

Review

A Keyword Co-Occurrence Analysis of Research on Service Learning: Conceptual Foci and Emerging Research Trends

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Abstract: Although a significant body of research has accumulated on service learning over the past seven decades, to date, no reviews have analyzed the entire multi-disciplinary literature. Thus, scholars lack systematic documentation of the scope of this literature, its thematic structure, and topical foci. This bibliometric review aimed to document these features of the service learning knowledge base. The review analyzed 5615 Scopus-indexed documents on service learning published between 1950 and 2022 through citation, co-citation, and keyword co-occurrence analyses. The analyses uncovered thematic and empirical foci associated with the theory, implementation, and effects of service learning. The review identified engineering education and problem-based learning as related topics of significant interest. In recent years, educators have increasingly experimented with the integration of other active teaching and learning methods into service learning programs. This review suggests that future research examine service learning from the perspectives of public policy, stakeholder engagement, and educating for sustainability. The field would also benefit from additional theorizing on the features that distinguish service learning from other active learning pedagogies.

Keywords: service learning; experiential learning; active learning; engineering education; problem-based learning; bibliometric review; science mapping



Citation: Narong, D.K.; Hallinger, P. A Keyword Co-Occurrence Analysis of Research on Service Learning: Conceptual Foci and Emerging Research Trends. *Educ. Sci.* **2023**, *13*, 339. <https://doi.org/10.3390/educsci13040339>

Academic Editor: James Albright

Received: 31 January 2023

Revised: 20 March 2023

Accepted: 20 March 2023

Published: 25 March 2023



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1. Introduction

Over the past half-century, educators have been challenged to develop teaching and learning methods capable of fostering deeper student understanding of disciplinary content knowledge [1–3]. This has led to experimentation with a range of active learning methods, including problem-based learning [2,4], project-based learning [5–7], simulations and serious games [8–10], flipped classrooms [11,12], and service learning [3,13,14]. Although research finds that each of these pedagogical approaches has the potential to enhance student understanding and application of conceptual knowledge [4,6,9,12], only service learning explicitly espouses the additional goals of shaping the social responsibility of students and impacting the well-being of communities [13,15–17]. Moreover, these unique goals of service learning have gained additional legitimation during the United Nations Decade of Education for Sustainable Development [4,18].

The term ‘service learning’ first emerged in the 1950s to describe forms of experiential education that explicitly promoted voluntary student engagement in their communities [3,14,19]. In 1990, the National and Community Service Act of the United States [20] defined service learning as a pedagogy by which students learn through active civic participation in school-organized service activities that address the needs of their communities [20,21]. In 2009, the Serve America Act enacted by the United States Congress legitimated an infrastructure designed to enhance education quality and foster community service by students throughout the United States [20]. Service learning was explicitly mentioned in this act as a vehicle for achieving these goals [22].

During the decades since its emergence in the 1950s, service learning has developed into a well-recognized pedagogy that integrates community service within the curriculum frameworks adopted in primary, secondary, and tertiary education [13]. Rather than focusing solely on preparing students with the knowledge and skills needed for success in a particular profession, service learning also addresses the broader intellectual, moral, and civic goals of education [13,23]. Service learning supports the development of engaged citizens who appreciate their responsibility and potential for enhancing the quality of life in their communities [14,23,24]. Moreover, as indicated above, the aim of serving the communities where students study and live distinguishes service learning from other methods of active learning [16,25,26].

Research has also highlighted the positive effects of service learning on faculty mentors, educational institutions, and communities [27–31]. With respect to faculty, existing research has investigated faculty satisfaction [32–36], faculty commitment to research [29], and faculty rewards and barriers [36–40]. In terms of educational institutions, scholars have examined service learning in relation to institutional commitment [35,38,41,42], program availability [35,38,41,42], student retention [43,44], and community relationships [29,38,45]. Research on communities has examined community satisfaction [29,32,33,38], the benefits of service learning [29,32,33,38], and community-institution partnerships [29,38]. Nonetheless, research within these domains remains limited when compared with the body of studies that have examined the effects of service learning on students [27–31].

Systematic reviews of research have consolidated findings from research on service learning conducted within specific disciplines and educational levels [46–49]. Nonetheless, to date, no comprehensive reviews of research have analyzed the full multi-disciplinary literature on service learning. Thus, the field lacks clarity with respect to the conceptual, empirical, and topical foci of the full knowledge base on service learning without regard to subject or educational level.

This gap in the knowledge base suggests the timeliness of a comprehensive review of the full multi-disciplinary literature on service learning. The following research questions guided this review.

1. Which conceptual and empirical research foci have gained influence in the knowledge base on service learning that has accumulated from the 1950s through 2022?
2. Which topics have attracted the greatest attention from scholars over time, and which topics represent the ‘research front’ in the literature on service learning?

This review employed the bibliometric review method, which is suited to the goals of documenting and analyzing trends in a field of study comprised of a large corpus of documents [50,51]. This review identified 5615 Scopus-indexed documents published on service learning between 1950 and 2022 as the database for the review (Supplementary Materials). Bibliometric analyses addressed the research questions through co-citation and keyword co-occurrence analyses [52,53].

The contributions of this bibliometric review arise from its analysis of the literature on service learning encompassing different educational levels and subject domains. This enabled the review to illuminate broad trends in the research foci of scholars across the full spectrum of service learning research and practice. This contrasts with prior reviews, which employed relatively small document samples [46,54], focused on research at a single educational level [24,55,56], or limited the review to a single discipline [47,57]. Thus, the findings from this review offer a broader perspective on the accumulated knowledge base, provide benchmarks that can be compared empirically in future decades, and outline key foci for future research on this pedagogical approach.

2. Methods

Whereas other methods of research review (e.g., scoping, integrative, meta-analytical) tend to synthesize research findings, bibliometric reviews are distinguished by their goals of documenting and visualizing structural and relational features of the accumulated knowledge base in a discipline or topic of inquiry [50,54]. Bibliometric review methods

have been widely used to model the evolution of concepts and identify topics studied in a field of inquiry [52,58]. For example, bibliometric reviews have tracked the development of research on simulation-based learning [10] and problem-based learning [59], as well as broader sub-fields, such as education for sustainable development [60] and educational leadership and management [61]. Thus, this approach to research review was deemed suitable for the goal of analyzing conceptual and topical trends in the full literature on service learning.

2.1. Identification of Documents

Scopus was chosen as the source of documents in this review. While some systematic reviews employ multiple databases, limitations imposed by the VOSviewer software used for data analysis in this review meant that the authors were limited to data extracted from a single document index. Scopus was chosen as the document source rather than the Web of Science due to its significantly greater coverage of published literature in the field of education [61]. For example, a recent review of research on educational administration found that a document search conducted in the Web of Science omitted seven out of the 10 core international journals in the field [61]. Moreover, comparative analyses have shown that although most documents indexed in the Web of Science can also be found in Scopus, the reverse is not true [61–63].

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework [64] was used to track the filtering and screening of documents (see Figure 1). Systematic reviews often must rely on keyword combinations to identify the full set of relevant documents. However, in this review, the topical focus on ‘service learning’ was so distinctive that a single search term was employed.

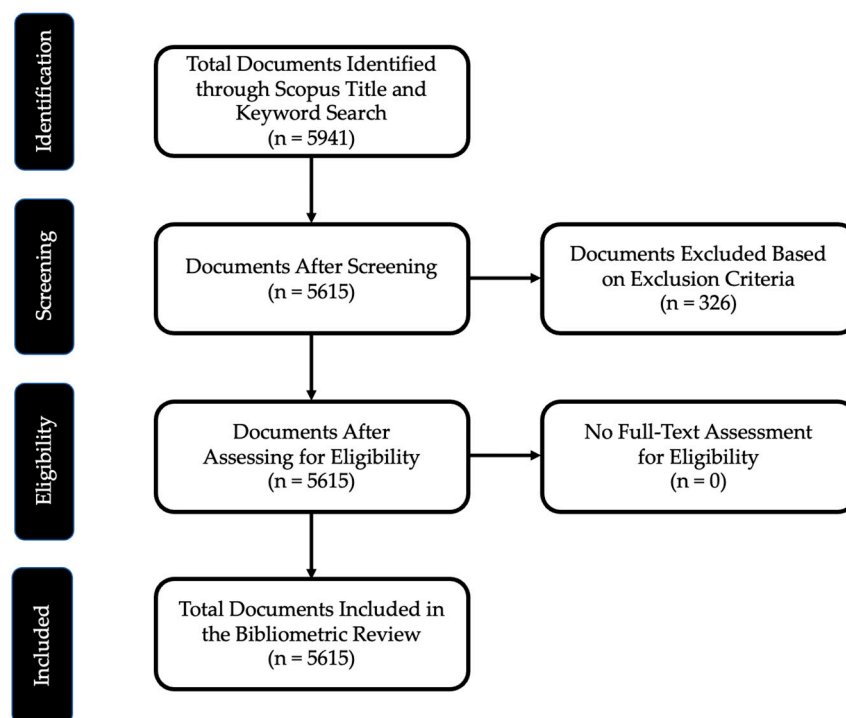


Figure 1. Identification of Sources for the Review of Service Learning [64].

An open-ended search (i.e., without restrictions of time, geographies, or document type) applied the search terms ‘service learning’ OR ‘service-learning’ OR ‘service-based learning’ to the ‘keywords’ OR ‘document title’ fields in the Scopus search engine. The initial search produced a list comprised of 5941 documents.

Scopus filters were used to limit the document list to peer-reviewed journal articles, reviews, books, book chapters, and conference papers. Although books, book chapters, and

conference papers are not always subjected to the same quality controls as journal articles, the authors wished to source as much of the literature as possible. While bibliometric reviews do not require the researcher to read every article, an examination of key documents is always necessary. Thus, it was decided to limit the list to English-language documents. Finally, Scopus filters were used to exclude documents published in 2023 (see Figure 1).

Next, the documents in the Scopus list were screened for relevance. Surprisingly, no documents were excluded. This unusual result was due to the uniqueness of the search term (i.e., service learning). The final document list consisted of 5615 Scopus-indexed journal articles, reviews, books, book chapters, and conference papers.

2.2. Data Analysis

Bibliographic meta-data associated with the Scopus list were exported into comma-separated values (CSV) file on 1 January 2023. Next, the data were 'cleaned' through a process of 'data disambiguation' [65]. Because bibliometric reviews analyze bibliographic meta-data (e.g., author names, document names, keywords, citations) rather than research findings, 'ambiguities' in the dataset must be identified and eliminated [66]. For example, keyword data associated with the documents in this review included alternate forms of numerous keywords; for example, 'service learning' or 'service-learning' and 'student' or 'students'. Unless these ambiguities were addressed prior to data analysis, the results would lack accuracy. The authors addressed this issue by creating a 'thesaurus file' [65], which included instructions for the analytical software to replace all instances of one keyword (e.g., service-learning) with another (e.g., service learning).

The review used VOSviewer software version 1.6.18 [67] for data analysis. The first research question on the conceptual and empirical foci of the knowledge base was addressed through a combination of document citation and co-citation analyses. Document citation analysis yielded the number of times that each document in the review database had been cited by other Scopus documents. The table of highly-cited documents refers to 'Scopus citations'; this highlights the fact that citation counts are specific to the database from which the documents were extracted. For example, Scopus citation counts are typically larger than those derived from the Web of Science due to differences in the relative size of the indexes [62].

Citations are often used in bibliometric studies as a metric that signifies scholarly influence [51,68,69]. Notably, citation analysis has not only been used to identify influential documents but also to gain insight into key research trends that emerge within a body of knowledge [70,71]. That is, documents that are frequently cited in the literature tend to reflect important foci of scholars working on the topic of inquiry. Thus, in this review, document citation analysis was used first to identify the most highly cited documents and then to synthesize their distinguishing conceptual and empirical foci.

Co-citation analysis, conducted in the VOSviewer software [67], was next used as a complementary means of gaining insights into the knowledge base on service learning. Co-citation analysis examines the frequency with which documents have been cited in 'the reference lists of documents in the review database' [51]. Notably, because co-citation analysis tracks citations in the reference lists of the review documents, the results are more far-reaching than those of citation analysis, where both the cited and citing documents are limited to the Scopus index.

Thus, for example, in this review, co-citation analysis identified influential documents that were neither indexed in Scopus nor written on the topic of service learning. For example, this analysis revealed the influence of John Dewey's [72,73] theoretical treatise on experiential learning, published 15 years prior to the publication of the first Scopus-indexed documents on the topic of 'service learning'. This feature of co-citation analysis has been widely used to gain insights into the theoretical literature that scholars working in a field of inquiry frequently reference [51].

The second research question was addressed using keyword analyses conducted in VOSviewer [52,53,58]. Keyword analysis was conducted in three related steps. First, basic

keyword analysis was used to identify the most frequently occurring author-selected and indexed keywords. This analysis offered insights into the service learning ‘topics’ that have attracted the greatest attention from scholars.

Second, keyword co-occurrence analysis (co-word analysis) was conducted in VOSviewer in order to visualize the relationships of keywords or topics to one another [52,53,58]. Co-word analysis is a text-mining technique that analyzes the ‘co-occurrence’ of pairs of keywords in the review documents [53]. This analysis assumes that keywords that frequently appear together (i.e., co-occur) in the same review documents bear a relationship to one another. In this review, VOSviewer software was used to create a network map that visualized both the frequency of keyword occurrence and patterns of co-occurrence.

VOSviewer generates a co-word map through a multi-step process. In step one, VOSviewer tracks the frequency with which pairs of keywords appear in the same review documents (i.e., co-occurrence). For example, take the keywords ‘service learning’ and ‘curriculum’. Each time that VOSviewer found that these two keywords were associated with the same review document (i.e., co-occurrence), they would accrue a ‘link’. The frequency of these ‘links’ is interpreted as a measure of relationship or similarity [53].

In the next step, VOSviewer creates a matrix comprised of the number of ‘links’ between all pairs of co-occurring keywords extracted from the document database. These data are then used to generate a map that ‘visualizes the similarities’ (VOS) among the keywords in the literature. VOSviewer employs a technique that aims, “to locate items in a low-dimensional space in such a way that the distance between any two items reflects the similarity or relatedness of the items as accurately as possible” [74] (p. 2407). A distinct advantage of using maps generated by VOS lies in the clarity of visualized relationships and the resulting ease of interpretation compared with maps generated by other bibliometric software programs. This kind of ‘science map’ has been used to identify thematic clusters that emerge within disciplines and topical domains over time [51,52,58,61].

Finally, ‘temporal co-word analysis’ was used to highlight the evolution of research foci in the literature on service learning. In temporal co-word analysis, VOSviewer tracks the frequency of occurrence of keywords in conjunction with the publication dates of the documents from which they were extracted [53,65]. More specifically, the software tracks the publication dates (i.e., year) of all of the documents that featured a given keyword. The software then calculates the mean year of occurrence for the keyword across the resulting timeline and assigns a temporally-ordered color to the keyword node of the map. Darker-colored nodes are associated with topics studied in the earlier literature, and lighter-colored nodes with topics in the more recent literature.

For example, assume that the keyword ‘psychological aspect’ was extracted from 18 documents published during the 1980s, 52 documents during the 1990s, 18 in the 2000s, and 10 in the 2010s. The mean year of its occurrence might be sometime in the late 1990s. The temporal map would then associate this keyword with a dark color, thereby indicating that it tended to appear during the earlier period of this literature.

In contrast, assume that ‘international service learning’ was not associated with any review documents published prior to 2000 but appeared in 10 documents published during the 2000s and 34 between 2010 and 2022. If the mean year of this keyword’s occurrence was 2017, the software would assign international service learning a light color (e.g., yellow) on the map, thereby indicating that it was a topic of recent interest among scholars.

Temporal co-word analysis has been used both to track the topical evolution of the literature as well as to identify the ‘research front’. Keywords that were associated with documents whose publication dates were weighted toward the present were interpreted as comprising the ‘research front’ in this literature [51,75,76]. This analysis was used to identify emergent topical foci in the multi-disciplinary literature on service learning.

3. Results

3.1. Descriptive Analysis

The 5615 Scopus-indexed documents identified for this review represent a large body of formal knowledge on service learning. The review database included journal articles and research reviews (68%), conference proceedings (18%), book chapters (13%), and books (1%). Social sciences (47%), science, technology, engineering, and mathematics (STEM) (17%), and healthcare (14%) made up 78% of the literature. Interest in this active learning pedagogy emerged slowly between 1950 and 1990 (10 documents). However, after 1990, the growth trajectory began to accelerate with the publication of 187 and 1279 documents during the 1990s and 2000s, respectively. Remarkably, over 70% of the literature on service learning has been published since 2010 (4139 documents). These trends indicate that disciplinary interest in service learning is quite diverse and that interest in its use is growing very rapidly.

3.2. Conceptual and Empirical Research Foci in Service Learning Research

The first research question sought to reveal influential conceptual and empirical foci through the analysis of highly cited and co-cited documents in the literature.

3.2.1. Document Citation Analysis

Table 1 shows that the 20 top-cited service learning documents featured a range from 134 to 761 Scopus citations. This magnitude of Scopus citation impact is significantly smaller than was previously reported in reviews of research on problem-based learning [59] and simulations and games [10]. More specifically, comparable analyses of the 20 top-cited documents identified a range of 461 to 4118 citations in the literature on problem-based learning [59] and 271 to 1653 citations for the 20 top-cited documents on simulations and games [10].

As shown in Table 1, service learning publications from the education field [77,78] have accumulated the most citations. Other fields represented in this list include political science [21,79], engineering [80], business [81,82], and healthcare [83]. Analysis of the top-cited documents offers additional empirical support for the conclusion that service learning is being in a wide range of subjects [43,78,84,85].

The distribution of the top-cited documents by 'type' revealed eight conceptual, six empirical, four review, and two commentary papers. This balance suggests that the service learning literature is not only grounded in theory but also includes significant empirical studies worthy of frequent citation. The presence of research reviews bolsters the conclusion that substantial empirical literature has accumulated in this field of research and practice.

Seven out of the 20 top-cited documents sought to develop and extend the theoretical foundations of service learning [21,79,84,86,87]. These theoretical papers [21,84,87] adopted a variety of conceptual perspectives (e.g., technical, cultural, political). Collectively, these highly cited documents reflect a decades-long quest to assess the potential of service learning for fostering a more active citizenry in local communities and promoting civic engagement for a more equitable society [79,83,84].

Seven of the documents in Table 1 employed either original empirical research or research review in order to examine the nature of service learning experiences and their impact on student learning outcomes [88–90]. Frequently studied outcomes included students' academic learning [88,91,92], personal and interpersonal development [78,91,92], and civic knowledge and community engagement [90,92]. In addition, these documents also highlighted factors that contributed to more effective service learning practices [88,91,92]. Contributing factors identified in this scholarship included clear program goals and objectives [91,92], use of structured reflection [88,91,92], varying intensity and duration of service activities [88,91], and stakeholder engagement and partnership [88,91,92].

Table 1. 20 Top-Cited Documents on Service Learning, 1950–2022.

Rank	Document Name	Primary Focus	Type	Scopus Citations
1	Galston (2001). Political knowledge, political engagement, and civic education. [79]	Higher Education; Civic engagement	Con	706
2	Bringle & Hatcher (1996). Implementing service learning in higher education. [13]	Higher Education; Implementation	Con	627
3	Celio et al. (2011). A meta-analysis of the impact of service-learning on students. [91]	Cross-level and Subject	Rev	355
4	Seifer (1998). Service-learning: Community-campus partnerships for health professions education. [83]	Higher Education; Healthcare	Con	288
5	Pless et al. (2011). Developing responsible global leaders through international service-learning programs. [82]	Higher Education; Business	Emp	267
6	Yorio & Ye (2012). A meta-analysis on the effects of service-learning on the social, personal, and cognitive outcomes of learning. [78]	Cross-level and Subject	Rev	264
7	Conway et al. (2009). Teaching and learning in the social context: A meta-analysis of service learning's effects on academic, personal, social, and citizenship outcomes. [88]	Cross-level and Subject	Rev	261
8	Butin (2010). Service-learning in theory and practice: The future of community engagement in higher education. [86]	Higher Education; Civic engagement	Con	218
9	Billig (2000). Research on K-12 school-based service-learning: The evidence builds. [92]	K-12 Education	Com	198
10	Morgan & Streb (2001). Building citizenship: How student voice in service-learning develops civic values. [93]	K-12 Education; Civic engagement	Emp	191
11	Ash & Clayton (2004). The articulated learning: An approach to guided reflection and assessment. [77]	Higher Education	Con	185
12	Baldwin et al. (2007). What teacher candidates learned about diversity, social justice, and themselves from service-learning. [89]	Higher Education; Teacher Education	Emp	182
13	Butin (2006). The limits of service-learning in higher education. [87]	Higher Education	Rev	180
14	Butin (2003). Of what use is it? Multiple conceptualizations of service learning within education. [84]	Higher Education	Con	177
15	Einfeld & Collins (2008). The relationships between service-learning, social justice, multicultural competence, and civic engagement. [94]	Higher Education; Civic engagement	Emp	166
16	Nieusma & Riley (2010). Designs on development: Engineering, globalization, and social justice. [80]	Higher Education; Engineering	Con	164
17	Godfrey et al. (2005). Creating breadth in business education through service-learning. [81]	Higher Education; Business	Con	163
18	Westheimer & Kahne (1994). In the service of what? The politics of service learning. [21]	Higher Education; Political Science	Com	159
19	Simons & Cleary (2006). The Influence of service learning on students' personal and social development. [90]	Higher Education; Social	Emp	153
20	Bringle & Hatcher (2000). Institutionalization of service learning in higher education. [41]	Higher Education; Implementation	Emp	134

Con = conceptual; Emp = empirical; Rev = review; Com = commentary.

The remaining six highly cited publications were associated with service learning implementation in K-12 schools and higher education institutions [13,41,80,82,93]. These studies aimed to provide a comprehensive action plan, programmatic guidelines, and recommended practices for service learning programs. For instance, Bringle and Hatcher [13,41] developed the Comprehensive Action Plan for Service Learning (CAPSL) model, which provides a heuristic framework for the implementation of service learning programs in higher education [13,41].

Other highly cited publications offer complementary conceptual and empirical research foci. The themes of these documents sought to balance academic rigor with practical experience within a context of civic engagement [81], promote students' engagement in

the implementation of service activities [93], and develop responsible global leaders and citizens through service learning programs [80,82].

3.2.2. Document Co-Citation Analysis

Document co-citation analysis identified nearly 150,000 documents cited in the reference lists of the review documents. Table 2 shows the 20 documents most frequently cited by scholars writing on the topic of service learning. The top co-cited documents included 12 conceptual, five empirical, and three review papers. It is common for document co-citation analysis to identify a larger number of conceptual documents when compared with citation analysis. These conceptually oriented documents often provide the theoretical foundations for a topic of study [70]. Indeed, this analysis revealed three prominent scholars whose theoretical work has shaped the foundations of service learning: John Dewey [72,73], David Kolb [95], and Paulo Freire [96].

John Dewey [72,73] was an educational reformer who developed the theory of experiential education. Dewey [72,73] asserted that education should be grounded in real-life experiences. He proposed that all genuine learning occurs along a path of experience, inquiry, and reflection. Although Dewey never wrote on the topic of ‘service learning’, his philosophy of learning [72,73] had a profound impact on the scholars who formulated service learning as an experiential pedagogical framework [14].

David Kolb [95] is an educational theorist recognized for his contributions to experiential education. Influenced by John Dewey, Kurt Lewin, and Jean Piaget, Kolb [95] constructed his student-centered learning model to describe ‘learning from experience’ as a four-stage process. This experiential learning cycle consists of the learner’s doing, followed by the structured reflection, the formation of new concepts, and practical testing of those concepts [24,97–100]. Kolb’s [95] model of experiential learning has become “the Rosetta stone of experiential education”, including service learning, due to its theoretical clarity, conceptual parsimony, and pragmatic simplicity [101] (p. 6). Educators have used Kolb’s [95] experiential learning model as a framework for organizing the service learning process and activities [24,82,88,100,101].

Despite its wide adoption among service learning adherents, it is also worth noting that Kolb’s [95] model has been criticized for its lack of attention to the social context of education [101–104]. For example, Kiely [101] asserted that Kolb’s [95] model fails to adequately address the nature and process of reflection, the positionality and identity of the educator, and the role of emotions, context, ideology, and power in promoting or impeding learning processes. In response, Kiely [101,105–107] adapted Mezirow’s [108,109] transformational learning process model to service learning. The resulting model seeks to leverage reflection as a means of enhancing the possibilities for socially responsible actions and transformative impact on students’ personal, civic, moral, and intellectual development [101].

Tinto’s [110] student retention theory and Astin’s [111] student involvement theory have been adopted in studies of service learning [13,43,112,113]. For instance, Tinto’s [110] theory was employed to explain how service learning can impact students’ social and academic involvement in their colleges and communities, as well as their persistence to graduate [112,113]. Similarly, Astin’s [111] theory has been applied in studies that seek to explain how and why student engagement in service learning activities can positively impact learning outcomes [13,43].

Table 2. 20 Top Co-Cited Documents in the Scopus-Indexed literature on Service Learning (1950–2022).

Rank	Cited Reference	Type	Theme	Co-Citations
1	Bringle & Hatcher (1996). Implementing service learning in higher education. ¹ [13]	Con	SL Implementation	154
2	Astin & Sax (1998). How undergraduates are affected by service participation. [43]	Emp	SL Outcomes	121
3	Kolb (1984). Experiential learning: Experience as the source of learning and development. [95]	Con	Learning Theory	88
4	Bringle & Hatcher (1995). A service-learning curriculum for faculty. [114]	Con	SL Implementation	82
5	Dewey (1938). Experience and education. [73]	Con	Learning Theory	82
6	Celio et al. (2011). A meta-analysis of the impact of service-learning on students. ¹ [91]	Rev	SL Outcomes	62
7	Mitchell (2008). Traditional vs. critical service-learning: Engaging the literature to differentiate two models. [115]	Con	SL Theory	56
8	Yorio & Ye (2012). A meta-analysis on the effects of service-learning on the social, personal, and cognitive outcomes of learning. ¹ [78]	Rev	SL Outcomes	45
9	Eyler & Giles (1999). Where’s the learning in service learning? [116]	Con	SL Outcomes	43
10	Markus et al. (1993). Integrating community service and classroom instruction enhances learning: Results from an experiment. [117]	Emp	SL Outcomes	40
11	Freire (1970). Pedagogy of the oppressed. [96]	Con	Learning Theory	39
12	Hatcher & Bringle (1997). Reflection: Bridging the gap between service and learning. [118]	Con	SL Implementation	37
13	Kiely (2005). A transformative learning model for service-learning: A longitudinal case study. [101]	Con	SL Theory	37
14	Butin (2006). The limits of service-learning in higher education. ¹ [87]	Con	SL Theory	35
15	Einfeld & Collins (2008). The relationships between service-learning, social justice, multicultural competence, and civic engagement. ¹ [94]	Emp	SL Outcomes	35
16	Batchelder & Root (1994). Effects of an undergraduate program to integrate academic learning and service: Cognitive, prosocial cognitive, and identity outcomes. [119]	Emp	SL Outcomes	34
17	Ash & Clayton (2004). The articulated learning: An approach to guided reflection and assessment. ¹ [77]	Con	SL Implementation	31
18	Baldwin et al. (2007). What teacher candidates learned about diversity, social justice, and themselves from service-learning experiences. ¹ [89]	Emp	SL Outcomes	29
19	Novak et al. (2007). Evaluating cognitive outcomes of service learning in higher education: A meta-analysis. [120]	Rev	SL Outcomes	29
20	Jacoby (1996). Service-learning in higher education: Concepts and practices. [121]	Con	SL Implementation	28

¹ Denotes that the document is among the 20 top-cited documents. Con = conceptual; Emp = empirical; Rev = review; SL = service learning.

Freire’s [96] *Pedagogy of the Oppressed* criticized the traditional ‘banking model’ of education (i.e., passive learning with no real-world connection). Instead of teachers filling the minds of students with information, he proposed a more inclusive, humanizing learning approach. Freire’s [96] model promoted collaborative learning and classroom equality among teachers and students, as well as between students and community members [122–124]. Service learning, conducted within the framework of Freire’s [96] analysis, has sought to reframe the power relationships among students and between schools and their communities [123]. Freire’s [96] political analysis represents an additional sustained line of theory-based inquiry within the literature on service learning [125].

The document co-citation results in Table 2 further reinforced the conceptual and empirical foci observed in the document citation study. More specifically, nine of the documents

were associated with service learning outcomes [43,91,116], six with theories related to service learning [73,95,96], and five with service learning implementation [13,77,121]. This suggests the strength of these foci as organizing concepts in the literature.

3.3. Topical Foci of Research on Service Learning

The second research question inquired into the topical foci studied in the literature on service learning using a series of keyword analyses.

3.3.1. Most Frequently Studied Topics in Service Learning

In the first analysis, VOSviewer extracted over 11,600 terms from the author-defined and indexed keywords of the 5615 review documents. This analysis ranked the most frequently occurring keywords as a means of identifying commonly studied topics in this literature (see Table 3). Total link strength is a metric that combines the frequency of occurrence with the number of other keywords with which a keyword co-occurs in the documents.

Table 3. 20 Most Frequently Occurring Keywords in the Scopus-Indexed literature on Service Learning (1950–2022).

Rank	Keyword ¹	Occurrences	Total Link Strength
1	Curriculum	755	7736
2	Engineering Education	604	4593
3	Community Partnerships	480	2754
4	Higher Education	405	3411
5	Experiential Learning	320	1771
6	United States	271	4075
7	Community Services	257	2018
8	Organization and Management	251	4124
9	Professional Competence	249	2639
10	Service Learning Projects	244	1850
11	Community Health Care	240	3789
12	Nursing Education	238	3384
13	Medical Education	235	3425
14	Surveys and Questionnaires	166	2288
15	Problem Based Learning	166	2246
16	Human Experiment	162	2194
17	Undergraduate	161	1207
18	Public Relations	160	2521
19	Nursing Students	159	2440
20	Learning Systems	155	1099

¹ “Service Learning” was excluded from this list due to its being the main term used in the keyword search.

An initial perusal of Table 3 identified numerous keywords one would have expected to find frequently occurring in the literature on service learning (e.g., service learning, curriculum, community partnerships, United States, community services, and service learning projects). For example, a complementary bibliometric review of this literature [126] identified the United States as the center of service learning research and practice. Curriculum, community partnerships, community services, and service learning projects have also been identified in prior reviews of research as important foci of research on service learning [54,75,85].

However, several other keywords caught the authors’ attention since there was *no a priori* reason to believe that they would occur so frequently in the service learning literature. These included engineering education, higher education, healthcare education (e.g., nursing and medicine), and problem-based learning. The prevalence of engineering education, higher education, and healthcare education suggests a significant level of adoption and research on service learning in these educational domains. The frequent occurrence of problem-based learning in the service learning literature suggests an interesting trend

whereby educators have leveraged two distinct learning pedagogies as a means of enhancing students' learning outcomes [4,123,127]. The inclusion of experiential learning in this table also reprises the theoretical roots of service learning [72,73,95,99].

3.3.2. Conceptual Themes Based on Co-Word Analysis

In the second stage of keyword analysis, VOSviewer was used to produce a co-word map (see Figure 2). The authors selected a threshold of at least 30 occurrences of a keyword. This means that each of the 171 keywords on the co-word map in Figure 2 had appeared in at least 30 documents. There is no standard threshold for use in co-word analysis [53]. The authors selected 30 occurrences in order to balance the goals of reasonably frequent occurrence and comprehensive coverage. Although a selection of a lower threshold (e.g., five occurrences) would have yielded more information (i.e., over 1000 keywords), many of the keywords on the map would have occurred infrequently. Thus, a map that visualized 171 keywords of frequent occurrence was deemed suitable for this analysis.

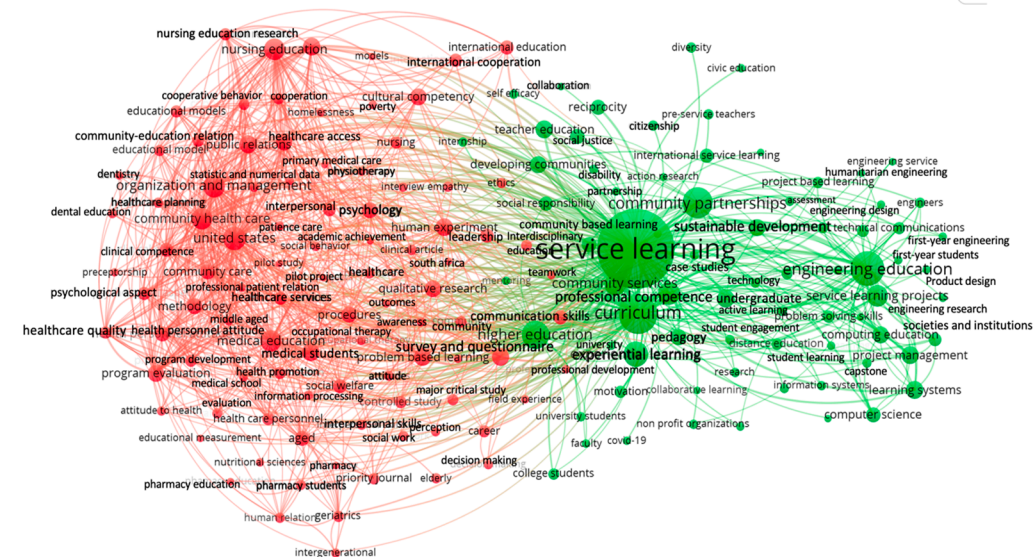


Figure 2. Co-Word Map of the Scopus-Indexed literature on Service Learning (Keyword Co-Occurrence Threshold = 30, Display 171 Words). Map Generated in VOSviewer.

The co-word map revealed patterns of frequency and relationship among the 171 service learning keywords/topics. The size of keyword nodes on the map signifies the relative frequency (i.e., level of interest) of a topic discussed in the review documents. The smallest nodes on the map were associated with keywords that occurred at least 30 times in the document database. The positions, links, and proximity between keyword nodes visualize the 'relatedness' of topics studied in the literature. The lines or links between nodes indicate that the two keywords 'co-occurred'; the density of the lines suggests the frequency of co-occurrence. The proximity of nodes on the map suggests the degree to which nodes were related in the literature. Finally, the software organized the keywords into colored clusters, which suggest broad conceptual similarity among the keywords (see Figure 2).

The co-word map reveals a wide range of educational domains, levels, and settings where service learning has been adopted over the past seven decades. Educational subjects that lead in service learning research include the social sciences (e.g., education, psychology, social work, social welfare), STEM (e.g., engineering, computer science, technology), and healthcare (e.g., nursing, dentistry, pharmacy, geriatrics). This finding reaffirms findings reported in our complementary bibliometric review [126] as well as in reviews of service learning in specific subject areas [43,78,84,85]. Although these analyses affirm the use of service learning in a variety of educational settings, the findings suggest that service learning has been most frequently researched in higher education. The co-word map also

implies that service learning has been deployed in capstone projects, with international study, and through distance education.

It was also notable that engineering education emerged on the co-word map as one of the key subjects in service learning research and practice. This conclusion was based on its rank in Table 3 and node size in Figure 2. The keyword network centered on engineering education was also visualized to further inspect connections between engineering education and other keywords (see Figure 3).

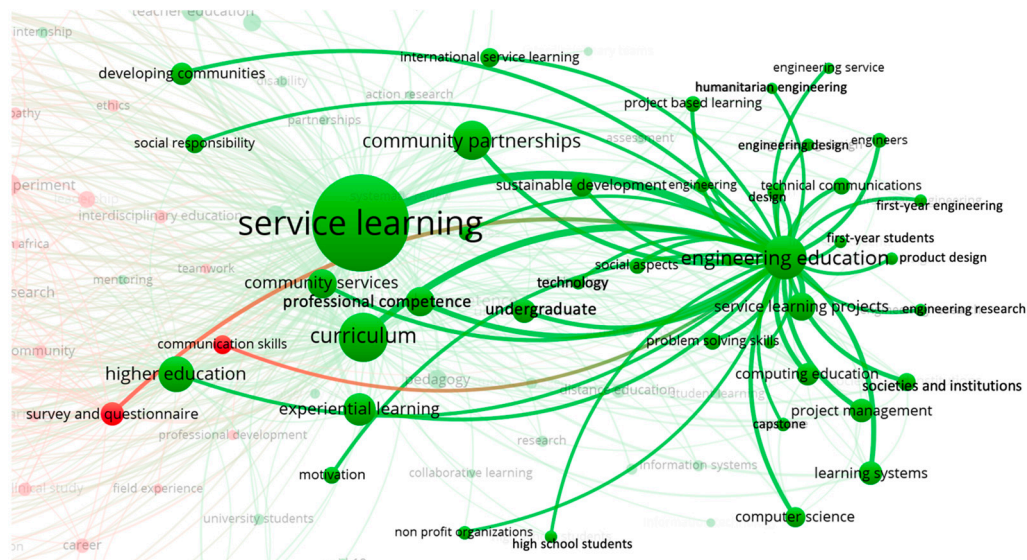


Figure 3. Drill-Down Co-Word Map on Service Learning in Engineering Education. Map Generated in VOSviewer.

Service learning in engineering education was frequently linked to ‘sustainable development’, ‘humanitarian engineering’, ‘project management’, ‘computing’, and ‘technology’. Furthermore, engineering education has often been associated with project-based learning, capstone courses, and design projects. The drill-down network map in Figure 3 also suggests this educational domain has regularly offered service learning opportunities during the first year in engineering programs [128–130]. Scholars in service learning and engineering education have focused on studying its effects on a range of students’ learning outcomes, including motivation, problem-solving skills, technical communications, social responsibility, and professional competence [6,131]. Service learning in engineering curricula also appears to be studied or carried out frequently in high schools and colleges, in developing societies, and in association with non-profit organizations.

As noted earlier, problem-based learning also emerged as a topic of significant interest. The network map for problem-based learning (see Figure 4) evidenced ‘dense links’ (i.e., numerous co-occurrences) between problem-based learning and service learning. Note also the broad (i.e., numerous links) and deep (i.e., dense links) connections between problem-based learning and topics associated with healthcare education. This suggests that healthcare education has been one of the key venues where problem-based learning has been used and studied in concert with service learning [132–134].

Problem-based learning has been widely applied to service learning programs in healthcare education as a means of achieving (1) a deeper and broader knowledge base, (2) hands-on experience, and (3) the attitudes, habits, and techniques of a lifelong learner [127,132,135]. Consequently, educators have experimented with hybrid forms of service learning that leverage the problem-focused, project-oriented features of problem-based [4,123,127] and project-based learning [5,6,136]. With this in mind, also note the dense links and close proximity of project-based learning to service learning on the map in Figure 2.

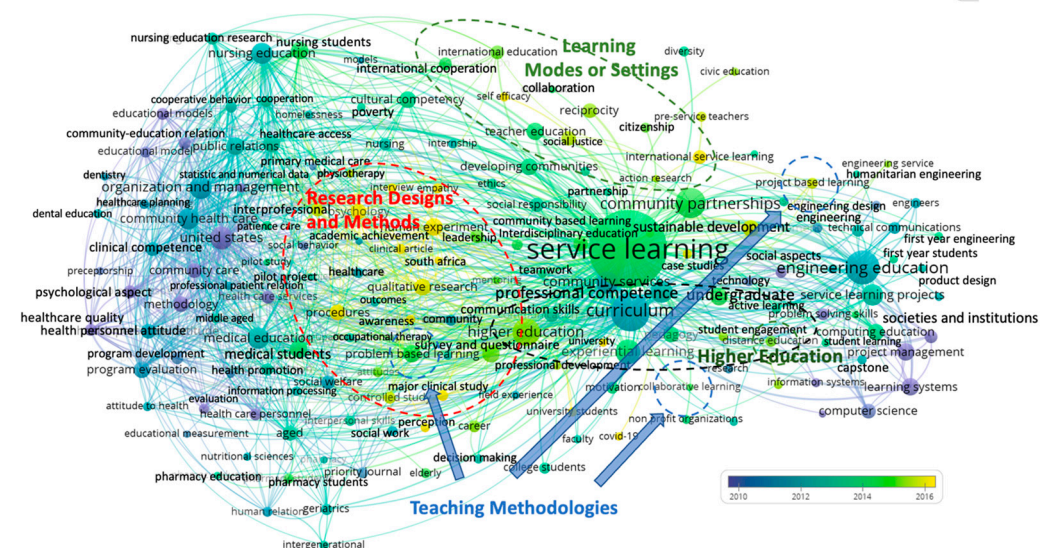


Figure 5. Co-Word Map with Temporal Overlay Based on 5615 Scopus-Indexed Review Documents (Keyword Threshold = 30, Display 171 words). Map Generated in VOSviewer.

The middle period, indicated by dark green nodes, highlights expanded areas of research in curriculum development, professional competence (e.g., identity, roles, and skills), and cultural competency (e.g., awareness, sensitivity, and immersion). Engineering education and healthcare education were the primary educational domains studied during this period. Notably, ‘social aspects’, ‘social welfare’, ‘human relations’, and ‘community services’ were other topics of considerable interest. The nodes representing these topics are also connected with the ‘curriculum’ node (see Figure 5). This suggests their level of relatedness and influence in the development of the curriculum.

The research front (i.e., recent topics) appears on the temporal co-word map as light green and yellow nodes. Synthesis of these topics revealed four themes in the emerging literature. The first theme focuses on the research designs and methods used in empirical studies of service learning (e.g., qualitative research, controlled study, human experiments, clinical study, interviews, surveys, and questionnaires). This suggests that the empirical portion of the literature on service learning is of a more recent vintage.

The second theme concerns where service learning is being studied. From the keyword and co-word analyses, higher education has been shown to attract the greatest attention from scholars when compared to other educational levels. The temporal co-word map in Figure 5 further extended the finding to suggest that higher education is a research front in the service learning knowledge base. This was also confirmed by reviewing the recent documents in the review database. In fact, one out of three documents published between 2020 and 2022 referenced ‘higher education’, ‘university’, ‘college’, or ‘undergraduate’.

Moreover, many of these recent service learning documents cover a wide range of topics that higher education has faced in recent years. Some of the frequently researched topics include sustainability and sustainable development [138–141], social innovation and entrepreneurship [142–145], graduate employability (e.g., Refs. [146–148]), and university social responsibility [149–151].

The third theme in the research front highlights keywords on other experiential, active learning methodologies employed in connection with service learning. As shown in the temporal co-word map, three dominant methods in the recent literature of service learning include problem-based learning, project-based learning, and collaborative learning. While educators began to make connections between service learning and problem-based learning as far back as the 1990s [152], the temporal co-word map indicates that the integration of these complementary methods of active learning has gained momentum over the past decade. Indeed, educators have recently referenced this integrated approach as ‘problem-based service

learning' (PBSL) [153]. PBSL integrates the foundation of skills (e.g., collaboration, critical thinking, deep learning, teamwork, communication, problem-solving, and social skills) developed through both pedagogies into a new model of learning [153,154]. The PBSL model attempts to expedite the learning of crucial 21st-century skills through this new form of community-based, problem-driven, cooperative learning [153,155]. The emergence of this approach responds to rapid changes in today's workplace and society [155–157].

The temporal co-word map also suggests a growing affiliation between service learning, project-based learning, and collaborative learning in the recent literature. Their smaller node sizes and peripheral locations suggest that their integration with service learning is, however, less mature than, for example, with problem-based learning [158,159]. The primary aims of the integration of service learning and project-based learning include providing students with (1) employability skills (e.g., technical skills, communication skills, resourcefulness, and professional ethics) [7,160,161], (2) direct real-world experience [7,159–161], and (3) an enhanced sense of social responsibility [7,158].

Collaborative learning has also been studied in conjunction with service learning [162–165]. Collaborative learning is an active learning, learner-centered pedagogy that involves students working together to master a body of knowledge [166]. Together with service learning, collaborative learning—referred to as collaborative service learning (CSL)—integrates community services with the application and synthesis of knowledge gained from collaboration [164,167]. The recent literature on CSL centers on empirical research into how the conjoint pedagogical framework [162–165] enhances students' learning experiences [162,164,165], promotes relationship-building, inclusion, and diversity of thinking [162,163], and fosters student's sense of social responsibility [164].

The fourth theme highlighted by the temporal co-word analysis describes the increasing diversity of modes and settings where service learning is being used [168–172]. These include 'international education', 'international cooperation', and 'international service learning'. Furthermore, the temporal co-word analysis extends the literature to include the recent innovation in the pedagogy called 'electronic service learning' or 'e-service learning'. E-service learning is simply service learning activities employed in online courses or using online platforms to achieve the desired learning outcomes [169,171,172]. This aspect of the research front reflects the rapid transition from bricks-and-mortar to online classrooms [169,171,172].

4. Discussion

This review aimed to add clarity with respect to the conceptual, empirical, and topical foci of service learning research and practice. This concluding section discusses the limitations, offers a synthesis of the results, and suggests implications for future research.

4.1. Limitations of the Review

Although Scopus, the sole database used in this review, offers comprehensive listings of publications [62], it does not capture all relevant documents on the subject. The use of document co-citation analysis in this review did, however, mitigate this limitation by highlighting key documents beyond the Scopus database.

This bibliometric review did not assess or discuss the content of individual studies or topics in depth due to the large size of the review database. Another limitation lies with the bibliometric review methods' inability to give equal attention to all topics of research. In other words, this review method may overlook certain qualitative aspects of research due to the methods' overreliance on quantitative data. That said, its results have limited and intended use and cannot be generalized beyond the scope of the review.

4.2. Interpretation of the Results

Citation analyses conducted in this review uncovered three conceptual and empirical research foci associated with (1) theory, (2) implementation, and (3) effects of service learning. These thematic foci have gained the sustained attention of scholars studying

service learning. Similar thematic strands have been identified in bibliometric reviews of the literature on problem-based learning [59] and simulations and serious games [10]. This is notable in that each of these methods of active learning has maintained the sustained attention of educational practitioners over a period spanning six or more decades. Moreover, each pedagogical method has generated a substantial body of knowledge encompassing thousands of research documents.

The evolution of these conceptual and empirical themes suggests that service learning has gained maturity as a knowledge base. More specifically, this review of the full literature on service learning concludes that the knowledge base is large, has accumulated over a significant period of time, is informed by theory, and has been tested through empirical research. These findings, based on bibliometric analysis of the full literature, reinforce and extend findings reported in prior research syntheses of different segments of the literature on service learning using meta-analytic [78,91,98], systematic [54–56], and narrative [49] review methods.

Co-citation analysis highlighted the contributions of three prominent scholars to the theoretical underpinnings of service learning: John Dewey [72,73], David Kolb [95], and Paulo Freire [96]. Notably, although none of them authored documents on service learning, their learning philosophies have shaped the foundations of service learning theory and practice. This conclusion was reinforced by content analysis of the highly referenced service learning documents, which frequently cited their learning models and frameworks [1,13,79,84,86].

For instance, Dewey's [72,73] theory of experiential learning provided the initial theoretical impetus for service learning by explicating the link between experience, inquiry, and reflection. Influenced by Dewey, Lewin, and Piaget, Kolb [95] extended the experiential learning model to include four phases of experiential learning (i.e., experience, reflection, conceptualization, and experimentation) [24,97–100]. Freire [96] challenged the traditional view of education in which teachers know all and students are viewed as empty vessels. Instead, he called for a more active, inclusive, and equitable learning model. Moreover, Freire's [96] political analysis of education critiqued power relationships between educational institutions and their communities. These scholars and their publications have had a profound, sustained impact on the evolution of service learning and established the connections between service learning and the broader literature on human learning.

Kolb's [95] model of experiential learning remains an influential theoretical framework in the literature on service learning [24,82,88,100,101]. Despite its popularity, the model has been questioned for its lack of social and contextual aspects of experiential knowing [101–104]. Hence, other conceptual frameworks, such as Mezirow's [108,109] transformational learning theory, Tinto's [110] student retention theory, and Astin's [111] student involvement theory, have also been adopted to explain and predict service learning experiences and outcomes.

Scholars associated with service learning implementation (e.g., Bringle, Hatcher) developed comprehensive guidelines for service learning programs [13,82,93]. Their efforts established a heuristic framework that defined the roles and responsibilities of key stakeholders [13,93] and identified activities that contribute to program success [13,82]. The aims of this program-oriented scholarship include balancing academic rigor with practical experience [81], encouraging students' engagement in the service learning implementation [93], and cultivating responsible global leaders and citizens through service learning activities [80,82].

Scholars working in this field have worked actively to assess the effects of service learning on student learning outcomes [88–90]. These include academic learning outcomes [88,91,92] as well as resulting civic knowledge and engagement [90,92]. Research on the effects of service learning has not only sought to determine if positive outcomes could be identified but also to identify effective service learning practices [88,91,92]. Highly cited documents examined the impact of program goals and objectives [91,92], the use of

structured reflection [88,91,92], the intensity and duration of service activities [88,91], and stakeholder engagement and partnership [88,91,92].

Topical analyses conducted for this review identified dominant topics and the research front in the service learning knowledge base. Engineering education emerged as one of the significant subjects in the current literature. In particular, 'engineering education' was frequently mentioned with 'sustainable development' and other STEM fields. Engineering education also appeared to have been researched regularly in conjunction with project-based learning, capstone courses, and design projects.

Temporal co-word analysis highlighted the evolution of service learning research topics in three time periods (i.e., early adopters, model period, and research front). Early adopters focused their attention on educational models, methods, systems, and community relations. The middle period expanded areas of research to include curriculum development, professional competence, and cultural competency. During these two early periods of adoption, service learning was widely discussed in healthcare and STEM education. Analysis of early adopters and the middle period also suggests empirical support for research on how to help students gain a deeper and broader knowledge base and real-world experience [127,132,135].

Temporal co-word analysis reaffirmed and elaborated on findings from other recent studies indicating that educators have begun to cross-pollinate different active learning methods [153,155]. Our analysis found a clear trend toward the integration of service learning and problem-based learning over the past decade. Key elements of problem-based learning include a problem-driven focus for learning, the introduction of theory after considering the problem situation, the use of cooperative teams, and the active resolution of the problem [59,127,132]. The use of service learning in concert with elements of problem-based and project-based learning could be a response to increased pressure for higher education institutions to equip students with 21st-century skills [153,154].

4.3. Implications of the Findings

This review has identified a variety of advances in the development of a knowledge base on service learning. Our analysis of this knowledge base yields several implications for policy, theory, research, and practice.

First, it was only after the passage of legislation during the 1990s and 2000s that service learning research and practice gained traction in the United States. This set the stage for its gradual expansion into other nations over the past 15 years. This highlights the potential role that public policy can play in supporting the broader adoption of service learning. More specifically, educators and policymakers should review the policy frameworks adopted in the United States and consider their suitability for both adaptation and adoption in other international contexts.

Second, the literature reveals a significant gap in theory specifically related to service learning. Instead, educators and scholars have looked to other established learning theories and concepts, such as Kolb's [95] experiential learning theory, Mezirow's [108,109] transformational learning theory, Tinto's [110] student retention theory, and Astin's [111] student involvement theory, as means to understand and predict outcomes from service learning experiences. However, there have been few attempts to develop a theory of service learning that takes into account its unique dimensions and processes. This represents a worthy focus for future scholarship.

Third, scholars have understandably developed a sustained program of research on the effects of service learning on student learning and development [28–31,173]. However, far less attention has been paid to its effects on other stakeholders, including faculty, communities, and educational institutions [28,30,31,173]. Hence, there is a need for further research to better understand and address the perspectives, interests, and needs of all stakeholders involved in or affected by service learning.

Fourth, another implication follows from a topic that was missing in this literature: the perspective of employers toward service learning. Research suggests that service learning

possesses unique, reciprocal benefits that accrue to students and their communities through service activities [14,78,84,91]. That said, there is a lack of studies regarding the impact of service learning on employers and employment. In fact, none of the findings (i.e., research topics or emerging themes) highlighted the effects of the service learning experience from this standpoint. At this juncture, more studies that examine employers' perspectives are needed to ensure that this pedagogical practice meets the needs and expectations of all stakeholders.

Fifth, the topic of 'sustainability' rose to the fore in the temporal co-word map. This follows two recent global trends. First, it reflects a search among educators internationally for active learning methods capable of meeting the complex challenges of educating for sustainability [174,175]. Second, it highlights the relevance of service learning to the efforts of sustainability educators to engage learners actively in solving social and environmental problems at the community level [176,177]. Thus, the authors see great potential in the use of service learning as a pedagogical tool in educating for sustainability.

Sixth, somewhat to our surprise, engineering education emerged from the keyword analyses as one of the most significant subject domains of service learning research and practice. Moreover, the temporal co-word analysis indicated that this is not a recent phenomenon. Indeed, systematic reviews of research were recently published on the use of service learning in engineering education from the perspectives of community engagement [178] and assessment [179]. Nonetheless, given the knowledge and experience that has accumulated on the use of service learning in engineering education, we believe that it would be timely to conduct reviews of research that clarify, summarize, and consolidate what has been learned from the in-depth implementation of service learning in this domain.

Finally, the recent literature examined in this review suggests that the use of a single pedagogical method may be insufficient to meet the educational challenges of this century [152,154,158,164]. Therefore, the authors suggest that educators should continue to experiment by cross-pollinating service learning with elements drawn from other active learning methods, including problem-based learning, project-based learning, and collaborative learning. Research in this domain should seek to identify the relative contribution of different design elements that are drawn from these other active learning pedagogies to support the achievement of service learning outcomes. In addition, the authors suggest that there is a sufficient body of existing studies to warrant a scoping review of the literature on how service learning has been integrated specifically with problem-based and project-based learning.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/educsci13040339/s1>. Publicly available datasets were analyzed in this study.

Author Contributions: Both co-authors contributed to all parts of the research and writing of the article. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the ASEAN Center for Sustainable Development Studies and Dialogue, Mahidol University, Bangkok, Thailand.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data used in this review is available upon request from narong.d@northeastern.edu.

Conflicts of Interest: The authors declare no conflict of interest.

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