integrated projects in relation to using SL pedagogy to drive the development of competences among learners such as problem-solving and analytical thinking, respectively. The findings revealed that students were exposed to transformative learning through having to understand the socio-affective factors relating to their projects will facilitate the development of skills for lifelong learning, social inclusion and effective teaching and appropriate instructional resource use. The academic significance of this study lies in its contribution to understanding the impact of service-learning pedagogy on the development of critical competences such as problem-solving and analytical thinking among second-year Built Environment students at a South African University of Technology, thereby addressing the gap in research on student and lecturer experiences in construction-related programs.

Keywords: Capstone projects, Higher education, Service learning, Transformative pedagogy

1. Introduction

Traditionally, community engagement in higher education has been regarded as an optional service to communities, rather than an essential function alongside teaching, learning, and research (Pinfold, 2021). Higher education institutions in South Africa have undergone a shift that has made them more attuned to community needs. As a result, they now offer services and infrastructure to support service-learning programs (Thomson, 2011). Despite the existence of community engagement and service-learning initiatives at higher education institutions, the incorporation of community engagement into the curriculum has been slow (Jordaan and Mennega, 2022). Community engagement initiatives are typically considered as supplementary rather than integral parts of the curriculum.

Higher education institutions (HEIs) are increasingly prioritizing innovation, flexibility, and adaptation in response to the evolving educational landscape of the 21st century (Olo, Correira and Rego, 2021). Although there have been significant advancements, there is still an urgent want for teaching methods that drive students to analyze their own circumstances, beliefs, values, knowledge, and attitudes in a critical manner (Anderson and Stillman, 2013). Service-Learning (SL) is an innovative teaching method that enables students to participate in self-reflection, value diversity, and cultivate critical thinking abilities (Ramsaroop and Ramdhani, 2014). Although SL has gained significant popularity across several fields, there is a lack of research examining its effects on students enrolled in construction-related degrees at South African Universities of Technology.

This study aims to fill this need by examining the experiences of second-year students in the Built Environment Department at a University of Technology. It will do so by utilizing integrated projects and engaged teaching approaches. This study also aims to examine the effectiveness of Service-Learning pedagogy in improving the educational experiences of students enrolled in construction-related programs at a South African University of Technology. The study's main objective is to investigate the impact of SL on the enhancement of students' capabilities, particularly in problem-solving and analytical thinking.

2. Literature Review

2.1 Overview of Service-Learning Pedagogy

Academic service-learning integrates a university's education, research, and community service missions (Altun, 2021). Many university instructors worldwide have found that students who do community activities as part of their courses are more engaged and active (Chenarani, 2017). They recognize the practical relevance of their studies to real community challenges and contribute constructively to an organization (Carnicelli and Boluk, 2017). Students learn through actual experience in service-learning. It uses experiential learning theory to teach (Levkoe et al., 2014). Educational reform concepts that encourage student autonomy and accountability in learning shape it. This belief stems from the idea that the academy must prepare students for active citizenship (Mtawa, 2019).

Service-learning is linked to cognitivism, behaviorism, and constructivism. Cognitivism conceptualises students' learning processes, including information acquisition, organisation, and storage (Deeley, 2015). Language, logic, and problem-solving can retrieve information (Ertmer and Newby 2013). Social learning improves cognitive learning through reciprocal interactions with society, according to Vygotsky (1978). Behaviorism describes learning by observing behavior changes. It implies that students respond appropriately to external stimuli. Behaviourism links previous learning to new learning by applying it to new situations (Ertner and Newby, 2013).

Service-learning activities demonstrate constructivism by helping students put fragmented knowledge together. Unlike cognitivism and Botha and Bezuidenhout, Service-learning causes pedagogical regression. Behaviourism and constructivism argue that students can learn from scaffolding because information is subjective (Salam, Iskandar & Ibrahim, 2019). The constructivists believe that our worldview comes from our subjective interpretations of personal experiences. Students learn and gain personal meaning by participating in community service-learning activities, including planning, preparation, implementation, and reflection (Lin, 2021). This new meaning may change their behavior. Service-learning promotes active learning by engaging students in their own learning. Participatory learning is widespread in service-learning (Botha and Bezuidenhout, 2020).

Instructional sessions encompass lectures, collaborative discussions, student panels, and debates (Mey, 2018). Service-learning activities and resources depend on students' personal experiences, ingenuity, and expertise, as well as their engagement with the community, to broaden and diversify the intellectual resources available to them (Buswa, 2015). Service learning also exposes the underlying assumptions, attitudes, beliefs, and emotions that influence how students respond to new knowledge, either in a positive or negative manner. Service-learning enables students to get a more profound comprehension of module content by tackling intricate issues within real-life situations (Mey et al, 2018). Service-learning facilitates the application of knowledge and problem-solving abilities to unfamiliar situations through practical solutions. The activities related to the implementation of service-learning should be organized in a way that community involvement improves academic learning, without substituting it.

2.2 The Role of Service-Learning in Higher Education

Service learning (SL) is an educational approach that combines academic study with community service. Recently, higher education institutions have adopted the SL as a modern teaching and learning strategy. It can be defined a balanced approach to experimental education that can expand boundaries to enhance student cultural competence, create social capital and transformation and promote serving and learning (Salam, et. Al., 2019) & (Zembylas & McGlynn, 2012). Unlike traditional classroom learning, service learning actively engages students in real-world experiences, allowing them to apply theoretical knowledge to practical situations. Zulkefli and Uden (2013) suggest that quality is still key that it should be managed within higher education institutions by measuring and applying the emerging discipline of service learning. Therefore, it is key to note some of the key aspects of service learning which include integration of community service. Community service refers to voluntary work done to benefit the community, while service learning is a more structured approach that integrates community service with academic learning objectives. In the figure below, Mitchell (2008) illustrates the difference between traditional service learning and critical service learning in the figure below to explain how integrating community component transforms learning as a critical service.

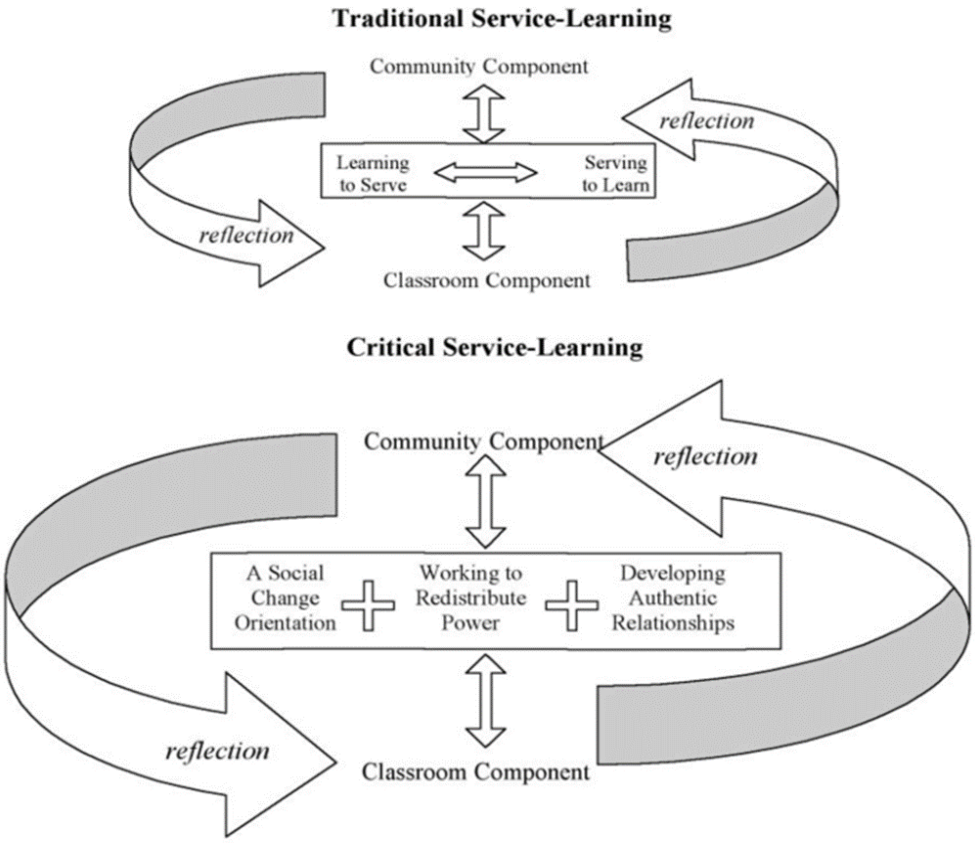

Figure 1: Differences between traditional and critical service learning (Mitchelle, 2008)

Transformative learning is a paradigm shift approach to learning as it enables a learner to critically reflect on their cultural beliefs and frame of reference (Jones & Miles 2017). Students will be able to critically reflect on their experiences, connecting what they have learnt in class to the community service activities. Reframing their ideologies helps them to transform into new ways of understanding and solving their own problems with understanding of their own beliefs (Mezirow, 2018). Through active engagement with the community projects, students can actively be aware of the social issues to be addressed whilst at the same time they take their individual social responsibility and use for personal growth (Shie, Leal and do Paco 2016). The projects identified should be such that they align with the transformational processes to advance societal well-being amongst the students and relevant to the curriculum.

2.3 Significance of Service Learning in Higher Education

Salam et.al., (2019) highlighted SL as a pedagogical approach that integrates community-based service with academic instruction. The significance lies in its capacity to enhance student learning by providing students skill enhancement for better knowledge on the practical implications of their studies and to develop critical thinking, problem solving and communication skills. Students acquire practical skills (communication, teamwork, problem-solving) while serving the community.

Through these lived experiences, service learning enhances employability by providing relevant experiences and networking opportunities. This hands on lived experiences can lead to increased motivation and engagement as students can see tangible results of their applied knowledge and work.

An analysis of the current research on the effectiveness of Service-Learning (SL) pedagogy in construction-related programs at South African Universities of Technology can provide valuable insights for future studies and improve the implementation of this teaching strategy (Chen 2016). Furthermore, there is a lack of comparative studies are required to assess the efficacy of SL pedagogy in construction-related programs across several Universities of Technology in South Africa (Lin, 2021). By comparing diverse institutions, one can gain a more comprehensive picture of the obstacles and achievements of service learning. Also, there is a lack of extensive research on the integration of SL into the wider curriculum and its compatibility with academic objectives and professional skills (Queiruga-Dios et.al. 2021). An analysis of the incorporation of SL into the curriculum and how

it complements conventional teaching techniques can improve its implementation (Botha and Bezuidenhout, 2020).

2.4 Service Learning in Construction Management (CM) Education

When looking at the effectiveness of service learning in higher education, it differs from one discipline to another. The curriculum mainly focuses on sustainability development concepts and how they can be effectively integrated. This examines the role that service learners play in the construction studies highlighting its benefits, challenges and best practices. Engaging in service-learning enhances students' metacognitive abilities, strategic planning and task-analysis skills, discernment of valuable information, and comprehension of client requirements and limitations (Caroline *et al*, 2013). Research and educational evidence indicate that service-learning is a very successful and appropriate method for training students in design, architecture, engineering, and construction. Considering these fields are practical in nature, many of them already necessitate experiential education such as internships, practicums, or cooperative service to graduate (El-adaway *et al,* 2015). Service-learning actively fosters participation and cooperation. Engaging in practical construction projects provides substantial chances for cooperative learning, which is crucial in contemporary construction practice (Redden and Bugg, 2022).

Service-learning in CM programs typically incorporates active learning (AL), collaborative learning (CL), and problem-based learning (PBL) techniques (Cline *et al*, 2014). Active learning is a type of learning that involves the learner actively participating in relevant learning activities (Hernández-de-Menéndez *et al*, 2019). AL prompts pupils to engage in tasks that compel them to contemplate ideas and evaluate their use of those ideas (Bertrand *et al,* 2021). Students frequently evaluate their own level of comprehension and proficiency in dealing with concepts and/or situations, and subsequently acquire knowledge through active participation or contribution (Kaddoura and Husseiny, 2021). The method engages students both mentally and, at times, physically, by involving them in activities that require knowledge collection, critical thinking, and problem solving. Collaborative learning enhances the active learning process by necessitating the learner to engage in group activity with the aim of achieving a shared objective, so enabling many individuals to learn or attempt to learn something collectively (de Hei *et al*, 2020). Problem-based learning necessitates the learner's engagement with practical challenges that serve as a genuine framework. Problem-Based Learning (PBL) is launched by presenting a challenging problem, question, or puzzle that the learner is motivated to solve (Salvador *et al*, 2023). PBL emphasizes the process of students defining, researching, and solving authentic and practical challenges (Thorndahl and Stentoft, 2020).

2.5 Benefits of SL in the Built Environment

Students being involved in community projects; they apply their theoretical knowledge to real-world scenarios. By engaging themselves on activities such as renovating community facilities, being involved in building houses processes etc., students gain a deeper understanding and application of how construction materials are used, what actual construction processes entails and how to choose different techniques of construction for different types of projects. The process allowed students to clearly perceive problems relevant to their live and giving the students opportunity to collaborate with their peers to share their knowledge in problem solving (Mebert, Dalley& Gawarecki, 2020). Harris et al., (2018), also put emphasis on the fact that these experiences also cultivate cognitive behaviour that enhances critical thinking and problem-solving skills to navigate through the real construction projects.

According to National Academies of Sciences, Engineering and Medicine (2017), after series of engagements with the community, the students develop a better understanding of concepts through application thereby improving their academic performance and become involved in issues of communal importance such as risks, how to engage with the community, public decision making and sustainability. Other opportunities of construction organisations are that they are increasingly relying on stakeholder groups, project teams to accomplish complex tasks faced in a construction project. Built Environment students and construction workers, therefore won't be able to work in silos but will be forced to work in collaboration with each other teams to adapt to the demands of the 21st century skills development (Sabat, Whiteney & Perry 2015).

2.6 Barriers of SL in the Built Environment

Recent research conducted at the Cape Peninsula University of Technology (CPUT) highlights a growing recognition of the value of community engagement within academic institutions. However, it also reveals a significant gap in participation of staff at the departmental level, often due to a lack of incentives and inadequate communication from management (Pinfold, 2021). This finding underscores the broader challenges faced in

integrating service learning into construction-related courses, particularly in terms of the efficacy of the integration of service-learning pedagogy in the curriculum.

Queiruga-Dios et al., (2021) discuss the many challenges of adopting service learning as a pedagogical strategy within engineering studies. They emphasize that for service learning to be effectively integrated, it must align with academic learning outcomes and be supported by robust assessment mechanisms. This necessitates careful curriculum alignment, ensuring that service-learning projects are not only relevant but also enhance the educational experience (Queiruga-Dios et al., 2021). It is emphasized by Bettencourt (2015) and Salam et al. (2019), that if learning outcomes are not well integrated into the curriculum, service learning cannot serve as an effective pedagogical or assessment tool. This misalignment can lead to fragmented learning experiences, where the practical benefits of service learning fail to translate into academic success. Furthermore, Chen (2016) identifies the importance of selecting community projects that are meaningful and relevant to the course curriculum. Projects that do not align well with academic goals can diminish the educational value and fail to engage students effectively. Construction students have different practical skills and experience, which influences their capacity to contribute to community projects in service-learning projects. Academic support and training are needed to guarantee effective participation and benefit from the experience (Pearce, Bohmann, & Berkebile, 2016).

Community engagement is another major issue, according to Jordaan and Mennega (2022). Building and maintaining connections with community organizations takes time and effort to choose built environment initiatives. Building trust and understanding between academic institutions and community partners is crucial but difficult, according to Welch and Plaxton-Moore (2019). Effective community participation requires clear communication, common goals, and continuous collaboration, which can be hampered by institutional regulations and limits (Pinfold, 2021). Long-term partnerships with community stakeholders should be prioritized by higher education institutions to satisfy community needs and provide relevant learning experiences (Welch and Plaxton-Moore 2019).

Moreover, managing the expectations of both the community and the students is a delicate balance. Lee and Ceylan (2021) highlight that aligning the needs and expectations of the community with the educational objectives of the students can sometimes be difficult and if there is any kind of misalignment and expectation are not met, it can lead to dissatisfaction and disengagement from both parties, undermining the potential benefits of service-learning projects.

Essentially, integrating service learning into construction-related courses involves navigating several challenges, including curriculum alignment, skill level variability, and community engagement (Queiruga-Dios, Santos, and Acosta 2021). Addressing these challenges requires strategic planning, effective communication, and a commitment to aligning service projects with both educational outcomes and community needs (Botha and Bezuidenhout, 2020).

3. Research Methodology

3.1 Research Design

This study used a quantitative research methodology to examine the experiences of second-year students in the Built Environment Department at a University of Technology in South Africa regarding the effectiveness of Service-Learning (SL) teaching methods. The research aimed to investigate the impact of SL pedagogy on students' acquisition of competences such as problem-solving and analytical thinking. This was achieved through the implementation of integrated projects that fostered active and participatory teaching methods. The study also aimed to enhance the existing information on SL pedagogy in construction-related programs offered by South African Universities of Technology, which is currently restricted.

3.2 Participant Selection

The participants in this study were chosen via purposive sampling to guarantee that they had relevant experiences with SL pedagogy. The sample comprised second-year students who were currently enrolled in the Built Environment Department at the chosen University of Technology. The selection of second-year students was made considering their substantial experience with both conventional teaching methods and SL pedagogy, ensuring a well-rounded understanding of its effectiveness. A total of n=100 students were requested to participate, assuring a representative sample of the entire student population. of the n=100 students, n=65 students completed the survey.

3.3 Data Collection Methods

The collection of data was conducted by the implementation of a well-organized survey that was given to the chosen participants. The survey was created to gather comprehensive data regarding students' anticipations, perspectives, and encounters with SL teaching methodology. The survey incorporated a combination of closed-ended and open-ended questions to collect quantitative data and allow students to express their personal perspectives and observations. The survey was disseminated electronically, guaranteeing convenient accessibility and completion for all participants.

3.4 Data Analysis Techniques

The study used quantitative analysis as a statistical method to interpret the information provided by the students. It uses the statistical techniques to understand the data presented. This technique helps the researcher to identify patterns in student's experiences and perceptions. It provides clarity with percentages to predict how variables perform. Descriptive analysis was used to summarise the data by providing key points, filtering fewer valuable data and check how variables are related.

4. Findings and Discussion

4.1 Student Expectations and Perceptions

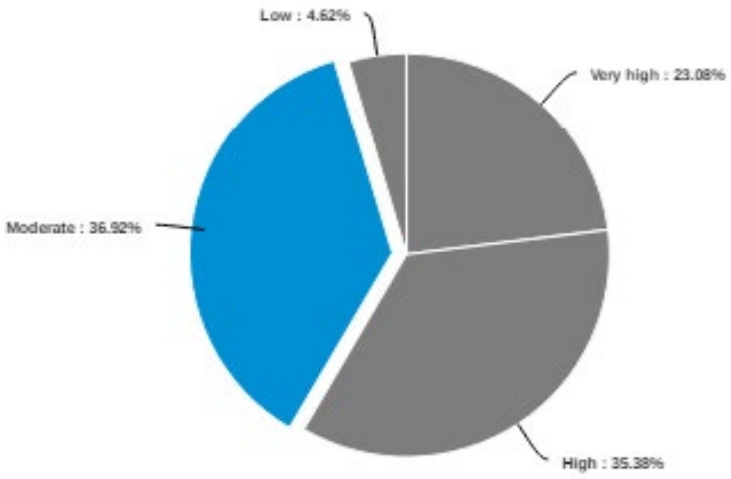

Figure 2: A chart showing student expectations and perceptions

The data indicates that a significant number of students felt unprepared for SL projects, with 41.54% unsure about their readiness and 10.77% feeling unprepared. Despite this, initial expectations for SL projects were high, with 23.08% having very high expectations and 35.38% having high expectations. Prior to participation, a substantial portion of students were either neutral (37.50%) or somewhat unfamiliar (28.12%) with the concept of service learning

The difference between preparedness and expectations suggests a gap in preparatory education for SL pedagogy. This aligns with Queiruga-Dioset al., (2021), who emphasize the need for curriculum alignment to prepare students adequately for SL projects. The high expectations indicate being aware of the potential benefits of SL, but the lack of preparedness may hinder students' ability to fully engage with and benefit from these projects. The lack of familiarity with the concept of service learning highlights the need for better integration of SL concepts into the curriculum. According to Bettencourt (2015) and Salam et al. (2019), effective SL requires that students understand its purpose and methods. Enhancing students' familiarity with SL can improve their engagement and the overall effectiveness of the pedagogy.

4.2 Development of Competences Through Service-Learning

Answer	Count	Percent	20%	40%	60%	80%	100%
Problem-solving	38	15.51%					
Analytical thinking	37	15.1%					
Teamwork	53	21.63%					
Communication skills	46	18.78%					
Leadership	22	8.98%					
Social inclusion	21	8.57%					
Lifelong learning skills	25	10.2%					
(Other	3	1.22%					
Total	**245**	**100 %**					

Figure 3: A table showing development of competences through Service-Learning

Students identified several competencies developed through SL projects, with teamwork (21.63%) and communication skills (18.78%) being the most prominent. Problem-solving (15.51%) and analytical thinking (15.10%) were also significant outcomes. These competencies align with the goals of SL, which integrates academic learning with practical skills development. Pearce, Bohmann, and Berkebile (2016) emphasize that SL projects enhance skills essential for professional practice. The competencies identified in this study reflect the practical benefits of SL, preparing students for real-world challenges in the construction industry.

4.3 Socio-Affective Factors and Transformative Learning

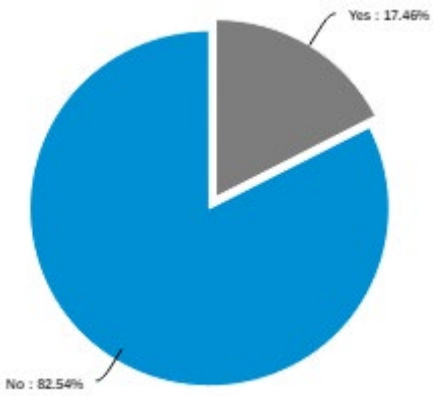

Figure 4: A chart showing socio-affective (e.g emotions and relationships) and transformative learning

While 82.54% of students reported no significant socio-affective factors impacting their learning, those who did (17.46%) mentioned issues such as mental health pressures, group conflicts, and lack of guidance. These findings underscore the importance of providing support mechanisms for students engaged in SL projects. According to Chen (2016), adequate training and support for both students and faculty are crucial for successful SL implementation. Addressing socio-affective factors can enhance the overall effectiveness of SL pedagogy and ensure positive learning experiences.

Engagement levels were high, with 52.38% of students feeling engaged and 23.81% feeling very engaged. Additionally, 30.16% of students reported that SL projects significantly encouraged self-reflection and the examination of their own contexts, beliefs, values, and attitudes. High engagement levels and the reported self-reflection indicate that SL can be a powerful tool for transformative learning. This supports the findings of Eyler and Giles (2015), who assert that SL fosters critical thinking and personal growth. The study's results demonstrate that SL projects can significantly impact students' socio-affective development, enhancing their educational experience.

Answer	Count	Percent	20%	40%	60%	80%	100%
Very Engaged	15	23.81%					
Engaged	33	52.38%					
Neutral	10	15.87%					
Disengaged	4	6.35%					
Very Disengaged	1	1.59%					
Total	**63**	**100 %**					

Figure 5: A table showing engagement levels service-learning projects

4.4 Satisfaction and Recommendation

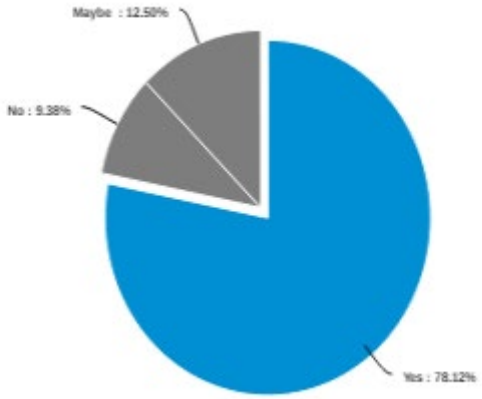

Figure 6: A chart showing the level of satisfaction

Regarding satisfaction with SL projects, 46.03% of students were satisfied, and 4.76% were very satisfied. The majority (78.12%) would recommend SL pedagogy to other students in construction-related programs. The high levels of satisfaction and willingness to recommend SL suggest that, despite challenges, students recognize the value of SL experiences. Welch and Plaxton-Moore (2019) highlight the importance of positive student perceptions in sustaining and expanding SL programs. This positive feedback supports the continued integration of SL in the curriculum.

4.5 Integration into Curriculum

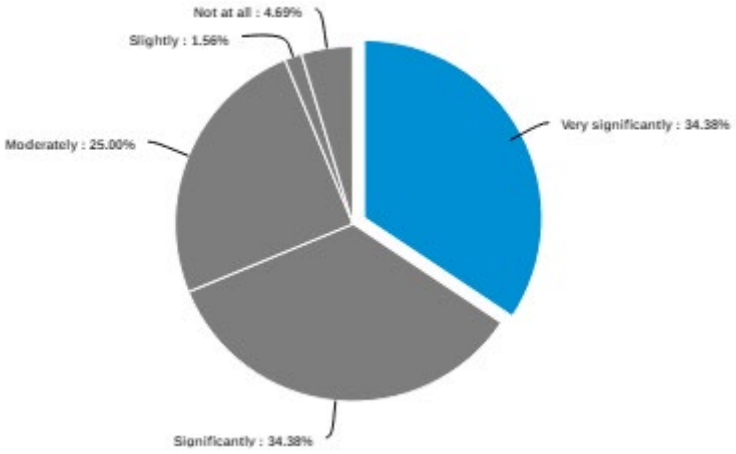

Figure 7: A chart showing integration of the curriculum

A significant portion of students (68.76%) believe that SL projects should be very significantly or significantly incorporated into other modules within their program. With student feeling the need to incorporate SL into the curriculum reflects a desire for more practical, experiential learning opportunities. Lee and Ceylan (2021) stress the importance of aligning SL projects with academic objectives to maximize their impact. The study's findings suggest that incorporating SL more comprehensively can enhance the overall educational experience, fostering critical skills and social responsibility.

5. Conclusion

This study explored how SL teaching affected second- year Built Environment students at a South African UoT. Despite high initial expectations, many students were unprepared for SL projects, but they improved their teamwork, communication, problem-solving, and analytical thinking. These skills are crucial for building success. Most students did not report significant socio-affective issues influencing their learning, but a few did mention mental health issues and group conflicts, stressing the need for support. SL's strong interactivity and self-reflection make it ideal for transformative learning. It fosters critical thinking and personal growth. Most students were satisfied with their SL experiences and supported integrating SL pedagogy into the curriculum.

Many students also supported incorporating SL projects into other classes, preferring hands-on, real-world learning. This study provides empirical evidence that SL pedagogy improves critical competencies and promotes transformational learning in construction-related programs. This research explains SL's pros and cons, helping educators and policymakers understand how it might improve education.

Future research should compare multiple South African UoTs. Service Learning (SL) should be studied throughout time to determine its effects on academic performance and professional growth. Research should also examine how to integrate SL into the curriculum. SL project community partnerships and socio-affective aspects should be examined in detail. Higher education institutions can use service learning (SL) to enhance vital skills, social accountability, and academic accomplishment to mitigate these gaps.

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