

Teaching Transposition in Higher Education: A Systematic Review

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Didactic transposition represents the transition of academic knowledge taking into account learning needs and interests. The objective was to analyze the publications related to the didactic transposition of teachers in higher education. The methodology considered the systematic analysis method, with a review of the literature on didactic transposition. The search was carried out in the Scopus, SciElo, Dialnet, Redalyc, Google Scholar and Zenodo databases, using the descriptors in Spanish: didactic transposition, education, and in English: didactic transposition as an advanced search. The inclusion criteria were open access articles, between the years 2020 and 2023 from different countries, published in Spanish and English. 20 articles were considered with the application of the flowchart criteria established in the PRISMA Declaration. Concluding that the publications found, mainly in the higher education environment, have highlighted the importance of didactic transposition in the pedagogical performance of teachers, since this aspect is transcendental for the significant and formative learning of university students since it contributes jointly to carry out didactic transposition, converting specialized knowledge into teachable knowledge.

Keywords: Didactic transposition, knowledge transition, activity design, pedagogical performance.

1. Introduction

In Europe, difficulties in teaching strategies were identified and the need to investigate the process of transformation or transposition of academic content into effective teaching practices in the classroom was found (Ramírez et al., 2023). Debates have arisen about the relationship between teachers and subjects, as well as about how academic knowledge is transformed into something that can be taught and that is meaningful to students (Gericke et al., 2018). It may be necessary to reorganize and transform curricular knowledge for didactic purposes (Deng, 2020).

One of the possible reasons that contribute to the problems is the difficulty that university students face in understanding the contents of a subject (Torres, 2011). It has been shown that the deficient didactics and pedagogy of university teachers hinders the understanding of the

contents transmitted to students (Acuña et al., 2013). Therefore, the incorporation of active pedagogical strategies in university teachers is required, it promotes the commitment and active participation of students in their integral development (Díaz & Hernández, 2019).

In order for the knowledge of a subject to be taught in schools, it is necessary to select, order and restructure it in a logical link and with a purpose that can serve a specific teaching objective. There needs to be a didactic transposition (pedagogical transposition) so that students can really acquire knowledge from academics to scientists. The transposition of scientific content to teachable content has its own rule. This "didactic transposition" includes not only the transition from academic knowledge to the knowledge to be taught, but also the transition from knowledge to be taught in the classroom. This must guarantee the freshness and timeliness of science, and the teachable contents must simultaneously meet the requirements of the training objectives and the teaching purposes, according to the circumstances and conditions of the country. In addition, didactic transposition is also an important step in the design of educational activities to achieve the goal of training and developing competencies for students (Do & Thanh, 2020).

Experience shows that didactic transposition inscribed in sociocultural theory can become a democratic act when (1) teachers and students not only negotiate topics and materials but, more importantly, discuss their motivations, needs, and interests and (2) teachers create spaces to incorporate students' voices in a systematic and coherent way in a way that enhances language learning (Banegas, 2014). Likewise, didactic transposition, according to Brousseau (2007), is the process in which the content of scientific knowledge (wise knowledge) undergoes an adaptive transformation into taught knowledge, which is finally reflected in knowledge learned from reference knowledge before it becomes classroom knowledge. From this perspective, didactic transposition assumes the existence of a procedure in which the content designated as wise knowledge undergoes a series of adaptive transformations (taught knowledge) that make it occupy a place among the objects of learning (learned knowledge). In this regard, Chevallard (1997) defined that didactic transposition is a transformative process that undergoes knowledge from its original formulation to its reception by students.

This article presented the purpose of analyzing the publications related to the didactic transposition of teachers in higher education.

2. MATERIALS AND METHODS:

The method of systematic analysis was used, through the review of the literature on didactic transposition. A search was carried out in the Scopus, Scielo, Dialnet, Redalyc, Google Scholar and Zenodo databases, using the descriptors in Spanish: didactic transposition, education, and in English: didactic transposition as an advanced search. The inclusion criteria in the review of open access articles, between 2020 and 2023 from different countries, published in Spanish and English, were considered. Likewise, the application of the criteria of the flow chart established in the PRISMA Declaration for the systematization of the articles was taken into account.

Finally, 20 articles were selected for the study with the systematization of the data in the Excel spreadsheet. Later, using the method of hermeneutics, the interpretation and analysis of the

results and conclusions reached by the authors in their various investigations on didactic transposition were made. After executing this process, the knowledge gap that will be mentioned in the results has been evidenced.

Table 1 shows a tally of the publications identified and chosen from a variety of sources.

Table 1 Items found and chosen from 2020-2023.

No.	Sources	Found without filter	2020	2021	2022	2023	Total
1°	Scopus	229	1	1	1	1	3
2°	SciElo	61	2	-	4	-	6
3°	Dialnet	417	-	1	2	-	3
4°	Eric	48	-	-	1	-	1
5°	Redalyc	60	1	-	-	-	1
6°	Google Scholar	988	-	1	1	2	4
7°	Zenodo	304	-	-	2	-	2
Total		2,107	3	3	11	3	20

Table 2 took into consideration the inclusion and exclusion criteria applied during the information search and selection process.

Table 2 Inclusion and exclusion criteria in the selection of publications

Aspects	Inclusion Criteria	Exclusion Criteria
Quadrennium	Belongs to: 2020 – 2021 – 2022 – 2023.	Does not belong to the quadrennium.
Study Objective	Contributes to the purposes of the review.	Focused on other topics.
Sample	Includes teachers from all educational levels.	Does not provide detailed information about the educational level of teachers.
Intervention	Highlights the didactic transposition of teachers in higher education.	Does not refer to the didactic transposition of teachers in higher education.
Results	Mentions and describes the didactic transposition of teachers in higher education.	Not focused on the purpose established for the article.

Figure 1 shows a detailed observation of the procedure for searching and selecting articles, applying the inclusion and exclusion criteria according to the guidelines of the PRISMA method.

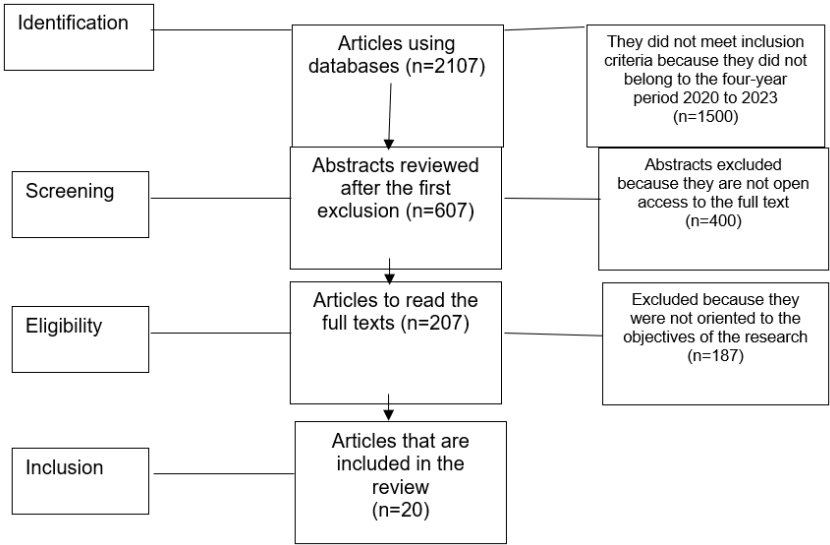


Figure 1. Flowchart to select items according to Prisma declaration

Searches for academic products were carried out in various databases and are based on the classifications of the descriptors of common contents.

3. RESULTS

After carrying out a preliminary review in the Scopus database, it was found that the significant majority of publications related to didactic transposition were concentrated in the educational field of Social Sciences, as illustrated in Figure 2, where it stands out with 38.7%. In second place are publications in Arts and Humanities with 29.0%, followed by those related to mathematics with 12.9%.

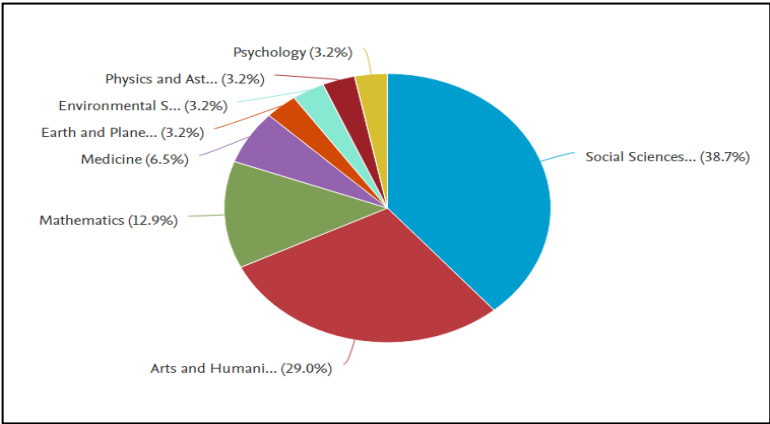


Figure 2. Publications on Didactic Transposition by research area.

Source: Scopus Database

Similarly, Table 3 shows that 229 publications were located using the "Didactic Transposition" search algorithms in Scopus, while using the "didactic transposition in education" algorithm 37 publications were obtained in the last four years. Likewise, in other search engines, there is a notorious disparity in search results applying both algorithms. From these findings, it is inferred that research continues to focus on educational areas (social sciences), as detailed later.

Table 3 Number of publications on Didactic Transposition by area and database.

Algorithm	Scopus	SciElo	Dialnet	Eric	Redalyc	Google Scholar	Zenodo
Didactic Transposition	229	61	417	48	60	988	304
Didactic Transposition in Education	37	25	55	20	23	165	175

After a thorough analysis in various academic and scientific databases such as Scopus, SciElo, Dialnet, Redalyc, Google Scholar and Zenodo, 20 highly relevant academic articles were selected, covering the period between 2020 and 2023. Figure 3 shows a significant increase in the number of reference articles or publications related to the concept of didactic transposition in 2022, with this increase assuming that this increase is due to the pandemic.

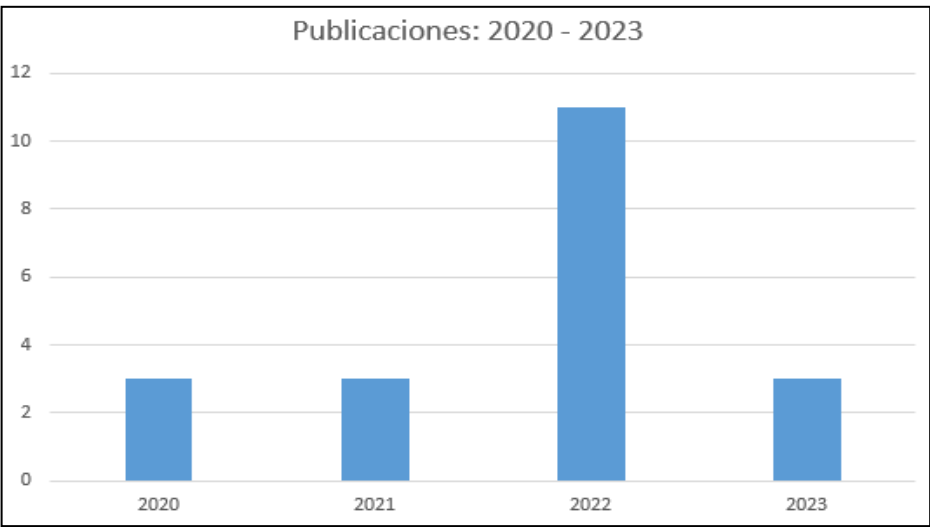


Figure 3. Publications on Didactic Transposition between the years 2020 - 2023. In original language Spanish

The appreciation and interest in the study of the didactic transposition of teachers in the educational environment, with the aim of contextualizing their concepts and processes within pedagogical performance, has experienced a significant increase in 2022. This growing concern is manifested in various studies carried out by academics such as López-Gutiérrez and Pérez (2022), Zapata et al. (2022), Ibáñez et al. (2022), Navarrete and Cerón (2022), Quintero et al. (2022), Torres et al. (2021), Souza et al. (2022), Roa and Hidalgo-Herrero (2022), Vintimilla (2022), Viana (2022), Gutiérrez et al. (2022). These studies highlight the importance of generating knowledge related to the didactic transposition of teachers.

Figure 4 presents an analysis of the distribution of publications on didactic transposition

according to country of origin. Of the twenty articles examined, four come from Colombia, three from Venezuela, three from Chile, two from Mexico, two from Brazil, two from Spain, one from Ecuador, one from Argentina, one from Indonesia and one from Cuba.

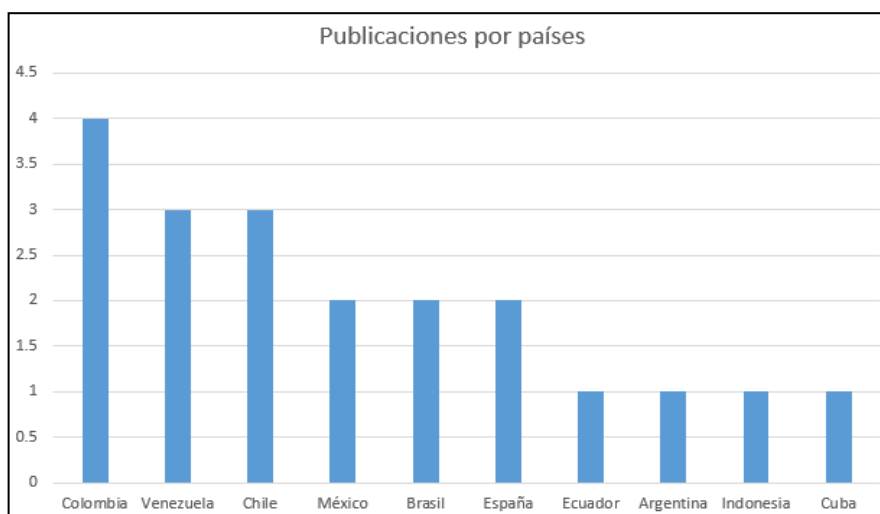


Figure 4. Publications on Didactic Transposition by Country. In original language Spanish

In relation to the research approach, Figure 5 shows an overview of 10 qualitative studies, 06 quantitative studies, and 04 that have involved documentary reviews and have used the systemic analysis method.



Figure 5. Publications on didactic transposition according to the research approach. In original language Spanish

Regarding the distribution of publications according to educational level, Figure 6 reveals that, of the 20 articles analyzed, 11 are linked to research carried out in the field of higher education, while only 9 are related to basic education.

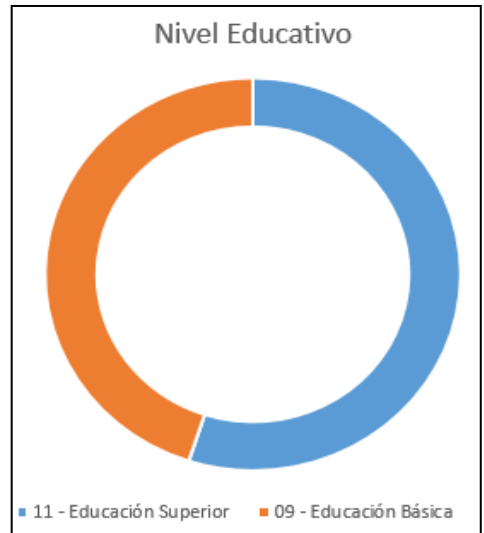


Figure 6. Publications on Didactic Transposition according to Educational Level. In original language Spanish

4. DISCUSSION

According to the results obtained, it has been observed that the topic of didactic transposition of teachers has been predominantly investigated in the educational context. However, in recent times, researchers have shown a growing interest in higher education, mainly in universities, where a close relationship has been established between didactic transposition and the pedagogical performance of teachers in order to strengthen student learning. In addition, it is highlighted that by implementing a framework of analysis related to educational practices from an intercultural educational approach and a co-constructive approach, the transformation of the teaching and learning process is possible, from an epistemological pluralism. These participatory actions allow the involvement of actors from the educational and social environment, thus building culturally relevant learning (Zapata et al., 2022).

To this end, the main actors in the didactic transpositions are the teachers in co-teaching mode and the academic assistant. This team collaborates together to carry out the didactic transposition, converting specialized knowledge into teachable knowledge (Navarrete & Cerón, 2022). In this sense, the constant practice of didactic transposition is demanded as a teaching strategy, because they add to the processes of quality certifications of engineering careers (Quintero et al., 2022); in future mathematics teachers (Souza et al., 2022) and in mathematics learning in general (Roa & Hidalgo-Herrero, 2022). Likewise, the importance of didactic transposition in the area of History is established (Viana, 2022).

These findings are encouraging, as they show progress, in Latin America, of the concept of didactic transposition of teachers in higher education to improve the learning of university students. As mentioned by López-Gutiérrez and Pérez (2022), the use of didactic transposition as a strategy for knowledge transfer has a significant impact on the communication and effective motivation of students' learning process. In the same way, it is similar to the study *Nanotechnology Perceptions* Vol. 20 No. S15 (2024)

carried out by Ibáñez et al. (2022), as they argue that didactic transposition, conceived as a generic and standardized technique or approach, represents the appropriate way to direct the pedagogical teaching-learning process for the benefit of students. Animated infovisualization was found to influence didactic transposition (Vintimilla, 2022).

A relevant result is that, of the publications selected and found in the field of education during the last four years, only eleven make specific reference to the didactic transposition of teachers in university education, while nine focus on school education. This fact represents an omission of substantial knowledge, which could indicate that there is a knowledge gap about the concept of didactic transposition in both universities and schools, and perhaps the teachers of these institutions are not properly applying this concept, resulting in an underestimated didactic transposition. However, research such as that of Torres et al. (2021) indicates that the didactic transposition carried out by teachers reflects a notable commitment to the contents of university courses, with the aim of using scientific knowledge in its ideal form and then converting it into relevant knowledge, in the same way, Gutiérrez et al. (2022) asserts, Despite the fact that didactic transposition is widely valued, some teachers find that its implementation in their performance can be complicated, due to the lack of an adequate pedagogical culture, unfortunately there is a decontextualization of the contents in the different curricular areas. Indeed, in recent years, the concept of didactic transposition has been the subject of an enlightening and renewing process. However, experiences in external internships in the teaching career have shown that, unfortunately, on rare occasions adequate didactic transposition is carried out. This situation has an impact on the fact that education is not sufficiently focused on the level of learning of students, which, on many occasions, prevents achieving the expected results.

In relation to the restrictions of the study, the presence of biases in the process of searching for information in databases such as Scopus, Redalyc, Scielo, etc., is identified. Although for a preliminary approach, this procedure was adequate due to the analysis of the literature with the greatest impact on science. In addition, a relevant restriction was the absence of open access to the content of the articles for review, likewise, another restriction was related to the criteria for selecting the articles; however, it was decided to investigate the most recent publications.

5. CONCLUSIONS

After the review of various studies, it has been observed that the topic of the didactic transposition of teachers remains a little-known or poorly researched topic. However, from the systematic review carried out, substantial information has been collected from the 20 scientific articles examined, which is of great relevance for dissemination in the scientific community. Likewise, this information should be taken into account for subsequent studies and continue with the collection of data in this important and pertinent line of research.

The publications found, in particular, in the higher education environment, have highlighted the importance of didactic transposition in the pedagogical performance of teachers, since this aspect is transcendental for the meaningful and formative learning of university students since it contributes jointly to carry out didactic transposition, converting specialized knowledge into

teachable knowledge. In this sense, the constant practice of didactic transposition is demanded as a teaching strategy, because they add to the quality certification processes. Therefore, it is suggested to continue with studies on this subject and to expand pertinently towards higher education, with the purpose of encouraging universities to become organizations that promote meaningful learning and the proper application of the didactic transposition of teachers, with a view to achieving better quality and competitiveness of higher education.

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