BIBLIOMETRIC ANALYSIS OF DIDACTICAL TRANSPOSITION ON TEACHING AND LEARNING PROCESS

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Abstract

Bibliometric and bibliography regarding didactic transposition in the teaching and learning process will be discussed in this study. A bibliometric approach using a VOS viewer was used to conduct this study. 159 documents published between 1990 to 2022 from the Scopus database were analysed using some main analyses such as co-authorship, citation, performance, and co-word supported by clustering and visualization analysis. The results revealed that the didactical transposition relatively soared in 2012, 2013, 2020, and 2021 while the development of citations related to the studies of didactical transposition relatively fluctuated between 1990 to 2022. Furthermore, Brazil and France relatively had the dominant influence in which most influential documents, authors, sources, and institutions affiliated with Brazil and France. Moreover, most of the authors coming from Brazil became the leaders in conducting the studies of didactical transposition. Selection, simplification, and organization of scientific content to create a curriculum that students can easily understand is part of the didactic transposition process. Didactical transposition also involves adapting teaching methods, activities, and materials to suit the needs and abilities of students. Didactical transposition aims to make scientific knowledge more relevant and meaningful to students and to facilitate their learning and understanding of complex concepts. However, it is important to note that didactical transposition can also introduce certain biases and limitations in the educational content and therefore must be approached with caution and critical reflection.

Keywords: Bibliometric, Didactical transposition, Scopus, VOSviewer.

1. Introduction

Bibliometric analysis can be used to answer a variety of research questions, such as identifying trends in a research field, measuring the impact of a particular publication or author, or comparing the productivity of different research groups [1, 2]. The research group that examines didactic transposition will be studied concerning bibliometrics. The process of transforming scientific knowledge into educational content that can be taught in classrooms is a complex and challenging task. It involves not only selecting, simplifying, and organizing scientific content, but also adapting it to suit the needs and abilities of students. This process is known as didactical transposition, a concept introduced by Yves Chevallard in the 1980s.

Didactical transposition is an important framework for analysing and understanding the teaching and learning process, as it sheds light on how scientific knowledge is transformed and conveyed to students. Didactical transposition aims to make scientific knowledge more accessible and meaningful to students [3] and to facilitate their learning and understanding of complex concepts. the Didactic Transposition processes contribute to the improvement of professional teacher training [4]. Therefore, it is essential to approach didactical transposition with caution and critical reflection. Teachers and educators must be aware of the potential limitations and biases introduced by this process and strive to create educational content that is both accessible and accurate. Therefore, this study aims to explore the bibliometrics of the publication of didactic transposition articles in the world who are the authors who have published articles related to didactic transposition and which countries have provided the most thought suggestions regarding didactic transposition in the world.

2.Method

To conduct this study, bibliometric analysis was employed. Detailed information is presented in previous study [1, 2]. Fuad et al. [5] stated that there were five steps in carrying out a bibliometric analysis study. Firstly, define search keywords. Scopus database was used to search the keywords because the database had many well-qualified documents. Some combinational keywords such as "didactical transposition" or "didactic transposition" were employed to search the documents. Secondly, conducting the initial search. The document search using the combinational keywords found 545 documents published between 1990 and 2022. The type documents were sourced from journals, books, conference proceedings, and book series which consisted of articles, book chapters, conference papers, reviews, erratum, and short surveys. The publication stage of the documents was final and one of the articles was in press.

Thirdly, refining the search results. Some inclusion criteria were established to get the documents that were suitable for this study. Systematically, to select the documents that were suitable for the inclusion criteria, four steps were taken: (1) identification, (2) screening, (3) eligibility, and (4) inclusion. In the identification step, 545 documents were found in the Scopus database. In the screening step, there were only 197 documents that contained keywords such as "didactical transposition" or "didactic transposition" in the article title, keywords, and abstract. The next step is excluding some documents, like 12 conference paper documents, 11 book chapters, 12 review documents, 1 erratum, 1 document short survey, and 1 article in press. Based on the 197 documents in the eligibility step, there were

only 159 eligible documents. These documents only consisted of articles published between 1990 and 2022 in the final publication stage. In the inclusion step, 159 eligible documents were included in this bibliometric analysis study.

Fourthly, the eligible and included documents were downloaded from the Scopus database in two formats such as Comma Separated Values (CSV) and Research Information System (RIS). Hudha et al. [6] argued that RIS and CSV contained bibliometric and bibliographical information. In addition, the RIS format opened in the Publish or Perish (PoP) software provided some information such as document title, citation, author, source, document type, and publisher, publication year [7]. Fifthly, there were several analyses used in this study such as performance analysis, co-authorship analysis, citation analysis, and co-word analysis [8]. PoP software was used to support the performance analysis. In addition, Networking and overlay visualization, and hierarchical clustering analysis were performed to enrich citation, co-authorship, and co-word analysis. The VOSviewer software was utilized to support those analyses [9, 10].

3. Results and Discussion

3.1. Performance analysis

This analysis was used to present the development of publications regarding didactic transposition or didactical transposition from 1990 to 2022 (see Fig. 1). Figure 1 shows that the development of publications related to didactic transposition or didactical transposition relatively soared from 1990 to 2020 even though it underwent a decrease of the publication from 2020 to 2022. It was relevant to research that states scientific publications in the field of social sciences and humanities tend to increase from the 1990s to the 2020s [11, 12]. Meanwhile, from 2020 to 2022, during the Covid-19 pandemic era, the number of scientific publications decreased due to changes in life and research subject focuses [13-16].
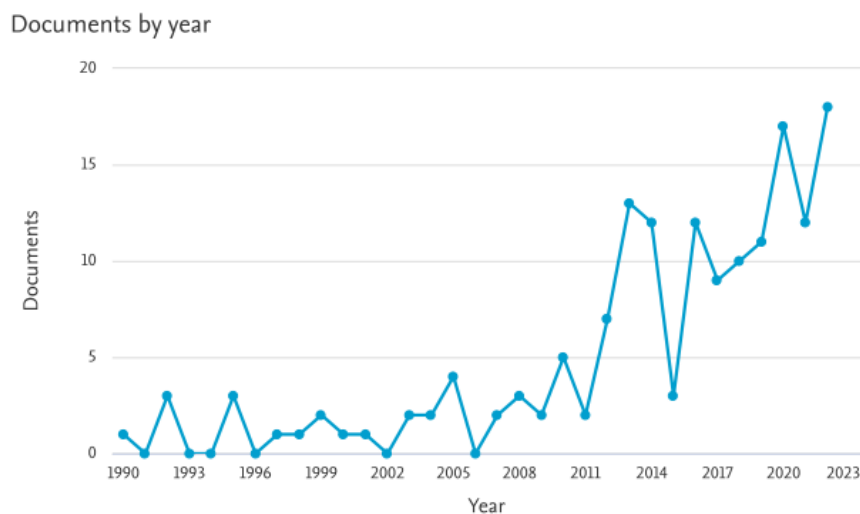

Fig. 1. The development of a publication of the studies about didactical transposition in the teaching and learning process.

3.2. Citation analysis

This analysis was employed to show the most influential document, author, country, source, and institution related to the studies of didactical transpositions between 1990 to 2022. The highest citation was used to present the most influential document, author, country, source, and institution [17-21]. Firstly, the document titled "didactic restrictions on the Teacher's Practice: The Case of Limits of Functions in Spanish high schools" was the most influential document related to didactical transposition which the document written by Barbé et al. published in the Educational Studies in Mathematics in 2005 had been cited as many as 53 times. Secondly, paper by Darnis and Lafont was the most influential author affiliated with Université Bordeaux Segalen. Thirdly, Brazil was the most influential country related to the studies of didactical transposition or didactic transposition and the documents published by the country had been cited as many as 48 times. Fourthly, the Journal of Revista Brasileira de Ensino de Fisica was the most influential source in which the documents published by Sociedade Brasileira de Fisica, SciELO, Brazil had been cited as many as 34 times.

3.3. Co-authorship analysis

This analysis was used to present the social interactions among authors and their countries related to the studies of didactical transposition or didactic transposition. Firstly, co-authorship analysis in the unit of analysis of the author was conducted by selecting the minimum number of documents of an author as many as 2 authors and the minimum number of citations of an author is 7 which appeared as 9 meeting the threshold. Some of the 9 items in the network are not connected. The largest set of connected items consists of 3 items (see Fig. 2). Secondly, co-authorship analysis in the unit of country analysis was conducted by selecting the minimum number of documents for a country as 5 and the minimum number of citations for the country as 7. The largest set of connected items consists of 10 items (see Fig. 3). There were 3 countries distributed in red clusters: Italy, Australia, and Chile, which are members of the blue, green, and yellow clusters, respectively.
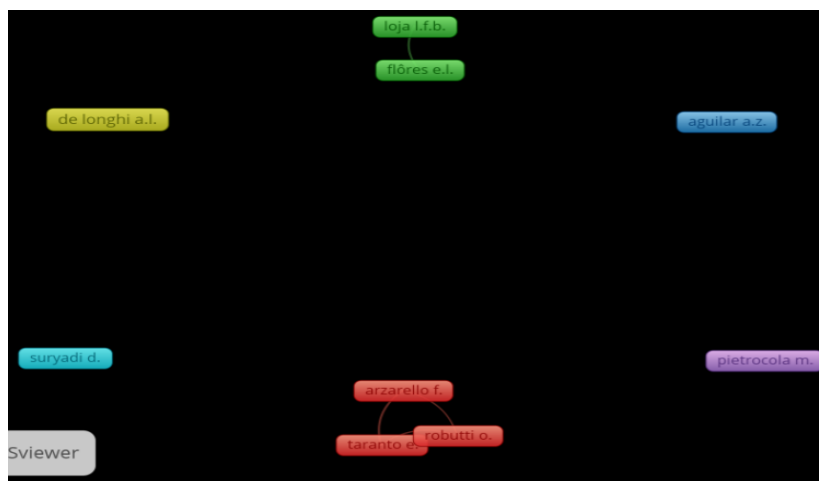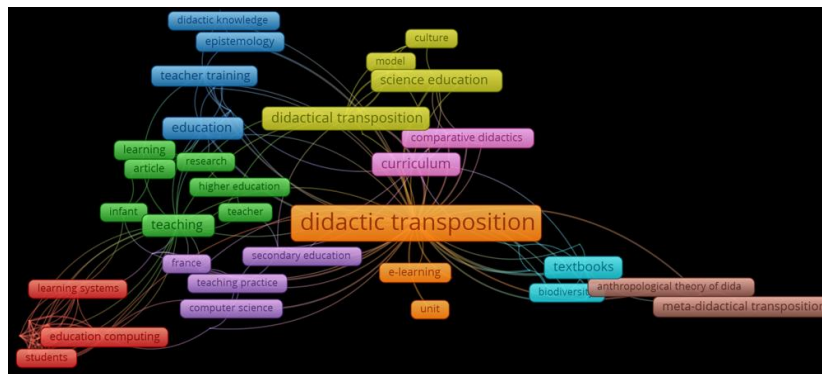

**Fig. 2. Network visualization of
co-authorship analysis in the unit of the author.**
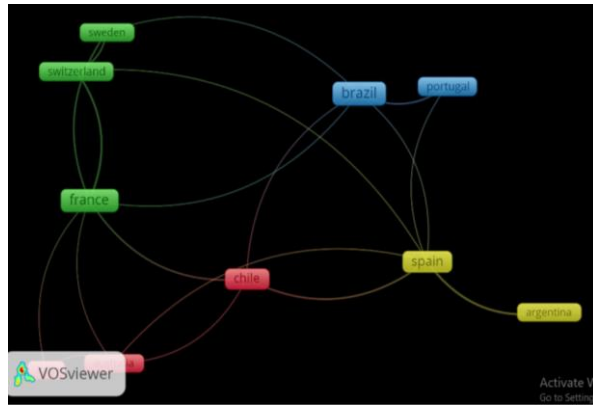
**Fig. 3. Network visualization of
co-authorship analysis in the unit of the country.**

3.4. Co-word analysis

This analysis was used to present the frequently appearing keywords related to the studies of didactical transposition in the teaching and learning process and show the distribution of the emerging keywords from 1990 to 2022. Firstly, this analysis was carried out by selecting the minimum number of occurrences of a keyword with as many as two keywords, which could be 66 interconnected keywords (see Fig. 4), showing 9 clusters.

**Fig. 4. Network visualization of the most emerging keywords regarding
didactical transposition in the teaching and learning process.**

Cluster #1, #2, #3, and #4 consist of nine items, consisting of colours red, green, dark blue, and yellow, respectively. Cluster #5 with dark purple colour and cluster #6 with blue colour consists of eight items. Clusters #7 and #8 consist of five items. It is coloured consecutively orange and light brown. Cluster #9 light purple consists of 4 items. One of them is the curriculum. Only the most emerging keywords are displayed in the network visualization. Secondly, overlay visualization analysis was carried out by selecting the minimum number of occurrences of a keyword as many as two keywords. As a result, it emerged 66 inter-connected keywords (See Fig. 5). Some keywords with yellow colour were appearing in the recent period

such as "teacher training", "teaching practice", "meta didactical transposition", and others. Moreover, the keyword "didactic transposition" emerged in the most current period specifically in January, May, August, October, and December 2022. This shows that didactic transposition is a trending problem in teaching and learning. It indicates that didactic transposition becomes the focus of many educational researchers. This result also confirms the effectiveness of bibliometric analysis to explore and visualize the current literature that can be used for deciding whether further research be done, as this study has been reported by other papers [22-29].
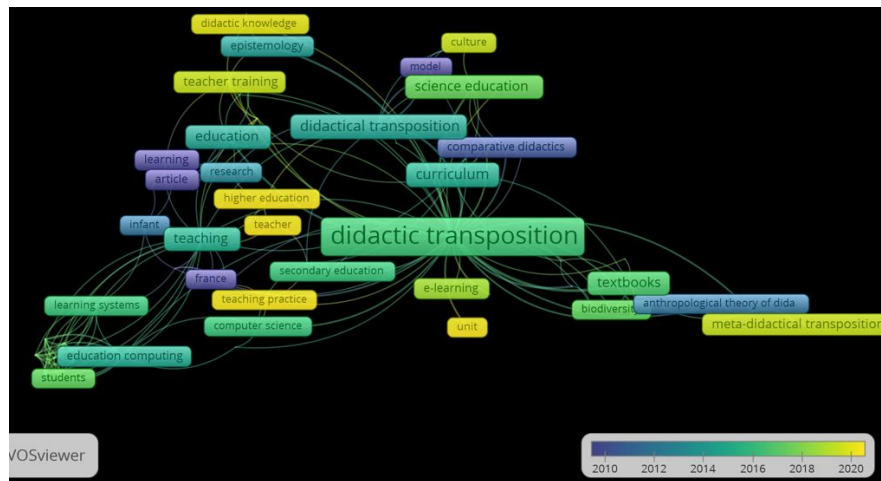
Fig. 5. Overlay visualization of the most emerging keywords regarding didactical transposition in the teaching and learning process.

4. Conclusion

159 documents related to the studies of didactical transposition analysed using the bibliometric analysis reveal that the development of publications regarding didactical transposition studies relatively fluctuated from 1990 to 2020, while the development of citations related to the studies of didactical transposition relatively soared between 1990 and 2022. Furthermore, Brazil had the dominant influence on the studies of didactical transposition, which is the most influential document, author, source, and institution affiliated with the Jenewa and Swiss, i.e., Université de Genève. Moreover, most of the authors coming from Brazil, France, and Spain became leaders in conducting studies of didactical transposition in social interactions among authors and countries. Hereinafter, this analysis can provide a comprehensive overview of the research landscape in the field of didactical transposition and its impact on teaching and learning processes. This can inform future research directions and contribute to the ongoing development of effective teaching and learning strategies. Additionally, this study suggests exploring the research topic related to didactic transposition because it is an essential strategy that enhances the learning process.

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