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The Teacher At The Center Of The Teaching Effectiveness Debate: Meta-Synthesis Of The Impact Of Teacher Characteristics

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Abstract

The purpose of this study is to synthesize the results of evidence accumulated from an extensive body of primary research through quantitative and qualitative synthesis studies (meta-analyses and systematic reviews) that examine the relationship between teacher characteristics and various measures of teaching effectiveness and quality. This meta-synthesis integrates the results of 6 papers that facilitate the description of their characteristics in their own context, together with an analysis of trends that transcend all of them. The results show that the cognitive and academic trajectory characteristics of teachers are integrated in broad models, although with a very moderate impact at best. Motivation studies are essentially descriptive, although they allow comparisons to be made according to the socio-economic and cultural context of teachers through the use of common measurement tools. This meta-synthesis shows that more large-scale research with validated instruments and comparable samples is needed. But above all, there is a need for research based on a solid theoretical foundation that addresses in an integrated manner the precise effects of teacher characteristics on teaching quality.

Keywords: teacher characteristics; teacher effectiveness; meta-analysis; systematic review.

1. Introduction

Large-scale international educational assessment programs, such as PISA, TIMSS, PIRLS, etc., have revealed, with empirical support, the situation of the different participating countries in terms of educational achievement. In all those in which the relative position is not satisfactory, there have been social and political reactions aimed at adopting measures to remedy the perceived shortcomings. This is the case of Spain, among others, without going any further.

The work of Hattie (2008, 2011), which meta-analyzes more than 65,000 research papers on the effects of hundreds of interventions on the learning of 250 million students , points out that the factor related to the quality of the teacher is the one that produces always greater differences, once other contextual effects, such as the origin of the students, have been controlled. Other factors, such as class size, level of investment, and the like, have very little effect on students' effective learning.

The focus on the teacher is shown in some reports that have highlighted the importance of teacher qualification and effectiveness (Atteberry et al., 2015; Darling-Hammond, 2010; Jackson et al., 2014; Hobson et al. ., 2010; OECD, 2005; Lankford et al., 2014) and, as a consequence, the impact that their training, the impact of their characteristics and the initial selection policies of teachers have on the academic results of their students.

Teaching effectiveness is difficult to define. Conceptually, teacher effectiveness refers to a set of internal attributes - personality, motivation, beliefs and dispositions - that interact with contextual factors (cultural, social, educational) to influence student outcomes. Perhaps an applied solution is to refer to the different measures used to capture teacher effectiveness. Researchers and practitioners have used observational measures, direct measures of academic performance, student value-added scores, and student reports to evaluate teacher effectiveness, with

sometimes limited agreement between different forms of evaluation (Chetty et al., 2014; Grissom and Loeb, 2017). There is recent research on the measurement of teaching effectiveness, we will cite the CLASS System (in its acronym in English, Classroom Assessment Scoring System; Hamre et al., 2013) for its relevance, although the comparative analysis ICALT [1] (van der Lans et al., 2018) or also the international system ISTOF [2] (Muijs et al., 2018) would be good examples. Research on measures of teacher effectiveness has increased over the last decade, with greater reliability and validity, and greater consensus on the factors that underpin frameworks and models of effective educational practice (Gill et al., 2016; Klassen and Tze, 2014).

Among the theoretical models of teaching effectiveness (Muijs et al., 2014; Hamre et al., 2013), in this work we rely on the COACTIV model (Kunter et al., 2013) as it establishes a dynamic framework in which articulate teaching effectiveness, understood as student outcomes. It combines so-called contextual factors (educational system, initial teacher training programs, characteristics of schools) with the personal characteristics of the teacher, categorized into three large dimensions: cognitive skills (area of knowledge, reasoning capacity and pedagogical knowledge), non-native skills cognitive (beliefs, motivations and personality traits) and factors related to the academic career and access to the profession. Both sets of factors are integrated into the teaching process interactively (teacher competence and behaviors), relating to learning results. The model of Kunter et al. (2013), provides a theoretical basis to explain how contextual factors, learning opportunities and personal characteristics are relevant to decisions about the selection of future teachers.

This articulation of the teacher's personal characteristics has special relevance in this work, since the purpose of this study is to synthesize the results of the accumulated evidence of an extensive set of primary research through quantitative and qualitative synthesis studies (meta-analysis and reviews systematic) that examine the relationship between teacher characteristics and various measures of teaching effectiveness and quality.

More specifically, the following research questions are posed:

1. What teacher traits have been systematically studied in the research literature?

2. Are cognitive, non-cognitive and academic career skills treated in the same way in the literature?

3. Which of these traits are related to the various measures of teacher effectiveness and what evidence is there about their influence?

4. What are the characteristics of the measurement of teaching effectiveness included in the literature?

2. Meta-synthesis: methodological characteristics of this study

The methodological choice of the meta-synthesis is justified by the possibility of carrying out a qualitative analysis of the included synthesis studies, respecting the idiosyncrasy and specificity of each of them (Walsh and Downe, 2005), together with an aggregation process. also qualitative that allows defining the major joint trends of the results obtained in this large group of primary research aggregated through the 6 meta-analyses and systematic reviews selected for this meta-synthesis.

Since 2009, a total of six meta-analyses and systematic reviews have been published that specifically address the relationship between teacher characteristics

and teaching quality (see Table 1). These six meta-analyses synthesize the scientific evidence accumulated from 1960 to 2019. This scientific production is a sample of the concern and interest that this relationship between teacher characteristics and teaching effectiveness scientifically arouses, since the results of 323 primary investigations have been integrated. It is necessary to point out that among the integrated meta-analyses, little variability is observed in the populations studied, since most of the studies focus on the United States, although two of them focus only on samples of practicing teachers and the other four also include samples of teachers in training (see Table 2). The sample of studies on which this research is based is made up of the set of syntheses of quantitative and qualitative results that have been carried out in the last 13 years based on empirical literature focused on the relationship between teaching effectiveness and teacher characteristics.

2.1 Search characteristics

The main bibliographic databases of scientific and academic literature in this disciplinary field (Web of Science (WoS) main collection, Education Resource Information Center (ERIC) database, Scopus and PsycINFO) have been used for the search. of research that included the analysis of the relationship between teaching effectiveness and teacher characteristics. The search terms adjust to the proposed conceptual definition, with their central focus being the study of the teacher's characteristics and their effectiveness.

The key words (extracted from the corresponding thesauri) used in the initial exploration were «meta- analysis » , «Systematic Review » , « Teacher Characteristics » , «Teacher Effectiveness » , «Teacher Selection » and « Initial Teacher Education » . In the different searches, the descriptors were used in a

variety of combinations, temporally limited to those studies published between 2000 and 2020.

After the initial search, in which more than 5,000 studies of different types were filtered (books, doctoral theses, articles, research reports, etc.), 166 works were selected due to their apparent connection with the research problem under study. However, a detailed analysis of them allowed for a more precise selection, in which those with insufficient synthesis data (meta-analysis or systematic reviews), not related to a measure of effectiveness external to the teacher or that presented problems related to the design and methodology, reasons that prevented its use in the present study. After this second selection, 17 investigations were considered, published in peer-reviewed scientific journals.

Table 1. Final selection of included meta-analyses.

Authors and date	Date	No. of investigations	Sample period
Aloe and Becker (2009)	2009	30	1960-2006
D'Agostino and Powers (2009)	2009	123	1960-2006
Heinz (2015)	2015	41	1990-2014
Fray and Gore (2018)	2018	70	2007-2016
Klassen and Kim (2019)	2019	32	2000-2017
Bardach and Klassen (2020)	2020	27	2000-2019

Note: Own preparation

The result of the final sample of this meta-synthesis also responds to the consideration of three inclusion criteria. First, the included meta-analyses and systematic reviews must have a measure of teaching efficacy external to the

teacher's own assessments (measures of self-efficacy are not included). Second, meta-analyses must refer to samples of primary school teachers in practice or in training. Finally, they must include characteristics of the teacher not related to factors associated with the teacher's personality. By using these three criteria, the final sample is composed of the six works presented in Table 1.

2.2 Meta-synthesis results analysis process

The stated objectives lead to a double analysis strategy. On the one hand, a description of each of the included studies is made. In this way, each unit of analysis is examined. This perspective allows the results to be placed in the specific context of each study, respecting the specific research questions and the definition of effectiveness itself and its connection with specific characteristics of the teacher. On the other hand, a synthesis study of trends observed in the set of studies is carried out, drawing an overall overview of the general relationship between effectiveness and teacher characteristics, along with the main factors that produce differentiation in this trend.

3. **Results**

3.1 Qualitative analysis of the sample of meta-analytical studies

The meta-synthesis process begins with the examination of each meta-analysis and systematic reviews (Walsh and Downe 2005). Below is the summary of the six studies selected for the meta-synthesis. Each summary provides the purpose, the guiding research questions, the definition of the effectiveness measures and teacher characteristics studied, and the main results.

3.1.1 Aloe, AM and Becker, BJ (2009). Teacher verbal ability and school outcomes: where is the evidence?

Teachers' verbal ability is considered a good predictor of students' school results since the Coleman et al. report. (1966). Through a meta-analysis of 19 studies, the authors examine the evidence for teachers' verbal ability as a predictor of school outcomes, as represented by student academic achievement, principal ratings, and other measures of teacher performance. .

The results show that, at best, verbal ability is a poor predictor, and the main evidence of that weak relationship comes from the Coleman report itself. Several studies find no relationship. The results, in addition to the paucity of evidence on this issue, raise serious doubts about the many claims of the importance of verbal ability.

Clearly these results have implications for educational policy. Teacher certification in the United States focuses a lot on verbal ability, so it should be reviewed. The results of this synthesis are consistent with the idea that a teaching attribute is not by itself relevant to the quality of teaching.

3.1.2 D'Agostino, JV and Powers, SJ (2009) Predicting Teacher Performance with Test Scores and Grade Point Average: A Meta-Analysis.

They conduct a meta-analysis to examine the extent to which teachers' completion test scores and their performance in training programs (measured in terms of GPA) predict their teaching competence.

123 studies were selected that addressed the relationship between any teacher test or average grade at university and an indicator of teacher performance, so the studies varied considerably. Studies that examined students' overall college GPA, education major GPA, and teaching and methods GPA were included. Teachers who participated in the studies completed tests of basic skills, content knowledge, and professional knowledge, and measurements of their teaching were obtained

while they were enrolled in pre-service programs or while they were active teachers. In addition to measurements of teaching made by supervisors, their students, or external observers, studies were included that defined teachers' performance through students' test results.

Test scores are, at best, modestly related to teaching competence, while performance in preparation programs is a significantly better predictor of teaching competence.

The findings of this study have implications for teacher selection and certification practices in the United States. Initial training programs are often not trusted to prepare teachers adequately and comprehensively and must therefore be held accountable through external evidence. After reviewing a large amount of validity evidence, it is observed that certification test scores are less related to teaching performance than the performance obtained in initial training programs. In light of these results, those involved in the teacher hiring and selection processes should probably focus as much or more on student grades than on the test scores used to obtain certification.

3.1.3 Heinz, M. (2015). Why Choose Teaching? An International Review of Empirical Studies Exploring Student Teachers' Career Motivations and Levels of Commitment to Teaching.

Heinz presents a systematic and conceptual review of 41 empirical studies that analyze the motivations and commitment of student teachers in 23 countries on five continents.

The theoretical axis of this work assumes that academic competence, knowledge of the subject and teaching skills are important factors that contribute to teaching effectiveness, but quality education cannot be achieved without teachers who are

motivated, enthusiastic and committed to education. of their students and with the teaching profession. The central question of the work is: What can empirical studies tell us regarding the professional motivations of people who choose to enter the teaching profession in different countries and sociocultural contexts?

The work indicates that there are conceptual and methodological deficiencies in research on this topic. In most studies, teaching candidates are treated as a homogeneous group without taking into account the stage, sociocultural and biographical background or moment of training in which they are. If subgroups are analyzed, it is generally by gender. Furthermore, many of them are atheoretical, which leads to divergences in the definitions of the influencing factors and overlaps between categorizations (especially with regard to intrinsic and altruistic motivations).

On the other hand, many works seem to assume that the factors influencing individuals' career decisions are largely under their exclusive control. Researchers must go beyond models of planned decision making and pay attention to social, cultural, and opportunity factors that may limit or enhance people's career decisions.

In recent years, the use of FIT-Choice [3] has managed to overcome some of the theoretical and methodological deficiencies of previous studies. Furthermore, its use in different countries provides opportunities for more reliable cross-cultural comparisons. Although the results must be interpreted with caution, due to the limitations of this work, they indicate that the choice of a teaching career is potentially framed and shaped by opportunity structures, as well as by economic and labor market conditions that differ enormously between different students.

sociocultural contexts of high, middle and low income countries or with different human development indices.

Intrinsic and altruistic motivations are evident in high-income countries with very high human development indexes . Extrinsic reasons, such as financial rewards and job security, have a higher priority in low- to middle-income countries with lower human development indices, where there are fewer employment opportunities and where education can offer people lower class an opportunity for social progress.

3.1.4 Fray, L., and Gore, J. (2018). Why People Choose Teaching: A Scoping Review of Empirical Studies, 2007–2016.

Fray and Gore conduct a review of empirical research focused on the factors that influence the choice of teaching as a career. 70 studies carried out between 2007 and 2016 in different countries are reviewed, of which 63 have motivation as the primary explanatory focus. Furthermore, the traditional conceptualization of motivation predominates in types, such as altruistic (serving others, helping and supporting students), intrinsic (passion for teaching and interest in the subject) and extrinsic (it is related to the options of lifestyle outside of work and working conditions).

Beyond traditional conceptualizations of motivation, other studies have explored this factor in terms of 'adaptive' and 'maladaptive' strategies. “Maladaptive” strategies include factors such as teaching as a second-chance career and the negative influence of significant others. Adaptive motives relate to effort, participation and commitment, and include the ability to teach, shape children's future, improve social equity, social status, intrinsic professional values, experience and make a contribution social. Some studies examine the motivation

of future teachers based on a different typology of teachers, which classifies them as “enthusiastic”, “conventional” or “pragmatic”.

Although important, continued reliance on motivation overlooks other relevant factors and has limitations. In general, these studies do not address variables such as demographic profiles, different professional trajectories within teacher training or the structural elements of said teacher training. Research should adopt “more sophisticated methodologies” in exploring pre-service teachers' motivations for addressing issues related to inconsistent findings in previous research.

With greater methodological sophistication are the 17 studies that have used the FIT-Choice scale, which is the best known for examining the factors that influence the choice of teaching as a career. This model attempts to explain the choice of teaching through a combination of key motivational factors including socialization influences, task demands, task returns, self-perceptions, intrinsic value, personal utility value, social utility value, and teaching as a career. alternative. It is a useful model and has provided progress, although it has received criticism because it does not consider some of the key components of motivation to be a teacher.

A line of research shared by 20 studies (including several with the FIT-Choice scale) is to identify key influences for motivation towards teaching as a profession. Three key influences have been identified: country of residence, gender and role of significant others.

Seven articles do not focus on motivation, but rather on social influences on interest in becoming a teacher.

Research on this topic has expanded greatly, but other theoretical lenses would be necessary that would be useful to understand how interest in teaching as a profession is related to social trends and conditions in a broad sense. Furthermore,

most research is done with people in teacher education and it would be necessary to understand the reasons why students are not interested in teaching in order to inform policies and strategies to attract people into teaching.

3.1.5 Klassen, R., and Kim, LE (2019). Selecting Teachers and Prospective Teachers: A Meta-Analysis.

Klassen and Kim examine the methods used in the selection of teachers for employment and pre-service teachers for entry into initial teacher education programs and evaluate the predictive validity of these methods. While systematic research on selection for employment and training has been developed in other fields, such as medicine, business, the military, etc., the same has not happened in the field of education. Methods are used without analyzing their predictive validity, often based on intuition.

They review research exploring selection methods for teaching and teacher training since 2000. They are especially interested in the predictive validity of these methods. They review 32 studies that reported selection methods administered under high-risk conditions and that included an external (not self-reported) outcome measure of teaching effectiveness.

Findings confirm that selection methods that assess academic and non-academic constructs are statistically associated with measures of teaching effectiveness, although effect sizes were small. Of the 32 studies, 28 showed a positive relationship between selection method and teaching effectiveness, but only 10 studies had overall effect sizes that were significantly different from 0.

The relative weakness of predictive validity compared to other disciplines raises questions about the methods used for selection in education. The authors advocate applying lessons learned in other professions. For example, in education the

selection methods to assess the most recent non-academic attributes used in medicine are not applied. Similarly, in education the evaluation of academic record is generally considered, but the explicit evaluation of reasoning ability is not included, despite the findings in organizational psychology that reasoning ability is one of the best predictors of the results of training and work. Designing effective and efficient selection methods for teaching and entry into training programs presents many challenges, but these challenges have been successfully addressed in other professional fields.

3.1.6 Bardach, L., and Klassen, RM (2020). Smart Teachers, Successful Students? A Systematic Review of the Literature on Teachers' Cognitive Abilities and Teacher Effectiveness.

Unlike what happens in other professions, little attention has been paid to cognitive abilities themselves (intelligence) in research on teaching effectiveness. However, there are more studies on proxies of cognitive abilities (scores on entrance tests, results of tests of basic academic skills, etc.).

In the analysis by Bardach and Klassen, a systematic review of 27 empirical studies is carried out that explore the relationship between the cognitive abilities of teachers, both in terms of intelligence and approaches to cognitive abilities, and teaching effectiveness (defined as the effects of high-quality teaching on student learning in terms of achievement gains).

Only a small number of studies have examined teacher intelligence, suggesting that over the past two decades, research on teacher effectiveness has largely ignored intelligence as a potential predictor of how teachers perform their jobs, perhaps because to the spontaneous acceptance of the idea that teachers are “born, not made.” Of them, half showed no statistically significant effect of intelligence,

while the other half reported a negative effect. Although there are few works and they have limitations, the recommendation that is derived is that intelligence tests should not be used for selection into training and teaching, contradicting what happens in other professions.

Compared to studies using intelligence tests, a greater number of studies evaluated approximations of teachers' cognitive abilities, especially using the results of university entrance exams. Of them, half find no effects on school effectiveness and the rest find small positive effects.

The message is clear: cognitive skills, or at least the cognitive skills assessed in this set of studies, do not seem to predict teacher effectiveness very well. However, the overall results for the proxies of cognitive abilities could mask some interesting heterogeneities, if we look at studies that examine separate domains rather than composite scores. In studies that use college entrance tests, the majority found that the strength of the relationships with teaching effectiveness varies across domains. It is important to investigate which domains are most related to effectiveness and the authors point to numerical skills, since several studies find significant relationships, above those found in verbal skills.

The authors conclude that research on indicators of cognitive abilities would particularly benefit from (a) continuing research on separate ability domains rather than composite scores, (b) examining and contrasting the effects for different subjects, and (c) expanding the scope to include subjects other than those typically investigated in studies based on student achievement (i.e., mathematics and language).

3.2 Analysis of trends in the sample of synthesis studies

The review of studies selected for a meta-synthesis should be followed by an identification of the key concepts and relationships in each study reviewed. This meta-synthesis step, often called a "compare and contrast exercise," constitutes an organized analysis of trends that aims to reveal relationships between the studies analyzed and ultimately produce more generalizable findings.

Table 2 shows a detailed description of some of the main characteristics of the six synthesis studies (meta-analysis and systematic review) that have been included in this meta-synthesis.

The time frame for the publication of these six works begins in 2009 and ends in 2020, all of them published in high-impact journals. However, 323 empirical works that began to be published in 1960 are synthesized. This time interval already anticipates the enormous variability in the characteristics of the primary research that is integrated. On the contrary, a very great homogeneity is found in the samples included in the primary studies, since except in the work of Heinz (2015) all the samples of teachers correspond to the Anglo-Saxon field, focused especially on the United States.

Globally, all these works study in depth the characteristics of the teacher under the hypothesis that they influence the quality of teaching. Four of these studies (Aloe and Becker, 2009; D'Agostino and Powers, 2009; Klassen and Kim, 2019; and Bardach and Klassen, 2020) respond to a relational or inferential analysis pattern, establishing relationships between these characteristics (as has mentioned in the COACTIV model) and various measures of teacher effectiveness. In these studies, the variables used as predictors respond to those categorized as cognitive and/or academic career predictors. The actual cognitive predictors used are verbal ability, some measures of intelligence and academic skills. The academic trajectory

variables include measures of performance in initial training and measures of performance in access to university.

The remaining two studies respond to a type of descriptive analysis (Heinz, 2015 and Fray and Gore, 2018), both addressing the various factors that motivate the choice of teacher studies. These teacher characteristics have been labeled as non-cognitive.

This clear selection of the predictor variables on the quality of the teacher shows a characteristic characteristic of this set of research and that is the absence of integrated studies that jointly analyze all the predictor variables (cognitive, non-cognitive and academic career) on the quality of the teacher. teacher.

The operationalization of the teaching effectiveness measure also has some diversity, although it is necessary to remember that studies have been sought that had an external measure of teacher effectiveness. In that sense, all studies focusing on the perception of teacher self-efficacy have been discarded. The inclusion of measures of student performance stands out, whether direct grades (Aloe and Becker, 2009 and D'Agostino and Powers, 2009) or measures of performance gain (Klassen and Kim, 2019 and Bardach and Klassen, 2020), linked to value-added models, which show the progression in learning, without taking into account the final level achieved and differentiating other factors that influence academic performance (such as, for example, the socio-cultural level of families). These measures can be combined with other estimates of teaching performance, such as those produced by direct classroom observation (D'Agostino and Powers, 2009; Klassen and Kim, 2019 and Bardach and Klassen, 2020) or some measure of previous performance. of the teacher in their initial training (Klassen and Kim, 2019).

Table 3 summarizes the main results of all our research. The main trends observed are highlighted here.

The four investigations that address the influence of the cognitive characteristics and the academic career of the teacher, which accumulate a total of 212 primary investigations, show a truly weak relationship, lower in any of the cases than 0.15, when studying verbal ability, tests of academic skills and cognitive abilities, following the criteria of Cohen (1988) or Hattie (2008). Only the relationships with the teacher's average performance expressed in GPA units yield moderate effect sizes (0.25). Studies that analyze direct classroom observation show rates of agreement between different observers (for example, between principals and teacher mentors), although their relationship with so-called effectiveness measures remains low.

The two investigations focused on non-cognitive factors, which accumulate a total of 111 primary investigations on the motivations in choosing a teaching career, indicate that all research in the field needs an improvement in theoretical and methodological approaches. A triple classification of motivations is observed: intrinsic-extrinsic altruistic, adaptive-maladaptive choice and enthusiastic-conventional-pragmatic teachers who show profiles that coincide with each other and, therefore, are comparable.

It is also observed that, starting in the 90s, a test to measure motivation towards teaching, the FIT-choice, began to be implemented, which allows comparisons between different populations to be made in a simple way. In this sense, the work of Heinz (2015) is especially useful. In any case, differences are observed that can be attributed to cultural and economic factors. Intrinsic and altruistic motivations are evident in high-income countries with very high human development indices,

despite differences in their educational systems and policies. Extrinsic reasons, such as financial rewards and job security, have a higher priority in low- to middle-income countries with lower human development indices, where there are fewer employment opportunities and where education can offer people lower class an opportunity for social progress.

Table 2. Description of the results synthesis studies.

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
Aloe and Becker (2009)	Educational Researcher	Meta-analysis	Inferential /Relationship	Evidence of teachers' verbal ability as a predictor of	Practicing Teachers (K-12)	30	1960-2006	Teacher's verbal ability	Cognitive	Student Grades

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
				school outcomes is examined.						
D'Agostino and Powers (2009)	American Educational Research Journal	Meta-analysis	Inferential /Relationship	The degree to which teachers' test results and their perfor	Teachers in training and in practice (K-	123	1960-2006	Performance during teacher training (GPA	Cognitive and academic career	2 measures: a) Student grades and b) Direc

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
				mance in training programs predict their teaching competence is examined.	12)			)		t observation in the classroom

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
Heinz (2015)	Educational Research and Evaluation	Systematic review	Descriptive	The empirical literature is examined regarding the professional motivations (intrinsic and	Teachers in training	41	1990-2014	Does not apply	Non-Cognitive	Motivation measures

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
				extrinsic) of people in different countries and sociocultural contexts who choose to enter						

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
				the teaching profession.						
Fray and Gore (2018)	Teaching and Teacher Education	Scope Review	Descriptive	A review of empirical research is conducted focusi	Teachers in training	70	2007-2016	Does not apply	Non-Cognitive	Motivation measures

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
				ng on the factors that influence people to choose teaching as a career.						
Klassen and	Educational	Meta-anal	Inferential /Relationship	The methods	Teachers in	32	2000-201	Teacher select	Cognitive	3 measures:

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
Kim (2019)	Research Review	ysis		used to select teachers for employment and prospective teachers to enter initial teache	training and in practice (K-12)		7	ion methods (entry into training and access to the profession)	and academic career	a) Gains in student performance (added value), b) Direct obser

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
				r training programs are examined and the predictive validity of these metho						vation in the classroom and c) Performance during teacher training

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
				ds is assessed.						(assessed in the classroom, not grade average)
Bardach and Klassen (202	Educational Research Revi	Systematic review	Inferential /Relationship	A systematic review is condu	Practicing Teachers (K-12)	27	2000-2019	Cognitive ability of teachers	Cogniti ve and academ	2 measures: a) Gains in

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
0)	ew			cted of empirical studies that explore the relationship between teachers' cogniti ve				through a) published intelligence tests, b) college admission tests, such as the	ic career	student performance (added value) and b) Direct observation in

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
				abilities, both in terms of intelligence and approximations of cognitive abilities, and				SAT, ACT or GRE, c) basic skills tests that assess basic academic competenci		the classroom

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
				teacher effectiveness (defined as the effects of high-quality teaching on the studen				es in areas such as mathematics, reading and writing.		

Authors and date	Fountain	Type of study	Question type	Research question	Teacher's educational level	Sample size	Temporal scope of the sample	Predictors (VI)	Predictor type	Measurement of results
				t learning in terms of achievement gains).						

Note: Own preparation

Table 3. Main results of each synthesis work

Authors and date	Results
Aloe and Becker (2009)	The general conclusion is that the relationship between teachers' verbal ability and school outcomes is, at best, extremely weak. Few studies examine the relationship

Authors and date	Results
	between teachers' verbal ability and teaching quality outcomes.
D'Agostino and Powers (2009)	Among the types of indicators, GPA produced larger effects than any type of teacher test. The weighted mean effect of GPA, 0.25, was larger than the effects of the content and professional knowledge tests (0.17 for both) and the effect of the basic skills test (0.09). Effects were also calculated by criterion type to examine whether validity coefficients depended on how teacher performance was measured. Ratings from university instructors and faculty mentors tended to be more correlated with the indicators. Third-party observation and principal ratings yielded comparable effect sizes, and student evaluations and achievement test scores were the least correlated with the indicators.
Heinz (2015)	There are conceptual and methodological deficiencies in the study of this topic, so the results must be interpreted with caution. Comparison of FIT-Choice in Australia, the United States, Germany and Norway indicates that motivations are similar in all four samples, with 'intrinsic value of the career', 'perceived teaching ability', 'desire to make a social contribution', 'working with

Authors and date	Results
	children/adolescents', and having had 'previous positive teaching and learning experiences' consistently rated highest by participants across countries. The comparison in FIT-Choice in Turkey, China, USA and Croatia allows us to verify greater differences in motivations, which may be due to cultural and economic factors. Extrinsic motivations, such as financial rewards and job security, have a higher priority in low- to middle-income countries, where there are fewer employment opportunities and where education can offer people an opportunity for social advancement.
Fray and Gore (2018)	In 63 of the 70 articles, motivation was the primary explanatory focus. More than half of the studies have used the traditional conceptualization of motivation into types, such as altruistic, intrinsic, and extrinsic. Other conceptualizations of motivation are studied. Some studies examine the motivation of future teachers based on a typology of “enthusiastic”, “conventional” or “pragmatic” teachers. Their results indicate that enthusiastic teachers were highly motivated by altruistic and intrinsic reasons and expressed enthusiasm for teaching. Conventional teachers were similar to enthusiasts, but had lower ratings

Authors and date	Results
	for career opportunities of all three types. Students in the pragmatic cluster indicated that their main motivations for teaching were related to intrinsic reasons, skills, and work benefits, with low scores on altruistic motivation. Seven articles do not focus on motivation but on social influences on interest in becoming a teacher. Additional research with other theoretical and methodological approaches is necessary.
Klassen and Kim (2019)	Findings confirm that selection methods that assess academic and non-academic constructs are statistically associated with measures of teaching effectiveness, although effect sizes were small. The effect size for non-academic predictors (r = 0.10) was significantly smaller than for academic predictors (r = 0.14), reflecting the challenge of reliably and validly assessing non-academic attributes in high-risk contexts. Both employment selection and teacher training selection methods predict effectiveness, but the effect sizes are small (selection for employment (r=0.11) and for training programs (r=0.11). 14).They find no relationship between the cost of selection methods and their effectiveness.
Bardach and	Only a small number of studies have examined teacher

Authors and date	Results
Klassen (2020)	intelligence, suggesting that over the past two decades research on teacher effectiveness has largely ignored intelligence as a predictor. Of them, half showed no statistically significant effect of intelligence, while the other half reported a negative effect. Although there are few works and they have limitations, the recommendation that is derived is that intelligence tests should not be used for selection into training and teaching, contradicting what happens in other professions. A larger group of studies used proxies for teachers' cognitive abilities, especially using results from college entrance exams. Of them, half find no effects on school effectiveness and the rest find small positive effects.

Note: Own preparation

4. Discussion and conclusions

The reviewed literature shows some common features that reveal the strengths and also the weaknesses of the study of teaching effectiveness.

1. There is a wide range of teacher characteristics that have been studied in the empirical literature. Perhaps surprising is the volume of studies that address the consideration of variables of a cognitive nature and measures of academic career. Generally, these cognitive and academic career factors are integrated into broader theoretical models, with the studies having a relational and/or predictive

aspiration of various operationalizations of teacher effectiveness. Although weak or at best moderate effect sizes of their relationship with efficacy are reported.

2. Studies related to variables of a non-cognitive nature essentially focus on the motivations for access to studies and the teaching profession. These factors are usually treated in an isolated and descriptive manner, not incorporating other explanatory and concomitant factors in the treatment of a complex phenomenon such as professional and socially transcendent choice such as access to the teaching profession. It seems that, in primary studies, motivation is such a suggestive factor that studies are dedicated exclusively to it. Thus, this factor is not included in more complex theoretical models, causing the literature to focus on describing the motivational characteristics of groups of teachers or aspiring teachers.

3. In the studies that address the motivation factor, there is a virtuous coincidence, since the widespread use of the same measurement tool (FIT-choice test) allows an appropriate comparison of the characteristics of teachers in various contexts, educational systems and economic and cultural situations.

4. This possibility of comparison is not so simple with the rest of the measures, being especially pronounced in those that refer to effectiveness. There is a certain conceptual coincidence, since, in various ways, reference is made to the academic performance of students. Although the operationalization of these measures (performance evaluated by classroom teachers, value-added measures, comparable standardized performance scales in percentage form, etc.) is very varied.

5. It is also observed in the literature that most of the studies in this area have been developed in the United States of America. This uniformity in the study samples makes it somewhat difficult to generalize the conclusions to other sociocultural and

economic contexts. Only in the study of motivations towards teaching is a greater variety found in the samples. Some differences between countries are easily comparable, while others are very difficult to conceptualize and measure. Furthermore, the frameworks are dynamic (e.g. the economic situation in times of crisis or prosperity influences vocational and professional choices). Therefore, in-depth knowledge of the cultural and educational contexts on which we work is needed.

The findings of this meta-synthesis contribute to addressing the issue of the impact of teacher characteristics on teacher effectiveness based on the available empirical evidence. However, it is also necessary to point out that the limitations found, both in terms of the number of works included, as well as their diversity of approaches and their geographical bias, already mentioned, imply that the meta-synthesis approach on the topic, which has been chosen in this article, must be expanded in the future. It could be stated that the study of teaching effectiveness, although it began decades ago, is still in an early phase of development, so the results of the review on it are still preliminary. These results may be enriched as more large-scale research is produced, with validated instruments and comparable samples. Furthermore, it is necessary to advance in the creation of a body of research based on a solid theoretical foundation that addresses in a global, dynamic and integrated manner the precise effects of the teacher's characteristics on the quality of teaching. Only in this way will it be possible to have contrasted knowledge that helps make decisions about the selection of candidates or teachers informed by educational research. The literature also points to the need for inspiration in procedures used in other professions. A certain standardization in the

predictors and processes designed for the selection of future teachers may be useful in this area.

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