

## Epistemological beliefs and teaching practice: a systematic literature review 2011 to 2021

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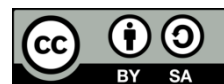
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### ABSTRACT

Teachers' actions are grounded on their theoretical and disciplinary knowledge; however, their belief system, and in particular their epistemological beliefs, may be influencing their teaching practices. This study analyzes the scientific production between 2011 and 2021 regarding teachers' epistemological beliefs and their relationship with teaching practice. The methodological design consists of a systematic literature review, following the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines in the Web of Science, Scopus, and ERIC databases. The sample considers 18 articles reviewed by thematic content analysis. The results report that this type of belief has a close relationship with teaching approaches, that there are certain inconsistencies with teaching practice, and that links have been established with other areas of study that enrich reflection. It seems prudent and necessary to observe this relationship from a broad, situated, and complex perspective, avoiding generalizing and polarizing the character of these beliefs, by noting that there are various factors involved between what teachers believe about knowledge and what they do in the classroom.

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## 1. INTRODUCTION

Previous researchers, such as Nespór [1] and Pajares [2] pointed out that beliefs are ideas or personal judgments that arise from experience, are influenced by context, and have a strong affective link. In addition, both authors state that beliefs converge in the teacher's thinking, giving meaning and significance to their pedagogical decisions, which makes them an essential predictor of their teaching practice [1], [2]. Several studies have been carried out on teachers' beliefs in order to evaluate, contextualize, and update them, since they would be the basis of the educational experience [3]–[5]. These studies have been developed using mainly self-report questionnaires [6]. In the context of initial training, many hours are devoted to the acquisition of theoretical and disciplinary knowledge; however, the role of beliefs in teaching practice has been neglected [7]–[10]. Within this line of research are the so-called epistemological beliefs, whose main authors describe them as notions about knowledge and the process of knowing [11], [12]. In general, the study of this type of belief has been developed in students and future teachers [13]–[16].

Several theoretical frameworks have been proposed for this type of belief; however, Schommer's multidimensional proposal is perhaps the most accurate. This research argued that epistemological beliefs can be described in terms of their development as simplistic or sophisticated; dimensions that are more developed than others can even coexist, since they are independent of each other [12]. Based on this proposal, teachers

with developed or sophisticated epistemological beliefs conceive knowledge as a complex phenomenon, constantly changing and constructed in spaces of dialogue and reasoning. Likewise, they believe that the ability to learn is modifiable and occurs gradually. On the other hand, teachers who hold naïve or underdeveloped epistemological beliefs conceive of knowledge as simple or isolated, that it remains stable and arises from those in authority. They also believe that the ability to learn is innate and that learning occurs quickly [17].

The beliefs that teachers have about knowledge could be acting as an obstacle to the installation of new teaching models [7]. Several countries have implemented reforms based on constructivist pedagogical approaches, encouraging students to play a leading and participatory role, and allowing them to articulate different contents in spaces of dialogue and reasoning [18]. Considering that teachers constantly interact with their students and that beliefs play a significant role in their classroom practice; it is worth asking: what does the scientific production between 2011 and 2021 report on epistemological beliefs and their relationship with teaching practice?

## 2. RESEARCH METHOD

The methodology used for this review corresponds to a secondary-level analysis by collecting primary studies [19]. The literature points out that systematic reviews favor the advancement of knowledge on a given topic, and allow for building a theoretical basis for future studies [20]. The recommendations of the PRISMA statement for the elaboration of systematic reviews [21], were followed to select relevant articles that were stringent and pertinent to answer the question and objective of this study.

For the document search process, the “advanced search” option was used with the keywords “epistemological beliefs” and “school teachers,” using the Boolean operator “AND.” This made it possible to delimit the object of study as precisely as possible. The search period corresponds to July and August 2022. Empirical scientific articles found in the Web of Science (WoS), Scopus, and EBSCO databases were reviewed since most of the journals that consider studies on this specific area are indexed in these databases. The search resulted in 15 articles in WoS, 25 in Scopus, and 183 in EBSCO. To ensure the relevance of the articles analyzed, inclusion and exclusion criteria were used, limiting the search only to empirical articles, published between 2011 and 2021, in English or Spanish, and that considered teachers in service in primary and secondary schools as part of their sample.

First, the inclusion and exclusion criteria were applied and duplicate articles were eliminated; second, the titles, abstracts, and results were read to select those documents that were relevant to this work. Finally, a complete reading of the documents was carried out, which made it possible to select a final sample of 18 articles for the systematic review Figure 1. To increase the validity and reliability of this process, an analysis sheet was prepared for each document, synthesizing the most appropriate and relevant information to answer the question and meet the research objective. To capture the meanings of the textual data, a thematic analysis was used that included strategies of supervision, improvement and agreement among coders, establishing a process of inductive and exhaustive examination of the research content [20].

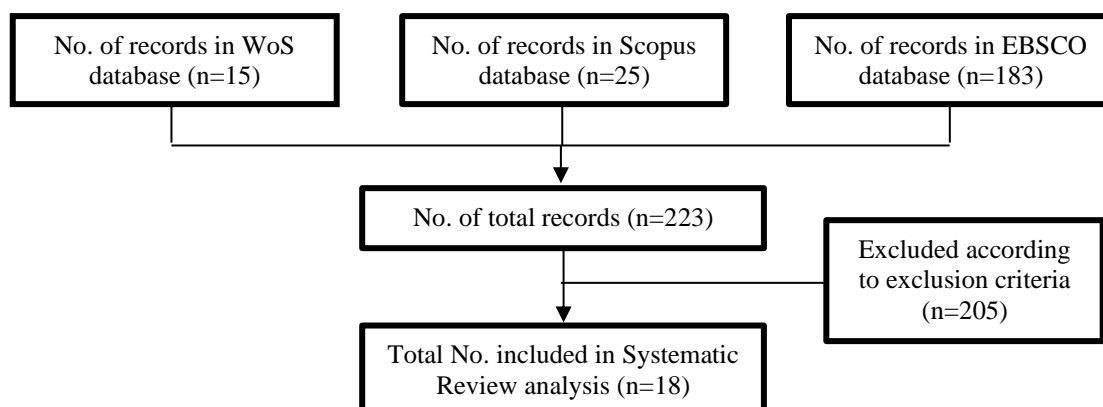


Figure 1. Process of information flow through the different phases of the systematic review [22]

## 3. RESULTS AND DISCUSSION

After the literature review and through a process of synthesis of the information, the results are presented in Table 1 with the research method, sample, and study findings of each article. The results provided

by the thematic analysis allowed the generation of the following categories: i) relationship with teaching approaches; ii) inconsistencies with teaching practice; and iii) links with other areas of study. Table 2 identifies the categories along with the authors addressing each category.

Table 1. Systematic review results

No	Study	Research method	Sample	Study findings
1	[23]	Qualitative	22 secondary school teachers in Saudi Arabia.	Teachers have sophisticated epistemological beliefs in most dimensions except the certainty of knowledge. Their responses differed on the concept, source, and factors affecting the formation of this type of belief.
2	[24]	Quantitative	284 primary school teachers in Turkey.	Teachers with developed epistemological beliefs prefer the constructivist approach. While teachers with underdeveloped beliefs tend to adopt a traditional approach to teaching and learning.
3	[25]	Quantitative	228 primary school teachers in Turkey.	There is a moderate relationship between some dimensions of epistemological beliefs and student control ideology. Teachers with naive beliefs are in favor of keeping students under control.
4	[26]	Quantitative	173 elementary school teachers in Germany	Epistemological beliefs developed around the dimension of knowledge stability have a direct effect on self-efficacy and the promotion of self-regulated learning.
5	[27]	Quantitative	184 secondary school teachers in Turkey.	Teachers' epistemological beliefs largely predict their reported preferences around their conceptions of teaching and learning.
6	[28]	Quantitative	182 elementary school teachers in the United States.	Teachers in gifted programs report more sophisticated epistemological beliefs, and a greater orientation to learning goals over performance goals than teachers working in the general education classroom.
7	[29]	Quantitative	127 secondary school teachers from Finland. 97 secondary school teachers from Taiwan.	There are cultural differences in Eastern and Western epistemological beliefs. There is a strong correlation between naive epistemological beliefs and teaching practice. The same does not occur with sophisticated beliefs when they manifest difficulties in deploying them in the classroom.
8	[30]	Quantitative	1,008 secondary school teachers from China.	The teachers held sophisticated epistemological beliefs on each of the five dimensions assessed. These developed beliefs were significantly and positively correlated with the constructivist conception and with different conceptions of teaching and learning.
9	[31]	Quantitative	285 Malaysian primary and secondary school teachers.	Malaysian teachers hold sophisticated epistemological beliefs. Teachers who believe in the incremental theory of intelligence use student-centered practices.
10	[32]	Quantitative	120 Iranian high school teachers.	The relationship between epistemological beliefs and conceptions of teaching and learning is statistically significant.
11	[33]	Quantitative	420 primary and secondary school teachers in Serbia.	There were 47.86% of the teachers held contextualist beliefs; 24.05% held relativistic beliefs; and 24.05% held realist beliefs. Teachers' self-reporting of their epistemological beliefs is not consistent with their practice.
12	[34]	Qualitative	32 United States elementary school teachers.	Teachers metaphorically situate themselves from a sophisticated perspective of knowledge, yet contextual challenges emerge that inhibit this practice.
13	[35]	Mixed	3 United States high school teachers.	When the teacher possesses high-quality pedagogical content knowledge about argumentation and sophisticated beliefs about the nature of knowledge, he or she is more likely to use this teaching strategy. The need to cover content or meet outcome standards constrains constructivist practices.
14	[36]	Mixed	1 primary school teacher and 1 secondary school teacher from Taiwan.	School culture tends to condition and transform teachers' epistemological beliefs into "pragmatic" beliefs about teaching. Inconsistencies are observed between teachers' epistemological beliefs and their teaching practices.
15	[37]	Quantitative	345 secondary school teachers in Turkey.	Sophisticated epistemological beliefs positively predict constructivist conceptions of teaching. They also promote student autonomy-supportive behaviors.
16	[38]	Quantitative	251 primary school teachers in Chile.	Teachers with less sophisticated beliefs had a greater perception that teacher evaluation favors professional development. While teachers with sophisticated beliefs reported a lower effect and use of teacher evaluation for their development.
17	[39]	Mixed	99 secondary school teachers in Cuba.	Mathematics teachers have a tendency towards sophisticated levels of their epistemological beliefs; however, these are not consistent with a constructivist practice in the classroom.
18	[40]	Quantitative	60 Iranian high school teachers.	There is a significant positive correlation between traditional conceptions of teaching and naïve epistemological beliefs on each of the dimensions.

Table 2. Categories with author(s)

Category	Studies
Relationship to teaching approaches	[24], [27], [30], [32], [37], [40]
Inconsistencies with teaching practice	[23], [24], [28], [29], [33]–[36], [39]
Relationship with other areas of study	[24]–[26], [28], [31], [35], [38]

### 3.1. Relationship to teaching approaches

Several authors agree that epistemological beliefs predict the didactic approach adopted by teachers. In general, two major views are considered, the constructivist and the traditional. Those teachers with sophisticated epistemological beliefs conceive the teaching process from a constructivist perspective, placing the student as the protagonist of the educational experience. While teachers with naive beliefs about knowledge maintain a traditional conception of teaching, developing transmitted strategies where the teacher is the protagonist of the class [24], [27], [30], [32], [37], [40]. This evidence adds to the findings reported by students and teachers in training [41]–[46].

A detailed review of these works allows us to identify some exciting findings highlighting this relationship. For example, according to several researchers [24], [30], the implementation of curricular reforms in the school system based on a constructivist approach to teaching has significantly affected the transformation of the approaches that guide teachers' decisions and practice. For these researchers, the development of this type of belief could be due to this reason since the treatment of contents is integrated under a complex belief of the structure of knowledge [24], [30]. Similarly, knowledge is conceived as the result of a dialogue that can occur between equals in contexts of dialogue and collaboration, under the belief that everyone possesses knowledge that can be reliable and accurate [37], [40].

Another interesting aspect to highlight, is that the sophistication of this type of belief does not develop simultaneously in all dimensions, however, the development in some of them has a direct relationship with constructivist teaching approaches [30]. This perspective promote the active participation of students, boosting their autonomy and generating spaces of interaction to favor dialogue and discussion [37]. Similarly, different works point out that the development of this type of belief promotes a cross-disciplinary approach to the contents between different disciplines [24], [27], [32], [40].

### 3.2. Inconsistencies with teaching practice

Several researchers have studied this type of belief about knowledge and the process of knowing to raise the importance of considering the specific characteristics of each context and culture as a factor that influences their construction and consolidation [41], [47]–[50]. In this sense, an interesting finding of this review is that a diversity of contextual factors hinders the implementation of constructivist strategies aligned with this type of belief. For example, although teachers report sophisticated epistemological beliefs in their discourse, the characteristics of the context cause certain inconsistencies with their teaching practice [23], [24], [28], [29], [33]–[36], [39]. These inconsistencies could depend on the teachers' skills, their age, the social and educational conditions of the context, and the effort made by the students [23], [24].

Other researchers pointed out that an essential factor to consider is the tacit nature of beliefs, which generally keeps them on the margin of reflection and debate, generating inconsistencies between what teachers do and think. The absence of a unified model and the diversity of sources and processes that affect the formation of beliefs could also influence their understanding and interpretation [23], [33], [39]. Another article points out that inconsistencies may be manifested as a product of the cultural background of teachers, a difference that would be subject to an integrated vision of Eastern pedagogical referents compared to Western ones [29].

Another criterion that affects this sense is the institutions' objective and educational projects. While some focus on achieving deep and meaningful learning by promoting active and participatory environments for students, others' work focuses on performance and promoting instructional practices to cover a large amount of content under a transmissive logic that hinders the possibilities of implementing formative experiences. When the emphasis of teaching is on evaluation and competitiveness, teachers tend to use traditional practices to ensure good short-term performance [28], [34]–[36].

### 3.3. Relationship with other areas of study

In order to broaden the reflection on this type of beliefs and their relationship with teaching practice, several authors have explored and analyzed their link with other areas of study, enriching with interesting findings the understanding of epistemological beliefs [24]–[26], [28], [31], [35], [38]. Ardic and Uslu [24], for example, studied teachers' self-efficacy and found a positive relationship between the adoption of sophisticated epistemological beliefs and innovativeness. Along the same lines, it was observed that self-efficacy to promote self-regulated learning was closely related to developed beliefs [26].

This same researcher explored the extent of this type of belief with the promotion of self-regulated learning, finding that the development of these beliefs promotes in teachers the inclusion of an autonomous learning environment and students' self-regulation [26]. That is, teachers with sophisticated epistemological beliefs would use strategies focused on students' decisions. On the other hand, Aytac [25] linked the study of these beliefs with the ideology of learner control held by teachers and found that naïve epistemological beliefs significantly predicted teacher control and supervision over the teaching and learning process.

A paper developed by Leng *et al.* [31] found a close relationship between sophisticated epistemological beliefs and the incremental theory of intelligence, finding that teachers with a sophisticated perspective on knowledge more frequently use strategies that promote its development. Sengul *et al.* [35] investigated pedagogical content knowledge and found that when the teacher has a high-quality pedagogical content knowledge on argumentation and has developed beliefs about knowledge, he or she is more likely to use this pedagogical strategy. Vargas *et al.* [38] reported that teachers with less sophisticated beliefs had a higher perception that teacher evaluation favors their professional development. In contrast, those teachers with sophisticated beliefs reported a lower effect and use of evaluation for their development.

#### 4. CONCLUSION




From the present literature review it is clear that the field of empirical studies on school teachers' epistemological beliefs has undergone a development during the last 10 years. In methodological terms, most studies have approached this phenomenon from a quantitative approach. These researches allow us to adequately answer the research question and objective by confirming that there is a close relationship between teachers' epistemological beliefs and their teaching practice. Considering the reported findings, it is possible to point out three significant conclusions. First, it seems prudent and necessary to observe this relationship from a broad, situated and complex perspective, avoiding generalizing and polarizing the naive and sophisticated character of these beliefs. Secondly, and as a suggestion, we could advance in studies that clarify disciplinary differences, in addition to studies that contrast sociocultural aspects. The literature indicates that epistemological beliefs do not operate in a vacuum, so it is necessary to analyze them in context in order to understand them better. Thirdly, it is suggested that training programs and teacher educators generate spaces for reflection and discussion on this type of beliefs. Regarding this review's limitations, the literature reports a conceptual diversity to refer to this type of belief, which could make it challenging to find works that contribute to this line. A second issue is that only publications in English and Spanish have been included. Finally, due to a question of space and time, it was not possible to extend the search to other databases.

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