

Protocol: Service Learning Interventions Effectiveness in Tertiary Education: A Systematic Review

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Abstract

Objectives: This is a protocol for a Campbell systematic review (intervention). The objective is to gather empirical research on service learning interventions implemented in tertiary education and evaluate and synthesize the results. Specifically: (a) to examine the effectiveness of service learning interventions across a broad range of disciplines and institutions on tertiary education students' academic and learning, socio-emotional, civic, career and employment, and community outcomes; (b) to estimate how much this effect varies across the academic and learning, socio-emotional, civic, career and employment, and community outcomes; (c) to identify potential moderators of treatment effects; and (d) to identify evidence gaps with regard to the effectiveness of interventions currently in use. The importance of conducting this review lies in the fact that it covers a larger number of outcomes and follows the high-quality standards for systematic reviews supported by The Campbell Collaboration.

Keywords: Service Learning; Intervention; Impact Evaluation; Systematic Review; Tertiary Education.

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Background

Description of the Condition

Educational attainment has increased significantly among young people in response to the demands of the labour market where advanced technical and technological skills have become more essential ([Organisation for Economic Co-operation and Development \(OECD\), 2022](#)). This is reflected in the OECD's statistics whereby approximately 48% of young adults aged between 25 and 34 years had completed higher qualifications in 2021 in comparison to the 27% in 2000 ([OECD, 2022](#)). However, concerns about the relatively high unemployment rate among young people persist which suggests that education level alone is insufficient to allow young people to penetrate the labour market ([Salvatori, 2022](#)). Consequently, the [European Commission \(2020\)](#) highlighted the need to provide young people with competencies that

enable them to enter the labor market successfully and participate actively in society. In fact, competency-based learning is vital for individual and societal development and progress across the entire educational system ([OECD, 2019a; 2019b](#)).

Against this background, tertiary education is said to be an “essential vehicle” to develop the high-level skills necessary to boost students' professional, social and personal lives ([European Commission, 2020](#)). Consequently, tertiary

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education must extend beyond the preparation of qualified professionals and the generation of knowledge, with the objective of fostering the development of responsible citizens who are aware of and committed to the problems of their community (Cabedo et al., 2018). In this regard, the values of citizen responsibility, sustainable development, commitment, values of citizen responsibility, sustainable development, commitment and social action are intrinsic to professional roles. Thus, they are integral to the competencies expected of those undertaking higher education (Vallaes, 2013).

The integration of these competencies into tertiary education necessitates the implementation of high-impact instructional strategies that address these competencies (Chan et al., 2017). Currently, the prevailing mode of instruction in tertiary education is the traditional lecture-based class, which has resulted in a significant gap between the implementation of competency-based education and its widespread adoption, primarily due to its incapacity to effectively engage students in active participation (Cabedo et al., 2018; Weimer, 2013).

In this regard, alternative pedagogical methods have emerged as potential alternatives for traditional classroom instruction, including active pedagogies such as project-based learning and collaborative learning (Cabedo et al., 2018). However, for these pedagogical methods to have a significant impact on students' socio-emotional and civic competencies, it is essential not only to work with texts but also to engage with tangible experiences while maintaining active engagement with reality (Kliksberg, 2009).

In this context, service learning has been identified as a key high-impact instructional pedagogy that enhances students' learning and educational attainment, as well as their acquisition and development of a wide range of personal, social, and professional competencies (Bringle & Clayton, 2021; Furco, 2001; Kuh and O'Donnell, 2013). Studies have also found service learning to be especially effective for students whose traditional approaches to schooling have not been effective (Song et al., 2017). Through service learning, tertiary education students and the community benefit from each other through an ongoing process of reflection and action (Opazo, 2015).

In recent years, service learning has experienced significant growth. The number of service learning interventions (i.e., practices, products, policies, and programs) (What Works Clearinghouse, 2022) within tertiary education has continued to increase as more primary, secondary and tertiary institutions are adopting the practice (Cayuela et al., 2020).

The expansion of service learning in tertiary education varies by country and academic discipline (Hallinger & Narong, 2024). On the one hand, service learning has its roots primarily in the United States, where it originated, grew, and subsequently disseminated to the rest of the world (Sotelino-Losada et al., 2021). Currently, the United States remains the country with the greatest production in this field, with approximately 70% of the literature originating from that country (Hallinger & Narong, 2024; Sotelino-Losada et al., 2021).

Although research on service learning was predominantly conducted in the United States until approximately a decade ago, there has been a notable expansion of service learning interventions (Hallinger & Narong, 2024). Consequently, service learning has become pervasive in Latin America, with notable adoption in countries such as Mexico, Argentina, Chile, and Uruguay (Sotelino-Losada et al., 2021). Thus, a well-established tradition of service learning can be observed in Central and South America, largely due to the efforts of CLAYSS (Latin American Center for Service-Learning). This organization has played a pivotal role in promoting the dissemination of this pedagogy across numerous countries (Sotelino-Losada et al., 2021; Tapia, 2021). Similarly, Europe is witnessing the emergence of service learning despite its relatively late arrival on the continent. Countries such as the United Kingdom, Ireland, Spain, and Germany are at the forefront of this movement, whereas in Austria, Belgium, the Netherlands, and Portugal, service learning is still in its early stages (Sotelino-Losada et al., 2021).

In addition, the practice of service learning is emerging in Asia, particularly in China. Nevertheless, it is still regarded as a novel concept within the context of Chinese higher education (Hong et al., 2024), as is the case in Japan (Mashino, 2022). In other parts of the world, the implementation of service learning remains relatively limited, as evidenced by studies in Australia (e.g., Patrick et al., 2019), Russia (e.g., Nikolskiy, 2023), and Korea (e.g., Choi et al., 2023).

Service learning interventions can also be implemented across academic disciplines (Hallinger & Narong, 2024). As indicated by the review conducted by Salam et al. (2019), the academic disciplines that have demonstrated the greatest advancement in the implementation of service learning are health sciences and nursing. Subsequently, the most prevalent disciplines are business and economics, computer and information sciences, sociology and criminal justice, teacher training, geography and environmental studies, linguistics and communication, and artistic studies. However, the existing research does not provide a definitive conclusion, because the trend varies depending on the country in which service learning is implemented. For instance, in Europe, service learning is predominantly conducted within the social sciences, with education and business studies representing the disciplines with the most significant presence (Cayuela et al., 2020).

Considering the varying degrees of expansion of service learning in tertiary education across different disciplines and countries, it is reasonable to conclude that the benefits derived from interventions may vary depending on the specific discipline and cultural context in which the service learning takes place.

In this context, following the systematic review carried out by Filges et al. (2022) with K-12 service-learning interventions, we need to measure the effectiveness of service learning interventions in tertiary education as they pertain to individual and societal aims and efforts and service learning's potential

to meet the educational, workforce, personal, and social needs of today's students. Furthermore, Celio et al. (2011), Conway et al. (2009) and Yorio and Ye (2012) observed that much of the available research on service learning in tertiary education contains methodological weaknesses that preclude researchers and practitioners from confirming service learning's causal potential for improving the academic and learning, socio-emotional, civic, career and employment and community outcomes for tertiary education students. Therefore, it is recommendable to extend the synthesis research studies on service learning interventions' effectiveness within tertiary education. More specifically, we need to implement a type of study (i.e., systematic review with or without meta-analysis) that will allow us to identify, synthesize, and summarize the quality of the evidence on service learning in tertiary education.

Description of the Intervention

Service learning has been defined by many authors since its origin. Furco and Billig (2002), who have been referents in service learning research, defined service learning as a methodology or pedagogical method which "seeks to engage students in activities that combine both community service and academic learning" (p. 25). This experiential learning approach involves students working with community partners and applying their knowledge to address real-life problems. Thus, through service learning, students are prepared to participate in our democratic society by developing a sense of civic engagement and responsibility (Bringle & Clayton, 2021).

Focusing on tertiary education, Bringle et al. (2012) considered service learning as "a course-based, credit-bearing educational experience in which students (a) participate in an organized service activity that meets identified community needs, and (b) reflect on the service activity in such a way as to gain further understanding of course content, a broader appreciation of the discipline, and an enhanced sense of personal values and civic responsibility" (p. 38). Therefore, service learning experiences can make tertiary education responsible for community challenges and contribute to their solution (Kenny et al., 2002). Moreover, the European Observatory of Service-Learning in Higher Education (2023) emphasizes that service learning practices must be linked to the course and the program must be recognized with credits.

Service learning has been employed to describe several experiential education practices such as volunteering and community service projects, although it is essential to differentiate them from these (Furco, 1996). On the one hand, practice-based learning programs focus on learning over service, which is the case of project-based learning, field education, cooperative education, extension service placements, practicum, and internships (Bringle & Hatcher, 2007; Furco, 1996; Resch & Knapp, 2020; Santos et al., 2015;

Tapia, 2019). On the contrary, community service programs (e.g., work-study, volunteer asystematic solidarity initiatives, community outreach) place the stress mostly on the service being provided, together with the benefits that the service activities have for the community (Bringle & Hatcher, 2007; Furco, 1996; Tapia, 2019). Thus, service learning gives equal attention to both service and learning, so academic credit is not granted for the service; rather, academic credit is due to the learning that comes as a result of community service (Bringle & Hatcher, 2007; Howard, 2000). There are also pedagogical methods such as action research and community-based research in which students work on practical community issues with an emphasis on research over service (Resch & Knapp, 2020). In addition, reflection is an essential characteristic of service learning, which differentiates it from volunteering and social entrepreneurship (Furco, 1996; Resch & Knapp, 2020; Santos et al., 2015).

According to our scoping search, the core characteristics of service learning interventions that receive more support from the research community (Bringle et al., 2012; Resch & Knapp, 2020; Tapia, 2021) are as follow.

- (1) Meaningful service: Students should have the opportunity to participate in relevant activities that meet real community needs while achieving the learning objectives of the course.
- (2) Integration of learning and service: Community service is intentionally linked with academic content. Therefore, service learning is used as an instructional strategy to meet academic goals.
- (3) Reflection: Service learning incorporates critical reflection activities that elicit a profound analysis of students' self-reflection and their relationship to the community.
- (4) Students protagonist role: Service learning provides students with the opportunity to plan, implement, and evaluate the experiences with supervision.
- (5) Collaboration: Students, community partners, and tertiary education staff members should cooperate to structure experiences that benefit each other.

The additional characteristics mentioned in the literature that are relevant to service learning successful development are.

- (6) Duration: The experiences should have a significant investment of time and effort by participants (Conway et al., 2009). However, the specialized literature published to date has not provided evidence in this regard.
- (7) Diversity: Service learning should include people and circumstances that differ from students' experiences and backgrounds to promote their understanding of diversity (European Observatory of Service-Learning in Higher Education, 2023).

- (8) Pre-established legal framework: In some universities, service learning has been institutionalized, thereby providing administrative support and the necessary resources to implement service learning interventions (Klentzin & Wierzbowski-Kwiatkowski, 2022). In this regard, the institutionalization of service learning requires the provision of infrastructure, financial resources, collaborative partnerships, the establishment of coordination offices, rewards, academic credits, or certifications that are significant for their professional development (Bringle & Hatcher, 2000).
- (9) Professor's professional development and coaching: This may have been acquired through participation in training courses, attendance at forums or conferences on service learning, or involvement in the implementation of other interventions. This enables the professor to be aware of other service learning interventions and resources for implementing service learning and to develop interdisciplinary professional relationships (Bringle & Hatcher, 1996).
- (10) E-service learning, which incorporates instruction, service, or a combination of both, in an online environment (Waldner et al., 2012).
- (11) Students tutoring assisted service learning combines tutoring (i.e., a methodology in which one more knowledgeable person helps another) with service learning, with the objective of enhancing the outcomes of university students. The tutor provides active support to assist the learner in acquiring knowledge and skills. Both the tutor and student benefit from the intervention (Topping et al., 2017).
- (12) International service learning: Encompasses experiences undertaken in a different country, where students engage in organized service. Students can learn from cross-cultural dialogues with others and reflect on their experiences. Such experiences should be approached in a way that allows for further understanding of the course content, global and intercultural issues, the host country and the discipline, enhancing a sense of responsibility as citizens, both locally and globally (Bringle et al., 2012).

An illustrative example of an intervention is the study conducted by Beling's (2004) in which university students participated in a service-learning course on geriatric rehabilitation. This intervention was in accordance with the high-quality standards in service learning interventions: (a) meaningful service: a needs assessment was conducted by the students in collaboration with the community partner. Subsequently, they designed and implemented a program on geriatric rehabilitation for seniors at various senior centers; (b) integration of learning and service: the students developed the projects as part of the geriatric rehabilitation course, which is a component of a postgraduate program in physiotherapy.

Furthermore, they conducted comprehensive research in geriatric rehabilitation and collaborated with a social entity to provide services to the elderly; (c) reflection: the students kept a reflective journal in which they documented their experiences and related their experiences through class discussions; (d) student protagonist role: the students selected the senior center with which they wished to collaborate, conducted an analysis of its needs, and designed and implemented the project; and (e) collaboration: the students collaborated with community partners in the needs analysis and subsequently during the intervention.

How the intervention might work

Tertiary education is constantly evolving, and the elaboration and transmission of knowledge require special sensitivity to social changes. Service learning has been identified as a pedagogical method that facilitates the development of competencies in democratic and plural societies based on the relationship between the curricular content of each discipline and community service (Folgueiras-Bertomeu et al., 2013; Housman et al., 2012; Stokamer, 2011; Wang, 2011).

From a philosophical perspective, service learning draws on the writings of Brazilian educator Paulo Freire and American educator John Dewey. On the one hand, Dewey (1938) posited that the primary objective of education should be the cultivation of a learner's judgment, which is a fundamental competency for the effective functioning of a participatory democracy. Dewey believed that students learn by taking an active role in social situations. Therefore, the interconnection between individual cognition and the social context is fundamental for preparing students to participate in social life. In this sense, both service learning and Dewey's theory emphasize the importance of civic participation in transforming society into a community that is more inclusive. Consequently, educators should take advantage of opportunities provided by the community to teach curricular content. On the other hand, Freire (1970) asserted that education is a process of empowerment. He advocated for ambitious educational goals, including political transformation through literacy, critical reflection, and collective social action. Freire further proposed that schools should function in society to promote more participatory, curious, and critically aware citizens. In this context, Freire's theory serves as a theoretical anchor for service learning, advocating for a reduction in the distance between education and society and an increase in civic participation among students. For both authors, education should build on past student experiences to connect new learning to their previous experiences and to provide students with the increased skills necessary to participate in democracy. Service learning can accomplish this by providing students with experiences that increase civic engagement and better prepare them to participate in their communities.

From an educational and psychological viewpoint, service learning is a form of experiential learning that builds upon

Lewin's field theory (1951), Vygotsky's theory of social constructivism (1978), Lave and Wenger's more recent situated learning theory (1991), and particularly Kolb's model of experiential learning (1984). In his field theory, Lewin proposes that human behavior is determined by interdependent forces within a particular social context (Lewin, 1951). Similarly, Lave and Wenger's situated learning theory suggests that optimal learning occurs when individuals engage in real-life contexts (Lave & Wenger, 1991), and Vygotsky's theory posits that learning is facilitated through social interaction and support (Vygotsky, 1978). These theories are reflected in the practice of service learning, which involves students actively engaging in learning by interacting with and adapting to real-life situations. Through active participation in community projects, students can modify their attitudes and broaden their knowledge, thereby contributing to community improvement. Kolb reduced Dewey's six-step model into a four-stage cyclical process: abilities attained by the student through concrete experience, followed by reflective observation, abstract conceptualization, and active experimentation. These four stages form the core elements of a service learning experience: students participate in a service experience through reflection and integrate abstract concepts

learned in the classroom to better actively understand their experience. In this context, the learner also must: be actively involved in the experience, reflect on the experience, use analytical skills to conceptualize and better understand the experience, and possess the skills necessary to use the experience as a springboard to test new ideas. Under the service learning model, faculty guide students through both reflection and application of class content to help students maximize their service experience.

From a neurobiological standpoint, experiential learning works, according to Zull (2002), because the four basic functions of the brain (i.e., getting information -sensory cortex-, making meaning of information -back integrative cortex-, creating new ideas from these meanings -front integrative cortex-, and acting on those ideas -motor cortex-), approximately aligns with Kolb's learning cycle (i.e., gathering, analyzing, creating, and acting). Therefore, when we ask students to engage in high-quality service learning, we require them to use each of the four regions of their brains to connect content.

From the social change sustainability perspective, Furco (1996) and Seifer (1998) argued that the service learning approach requires faculty, students, and community partners

Figure 1

Logic Model Diagram

RESOURCES	ACTIVITIES	OUTPUTS	OUTCOMES
Tertiary education staff (e.g., teachers). Tertiary education students Tertiary education program (e.g., medicine, nursing, engineering). Tertiary education infrastructure and resources Community organizations and partners Community infrastructure and resources	PREPARATION Service-learning intervention planning and design (e.g., identify the types of community needs or activities that are most closely aligned with the curriculum content). Community needs analysis (e.g., research, interviews with community members). Collaborative design for community service (e.g., creation of resources, design of activities, planning, integration of theories, concepts and methods from different disciplines into practical activities). ACTION Critical reflection activities about the service experience and curricular content (e.g., journals, forums, portfolios, experience analysis sessions). Collaborative activities with the community partners (e.g., teamwork with peers, teachers, community partners, problem solving).	OBSERVED PRODUCTS Students engage in: - X number of hours during learning curricular contents. - X number of hours during service Students collaborate with community agents to solve real problems. Successful implementation of the collaborative activities.	SHORT TERM Improved understanding of theoretical concepts and community knowledge. Enhanced student motivation. Community satisfaction. MID-TERM Enhanced: - Academic and learning outcomes. - Socio-emotional outcomes. - Civic outcomes. - Employability and professional readiness for students. LONG TERM Empowered communities. New infrastructures. Career and employment outcomes. Networks between community and tertiary education.

to collaborate to help shape both the service and learning experience, which goes beyond the technical or individual development focus of other forms of experiential learning, contributing to a more engaged civic sector and lasting social change. It also contributes to students' engagement in peer exchange and teamwork, which are increasingly necessary skills for today's workforce and civic engagement.

The contextual and structural factors that can influence service learning include resources (program inputs), activities (aspects of implementation), outputs (observable results), and outcomes (impact within various time frames), as illustrated in [Figure 1](#).

Description of the Outcomes

Several outcomes have been associated with service learning. Based on our scoping search, these outcomes can be classified into five categories.

- (1) Academic and learning outcomes: These include changes in cognitive processes and academic performance, including knowledge acquisition, the ability to apply knowledge, cognitive processes, and motivation to learn ([Conway et al., 2009](#)). Service learning is an effective pedagogical approach that engages students and improves their understanding of real-life problems. In this sense, when students are confronted with real-life problems, they can apply their theoretical knowledge and analytical thinking in way that facilitates more effective problem-solving. Furthermore, the service learning experience facilitates a more profound comprehension and practical application of the theories and course concepts acquired in the classroom. Such outcomes can directly enhance student motivation and cognitive processes, which in turn impact learning outcomes and grade point averages ([Salam et al., 2019](#)).
- (2) Socio-emotional outcomes: These types of outcomes include a set of skills that facilitate the expression, regulation, and comprehension of thoughts, emotions, and behaviors in routine circumstances and interactions with others ([Schoon, 2021](#)). Service learning offers a distinctive opportunity to apply social and emotional competencies in authentic contexts. In these interventions, students are exposed to a diverse range of individuals, which elicits a spectrum of affective responses that may differ from those they would typically exhibit in their daily lives. Consequently, students are required to adapt their practices in line with their emotional states and the perspectives of others. These intricate processes prompt students to engage in novel situations, which in turn facilitate their social and emotional growth ([Gordon et al., 2022](#)).
- (3) Civic outcomes: These include the capacity to act as responsible citizens and to engage actively in civic and social issues ([European Commission, 2019](#)). Service learning affords students the opportunity to engage with authentic social challenges. Such direct exposure and active involvement may enhance awareness, comprehension, and engagement with social and political issues ([Flores, 2018](#)).
- (4) Career and employment outcomes: These include a range of skills and attitudes essential for effective professional performance. Service learning bridges the gap between higher education institutions and communities, thus preparing students for the future workplace. In this way, students are presented with authentic scenarios in their professional settings, where they are required to collaborate with other stakeholders to resolve complex issues. Considering these considerations, service learning can prove advantageous in the development of future workplace competencies, which can extend the span of an individual's professional career ([Salam et al., 2019](#)).
- (5) Community outcomes: These outcomes include the impact of service learning on the community in which the service is being performed. Service learning interventions are designed to provide services for the common good. Therefore, any service learning intervention should first conduct a community needs analysis to identify potential opportunities and propose service learning interventions that will benefit the local population. Consequently, upon the conclusion of the service learning intervention, the community should have accrued a range of benefits, which vary according to the nature of the service provided ([Salam et al., 2019](#)).

Why it is Important To Do This Review

[Table 1](#) presents 10 reviews of service learning research in tertiary education. Although all reviewers have made significant contributions to the field of service learning, none of the reviews fully met the high-quality standards set by [The Campbell Collaboration \(2021\)](#).

For example, [Eyler et al. \(2001\)](#) attempted to synthesize the literature about service learning in higher education by (merely) summarizing and grouping the findings from 1993 to 2000, including all of the literature published until this year without following a specific search strategy. In this line, [Holsapple \(2012\)](#) included 55 studies from 1998 to 2010 that used qualitative, quantitative, and mixed research methodologies, including those that showed the effects of service learning interventions on diversity outcomes. Thus, both groups synthesized almost all the literature without identifying the best available research.

Other narrative reviews have followed a more rigorous procedure and have failed. [Taggart and Crisp \(2011\)](#) included

Table 1*Summary of the previous reviews of service learning in tertiary education*

Authors and year of publication	Objectives	Number of studies	Review type	Outcome type
Marcilla- Toribio et al. (2022)	Synthesize the currently available evidence on the use of service learning in the nursing education setting	22 from 2002 to 2020	Integrative review	Educational and non educational outcomes
Gordon et al. (2022)	Understanding the features of service learning programs that support development of empathy among students through systematically assessing the extant literature has the potential to advance theoretical conceptualization of the relationship between service learning, empathy, desirable attitudes, skills, and behaviors, and most importantly the praxis of service learning in higher education	35 studies published before 2020	Meta-analysis and meta-synthesis	Empathy development
Salam et al. (2019)	Answer the following research questions, i.e. (1) to what extent service learning is adopted in different academic disciplines in higher education? (2) what are the emerging issues for service learning integration in higher education curriculum? (3) what are the limitations of current service learning frameworks? (4) what are the potential outcomes of service learning pedagogy?	133 studies published from 2000 to 2018	Systematic literature review	Benefits for students, faculty members and community members
Yorio and Ye (2012)	Explore the overall effect that service-learning has on its expected learning outcomes and to explore some potential differences in the application of service-learning programs and research, which may help to explain some of the variance in research findings	40 studies published between 1993 and 2010	Meta-analysis	Cognitive development, understanding of social issues and personal insight
Holsapple (2012)	Determine the impact students' diversity outcomes of participating in service learning programs	55 studies from 1998 to 2010	Review	Diversity outcomes
Warren (2012)	Clarify the relationship between service-learning and student learning outcomes by considering unpublished literature and distinguishing between self-reported and concrete measures of learning such as exams and other assignment scores. Additionally, this meta-analysis only examines studies comparing service-learning and non-service learning students' learning outcomes	11 studies between 1993 and 2008	Meta-analysis	Learning outcome
Taggart and Crisp (2011)				

(continued)

Table 1*(continued)*

Authors and year of publication	Objectives	Number of studies	Review type	Outcome type
	Review and critique empirical work done to date specific to service learning experiences at the community college level	17 studies before 2009	Narrative review	Students success, attitudes, and satisfaction
Conway et al. (2009)	Meta-analyze the existing evidence on (a) extent and types of change in participants in service learning programs; (b) specific program elements (moderators) that affect the amount of change in participants; and (c) generalizability of results across educational levels and curricular versus non-curricular service	103 studies	Meta-analysis	Academic or learning outcome, personal outcome, social outcome and citizenship outcome
Novak et al. (2007)	Determine the impact on learning outcomes that have the inclusion of service learning on students	Studies from 1994 to 2002	Meta-analysis	Cognitive outcomes
Eyler et al. (2001)	Not available	Studies from 1993 to 2000	Narrative review	Personal, social, learning, career development, relationship with institution, processes and context and on communities

17 empirical studies before 2009 that also used quantitative, qualitative, and mixed methods, but without a precise description of the search procedures followed. [Salam et al. \(2019\)](#) conducted a narrative review of 133 studies published from 2000 to 2018 following the PRISMA guidelines for search strategy, selection criteria, study selection, and analysis. [Marcilla-Toribio et al. \(2022\)](#) published an integrative review of 22 studies on nursing students from 2002 to 2020. All of them established broad inclusion and exclusion criteria, evaluating the impact of service learning on particular outcomes without excluding studies with low internal and external validity (e.g., pre-post comparisons without a control group).

Other systematic review studies like [Gordon et al. \(2022\)](#), included 35 qualitative and quantitative studies published before 2020 that focused on empathy development as an outcome of service learning interventions. Although the interventions selected followed the key principles of service learning, course-based, credit-bearing, community needs, and student reflection, they actually analyzed all quantitative papers based on pre-post measures, without setting more stringent and rigorous requirements. [Yorio and Ye \(2012\)](#) identified 40 studies published between 1993 and 2010, considering the characteristics of service learning interventions and quantitative studies that contained the statistical information necessary to compute the effect size on at least one outcome variable. The study included both control

comparison and pre-post research designs. [Warren \(2012\)](#) conducted 11 studies between 1993 and 2008 that included experimental and control or comparison groups in their methodological design. Despite their purpose, the researchers only reported the effects of service learning interventions on learning outcomes. [Conway et al. \(2009\)](#) study's purpose was to meta-analyze the existing evidence on (a) the extent and types of change in participants in service learning programs; (b) specific program elements (moderators) that affect the amount of change in participants; and (c) generalizability of results across educational levels and curricular versus non-curricular service. They included a total of 103 studies in their meta-analysis, although from the methodological research quality perspective, they did not include an experimental and control comparison group or evidence of equivalence at baseline on key variables. [Novak et al. \(2007\)](#) performed a meta-analysis assessing service learning's impact on cognitive outcomes using data from nine studies conducted from 1994 to 2002. This study did not include a clear inclusion and exclusion criteria (only included, the studies needed to quantitatively measure cognitive outcome and report sufficient statistical information to allow the calculation of an effect size), an explicit search strategy, or systematic coding and analysis.

In conclusion, we intend to provide a better understanding of the potential benefits and limitations of service learning for students by adopting a more rigorous criteria for including,

evaluating and synthesizing the results from published and unpublished research investigations and evaluation studies across different academic fields and across a wide range of outcomes.

Objectives

The main goal of this review is to gather empirical research about service learning interventions implemented in tertiary education and evaluate and synthesize the results using systematic research review standards recommended by Campbell Collaboration. The specific objectives are: (a) to examine the effectiveness of service learning interventions across a broad range of disciplines and institutions on tertiary education students' academic and learning, socio-emotional, civic, career and employment, and community outcomes; (b) to estimate how much this effect varies across the academic and learning, socio-emotional, civic, career and employment, and community outcomes; (c) to identify potential moderators of treatment effects; and (d) to identify evidence gaps with regard to the effectiveness of interventions currently in use.

Methods

Criteria for Considering Studies for This Review

Types of Studies

The included studies will be restricted to rigorous or moderately rigorous research designs, including randomized controlled trials and quasi-experimental comparison group study designs, allocated at either the individual level or cluster level. Random assignment or matching with appropriate adjustments for any pre-test differences (e.g., analyses of covariance) will qualify for inclusion. Pretest data will have to be provided unless studies used random assignment and there were no indications of initial inequality. Studies have to have at least two professors to reduce the risk of teacher effects in single-teacher/class studies (Slavin et al., 2014). Additionally, studies have to include at least 30 students in each group (Bloom, 2003) to reduce bias related to non-normal distribution of variables. If pretest scores are not available, other standardized tests given at pretest or contemporaneously will be accepted as covariates to control for initial differences in outcomes.

Studies without control or comparison groups, such as single group pre-post designs and ex post facto designs, will be excluded.

The level of assignment may be in universities, faculties, degrees, classes, professors, or students. Analyses must consider clustering into account, or researchers will add adjustments for clustering adapted from What Works Clearinghouse (2017).

We will not include qualitative studies. The review will not include research other than that estimating intervention

effects. In this regard, qualitative portions of quantitative studies will not contribute to the objectives of this review.

Studies will be limited to those published in English, Italian, or Spanish (given the evaluation team's existing expertise). No restrictions will be implemented based on date, geography, publication status, or type of publication.

Types of Participants

Eligible participants for this review include all tertiary education students with any level of enrollment whether undergraduate or postgraduate students: (a) International Standard Classification of Education (ISCED) 5: Short-cycle tertiary education; (b) ISCED 6: Bachelor's degree or equivalent tertiary education level; (c) ISCED 7: Master's degree or equivalent tertiary education level; and (d) ISCED 8: Doctoral degree or equivalent tertiary education level.

There will be no ethnicity or cultural restrictions for inclusion.

Types of Interventions

Service learning interventions are practices, products, policies, programs, projects, experiences, actions, and/or activities that link community services to an academic curriculum. More specifically, eligible interventions will be those: (a) that address real community needs, with the tertiary education institution as part of the community (meaningful service), (b) being implemented during the academic course or curriculum, with clearly stated learning objectives (integration of learning and service), (c) include the service and the learning activity, taking place inside or outside the classroom, on the Internet or outside the country or a combination of them (integration of learning and service), (d) voluntary or mandatory (integration of learning and service), (e) involving students in drawing lessons from the service through regularly scheduled (student protagonist role), organized reflection or critical analysis (reflection), (f) incorporating cooperation between students, community partners and tertiary education staff members (collaboration), and finally, (i) generating at least one of the study outcomes.

No restrictions will be placed on the duration of service learning intervention.

No restrictions will be placed on intervention settings other than the service learning experiences offered by tertiary education institutions.

Types of Outcome Measures

Primary Outcomes

According to our scoping search, the primary focus will be on academic and learning outcomes (Cayuela et al., 2020; Celio et al., 2011; Conway et al., 2009; Eyler et al., 2001; Filges et al., 2022; Kilgo et al., 2015; Marcilla-Toribio et al., 2022; Novak et al., 2007; Salam et al., 2019; Taggart & Crisp, 2011; Warren, 2012; White, 2001; Yorio & Ye, 2012): Academic performance (i.e., grade point average, achievement

test scores, attendance, dropout, retention, repetition, and graduation), problem solving (i.e., skills to finding solutions to problems), critical thinking (i.e., ability to analyze, assess, and extend arguments), moral reasoning (i.e., ability to determine whether an action is right or wrong), self-regulated learning (i.e., ability to understand and control one's learning), sense of belonging to the university or college community (i.e., feeling of belonging to the community and feeling an important member of it), and academic attitude or motivation (i.e., students' perception and opinion after their participation on service learning interventions). All primary outcomes should be measured through standardized, formal and/or objective quantitative procedures, usually a questionnaire, an official report, a structured interview and/or a content task.

Secondary Outcomes

A secondary focus will be on the following outcome measures:

Socio-emotional outcomes (Cayuela et al., 2020; Celio et al., 2011; Collaborative for Academic et al., 2023; Conway et al., 2009; Eyler et al., 2001; Filges et al., 2022; Gordon et al., 2022; Holsapple, 2012; Marcilla-Toribio et al., 2022; National Commission on Social et al., 2019; Salam et al., 2019; Taggart & Crisp, 2011; White, 2001; Yorio & Ye, 2012): Self-awareness (i.e., skills to recognize one's own emotions, thoughts, values and how they affect behavior, while fostering an adequate self-perception –self-concept, self-esteem, self-efficacy– and confidence in one's own abilities –growth mindset), social awareness (i.e., skills to develop empathize with and understand the perspective of others, from diverse contexts and cultures, including defending one's own ideas without belittling others), self-control (i.e., ability to manage one's impulses and emotions effectively in different situations, handling stress appropriately, delaying gratification, including motivation –resilience, will, discipline, perseverance, organizational, and planning strategies– to achieve personal and collective goals and objectives), relationship skills (i.e., ability to establish and maintain healthy, supportive relationships and interact effectively with others –active listening, empathetic communication, seeking and offering help, conflict resolution, resisting negative social pressure, and working in groups), responsible decision-making (i.e., ability to consider ethical, safety and social factors when making decisions, including the assessment of the consequences of actions and personal well-being and that of others, in addition to identifying problems, proposing solutions and implementing actions that contribute to improving the immediate environment), risk behavior (e.g., drug and alcohol use, violent behavior, sexual risk taking, problem gambling) and well-being (i.e., the degree to which a person is fully functioning physically, mentally, and socially, associated with the realization of one's true potential).

Civic outcomes (Cayuela et al., 2020; Celio et al., 2011; Conway et al., 2009; Eyler et al., 2001; Salam et al., 2019;

Syvrtsen et al., 2015; Taggart & Crisp, 2011; Tedeschi et al., 2021; White, 2001): civic attitude (i.e., student's disposition toward or opinions about diversity, the environment, community, community involvement, and the importance of helping others), civic behavior (i.e., community-focused actions a student has taken, intends to take, or has expressed interest in taking), civic-related skills (i.e., student's skills, personality disposition, and competencies related to civic readiness), civic/political knowledge (i.e., student's content knowledge about the policies, processes, and historical events of the nation), political attitude (i.e., student's sense of responsibility to engage in the political process; opinions on what constitutes a good citizen; attitudes toward media; and disposition toward or opinions about the government and its institutions, policies, processes, and leadership), and political behavior (i.e., the politically focused actions a student has taken, intends to take, or has expressed interest in taking).

Career and employment outcomes (Choo et al., 2019; Hoka et al., 2016; Yorio & Ye, 2012): career exploration (i.e., learning impact, career aspirations, or career development), and career preparation (i.e., career goals, decision-making, or readiness for the workplace).

Community outcomes (Eyler et al., 2001): services, infrastructures, human capital, community networks, community empowerment, self-awareness, attitudes, engagement, satisfaction, etc., measured through standardized, formal, and/or objective quantitative procedures, such as questionnaires and/or structured interviews.

All secondary outcomes should be measured through standardized, formal, and/or objective quantitative procedures, usually a questionnaire, an official report, a structured interview, and/or a content task.

Studies will only be included if they consider at least one of the primary outcomes. If it is not clear from the description of outcome measures in the studies whether they are standardized, we will use electronic sources to determine whether a measure was standardized or not.

Search Methods for Identification of Studies

Electronic Searches

Following Campbell guidance on searching for studies (Kugley et al., 2016) and based on the review during scoping search, a comprehensive and diverse search strategy will be used to search the relevant studies in a series of electronic databases. However, if additional relevant databases are identified through our search process, we will consider searching these as well.

The following key electronic databases will be searched.

- (1) Science Citation Index Expanded (via Web of Science).
- (2) Social Science Citation Index (via Web of Science).

- (3) Arts & Humanities Citation Index (via Web of Science).
- (4) Korean Journal Database (via Web of Science).
- (5) MEDLINE (via Web of Science).
- (6) Preprint Citation Index (via Web of Science).
- (7) SciELO Citation Index (via Web of Science).
- (8) APA PsycExtra (via Proquest).
- (9) APA PsycInfo (via Proquest).
- (10) EconLit (via Proquest).
- (11) Nursing & Allied Health Database (via Proquest).
- (12) Periodicals Archive Online (via Proquest).
- (13) Periodicals Index Online (via Proquest).
- (14) Academic Complete (via Proquest).
- (15) ProQuest Central (via Proquest).
- (16) ProQuest One Business (via Proquest).
- (17) Psychology Database (via Proquest).
- (18) Education Database (via Proquest).
- (19) Education Resources Information Center (ERIC) (via Proquest).
- (20) Environmental Science Database (via Proquest).
- (21) International Bibliography of the Social Sciences (via Proquest).
- (22) Library Science Database (via Proquest).
- (23) Linguistics Database (via Proquest).
- (24) Political Science Database (via Proquest).
- (25) Public Health Database (via Proquest).
- (26) Applied Social Sciences Index & Abstract (via Proquest).
- (27) Social Science Database (via Proquest).
- (28) Sociological Abstract (via Proquest).
- (29) Sociology Database (via Proquest).
- (30) Scopus.
- (31) The Philosopher's Index (via OvidSP).
- (32) Social Work Abstracts (via OvidSP).
- (33) Ovid Nursing Database (via OvidSP).
- (34) Art & Architecture Complete (via EBSCOhost).
- (35) Business Source Complete (via EBSCOhost).
- (36) CAB Abstracts (via EBSCOhost).
- (37) CINAHL Complete (via EBSCOhost).
- (38) Education Source (via EBSCOhost).
- (39) Humanities Full Text (via EBSCOhost).
- (40) Library, Information Science & Technology Abstracts (via EBSCOhost).
- (41) PSICODOC (via EBSCOhost).
- (42) SPORTDiscus with Full Text (via EBSCOhost).
- (43) Teacher Reference Center (via EBSCOhost).
- (44) REDINED (<https://redined.educacion.gob.es/xmlui/>).
- (45) ISOC (<https://indices.csic.es/>).
- (46) Redalyc (<https://www.redalyc.org/>).
- (47) Dialnet (<https://dialnet.unirioja.es/>).

The search strategy will be modified according to the specifications of each electronic database. In addition, when possible, synonyms and wildcards will be applied as appropriate. The search terms and standardized subject terms reflect the criteria for

considering studies for this review in section “Criteria for considering studies for this review” and try to strike a balance between sensitivity (i.e., finding all articles in a topic area) and specificity (i.e., finding only relevant articles). We consulted information specialists at the University of Granada and the ERIC Thesaurus to select search terms and standardized subject terms.

For electronic databases with advanced search functions, we will classify search terms and standardized subject terms according to two categories (i.e., types of interventions and settings), which will be combined by the Boolean operator “OR” within each category and by “AND” between categories. The search terms will be applied to the title, abstract, and keywords (indexing) search fields.

- (1) Types of interventions: (“service learning” OR “e-service learning” OR “community learning” OR “experiential learning” OR “experiential education” OR “practical learning” OR “competency-based learning” OR “competency-based teaching”).
- (2) Types of settings: (tertiary OR “higher education” OR “higher learning” OR universit* OR college* OR “postsecondary”).

In addition, standardized subject terms will be searched specifically in each electronic database with advanced search functions.

For electronic databases with basic search functions, we will adjust the search terms and standardized subject terms due to the limited functionality of search functions. The search strategies will be based on keyword (natural language) searches and controlled vocabulary searches (i.e., we will identify standardized subject terms in each electronic database). For electronic databases that do not allow the combination of keywords-controlled vocabulary, separate keyword searches and controlled vocabulary searches will be conducted. Detailed search strategies for each database will be included in the appendix of the final review.

Electronic database limits or filters will not be used

The complete search string example is provided below for ERIC database (via ProQuest): (TI,AB (“service learning” OR “e-service learning” OR “community learning” OR “experiential learning” OR “experiential education” OR “practical learning” OR “competency-based learning” OR “competency-based teaching”) OR mainsubject. Exact (“service learning” OR “experiential learning”)) AND (TI,AB (tertiary OR “higher education” OR “higher learning” OR universit* OR college* OR postsecondary OR “post secondary” AND mainsubject. Exact (“higher education” OR “universities” OR “undergraduate students” OR “undergraduate study” OR “graduate students” OR “graduate study” OR “doctoral programs” OR “masters programs” OR “colleges” OR “college outcomes assessment” OR “college instruction” OR “college programs” OR “college curriculum” OR “college preparation” OR “college faculty” OR “college bound students” OR “college students” OR “college graduates” OR

“college attendance” OR “postsecondary education as a field of study” OR “postsecondary education”).

Searching Other Resources

Hand Search of Journal Relevant to the Topic

Most service learning studies are published in peer-reviewed research journals that are not included in the aforementioned key electronic databases. Therefore, to identify the most current peer-reviewed service learning articles, it is essential that we also search the peer-reviewed research journals in which service learning researchers are publishing their work. In this sense, the search will also include scanning the tables of the contents of the following key journals on service learning for the last 10 years period will be covered.

- (1) Collaborations: A Journal of Community-Based Research and Practice.
- (2) Engaging Pedagogies in Catholic Higher Education.
- (3) Engaged Scholar Journal: Community-Engaged Research, Teaching, and Learning.
- (4) International Journal for Service Learning in Engineering, Humanitarian, Engineering and Social Entrepreneurship.
- (5) International Journal of Civic Engagement and Social Change.
- (6) International Journal of Research on Service-Learning and Community Engagement.
- (7) International Journal of Research on Service-Learning in Teacher Education.
- (8) Journal of Community Engagement and Higher Education.
- (9) Journal of Community Engagement and Scholarship.
- (10) Journal of Higher Education Outreach and Engagement.
- (11) Journal of Service Learning in Higher Education.
- (12) Metropolitan Universities Journal.
- (13) Michigan Journal of Community Service Learning.
- (14) Partnerships: A Journal of Service-Learning and Civic Engagement.
- (15) Reflections.
- (16) The International Undergraduate Journal for Service-Learning, Leadership, and Social Change.
- (17) Transform, - Transform: The Journal of Engaged Scholarship (previously known as Australasian Journal of University-Community Engagement).
- (18) Undergraduate Journal of Service Learning and Community-Based Research.

Hand Search of Reference Lists of Previous Studies and Reviews

We will hand-search the reference lists of all studies meeting the inclusion criteria and the reference list of

previous reviews (i.e., Cayuela et al., 2020; Conway et al., 2009; Eyler et al., 2001; Gordon et al., 2022; Holsapple, 2012; Marcilla-Toribio et al., 2022; Novak et al., 2007; Salam et al., 2019; Taggart & Crisp, 2011; Warren, 2012; Yorlío & Ye, 2012).

Likewise, we will search those selected websites to find other reviews included in the following institutions' websites, and networks focusing on evidence-based research: American Institutes for Research (<https://www.air.org/>), Centre for Longitudinal Studies (<https://cls.ucl.ac.uk/>), Centre for Review and Dissemination (<https://www.york.ac.uk/crd/>), Community College Research Center (<https://ccrc.tc.columbia.edu/>), Education Commission of the States (<https://www.ecs.org/>), Education Development Center (<https://www.edc.org/>), Evidence for Policy Practice Information and Coordinating Centre (<https://eppi.ioe.ac.uk/cms/>), Evidence for Every Student Succeeds Act (<https://www.evidenceforessa.org/>), IZA World of Labor (<https://wol.iza.org/>), Lumina Foundation for Education (<https://www.luminafoundation.org/>), MDRC (<https://www.mdrc.org/>), RAND Corporation (<https://www.rand.org/>), Social Science Research Network (<https://www.ssrn.com/index.cfm/en/>), The Best Evidence Encyclopedia (<https://bestevidence.org/>), The Campbell Collaboration (<https://www.campbellcollaboration.org/>), Cochrane Library (<https://www.cochranelibrary.com/>), and What Works Clearinghouse (<https://ies.ed.gov/ncee/wwc/>).

In addition, hand-searching and citation chasing will be performed using software such as PaperFetcher or Citationchaser.

Conference Proceeding

The search will include conference proceedings and books indexes available via the Web of Science (i.e., Conference Proceedings Citation Index-Science; Conference Proceedings Citation Index-Social Science & Humanities; Book Citation Index-Science; Book Citation Index-Social Sciences & Humanities), although some of the electronic databases mentioned above are likely to include conference proceedings (e.g., APA PsicoExtra, ProQuest Central, Ebook Central, ERIC via Proquest, REDINED, Dialnet). Moreover, the following key conference abstracts and proceedings will be hand-searched to identify any potentially relevant studies for the last 10 years: (a) the European Conference on Service-Learning in Higher Education (<https://www.easlhe.eu/conference/>); (b) the National Service-Learning Conference (<https://nylc.org/slc/>); (c) the International Association for Research on Service-Learning and Civic Engagement Annual Conference (<https://www.iarslce.org/conferences/>); and (d) the International Conference on Advances in Service-Learning Research organized by the American Educational Research Association (<https://www.aera.net/SIG041/Key-Initiatives>). However, if the conference abstracts and proceedings are not available on the conference website, they will be requested by email to those responsible.

Dissertations and Theses

Dissertations and theses will be found by searching on ProQuest Dissertations & Theses Global (via ProQuest), although some of the electronic databases mentioned above also index dissertations and theses (e.g., APA PsicoExtra, ProQuest Central, ERIC via Proquest, OpenDissertations via EBSCOhost, REDINED, Dialnet). In addition, the following dissertations and theses search resources will be searched: Open Access Theses and Dissertations (<https://oatd.org/>), E-theses Online Service (ETHOS) (<https://ethos.bl.uk/>), Networked Digital Library of Theses and Dissertations (NDLTD) (<https://ndltd.org/>), and TESEO (<https://www.educacion.gob.es/teseo/irGestionarConsulta.do>).

Contact with Experts in the Field

We will contact the first authors of selected articles through email to identify any remaining studies that we may have missed. Electronic mailing lists will also be used (e.g., the National Youth Leadership Council Website, International Association for Research on Service-Learning and Community Engagement, the European Observatory of Service Learning in Higher Education, the Asociación de Aprendizaje-Servicio Universitario [University Service-Learning Association], or the European Association for Service-Learning in Higher Education).

Scholarly Search Engines

Additional search methods will include a general search using Google Scholar (<https://scholar.google.com/>) to identify additional studies. Advanced search options will be used to refine the gray literature search strategy. The first 50 hits from Google Scholar will be searched. Google Scholar will also be used for citation chasing.

Open Access Search Engines

We will conduct a grey literature search of resources such as the Directory of Open Access Repositories (<https://www.jisc.ac.uk/opensoar>), National Technical Information Service (<https://www.ntis.gov/>), CONnecting Repositories (<https://core.ac.uk/>), and Bielefeld Academic Search Engine (<https://www.base-search.net/>).

Ongoing Research

Moreover, the search will also include ongoing research through sources such as the Community Research and Development Information Service (<https://cordis.europa.eu/>), National Bureau of Economic Research Working Papers (https://www.nber.org/papers?page=1&perPage=50&sortBy=public_date), and Research Papers in Economics (<https://repec.org/>).

Government Documents

We will conduct a selected website search to identify government publications: United Nations Educational, Scientific, and Cultural Organization (UNESCO) (<https://www.unesco.org/en/publications>),

European Commission (https://research-and-innovation.ec.europa.eu/knowledge-publications-tools-and-data_en), Institute of Education Sciences (<https://ies.ed.gov/>), OECD (<https://www.oecd.org/en.html>), and Policy Commons (<https://policycommons.net/>).

Organizations, Institutions, and Networks' Websites

The websites of several relevant organizations, institutions and networks will be searched, including the American Educational Research Association (Experiential Education and Community Engagement: Scholarship and Practice SIG) (<https://www.aera.net/SIG041/Experiential-Education-and-Community-Engagement-Scholarship-and-Practice>), America's Service Commissions (<https://www.statecommissions.org/>), Asociación de Aprendizaje-Servicio Universitario (University Service-Learning Association) (<https://www.apsuniversitario.org/>), Campus Compact (<https://compact.org/>), Campus Engage (<https://www.iua.ie/ourwork/university-societal-engagement/>), Center for Information and Research on Civic Learning & Engagement (<https://circle.tufts.edu/>), Centro Latinoamericano de Aprendizaje y Servicio Solidario (Latin American Center for Solidarity Service-Learning) (<https://www.clayss.org/>), Centro Promotor de Aprendizaje y Servicio Solidario en Cataluña (Promotion Center for Service-Learning in Catalonia) (<https://aprenentatgeservei.cat/>), Centro Promotor del Aprendizaje y Servicio Solidario en Euskadi (Promotion Center for Service-Learning in Euskadi) (<https://www.zerbikas.es/>), CIVIS (<https://civis.eu/es>), Community Campus Engage Canada (<https://ccecanada.ca/>), Community-Wealth.org (<https://community-wealth.org/>), Corporation for National & Community Service (<https://www.americorps.gov/>), Engagement Australia (<https://engagementaustralia.org.au/>), European Association for Service-Learning in Higher Education (<https://www.easlhe.eu/>), European Observatory of Service Learning in Higher Education (<https://www.eoslhe.eu/>), Fundación Tomillo (Tomillo Foundation) (<https://tomillo.org/>), International Association for Research on Service-learning and Community Engagement (<https://www.iarslce.org/>), National Youth Leadership Council (<https://nylc.org/>), Observatório da Responsabilidade Social e Instituições de Ensino Superior (Observatory for Social Responsibility and Institutions in Higher Education) (<https://www.orsies.forum.pt/>), Red Española de Aprendizaje Servicio (Spanish Service-Learning Network) (<https://www.aprendizajeservicio.net/>), Red Iberoamericana de Aprendizaje-Servicio (Iberoamerican Network of Service-Learning) (<https://www.clayss.org/redes/red-iberoamericana-aprendizaje-servicio/>), Red Mexicana de Aprendizaje y Servicio Solidario (Mexican Network of Service-Learning and Solidarity Service) (<https://www.ayssmexico.org/>), Red Nacional de Aprendizaje Servicio Chile (National Chilean Network of Service-Learning) (<https://www.rease.cl/>), Reti di Service-Learning (Italian Network of Service-Learning) (<https://eis.lumsa.it/internazionalizzazione/reti-di-service-learning>), Stiftung

Lernen Durch Engagement Verbindet (Service-Learning in Deutschland) (<https://www.servicelearning.de/>), Service-Learning Asia Network (<https://su.edu.ph/slan/>), Service-Learning Education Engaging with Community (<https://www.sleec.org/>), Talloires Network of Engaged Universities (<https://talloiresnetwork.tufts.edu/>), The Association for Experiential Education (<https://www.aee.org/>), and Youth Service America (<https://ysa.org/>).

Finally, if additional relevant resources are identified through our search process, they will be included in the complementary search.

Search terms will be adjusted according to the specifications of each website, resource, and open-access engine. Websites, resources, and open-access engines limits or filters will not be used.

Data Collection and Analysis

Primarily, randomized controlled trials and quasi-experimental comparison group study designs will be included, although we are aware of the difficulties faced by many studies to meet these methodological prerequisites. Methodological adequacy will also be assessed according to the risk of bias model described in the section “Assessment of risk of bias” that will allow us to distinguish between studies with different degrees of risk. To determine the impact of the risk of bias, studies coded as medium and high risk will be further analyzed through sensitivity analyses.

Selection of Studies

The screening process will be completed using Covidence, an online platform for systematic reviews, or any other equivalent available software. The first screening will consist of eliminating duplicates and studies that are obviously not relevant (e.g., studies that are not evaluations of a service learning intervention) based on the title and abstract. The deduplication and screening of results will be conducted using Covidence by the first author. Studies that are not eliminated in this screening phase will be located and the full text read by two review authors in the second screening stage of the process. At this stage, the two review authors will independently decide on their final inclusion. Any disagreement in this screening process will be resolved by consensus and referral to a third review author, if needed.

We will include a PRISMA study flow diagram (Page et al., 2021) in the full review to document the screening process and a table with the summary characteristics of the excluded studies.

Data Extraction and Management

For all studies eligible for this review, after the aforementioned screening process, two review authors will independently extract data from all included studies using an Excel data collection form (Appendix 1). In case of inconsistency in the extracted data, or discrepancies and

disagreements, discussion and consensus will be used to overcome differences.

The following data will be extracted.

- (1) Contextual features: Full study reference, publication year, country, publication status, publication type, and founding source.
- (2) Intervention characteristics: Students protagonist role, meaningful service, reflection, integration of learning and service, collaboration, duration, service learning model implemented, students tutoring assisted service learning, diversity, type of participation, pre-establish legal framework, type of higher education institution, scope, discipline, via, and bearing-credit course.
- (3) Methodological characteristics: study design, sampling, randomization, clustering, and unit of assignment.
- (4) Sample characteristics: sample size by groups, sample composition/characteristics, number of clusters by groups, age, grade level, degree year, gender, race/ethnicity, and socio-economic status.
- (5) Outcome measures: definition of the outcome, the instrument used to measure the outcome and measurement time. The key outcomes of this review are the quantitative measures of service learning outcomes (see section “Types of outcome measures”). In one study, multiple outcomes may be observed in multiple domains. All study outcomes will be coded for inclusion. For each outcome analysis in each study, student sample sizes, cluster sample sizes, and the intra-class correlation coefficient (when available) will be coded for cluster studies, and the effect size for each outcome analysis will be calculated and recorded. The effect sizes will be calculated in terms of Hedges’ *g*.

Assessment of Risk of Bias in Included Studies

To assess the risk of bias, we will use the Risk of Bias in Non-randomized Studies of Interventions (ROBINS-I) (Sterne et al., 2016) and the Risk of Bias 2 (RoB 2) (Sterne et al., 2019). The ROBINS-I tool enables the estimation of the efficacy (harm or benefit) of an intervention in quantitative studies that did not employ randomization to assign units (individuals or groups of individuals) to comparison groups (Sterne et al., 2016). In this regard, studies will be classified into the following categories: (a) low risk of bias; (b) moderate risk of bias; (c) serious risk of bias; (d) critical risk of bias; and (e) no information. Consequently, the decision to include or exclude a study in the analysis will be contingent upon the degree of risk of bias that the study has achieved. The RoB 2 tool allows the examination of potential sources of bias

across multiple domains in randomized controlled trials. It classifies randomized trials as having low risk, high risk, or “some concern of” risk of bias.

Two review authors will independently assess the risk of bias in the included studies. Discrepancies will be resolved by a third review author.

Measures of Treatment Effect

The statistic used to measure the treatment effect will be the effect size. The effect size quantifies the difference in outcome between the treatment and control groups in terms of standard deviations. Data from each individual study will be standardized to allow the results across studies to be pooled meaningfully. The effect size calculation will depend on the type of data presented in each individual study (Lipsey & Wilson, 2001). More specifically, we will calculate mean differences effect sizes in terms of Hedges’ g when all studies utilized the same measurement scale, or the standardized mean difference in terms of Hedges’ g (i.e., the difference between adjusted posttest scores for treatment and control students, divided by the pooled standard deviation of unadjusted posttest scores for treatment and control, and with a correction applied for small sample sizes) (Hedges, 1981) when studies used different scales, with 95% confidence intervals, for continuous data. Odds ratios with a 95% confidence interval will be calculated for dichotomous data.

Following the recommendations of Pigott and Polanin (2020), we will estimate the mean effect size and its confidence interval using random-effects models with robust variance estimation. Furthermore, we plan to limit the use of shifting units of analysis when studies report multiple effect sizes. Also, if a study includes more than two intervention arms, the review will include only intervention and control groups that meet the eligibility criteria. In case the results are conceptually different, they will be analyzed separately. Researchers will use robust variance estimation in a single analysis of an overall construct if the studies report multiple effect sizes for a single construct.

Unit of Analysis Issues

Unit of analysis issues refer to clustering issues (individuals randomized/allocated in clusters). In this sense, if any clustered research designs are uncovered in the analytic sample of studies, we will seek direct estimates of the effect from an analysis that accounted for the cluster design. When the analysis in a cluster trial does not account for the cluster design, we will add adjustments for clustering adapted from What Works Clearinghouse (2017).

Dealing With Missing Data

In cases where not all relevant data are reported, we will first attempt to infer the information through an alternate source or seek the information in other reports of the same study. If after performing these actions, the data are still unavailable or insufficient, missing data will be collected by

contacting the study authors. In case these efforts are exhausted and the data are still unavailable, we employ, if possible, multiple imputation procedures following Pigott and Polanin’s (2020) recommendations. Then, we will evaluate the potential risk of bias introduced by missing data in our assessment of risk of bias and explore the impact of risk of bias through sensitivity analyses. These additional robustness checks should provide some indication of how missing data may have affected our findings.

Assessment of Heterogeneity

We will quantify heterogeneity using model-based between- and within-variance estimates and 95% prediction intervals around the average effect size. Prediction intervals provide a clear way to understand the range of impacts in meta-regression (Borenstein et al., 2009, 2017). With sufficient studies, we will use meta-regression to examine potential moderators of the effect.

Assessment of Reporting Biases

Selection bias due to either selective reporting of outcomes or study publication bias is a serious problem with important implications. If our review systematically misses studies or outcomes, it threatens the validity of the meta-analytic findings. To determine to what extent this is a concern, we will apply the Vevea and Hedges correction, which produces a mean effect size adjusted for potential publication bias as well as a log-likelihood test that denotes whether publication bias is a concern (Veeva et al., 2019). Likewise, we will use funnel plots to display the information about possible publication bias if we find sufficient studies (i.e., at least 10 studies are available for the meta-analysis) (Higgins et al., 2011).

Additionally, we will use a contour-enhanced funnel plot (Peters et al., 2008) and (modified) Egger’s test (Rodgers & Pustejovsky, 2021).

Data Synthesis

We plan to use a correlated and hierarchical effects (CHE) model with robust variance estimation (RVE) to account for the two types of dependencies between effect sizes (Hedges et al., 2010; Pustejovsky & Tipton, 2022) for each type of registered outcome. The main advantage of this approach is that it allows us to estimate true heterogeneity both within and between studies using restricted maximum likelihood (REML) and to guard against model misspecification. Based on Pustejovsky and Tipton (2022), we assume a correlation of $\rho = 0.60$ for effect sizes nested in studies to estimate the CHE model. We will conduct sensitivity analyses by varying the correlation value to investigate how this assumption affects the results. We will apply the small-sample adjusted t-test with Satterthwaite approximation (Tipton, 2015). If the Satterthwaite degrees of freedom are below 4, the probability of a Type I error rises well above 0.05 (Fisher & Tipton, 2014). Consequently, we will deem estimates with degrees of freedom less than 4 to be unreliable. Stata Statistical

Software: Release 18 will be used to conduct the analysis (StataCorp, 2023).

First, we will quantify heterogeneity using model-based between- and within-variance estimates and 95% prediction intervals around the average effect size. If we find large heterogeneity, we will use multiple meta-regression to explore the effects of potential moderators.

However, if the number of studies included is small and a CHE model is not suitable, then we will calculate an average study effect size and use a fixed-effects meta-analysis for each outcome, before implementing a narrative synthesis to weave the evidence together in a structured approach following Popay et al. (2006).

Subgroup Analysis and Investigation of Heterogeneity

Multiple meta-regression will be used to test the effects of potential moderators. We will code potential moderators following the MUTOS approach (Becker, 2017): (a) methods characteristics (i.e., sample size, study design, publication status, publication type, funding source); (b) unit of the sample population (i.e., student grade level, student degree year, student gender, student race/ethnicity, student socio-economic status); (c) treatment characteristics (i.e., duration of the intervention, bearing-credit course, pre-establish legal framework, students tutoring assisted service learning, professor professional development and coaching, diversity, specific service learning model implemented, type of participation); (d) outcome measures (time of the outcome assessment relative to the intervention to gauge short- and long-term effects); (e) setting (i.e., country, discipline, type of higher education institution, via, scope).

The MUTOS categories and covariates included in modeling the heterogeneity will be.

- (1) Methods: study design.
- (2) Units: student grade level, student gender, student socio-economic status.
- (3) Treatments: duration, bearing-credit course, pre-establish legal framework, students tutoring assisted service learning, professor professional development and coaching, diversity, specific service learning model implemented, and type of participation.
- (4) Outcomes: academic and learning, socio-emotional, civic, career and employment, and community outcomes.

First, a null model will be fitted, followed by a second model with all covariates (Methods) and finally, we will test four separate models including the Methods covariates plus a group of moderators for each UTOS category. The moderators will be grand-mean centered to facilitate the interpretation of the intercept as the adjusted average effect size. The variables from the UTOS models that will be statistically significant ($p < 0.05$) or marginally statistically significant ($p < 0.10$) will

be added in a combined model that also includes Methods covariates.

We may not be able to test some characteristics that we planned to explore for several reasons. First, missing covariate data may preclude the inclusion of moderators in the model to explore heterogeneity. Second, in the case of multicollinearity, we will select the moderators that are more relevant to be included in the models for heterogeneity, explaining any deviation from the protocol.

Sensitivity Analysis

After completing our null model and meta-regression, we will conduct sensitivity checks to assess how robust our findings are. Because multivariate meta-regression models require an assumed correlation between effect size estimates within each study, we will re-run the models using alternate specifications of this correlation (rather than the assumed correlation of 0.6, we will use values varying from 0.2 to 0.9). We will investigate inconsistencies and potential explanations due to specific studies or effect sizes. In addition, we will test how robust our findings are using different assumed values for the intra class correlation coefficient when adjusting the effect sizes and variances of clustered studies, without the inclusion of extreme outliers (more than two standard deviations from the mean), and for unequal sample sizes in studies that did not provide sample size breakdowns by condition (rather than assuming equal sample sizes).

Reporting of the sensitivity analysis process will be summarized.

Author Contributions

The team is well suited to conduct the review. The team's expertise is summarized as follows. Content: Andrew Furco, Mirian Hervás-Torres, Francisco D. Fernández-Martín, and Jose L. Arco-Tirado. Systematic review methods: Patricia Ayllón-Salas, Mirian Hervás-Torres, Francisco D. Fernández-Martín, and Jose L. Arco-Tirado. Statistical analysis: Francisco D. Fernández-Martín, Jose L. Arco-Tirado, and Marta Pellegrini. Information retrieval: Patricia Ayllón-Salas, and Mirian Hervás-Torres. The protocol was developed by Patricia Ayllón-Salas, Mirian Hervás-Torres, Francisco D. Fernández-Martín, Marta Pellegrini, Jose L. Arco-Tirado, and Andrew Furco.

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Declaration of conflicting interests

The authors declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article:

Andrew Furco is a referent in the field of service learning and has published some of the first studies in the field, which have included the development of some of the instruments that have been standardized and used in other studies on service learning. Thus, there is a high probability that one or more studies to which he has contributed, or studies that have incorporated aspects of his research, will meet the criteria of the proposed systematic review and be included in the review. To ensure that there is no conflict of interest, Furco will not be involved in the eligibility decisions related to the studies.

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Appendix

Appendix I. Excel data collection form

Full reference	
Publication year	
Study design	RCT = randomized controlled trial; CRT = cluster controlled trial; QECG = quasi-experimental comparison group
Randomized	Choose between Yes = 1/No = 0
Clustered	Choose between Yes = 1/No = 0
Unit of assignment	Choose from the list who is assigned to the experimental and control group. Specify if universities = 1, classes = 2, professors = 3, students = 4, or others = 5
Number of treatment clusters	Expressed in number; be sure to enter the number of the analytical sample after attrition
Number of control clusters	Expressed in number; be sure to enter the number of the analytical sample after attrition
Total number of clusters	Expressed in number; be sure to enter the number of the analytical sample after attrition
Intra-class correlation coefficient	Expressed in number (when available) for cluster studies
Number of treatment group participants	Expressed in number; be sure to enter the number of the analytical sample after attrition
Mean of the treatment group	Expressed in number
SD of the treatment group	Expressed in number
Number of control group participants	Expressed in number; be sure to enter the number of the analytical sample after attrition
Mean of the control group	Expressed in number
SD of the control group	Expressed in number
Total number of participants	Expressed in number; be sure to enter the number of the analytical sample after attrition
Effect size	Expressed in number for each outcomes analysis
Instruments	Specify which instrument was used to measure the outcome
Participant characteristic	Age, grade level, degree year, gender, race/ethnicity, socio-economic status
Students' protagonist role	Code yes if students were involved in planning, implementation, and/or evaluation process of the program
Meaningful service	Specify what the real community needs are addressed
Reflection	Specify the type of reflection activity reported
Integration of learning and service	Description of service learning activities
Collaboration	Specify community partners and tertiary education staff members involved
Duration	Number of weeks, one semester, one school year Number of learning hours at the tertiary education institution Number of community service hours per week/month
Professor professional development and coaching	Code yes if there is professor professional development and coaching: Participation in training courses, attendance at forums or conferences on service learning, or involvement in the implementation of other interventions
Service learning model implemented	Specify the service learning model implemented
Students tutoring assisted service learning	Code yes if service learning intervention include students tutoring assisted service learning
Diversity	Code yes if service learning intervention include people and circumstances different from students' experiences and backgrounds
Type of participation	Voluntary or mandatory
Type of outcome	Choose between academic and learning, socio-emotional, civic, career and employment and community outcomes
Outcome measure	Express in number the time of the outcome assessment relative to the intervention to gauge short- and long-term effects
Setting	Specify country, discipline, type of higher education institution, via (virtual vs. physical), scope (national vs. international)
Publication information	Specify the publication status, publication type, and funding source
Pre-establish legal framework	Code yes if there is a pre-establish legal framework for service learning
Bearing-credit course	Code yes if the service learning intervention is part of a credit-bearing course
Issues/Notes	