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Research Trends in Scholarship of Teaching and Learning in Higher Education: A Combination of Thematic and Bibliometric Analysis

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Abstract

The need for further research on the Scholarship of Teaching and Learning (SoTL) in higher education is gaining considerable recognition and momentum in recent teaching and learning literature. Although teaching and learning centers have been established in many higher learning institutions in a number of countries, little is published to provide a big picture of SoTL research trends in this field of knowledge. The present study extends the review of the literature by providing a general perspective of SoTL research trends in higher education using bibliometric technique. The current study, involved investigating 632 existing documents from 2000 to 2021 which have been indexed in the Web of Science database. The study also analyzed a sample of 100 most cited articles to identify the quality and impact of SoTL research trends such as variations across publication years, identifying active research areas, the most prolific authors, organizations and countries, and co-authorship. Six themes emerged including (1) Professional development; (2) learning improvement; (3) pedagogy and diversity; (4) Student assessment; and (5) teaching improvement. (6) SoTL related research The study examines state of the art research in the SoTL area particularly in higher education context. Implications of the importance of SoTL for research institutions, education policy makers, and educational researchers are discussed.

Keywords: Scholarship of Teaching and Learning, Research Trends, Bibliometric, Higher education, Literature Review

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Introduction

In recent years, the need for SoTL has been widely discussed and gained momentum in the literature by scholars in different disciplines (Gravett, 2016; Hoffmann, 2018; Tight, 2018; Anjum, 2019; Chick, Nowell and Lenart, 2019; Webb and Tierney, 2019; Palmer, 2020). The concept of Scholarship of Teaching and Learning (SoTL) evolved from Boyer's (1990) formulation of four scholarships: discovery, integration, application and teaching. Since then, SoTL has been described, elaborated on, and clarified in a variety of ways. It has been identified with a number of learning and teaching practices including quality and enhancement of learning, competence and acknowledgement, pedagogic science, and solving work-related problems (Fanghanel et al., 2016). It also identified as exploration of how teaching and learning research could be conducted the classroom setting (Nowell et al., 2020). Improving the teaching quality in higher education institutions is the main purpose of SoTL.

However, apart from the emphasis on teaching and learning, much of what is said to be within the framework of SoTL is still unpublished, not open to critical review, not disseminated outside of its original context, and unrelated to previous literature and scholarship (Canning and Masika, 2020). Having said that, SoTL sees teaching and learning environments as places for questioning about learning in ways that will help to develop and advance the teaching profession as a whole (Hutchings, Huber and Ciccone, 2011). In this regard, some of the instructors used it to enhance students' learning (McKinney, 2010). They also used it as identification of a learning gap, learning goals articulation, and description of faculty members' innovative teaching/learning strategies as other fields of research in SoTL research literature. Canning and Masika (2020) indicate that the main purpose of SoTL in higher education however is to raise the status of learning and teaching where the majority of instructors and faculties use a variety of SoTL models to document students' learning (Willingham-McLain, 2015). Others, have used it to cover a range of activities and practices. For example, Tierney (2020) investigated SoTL research in UK higher education through pedagogic perspective. The researcher concluded that research on SoTL should be considered as a priority activity. However, Canning and Masika (2020) argued that SoTL is the thorn in the flesh of educational research. They argue that "the time has come to consign SoTL to history, and start the process of asserting the value of higher education research" (p. 1). Although, we believe that this argument is created veil of confusion amongst academics, however, it seems that a part of tension is based on the fact that Boyer (1990) has not believe to the research of teaching and learning as part of his model. So, it crates inconsistency between the scholarships of discovery and teaching (Smith and Walker, 2021) These different point of views on SoTL encourage the researchers to look at the SoTL research in higher education from a Macro level. Hence, the current study, reviews the data for SoTL, aiming to provide a big picture on how SoTL is being used in higher education research.

Literature Review

The origin of SoTL work has been rooted in educational psychology and pedagogical research. SoTL intends to answer the following questions: "what is?", "what is possible?", "what explain learning, teaching, and pedagogy?" (Henderson and Sendall, 2022). Additionally, SoTL observes and comments on teaching practice (Flores et al., 2021). SoTL as scholarly endeavors would help instructors and practitioners to better understand how to provide effective and supportive teaching for students. Consequently, SoTL scholars are curious about their practice. Review of literature shows that SoTL is grounded in empirical methodologies in the various fields of knowledge including educational psychology, sociology, or behavioral psychology.

As a result, there is at this stage, some literature reviews, content analysis and meta-analysis studies related to SoTL which found such an intensive implementation in higher education (Gravett, 2016; Booth and Woollacott, 2018; Chick, Nowell and Lenart, 2019; How, 2020; Palmer, 2020). These studies are particularly important in terms of identifying trends of SoTL applications in higher education and indicating that SoTL plays a leading role in teaching and learning processes. The following table presents the titles of these studies along with their authors and a brief summary of the research conducted.

Table 1. *Previous research and details*

Title	Authors/Year	Method	Summary of the Research
The Scholarship of Teaching and Learning in Religious Studies	Gravett (2016)	Literature review	The study explored three main elements of this particular kind of scholarship: research with human subjects and the Institutional Review Board, a foundation in other scholarship, and assessment.
On the constitution of SoTL: its domains and contexts	Booth & Woollacott (2018)	Content analysis	By reviewing the exiting literature on SoTL it has been provided a new way of thinking about the nature of SoTL.
The Scholarship of Teaching and Learning: A Scoping Review Protocol	Chick et al., (2019)	Scoping Review	Mapped the range and nature of published SoTL projects.
Meta review of recent scholarship on learning and teaching in criminology	Palmer (2020)	Literature Review	There is so little research of this nature being published despite the broader environmental pressures to ensure and enhance 'teaching excellence'.
A Systematic Review of Scholarship of Teaching and Learning Research in Higher Education Institutes from 2014–2019	How (2020)	Systematic Review	Conceptualizing and framing SoTL; SoTL methodologies and approaches; Teaching and learning strategies and tools; Applied SoTL research; Institutional support for SoTL

Although there are some common points in terms of the analyzed items in the literature review as seen in Table 1, many different items were included in the scope of the research as well. It also covers a relatively long period of time, from 2010 to 2020 with focus on the current studies. Furthermore, unlike other studies in the literature, this paper analyzed other components such as co-authorship, co-accordance and a thematic analysis in SoTL studies to answer the following questions:

(1) What are the research trends in SoTL in higher education?
(2) How are the main figures publishing the most number of research papers on SoTL in higher education?
(3) Which countries have published the most number of papers on SoTL in higher education? Which universities have published the most number of papers on SoTL in higher education?

(4) What is the chronological research behavior on SoTL in higher education?

This research is seen important because the findings may show citation analysis of the top papers in SoTL studies that will provide a general overview on how SoTL is implemented in higher education context. Moreover, this study seeks to determine the trends of SoTL in higher education by examining published scientific productions under the Social Science Citation Index (SSCI) between 2000 and 2021.

Methodology

Bibliometric analysis along with thematic analysis were chosen as methodology of the study. Bibliometric analysis provides overall umbrella of a specific research discipline by mathematically (statistically) uncovering the "distributed architecture" (Tang et al., 2021) of literature production and academic publication status. Although bibliometric is an effective technique for summarizing and synthesizing literature, however its main limitation is a short-term forecast of the research field (Donthu et al., 2021). Additionally, since bibliometric method is quantitative in nature, the qualitative assertions would be quite subjective (Gaur and Kumar, 2018). Thematic analysis also is a widely used method to identify analysis and report of the patterns within data (Braun and Clarke, 2006) in order to describe and organize the valuable information from the data.

This study was conducted on 14 January 2021 in the Web of Science (WoS) Core Collection database. The study was used WoS as the world's leading citation database in which cover multidisciplinary fields. We have selected Web of Science rather than other alternatives (e.g., Scopus and Google Scholar) because (i) WoS is the most trusted global citation database in the world, (ii) WoS is the most powerful research engine, providing best-in-class publication and citation data for access and evaluation, (iii) WoS collects and indexes high-quality research and creates the most comprehensive and complete citation network for every single record. (iv) technically, the combination of the extracted WoS and Scopus data are naturally different and they can't be combined. In terms of quality and relevance, Scopus journals are slightly weaker than SCI-indexed journals. Additionally, as research conducted by Ball and Tunger (2006) shows WoS journals have shown higher citation rates when compared to Scopus.

This databased was searched for the papers related to the SoTL by using the following parameters: WoS TOPIC (title, abstract author keywords, and keywords plus): ("Scholarship of Teaching and Learning", OR "SoTL", OR "Scholarship of teaching" OR "Scholarship in Teaching and Learning") as a search string for the period 2000 till 2021. It should be said that use of quotation marks (" ") is necessary to find the exact terms and phrases (Usman and Ho, 2020). In this study we consider the term of SoTL as any inquiry to the student learning in higher education setting particularly empirical enquiries.

Although, we believe that SoTL emerged from the seminal work of Boyer (1990), however, in our data source (WoS) the progress of SoTL and its literature emerged after the publication of Boyer's report has emerged (for example see (Healey, 2000; Kreber and Cranton, 2000; Trigwell et al., 2000; Kreber, 2002, 2005; Hatch, 2005). Hence, in our data set all of the publications index after 2000.

Using this strategy to search WoS yielded 632 records. To perform the descriptive bibliometric analyses, including type of documents most prolific years such as authors, institutions, citations, and countries we used the Web of Science built-in functions Refine and Analyze. In order to generate landscapes and networks (to generate visual knowledge maps),

the Web of Science full record with references format was downloaded and analyzed by the VOSviewer (Van Eck and Waltman, 2013, 2014) software. This tool is an effective visualization software was developed by Van Eck and Waltman (Van Eck and Waltman, 2010). Although there are many bibliometric tools VOSviewer has been selected based on its applicability and operability. All common terms, such as “research”, “file”, “study”, “respondents”, “author”, were excluded from the analyses. In order to use the parameters, we used VOSviewer default parameters. However, we analyzed only the abstracts and title terms that are occurring more than 100 times and the author keywords occurring more than 10 times. VOSviewer apply a unified approach for clustering. In this regards the terms that are closely related are categorised into the same clusters by the same color. In order to label the emerged clusters, four higher education experts from Sultan Qaboos University were participated in the research study. Inter-rater reliability (Cohen's Kappa) was calculated for each cluster. The average Kappa across clusters was 0.78. Kappa was above 0.6 for every cluster, placing all clusters in the "substantial agreement" or "almost perfect agreement" of Landis and Koch's (1977) guidelines.

We used “Citation Report” function of WoS for the top cited papers. We retrieved the top 100 results sorted by relevence string for each paper. These results were exported from WoS to a CSV file and merged and sorted for citation.

Results

RQ1: What are the research trends (document subject, document types) in SoTL in higher education?

The first trend of this study was Document by subject area. We were interested to identify which subject areas attracted more SoTL researchers. The results of this analysis are shown in Table 2.

Table 2. *Document subject in SoTL Research*

Web of Science Categories	Records	% of 632
Education & Educational Research	354	66.04
Education Scientific Disciplines	71	13.24
Sociology	50	9.33
Psychology Multidisciplinary	24	4.47
Pharmacology Pharmacy	12	2.23
Political Science	12	2.23
Biochemistry Molecular Biology	11	2.05
Computer Science Theory Methods	11	2.05
Information Systems	9	1.68
Information & Library Science	9	1.68

As Table 2 shows the majority of the document subject in the SoTL research has belong to the education category (n=425, 79.28%). Hence, education field has been taken a considerable amount of SoTL researchers’ attention. Based on the above Table sociology (9.33%) and psychology (4.47%) have ranked as second and third respectively. Information & Library Science (1.68%) has been ranked as last category in SoTL research area.

As Table 3 illustrates, among document types, there were 493 (78.01%) articles. These articles were the dominant document type of the research field production in SoTL.

Proceedings Paper was the next document type (n = 66; 10.44%), followed by Book Chapter (n = 37; 5.85%), Editorial Material (n = 29; 4.58%), Early Access (n = 25; 3.95%), Book Review (n =20; 3.16%), and Meeting Abstract (n =13; 2.06%). Minimum numbers of information sources have been published by Bibliography (n = 1; 0.15%) document types.

Table 3. *Document Types in SoTL Research*

Document Types	Records	% of 632
Article	493	78.01
Proceedings Paper	66	10.44
Book Chapter	37	5.85
Editorial Material	29	4.58
Early Access	25	3.95
Book Review	20	3.16
Meeting Abstract	13	2.06
Review	13	2.06
Book	3	0.47
Bibliography	1	0.15

RQ2: How are the main figures publishing the most number of research papers on SoTL in higher education?

Table 4 shows the top journals that have published the SoTL papers from 2000 to 2021. As the table shows, the majority of the papers in the field of SoTL have been published in teaching and learning inquiry, the ISSOTL journal (n= 49; 7.75%). It is then followed by teaching sociology (n = 47; 7.43%) and the Canadian journal for the scholarship of teaching and learning (n = 34; 5.38%).

Table 4. *Top Contributing Journals to SoTL Research*

Source Titles	Records	% of 632
Teaching Learning Inquiry The ISSOTL Journal	49	7.75
Teaching Sociology	47	7.43
Canadian Journal for the Scholarship of Teaching and Learning	34	5.38
Higher Education Research Development	24	3.79
Teaching of Psychology	19	3.00
International Journal for Academic Development	17	2.69
Teaching in Higher Education	13	2.05
American Journal of Pharmaceutical Education	11	1.74
Biochemistry and Molecular Biology Education	10	1.26

Most publication outlets on this list are journals that are directly related to the scholarship of teaching and learning, and teaching filed which suggests that SoTL research is welcomed at premier journals.

In our analysis of data set, 632information sources have been published from 2000 to 2021 (22 years). Table 5 shows the paper published frequency along with the record and percentage of each year. It also shows that the documents which were written in 2020 are the highest and the documents that were written in 2000, 2001 and 2004 are the lowest.

Table 5. *Frequency of SoTL Publications Per Year (2000-2021)*

Publication Years	Records	% of 632	Publication Years	Records	% of 632
2021	41	6.48	2010	19	3.01
2020	90	14.24	2009	10	1.58
2019	66	10.44	2008	18	2.84
2018	65	11.75	2007	14	2.21
2017	62	9.81	2006	9	1.42
2016	49	7.53	2005	10	1.58
2015	53	8.38	2004	2	0.31
2014	25	3.95	2003	5	0.79
2013	34	5.38	2002	6	0.94
2012	19	3.01	2001	2	0.31
2011	31	1.58	2000	2	0.31

The distribution of academic productions by year of publication indicates that SoTL has gained increasing interest over the last 22 years (see Table 5). Interestingly, SoTL research mostly appeared in single digits every year prior to 2006, and double digits after 2007 onwards.

Bibliometric Mapping

Bibliometric mapping is an important method in bibliometric analysis which is widely used to analyze the dynamic nature of publications (Chen, 2006). For the purpose of this study, the VOSviewer program was used to analyze the keywords which occurred in the publication titles and abstracts. The results of this analysis are presented in Figure 1. Based on the mapping approach, in the scientific overview, four (4) clusters emerged automatically. Each of the cluster was labeled with an appropriate research theme based on the most frequently occurring keywords applying thematic procedure:

- Student and learning improvement related research (green color): This cluster comprises terms such as “student”, “outcome”, “approach”, “benefit”, “course”, “student learning”, “experience”, “opportunity”, “assessment”, “classroom”, “implementation”, “pedagogy”, “activity”, “model”, and “instructor”.
- Strategic related studies (red color): This cluster includes terms such as “teaching”, “scholarship”, “research”, “SoTL”, “higher education”, “research”, “relationship”, “insight”, “community”, “context”, “discipline”, “community”, “work”, and “college”.
- Faculty development and teaching improvement studies (blue color) are represented by author keywords such as “implication”, “engagement”, “university”, “faculty”, “development”, “case study”, and “group”.
- SoTL related studies (yellow color) are represented by author keywords such as “understanding”, “project”, “process”, “concept”, and “reflection

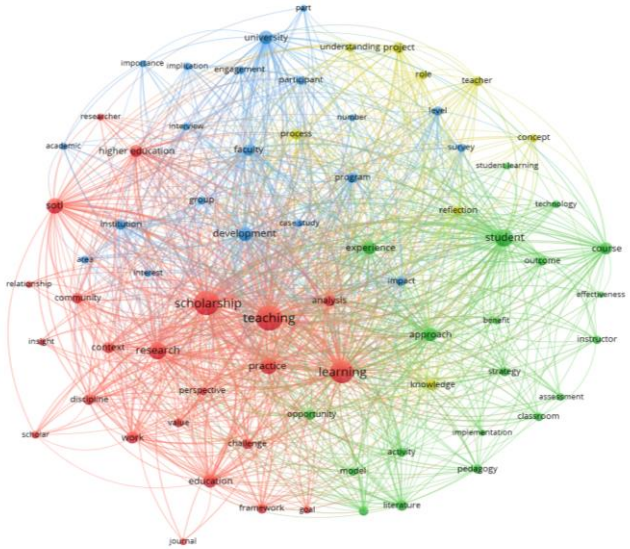

Figure 1. *The scientific overview of the SoTL research (30>)*

In addition, the author's keywords were analyzed because they are very important since they represent key concepts of the publication (Vošner et al., 2016). According to our findings, SoTL researchers used 1250 different keywords. In this study, using VOSviewer, we highlighted more frequently used keywords with larger circles while we used smaller circles to indicate less frequently used keywords (Figure 2). The software identified keywords as occurring within different color-coded clusters. Six (6) different clusters were identified which represent the themes below:

- SoTL related studies (red color) indicated by keywords such as "higher education", "SoTL", "evaluation", "technology", "faculty development", "educational development", and "case study";
- Research on professional development area (green color) characterized by author keywords such as "academic development", "leadership", "professional development", "collaboration", and "educational research";
- Learning improvement related research (blue color) represented by author keywords such as "teaching", "learning", "online learning", and "experiential learning".

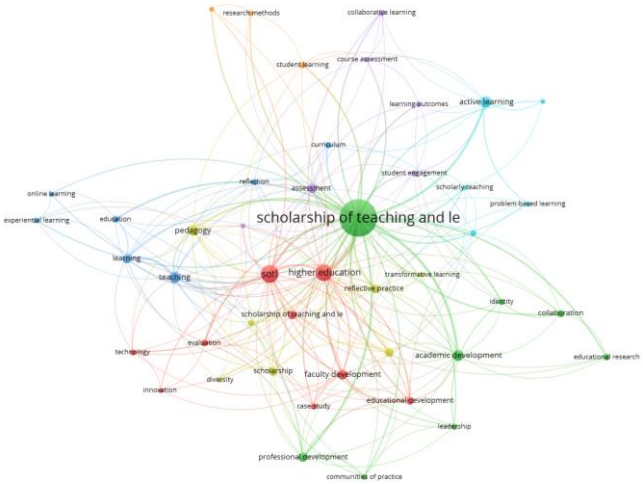

Figure 2. *Author keywords Co-occurrences Network*

- Pedagogy and diversity related research (yellow color) are represented by author keywords such as “transformative learning”, “reflective practice”, “diversity”, “pedagogy”.
- Assessment related research (violet color) are represented by author keywords such as “assessment”, “collaborative learning”, “course assessment”, “student engagement” and “learning outcome”.
- Teaching improvement related research (light blue color) are reflected by keywords such as “active learning”, problem based learning”, and “scholarly teaching”.

The network identified some interesting research area in SoTl like: research “related to SoTL” and research “about SoTL”.

RQ3: Which countries have published the most number of papers on SoTL in higher education? Which universities have published the most number of papers on SoTL in higher education?

The results of co-authorship collaboration among SoTL researchers are presented in Figure 3. As the figure shows, collaboration was identified between the top 15 countries. As indicated by the size of the circle, the most active authors in co-authorship collaboration are from the USA. These authors have strong collaborations with Canadians, Australians, English, and South Africans respectively as indicated by the strength (thickness) of the lines. As the figure shows, Canadian SoTL researchers are the second most active authors who have strong collaboration with Americans, Australians and English researchers. The whole co-authorship collaboration among the researchers from the top 15 countries is shown in Figure 3.

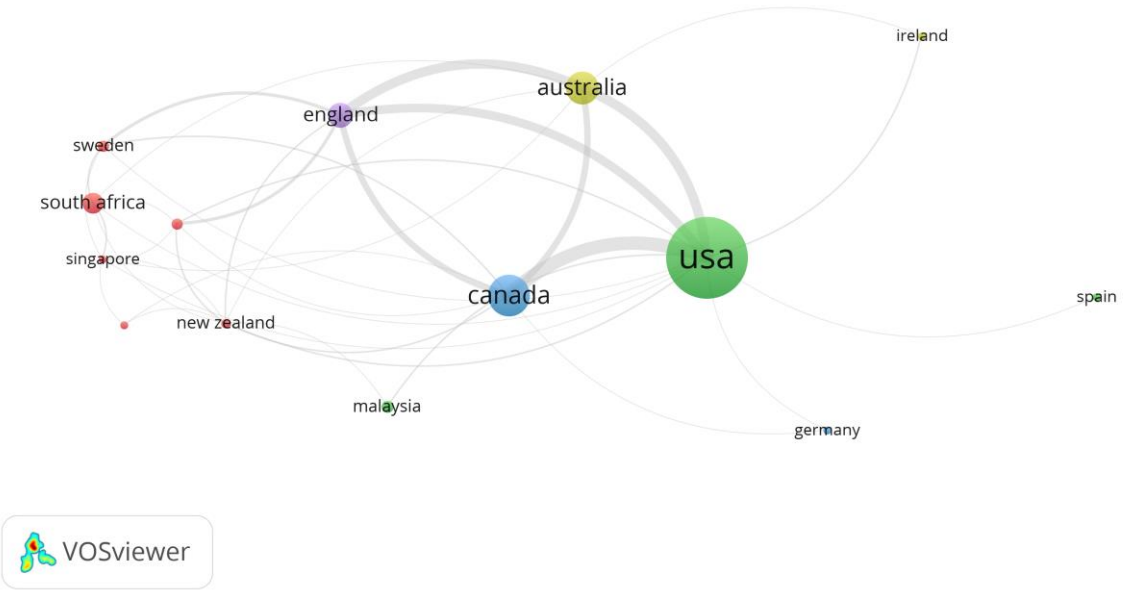

Figure 3. Co-authorship Collaboration among the Researchers from the Top 15 Countries

The next trend we describe is the most productive institution in SoTL research. From a total of 506 institutions, Indiana University (n=18, 3.36%), McMaster University (n=16, 2.99%) and University Wisconsin and University of British Columbia (n=14, 2.61%) were the most productive universities. Institutional co–authorship was reported among 506 institutions. The whole co-authorship collaboration among top institutions is portrayed in Figure 4.

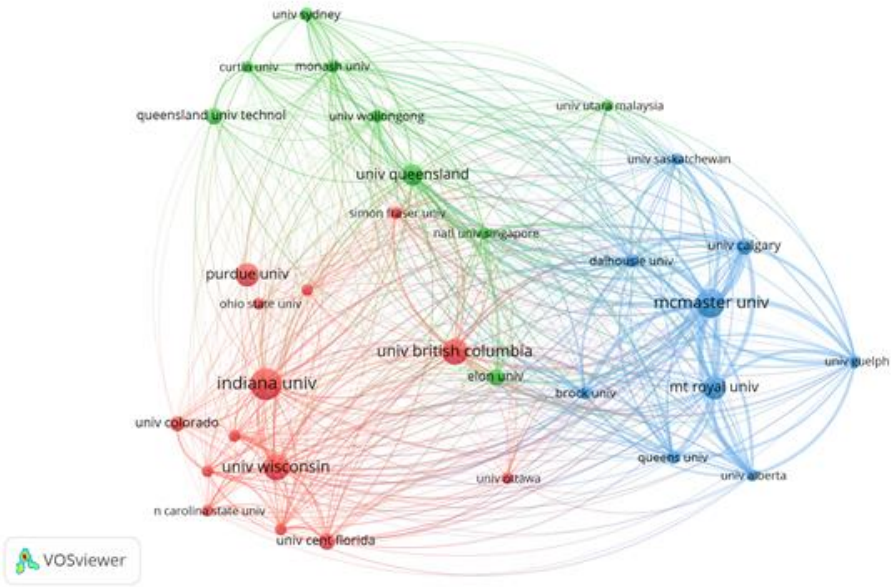

Figure 4. *Co-authorship Collaboration among 30 most Collaboration Intensive Institutions*

RQ4: What is the chronological research behavior on SoTL in higher education?

In order to present a wide-range overview of SoTL literature, we conducted a chronological thematic analysis of the Keyword Plus of the records which have been extracted from WoS. Figure 5 depicts the results of this analysis, which was based on the average publication date of the SoTL research. As the figure shows, the literature production in the area of SoTL progressed in three (3) different categories. It is worth noting that the focus of the early produced publications was primarily on academic development, pedagogy and curriculum studies. Then, the research in the field of SoTL between 2010 and 2015 shifted the focus on problem-based learning, student engagement, learning outcome and community of practice. However, the emphasis turned to studies such as reflective practice, collaborative learning, active learning and professional development studies in 2015-2020.

Figure 5. *The evolution of Keyword Plus over time, based on average publication date.*

In order to provide a comprehensive overview of SoTL research trends, highly cited publications were analyzed. The aim of this analysis was to detect the articles with higher impact and quality. For this purpose, the top 10 highly cited studies were analyzed via citation counts (as of 14 January 2021). By using total citations, we identified the 10 most frequently-cited documents published from 2000 to 2021. These articles had citation counts ranging from 30 to 163. As Özçınar (2017) articulates, publication with more citations is likely to have made a greater contribution to the field. The articles with the highest frequency of citations were analyzed based on their research design (developmental, descriptive, experimental), research methods (qualitative, quantitative) and research settings. In this section, we selected the top Five (5) publications for detailed analysis.

Lieberman, A., & Pointer Mace, D. H. (2008). Teacher learning: The key to educational reform. Journal of teacher education, 59(3), 226-234; Total Citations, 163; Average per Year citation, 11.64. This paper recommends the transformation of teacher in-service learning as a powerful means of education reform. Too often, professional development is perceived by teachers as being idiosyncratic and irrelevant. The authors recommend a reconceptualization of professional learning for practicing teachers, in which educators are involved in learning communities. These communities evolved over time and they revolve around norms of openness, scholarly rigor, and collaborative construction of professional knowledge. The authors described three such environments for professional learning—the National Writing Project, the Carnegie Academy for the Scholarship of Teaching and Learning, and the Quest Project for Signature Pedagogies in Teacher Education—and recommend that the incoming chief executive should capitalize on the strengths of such programs and extend them to many more teachers nationwide.

Moskal, P., Dziuban, C., & Hartman, J. (2013). Blended learning: A dangerous idea? The Internet and Higher Education, 18, 15-23.; Total Citations, 142; Average per Year citation, 15.78. In this article, the authors make the case that implementation of a successful blended learning program requires the alignment of institutional, faculty, and student goals. Reliable and robust infrastructure must be in place to support students and faculty. Continuous evaluation can effectively track the impact of blended learning on students, faculty, and the institution. These data are used to inform stakeholders and impact policy to improve faculty development and other support structures necessary for success. This iterative loop of continuous quality improvement is augmented by faculty scholarship of teaching and learning research. The evolution of blended learning at the University of Central Florida is used as a model and research collected over sixteen years illustrates that with proper support and planning, blended learning can result in positive institutional transformation.

Chalmers, D. (2011). Progress and challenges to the recognition and reward of the scholarship of teaching in higher education. Higher Education Research & Development, 30(1), 25-38.; Total Citations, 93; Average per year citation, 8.75. This paper reviews initiatives to increase the status of teaching through better recognition and reward of teaching in universities. Current practices and evidence of change are reviewed. The paper concludes that while there has been significant progress made to date, the ultimate symbols of recognition and reward – promotion and tenure – are proving to be elusive but not unattainable for those who focus on the Scholarship of Teaching.

Lovelace, M., & Brickman, P. (2013). Best practices for measuring students' attitudes toward learning science. CBE—Life Sciences Education, 12(4), 606-617. Total citations, 66; Average per Year citation, 7.33. Science educators often characterize the degree to which tests measure different facets of college students' learning, such as knowing, applying, and problem

solving. A casual survey of scholarship of teaching and learning research studies reveals that many educators also measure how students' attitudes influence their learning. Students' science attitudes refer to their positive or negative feelings and predispositions to learn science. Science educators use attitude measures, in conjunction with learning measures, to inform the conclusions they draw about the efficacy of their instructional interventions. The measurement of students' attitudes poses similar but distinct challenges as compared with measurement of learning, such as determining validity and reliability of instruments and selecting appropriate methods for conducting statistical analyses.

Boshier, R. (2009). Why is the scholarship of teaching and learning such a hard sell? Higher Education Research & Development, 28(1), 1-15.; Total citations: 65; Average per year citation, 5. This article highlights problems impeding SoTL. First, scholarship of teaching gets used as a synonym for other activities. Second, Boyer's definition was conceptually confused. Third, SoTL is difficult to operationalize. Fourth, much discourse concerning SoTL is anti-intellectual and located in a narrow neoliberalism. Fifth, there is uncritical over-reliance on peer review as the mechanism for measuring scholarship. Each impediment makes SoTL a hard sell – particularly in research-intensive universities. Taken together, they constitute a formidable problem for SoTL advocates and contain incendiary implications for promotion candidates and committees.

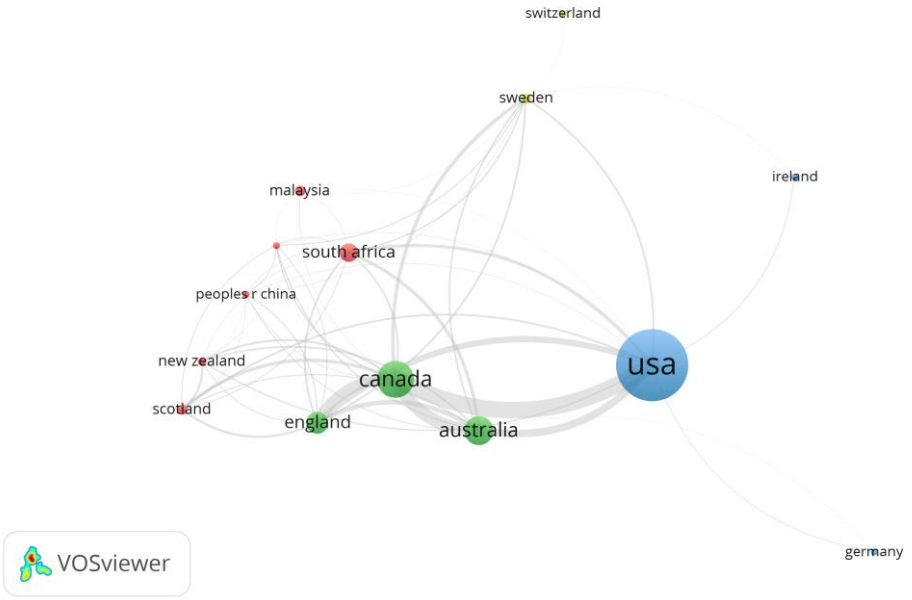

Figure 6.*Top cited countries*

All of the five most cited articles were published before 2013. Further analysis on top cited papers showed that researchers in the US and Canada have published high quality papers (Figure. 6), followed by those in the Australia and UK.

Discussion and Conclusion

The results of this bibliometric review study suggested that the research in SoTL is quickly, continuously and extensively growing. Based on the analysis performed, it appears that about two third (78.01%) of the 632 samples were journal articles (as dominant research publication types). This leads to the claim that SoTL is presently looked upon with a very serious "research" lens and its depths and breadths, role, influences and efficiencies have been

meticulously investigated by the scholars in the field. The increase in the number of publications as low as 2 records in the year of 2000 to 90 records in the year 2020 shows the growing interest of scholars in the scholarship of teaching and learning as a research field. The reason for the increase in the number of papers would be paying more attention by the academia on the improvement of their teaching and learning along with institutional incentives to undertake SoTL research.

The story would be even more noteworthy considering the fact that based on the results of co-authorship collaboration among SoTL researchers (within research-based universities in the eastern globe), a wide variety of scholars are zooming on SoTL across the world with the pioneering position of the eastern countries (e.g., Malaysia, Australia, Singapore), Canada and USA. Those researchers are the main research players in the world; hence, yielding the richest and most updated data and contribution to the field doubled with the aforementioned co-authorship relationships and integrative papers.

Further, the findings of the bibliometric analysis and mapping, clearly suggest that the most recent and current research topics in SoTL is not merely limited to the introduction and influence of SoTL on learning. It is rather on analyzing different frameworks of SoTL that have taken considerable amount of literature. In addition, analyzing a large sample of 632 records in conjunction with a subsample of 10 most frequently cited articles made us able to capture the increasing interest in SoTL studies among the practitioners. Researchers have been conducting miscellaneous studies in the area of SoTL, especially on its application in higher education as a method of improving teaching and learning activities. These dynamic topics represent the foundation of the field and have highly progressive properties in the literature on SoTL. The trend in literature production has been positive. The major trends in SoTL research showed variations across publication years, the identification of active research areas, and the most prolific authors. The results of the bibliometric mapping have identified some of most valuable SoTL research themes such as student's engagement and assessment, learning outcome and so on.

Mainly, by analyzing publication production in this study we have found two main threads: 1) some *related* SoTL studies which have potential impact for instance student learning. These type of studies can be classified under or related to pedagogical topics, etc, and 2) some are actually *about* SoTL itself. These types of the studies mostly are about the field itself, how to support the field (i.e., faculty development, communities of practice). This can be one of the main novelties of the current study and we recommend the future studies more focus on it.

Furthermore, the findings of the study, as a function of the results of the researches reviewed, have provided precious pedagogical implications by showing how it is possible to improve teaching and learning processes by using SoTL elements particularly in higher education institutions. Despite its contributions, the current study had some limitations. For example, the sample used in this study was gathered from a single database source. The WoS, and articles that are not listed in the WoS database are not represented in the study. Although WoS provides a comprehensive citation search, Scopus; another main database, appears to have much broader journal coverage. As well, the bibliometric mapping was performed on only information source, author keywords, abstracts and titles of publications. The results might have been different if the full publications had been analyzed. Finally, in the citation analysis, only the 10 most frequently cited papers were included. Including more studies and samples would, undeniably, yield richer conclusions.

SoTL is the critical for higher education institutions as it directly impacts on high quality of teaching and learning. This review has enabled researchers to unpack the bibliometric attributes of SoTL in state-of-the-art research and to develop future research directions to develop our sympathetic of SoTL. It is evident from our study that SoTL is one of the main components of teaching quality. This study also showed that there is a need for scholars to apply different types of methodology in their research activities. Our review indicated that there is little research on SoTL using experimental invistigations. Hence, we would encourage future research to be more experimental in the different contexts.

Based on our findings, we opine that the field of SoTL will remain intriguing and exciting for researchers, instructors, and policy makers due to the abrupt shift in teaching and learning, both domestically and internationally. Principally, there is a need to explore the teaching and learning process to maximize students learning. The SoTL guidelines, which is the significant component of teaching, is an example of such topics. Thus, we hope that our advice and call for more investigation on SoTL research will be heeded for the benefit of stakeholders in the field.

In conclusion, examining research trends in SoTL publications derived from a high-quality database, during the years from 2000 to 2021 suggests a direction for researchers in the future and it is expected that this review of SoTL research will outline a roadmap, and provide support for researchers to research deeper around SoTL. It can also help them initiate a foundation on which novel literature streams can be built in the context of SoTL research.

Conflict of Interest

All financial, commercial or other relationships that might be perceived by the academic community as representing a potential conflict of interest must be disclosed. If no such relationship exists, authors will be asked to confirm the following statement:

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author Contributions

The Author Contributions section is mandatory for all articles, including articles by sole authors. If an appropriate statement is not provided on submission, a standard one will be inserted during the production process. The Author Contributions statement must describe the contributions of individual authors referred to by their initials and, in doing so, all authors agree to be accountable for the content of the work. Please see here for full authorship criteria.

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