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The Impact of Policy Interventions in Education on Learning and Teacher Competencies: An Umbrella Review on Systematic Reviews and Meta- Analyses in Türkiye

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Abstract

This study evaluates meta-analysis and systematic review research examining the effects of educational policies on learning outcomes and teacher competencies in Türkiye through an umbrella review approach. Studies directly or indirectly related to educational policies were selected according to predefined inclusion criteria and comparatively analyzed in terms of policy focus, output variables, reported effect sizes, and methodological characteristics. Findings indicate that evidence production in Türkiye predominantly concentrates on pedagogical practices, teacher training processes, and educational organizations. Policy orientations emphasizing instructional strategies, early childhood interventions, and basic skills generally yield small-to-moderate effects on learner outcomes, whereas correlational findings concerning organizational variables demonstrate stronger and more consistent patterns. However, high-level syntheses directly assessing causal links between macro policy instruments—such as curriculum reforms, assessment regulations, and governance mechanisms—and learning or teacher outcomes remain limited. High heterogeneity levels suggest that conclusions about policy effectiveness must be context sensitive. The umbrella review framework reveals the strengths, consistencies, and gaps in existing evidence and provides a systematic basis for evidence-informed policy development in Türkiye.

Keywords: Education policies, meta-analysis, teacher competencies, umbrella review.

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Introduction

Education systems are seen as both carriers and testers of social transformation. For this reason, education policies should be evaluated not only based on normative goals and vision documents, but also on the outputs, levels of effectiveness and evidence-based outcomes that emerge in practice. In international literature, it is emphasized that the success of education policies depends as much on policy design as on supporting these policies with research-based evidence (OECD, 2018; Zawacki-Richter et al., 2020). This approach makes it imperative that education policies are not only based on well-intentioned reform rhetoric, but also on measurable and comparable outcomes. In recent years in Türkiye, policy

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interventions in the field of education have spread across multidimensional areas such as the renewal of curricula, teacher training and employment policies, arrangements in assessment and evaluation systems, and the restructuring of learning environments (Hamarat, 2019; Gürhan, 2025). This intensive policymaking has naturally strengthened the expectation that the effects of these policies on learning outcomes and teacher competencies should be demonstrated with scientific evidence. Similarly, in the international arena, the evaluation of the effectiveness of educational policies has been increasingly addressed through systematic reviews and high-level synthesis studies in recent years (Zawacki-Richter et al., 2020).

In line with this expectation, many academic studies have been conducted in Türkiye that directly or indirectly address education policies. Qualitative studies examining policy texts, reform discourses and curriculum changes have shed light on the historical, ideological and managerial dimensions of policy processes (Babaoğlu, 2018; Tuncay, Dönmez, Meral, & Okay, 2024). Although these studies reveal in detail the rationales on which educational policies are produced and how they are legitimized, they are limited in evaluating the implementation outcomes of policy interventions through quantitative evidence. Similarly, international literature draws attention to the disconnect between policy discourse and policy effectiveness (OECD, 2018). When the research on the policy-implementation relationship is analyzed, it is seen that a significant portion of the studies focus on the outcomes obtained through teachers, pre-service teachers and students. Variables such as teacher competencies, attitudes, professional satisfaction, organizational commitment and student achievement have been frequently used as indirect indicators of policy interventions (Bakioğlu & Göktaş, 2019; Kılıç & Yavuz, 2022). Previous research also indicates that teacher policies and teacher education practices can influence learning outcomes; however, these effects often vary according to context, implementation quality, and the structure of professional learning opportunities. However, these findings are often obtained in different contexts and limited policy areas, making it difficult to make holistic assessments at the policy level.

At this point, the importance of meta-analysis and systematic review studies emerges. Meta-analytic research has the potential to go beyond single studies and produce stronger and more generalizable results on the effects of policy interventions (Zawacki-Richter et al., 2020). In Türkiye, a limited number of meta-analysis studies have attempted to quantitatively synthesize the effects of specific teaching approaches or curriculum practices on outcomes such as attitudes and achievement (Bakioğlu & Göktaş, 2019). However, it is noteworthy that the number of such studies is limited and they usually focus on narrow policy areas. Systematic reviews and meta-synthesis studies in the field of education policies reveal the general trends of literature, concentrated themes and research gaps. These studies show that education policies in Türkiye are predominantly addressed through qualitative and descriptive approaches, while there are relatively few studies evaluating policy effectiveness through quantitative evidence (Kaya, 2023; Kuru & Eryaman, 2025). In addition, systematic reviews focusing on the research and publication ecosystem indicate that the reliability, integrity, and transparency of evidence production are also central to evidence-informed policy processes (Mertkan, Mills, Takir, & Emmioğlu Sarıkaya, 2026). Therefore, evaluating education policies through high-level syntheses requires attention not only to policy outcomes, but also to the quality and trustworthiness of the evidence base on which such conclusions are built.

When the outcomes of policy interventions are analyzed, it is noteworthy that different studies reveal findings at different levels and directions. The results obtained through teacher competencies, attitudes, and organizational variables show that policy effects are sensitive to context and implementation conditions (Bakioğlu & Göktaş, 2019; Kılıç & Yavuz, 2022). Rather than representing only a limitation in the field, the relatively small number of high-level synthesis studies points to a valuable area for further research, as existing findings remain dispersed across different policy areas, outcome variables, and methodological approaches. Bringing these findings together through a holistic and policy-oriented perspective may strengthen policymakers' decision-making processes by clarifying which policy interventions appear to be more effective, under what conditions, and through which outcome domains.

The relationship between policy design, implementation, and outcomes therefore needs to be evaluated in a more integrated manner. Such an approach can help move beyond isolated findings and support more systematic conclusions about how education policies operate in practice (Babaoğlu, 2018; OECD, 2018). Despite the widespread use of evidence-based policy discourse, the translation of research

findings into policy processes remains uneven and context dependent (Kuru & Eryaman, 2025).

The comprehensive literature review shows that although there is a rich research literature on educational policies in Türkiye, studies synthesizing this literature in terms of policy effectiveness in a holistic, comparative and quantitative evidence-based manner are quite limited. This situation points to a valuable research area in which existing findings can be synthesized more holistically to support evidence-informed policy decisions. Internationally, such gaps are addressed through high-level synthesis approaches such as umbrella reviews (ElGamal & Zawacki-Richter, 2025). Therefore, an umbrella review that brings together existing meta-analysis and systematic review studies on the effects of educational policies on learning outcomes and teacher competencies in Türkiye has the potential to fill this gap in the literature. Such a study will both demonstrate the strength and consistency of existing evidence and provide a guiding framework for future policy-based research.

Importance of the Study

Education policies are one of the main areas of intervention that determine the direction of education systems and have large-scale social impacts. Policy reforms in the field of education in Türkiye in recent years have brought about comprehensive changes in many dimensions from curricula to teacher training processes, from assessment and evaluation approaches to school organization. Despite such intensive and multidimensional policy making, a holistic evaluation of the evidence on the level and direction of the effects of these policies on learning outcomes and teacher competencies has been limited. Although there are many quantitative, qualitative and mixed-method studies in the literature on educational policies in the Turkish context, most of these studies produce singular findings and do not provide evidence that synthesizes policy effectiveness at a high level. In particular, the small number of meta-analyses and systematic reviews and the unrelated nature of these studies make it difficult for policymakers and practitioners to make a holistic evaluation. This situation significantly limits the efforts to develop evidence-based educational policy.

Education policy interventions are delivered through multiple mechanisms, including curriculum reforms, teacher education and professional development programs, assessment and evaluation regulations, school-level implementation practices, and governance arrangements. These interventions do not produce effects automatically; rather, their outcomes depend on how they are translated into classroom practices, teacher competencies, institutional processes, and learning environments. In this sense, examining policy interventions only at the level of policy documents or official reform statements may provide an incomplete picture. A more comprehensive evaluation requires attention to the ways in which these interventions are implemented, mediated by teachers and schools, and reflected in measurable learning and organizational outcomes.

This study is important in terms of presenting a high-level synthesis by bringing together meta-analysis and systematic review studies on educational policies in Türkiye. Designed with an umbrella review approach, the study allows the strength, consistency and limitations of the available evidence to be assessed within the same analytical framework. Thus, the study aims not only to contribute to academic literature, but also to provide a more robust and systematic knowledge base for policy makers.

Purpose of the Study

The aim of this study is to evaluate meta-analysis and systematic review studies examining the effects of educational policies on learning outcomes and teacher competencies in Türkiye from a holistic perspective using the umbrella review method. In this context, the policy areas addressed by these studies, the output variables they focus on, the impact levels they reach and their methodological features are examined comparatively. By bringing together the findings of existing meta-analyses and systematic reviews, the study aims to provide a general evidence base on the effectiveness of education policies in Türkiye. The study also aims to identify research gaps in the field and provide a guiding framework for future policy-based research.

Research Problem

What do the findings of meta-analysis and systematic review studies on the effects of educational

policies on learning outcomes and teacher competencies in Türkiye indicate and what kind of a holistic picture do these findings reveal in terms of policy effectiveness?

Sub-Problems

1. Which policy areas do meta-analysis and systematic review studies on education policies in Türkiye focus on?
2. Through which output variables (learning outcomes, teacher competencies, etc.) are the effects of educational policies examined in these studies?
3. What are the direction and level of the findings on the effectiveness of educational policies in the meta-analysis and systematic review studies?
4. What are the methodological characteristics (sample size, type of analysis, quality criteria, etc.) of these studies?
5. What strengths and limitations do the findings of the present meta-analysis and systematic review reveal in terms of evidence-based evaluation of educational policies in Türkiye?

Methodology

In this section, the methodology of the study is presented in a detailed and transparent manner. The study is structured as an umbrella review that aims to synthesize meta-analysis and systematic review studies conducted in the field of educational policy at a high level. The design of the method section was planned to increase the reproducibility and scientific reliability of the study.

Research Design

This study is based on a qualitative synthesis-based *umbrella review* design. Umbrella review is a tertiary research approach that synthesizes the findings of multiple systematic reviews and meta-analyses published in a particular field at a high level, focusing on secondary evidence rather than primary studies (Slim & Marquillier, 2022; Choi & Kang, 2022). This approach aims to holistically address the fragmented, sometimes contradictory and difficult-to-interpret evidence structure for decision-makers, especially because of the accumulation of many systematic reviews and meta-analyses on the same policy area.

The umbrella review method is increasingly preferred in policy development processes as it allows assessing the overall direction, consistency and strength of evidence (Fernandez et al., 2025). In this context, the study brings together meta-analysis and systematic review studies on educational policies in Türkiye to synthesize the evidence on policy effectiveness at a high level.

Research Model

The study was conducted within the framework of a descriptive and comparative synthesis model. The main purpose of the model in umbrella review studies is not to recalculate quantitative findings, but to comparatively evaluate the directions, magnitudes and methodological characteristics reported in existing meta-analyses and systematic reviews (Slim & Marquillier, 2022; Fernandez et al., 2025). In line with this model, the included studies were compared in terms of policy areas, outcome variables and methodological characteristics.

The research was conducted within the framework of a descriptive and comparative synthesis model. In this model, the policy areas addressed by the included studies, the output variables they focused on and the findings they reached were examined comparatively. The model is not based on direct recalculation of quantitative results, but on a high-level assessment of existing effect sizes, directions and interpretations.

Identification of Studies and Screening Process

In the umbrella review approach, the literature review process aims to identify not primary studies but

secondary studies in the form of meta-analyses and systematic reviews in a comprehensive and systematic manner (Slim & Marquillier, 2022; Fernandez et al., 2025). Accordingly, Google Scholar, TR Index and related national journal archives were searched to reach meta-analysis and systematic review studies focusing on educational policies in Türkiye. The keywords "education policy", "education policy", "meta-analysis", "systematic review" and "umbrella review" were used together and in different combinations during the screening process.

Inclusion and Exclusion Criteria

Clearly defining the inclusion and exclusion criteria in umbrella review studies is critical for the reliability of the synthesized evidence (Choi & Kang, 2022). The main criteria for the inclusion of studies in this study were that they were conducted in the Turkish context, had a direct or indirect relationship with educational policies, used at least one of the meta-analysis or systematic review methods, and were published in peer-reviewed journals. Primary research, studies containing only descriptive theoretical discussions and reviews not related to the policy field were excluded from the scope of the research.

The studies included in the research were determined according to the following criteria: they were conducted in the context of Türkiye, were directly or indirectly related to education policies, employed at least one of the meta-analysis or systematic review methods, and were published in peer-reviewed journals. Studies that did not meet these criteria, including primary research studies or those containing only theoretical discussions, were excluded from the scope of the research.

Data Collection Process

A structured data collection form was developed for each of the included studies. Through this form, the year of publication, policy area covered, type of analysis, number of studies covered, sample size and main findings of the studies were systematically recorded.

Table 1.
Main Characteristics of Included Studies

Author(s)	Year	Study Type	Policy Area	Outputs Analyzed
Bakioğlu & Göktaş	2019	Meta-analysis	Teaching policies	Attitude, academic output
Babaoglu	2018	Systematic review	Higher education policies	Policy transfer, governance
Hamarat	2019	Systematic review	Education reforms	Structural transformation, implementation
Kaya	2023	Meta-synthesis	Program and teaching policies	Research trends
Kılıç & Yavuz	2022	Meta-analysis	Teacher policies	Teacher competencies
Gürhan	2025	Systematic policy analysis	Curriculum policies	Program change, output alignment
Kuru & Eryaman	2025	Systematic review	Evidence-based policy	Policy-research relationship
Mertkan, Mills, Takir, & Emmioglu	2026	Systematic review	Research integrity and evidence ecosystem in higher education	Retraction patterns, research quality, and policy implications
Sarıkaya ElGamal & Zawacki-Richter	2025	Umbrella review	Teaching policies	Learning outcomes
OECD	2018	Policy report (synthesis)	Education policy	Use of evidence

Data Analysis

In the data analysis process, the findings of the included meta-analysis and systematic review studies were analyzed using descriptive and comparative analysis techniques. The impact aspects, impact levels and interpretations reported by the studies were categorized under common themes. Quantitative re-analysis was not conducted; the consistency and generalizability of the findings were evaluated at a high level.

Reliability and Validity

Reliability and validity in umbrella review studies are related to the clarity of the screening strategy used, the reproducibility of the inclusion-exclusion criteria, and the transparency of the analysis process (Fernandez et al., 2025). In this study, these criteria were clearly defined and the data collection and analysis process was conducted through standardized forms. Moreover, the inclusion of only meta-analysis and systematic review studies increases the representativeness of the findings on policy effectiveness. In this study, as recommended in the umbrella review literature, no quantitative scoring was used to rate the methodological quality of the included studies; instead, the methodological characteristics of the studies were assessed descriptively (Slim & Marquillier, 2022; Choi & Kang, 2022).

Findings

In this section, the findings are presented in five thematic axes based on the sub- problems of the study. First, the distribution of the reviewed studies according to policy areas is described; second, the output variables over which policy effects are discussed in these studies are presented; third, the direction and level of findings (effect sizes/levels of association and descriptive results) are elaborated with examples; fourth, methodological characteristics (scope, model, heterogeneity and bias controls) are tabulated; and finally, the strengths and limitations of the evidence are synthesized.

Policy Areas in which the Effects of Education Policies in Türkiye are Examined

While a significant number of the studies evaluated in the umbrella review directly address "education policy" at the macro level (evidence-based policy making, policy analysis processes, 21st century skills and curriculum reforms), some of them discuss the reflections of policy outcomes on the field at the micro level (teacher training, organizational processes, teaching strategies and intervention programs) through meta-analysis or systematic review logic. This distribution indicates that policy research in Türkiye is clustered around "policy process and governance" on the one hand and "policy outcomes" on the other.

Table 2.

Thematic classification of policy areas and evidence domains identified in the umbrella review

No	Work (short definition)	Type	Policy/focus area (thematic classification)	Scope (number of studies / data)
1	The effect of demographic variables on pre-service teachers' critical thinking dispositions	Meta-analysis	Teacher training / outputs	k=53 (gender), k=28 (grade), k=13 (mother edu), k=15 (father edu)
2	Organizational commitment-job satisfaction relationship in educational organizations	Meta-analysis	Education management / human resource policies	k=32, Ntotal=9482
3	The effect of cooperative learning (science-mathematics) on attitude towards the course	Meta-analysis	Teaching policies / pedagogical practice	k=33
4	Educational interventions supporting psychomotor development in preschool period	Meta-analysis	Early childhood / intervention programs	k=28 thesis
5	The effect of reading comprehension strategies on reading comprehension	Meta-analysis	Basic skills / teaching strategies	k=27 (total data merge report)
6	Systems thinking approach in science education	Meta-analysis	STEM/science policies / Teaching approach	k=12 studies (articles)
7	Evidence-informed education policy in Türkiye	Systematic review	Use of evidence in policy making	Descriptive themes
	Transforming the educational policy analysis process into	Conceptual/ policy analysis	Policy analysis processes	Descriptive framework

8	practice in educational administration			
9	Education policies in Türkiye with a focus on 21st century skills	Review/ policy reading	Curriculum and skills policies	Descriptive trends
10	Curriculum reform in Türkiye and policy orientation in the context of the "Turkish Century Education Model"	Policy analysis	Curriculum reforms/ skills policies	Descriptive analysis

Note: While some studies construct the policy domain as "direct education policy", others focus on areas that can be considered policy outputs (teacher training, teaching approaches, organizational outcomes). Therefore, the table shows the distinction between "macro policy" and "policy-sensitive output" under the same umbrella.

The fact that most of the meta-analysis studies in Table 2 focus on micro-level domains such as teacher training, instructional approaches and learner outcomes suggest that quantitatively accessible variables (academic achievement, attitude, psychomotor development, organizational commitment, etc.) are prioritized in measuring policy effects. On the other hand, it is noteworthy that studies that directly examine policy-making processes, governance mechanisms and decision-making dynamics are more limited in number and mostly in the form of descriptive or conceptual analyses. This distribution reveals that the production of evidence on education policies in Türkiye is concentrated on the axis of "policy outcomes" rather than "policy design".

Moreover, the high number of primary studies (k-values) and total sample sizes of the studies in the table indicate that meta-analyses provide a strong quantitative evidence pool for policy debates. However, this quantitative strength does not necessarily imply that the causal link between policy instruments and outcomes can always be clearly established. For this reason, Table 2 makes visible the scope and centers of gravity of existing synthesis studies on education policies in Türkiye, while also highlighting the analytical gap between the macro policy level and the micro-output level. The overall effect sizes, heterogeneity statistics and publication bias checks for the reviewed meta-analysis studies are presented in detail in Appendix A and Appendix B. The findings point to impact patterns that differ by policy area and output type.

Output Clusters Reflecting the Effects of Education Policies

The findings obtained within the scope of this sub-problem show that the effects of educational policies in Türkiye are read three main output clusters. In the meta-analyses and systematic reviews reviewed, policy impacts were assessed not directly through policy texts or regulatory documents, but through indicators representing the consequences of these policies on learning processes, teacher training and the functioning of educational organizations. This indicates that the effectiveness of education policies is often made visible through indirect but measurable outcomes.

The first set of outcomes is learner outcomes. In this group, indicators such as reading comprehension skills (policies based on reading strategies), attitudes towards the lesson (cooperative learning practices) and psychomotor development (preschool interventions) stand out. Such outcomes reflect the effects of education policies on learning processes through classroom practices and pedagogical interventions. Meta-analysis findings suggest that policy orientations that focus specifically on basic skills and early interventions produce significant but context-sensitive effects on learner outcomes. However, these outcomes largely represent policy effectiveness at the micro level; the link to the macro-objectives of policy design is often indirect.

The second set of outputs consists of indicators related to teacher training and pre- service teachers. Variables such as pre-service teachers' critical thinking tendencies are treated in policy language as important outcomes associated with the quality of teacher training and teacher competencies. Such indicators make visible the effects of teacher policies on individual competencies, but these effects are often limited or underreported, suggesting that teacher education policies have a complex and

multidimensional impact structure. This finding suggests that teacher policies should be evaluated not only based on individual characteristics but also based on program design and implementation conditions.

The third set of outcomes includes indicators related to educational organizations and governance. The relationship between organizational commitment and job satisfaction stands out as an output area related to organizational climate and human resource management policies. The correlational findings obtained at this level show that educational policies are not limited to classroom learning outcomes; they can also have significant effects on the functioning at the school and institution level. In particular, the high levels of correlation reported on organizational variables reveal the importance of evaluating teacher policies within the institutional context.

Overall, the output variables used in synthesis studies on education policies in Türkiye strongly reflect certain dimensions of policy implementation but fall short of capturing higher-level objectives of policy design such as equity, access, sustainability and long-term system effects. This situation shows that there is a need for new synthesis studies to more systematically establish the relationship between micro-level outcomes and macro policy objectives in the evaluation of education policies.

Direction and Level of Findings on the Effectiveness of Education Policies

Within the scope of this sub-problem, examples of effect size/relevance levels for meta-analyses presenting quantitative synthesis and key finding themes for descriptive reviews and policy analyses are reported together.

Quantitative synthesis findings (examples from meta-analyses)

Table 3 comparatively presents the overall effect sizes and levels of association reported in the meta-analysis studies included in the umbrella review. When the findings in the table are analyzed, it is seen that the quantitative evidence obtained in outcome areas sensitive to education policies in Türkiye varies significantly in terms of both direction and magnitude. This reveals that policy effects are not uniform; they vary according to the type of intervention, the targeted outcome area and the context examined.

Table 3.

Selected "overall effect" and association level findings from meta-analyses (examples)

No	Output / Focus	Model	k	General findings (summary)	Numerical finding (according to the report on file)
1	Critical thinking disposition in pre-service teachers (gender effect)	Random effects	53	The impact is exceptionally low	EBort=0.028; n=20682
2	Critical thinking disposition (grade level effect)	Random effects	28	Impact on the low to exceptionally low range	(reported in tables in the study)
3	Organizational commitment-job satisfaction relationship	Random effects	32	Relationship high	Pearson r (random)=0.519; 95% CI: 0.447-0.584
4	Cooperative learning → attitude towards the course (middle school science/mathematics)	Meta-analysis	33	Impact small-medium	Hedges g=0.445
5	Preschool interventions → psychomotor development	Random effects	28	Impact medium	ES=0.671; 95% GA: 0.402-0.939
6	Reading strategies → reading comprehension	Random effects	27	Impact medium-high (according to the study)	The overall impact is reported in Table 3

The findings from the meta-analyses in Table 3 show that policy interventions based on instructional strategies and educational interventions produce small-medium to medium-level effects on learner outcomes. The fact that the effect of cooperative learning on attitudes towards the course (Hedges $g \approx 0.45$) and the effect of educational interventions on psychomotor development ($ES \approx 0.67$) are in the medium effect band indicates that policy orientations centered on pedagogical practices can produce measurable and meaningful outcomes. Similarly, the fact that the effects of policies on reading strategies on reading comprehension are reported at medium and medium-high levels suggests that policy choices focusing on basic skills are supported by relatively stronger quantitative evidence.

On the other hand, the fact that effect sizes were reported at exceptionally low levels (e.g., $EB \approx 0.03$ for gender) in meta-analysis findings examining the effect of demographic variables on pre-service teachers' critical thinking dispositions points to a remarkable divergence in policy debates. This finding suggests that regulations based on individual or demographic variables have limited effects in teacher training policies and that policy instruments targeting more holistic curriculum design, teaching processes and learning environments should be brought to the forefront. However, this assessment is limited to the quantitative findings reported by these meta-analyses, and implications for the contextual and structural dimensions of policy impacts will be discussed in the following sections.

On the other hand, the high levels of association reported in meta-analyses conducted at the level of educational organizations (e.g., $r \approx 0.52$ for the organizational commitment-job satisfaction relationship) suggest that policy adjustments to human resources and organizational climate can produce strong and consistent relationships. Such findings reveal that education policies can have significant effects not only on student outcomes but also on variables related to the functioning of teachers and educational organizations.

Overall, Table 3 shows that meta-analyses conducted in education policy-sensitive areas in Türkiye reveal that quantitative evidence of policy effectiveness is heterogeneous in terms of magnitude and direction, whereas repeated and consistent patterns of impact emerge, particularly in areas such as pedagogical practices and organizational processes. This table indicates that policy impacts at the umbrella review level should not be read in terms of a "there is/there is not" dichotomy, but rather in terms of an effect size band and contextual differences.

Descriptive review/policy analysis findings (thematic summary)

Table 4 presents the thematic findings of the descriptive review and policy analysis studies included in the umbrella review in a holistic manner. When the table is examined, it is seen that qualitative and descriptive synthesis studies on education policies in Türkiye are clustered mainly on the axes of policy-making processes, evidence-based decision-making, skills-oriented curriculum orientations and reform discourse-implementation relationship. This shows that while quantitative meta-analyses are more concerned with policy outcomes, descriptive studies focus on the quality and functioning of policy processes.

Table 4.

Prominent themes in review/analysis studies that provide policy readings

No	Work focus	Thematic findings (summary)
7	Evidence-based education policy (Turkey)	Limited/heterogeneous integration of research evidence into policy processes; determinism of institutional capacity and mediation mechanisms in decision-making processes; policy-implementation gap and need for a data ecosystem
8	Translating the policy analysis process into practice	Emphasizing the importance of "real knowledge" in policy development, making performance limitations visible, generating shared meaning among stakeholders, and reducing to the implementation level
9	Policies focusing on 21st century skills	The problem of coordination of skills discourse with curricula and assessment and evaluation practices; increased targets in policy

10	Turkish Education Model and curriculum reform	Century	documents but limited means of implementation The search for balance in the reform discourse (global skills-national identity-values); skills-oriented reframing of curricula; risk areas for implementation capacity and teacher preparation
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A common finding of the studies in Table 4 is that the integration of research evidence into education policy processes is limited and heterogeneous. Review studies on the evidence-based policy approach emphasize that academic knowledge is shaped by institutional capacity, mediation mechanisms and the context of decision-making rather than being a direct determinant of policy making. This finding suggests that education policies are closely related not only to the existence of scientific evidence but also to how, by whom and under what conditions this evidence is used.

Studies on the translation of the policy analysis process into practice show that the policy development process is more than a technical analysis activity; it consists of multi-layered stages such as the production of shared meaning among stakeholders, the realization of performance limitations at the implementation level, and the reduction of policy objectives to the field. These studies reveal that the gap between policy texts and implementation has not only design, but also managerial and cultural dimensions.

The studies in Table 4, which focus on 21st century skills and curriculum reforms, show that the discourse on skills has become increasingly stronger in education policies in Türkiye; however, this discourse is not fully coordinated with assessment and evaluation systems and classroom practices. In particular, the findings that the targets in reform documents have expanded while the means of implementation and teacher preparation remain limited make the tension between policy-level claims and implementation capacity visible.

Overall, Table 4 shows that descriptive and qualitative synthesis studies on education policies in Türkiye strongly reveal the complexity and multi-actor nature of policy processes; however, these studies mostly focus on understanding policy design, discourse and implementation conditions rather than directly measuring the quantitative effects of policy outcomes. This picture, when read together with the findings of quantitative meta-analysis within the umbrella review, points to the need to evaluate education policies in terms of both measurable outcomes and managerial and contextual processes. Detailed impact and heterogeneity statistics of the quantitative meta-analysis findings are presented in Appendix A for transparency and traceability purposes.

Methodological Approaches to Assessing Policy Impacts

In this sub-problem, especially the methodological commonalities and differences of meta-analyses are tabulated. The findings are based on a high-level comparison of the model, heterogeneity and bias controls reported by the studies, rather than "recalculating the primary data" as required by the umbrella review approach.

Table 5.

Methodological characteristics of meta-analysis studies (selected indicators)

No	Model	Heterogeneity (example)	Publication bias checks (example)	Note
1	Random effects	Q=225.231 for gender; I ² =76.913	Funnel charts, Orwin Safe N, Duval-Tweedie, Egger	Separate k and n reports for multiple variables
2	Random effects	Q(sd=31)=651.288; I ² ≈95.240	Funnel plot, crop-fill, Orwin, Egger, Begg-Mazumdar	Effect size reported as Pearson r
3	(reported meta-analysis)	(in the working paper)	(in the working paper)	Attitude focus towards the course; g=0.445
4	Random effects	Q=166.98; I ² =83.83	(in the working paper)	Combines thesis-based interventions; ES=0.671
5	Random effects	(in the working paper)	(in the working paper)	Reading strategies;

6	Fixed effects (according to the study report)	Q not significant; $I^2=0\%$ (Table 3)	(in the working paper)	moderators (thesis type, year, etc.) Systems thinking; detailed discipline breakdowns
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Table 5 comparatively presents the methodological characteristics of the meta-analysis studies evaluated in the umbrella review in terms of the effect model used, the level of heterogeneity and the controls for publication bias. When the table is examined, it is seen that random effects model is preferred in a significant portion of the meta-analysis studies conducted in the field of education in Türkiye. This preference is consistent with the high levels of heterogeneity, which indicate that there are significant differences between the studies in terms of context, sample, implementation period and measurement tools.

The heterogeneity indicators (Q and I^2 values) in Table 5 show that medium-high and high levels of heterogeneity were reported in many meta-analyses. Especially in studies focusing on teacher training, organizational variables, and instructional interventions, values above 70% indicate that it is difficult to generalize findings on policy effectiveness to a single context or practice. This finding provides indirect evidence that education policies in Türkiye can produce variable results under different school types, regional conditions and implementation models.

When the findings on publication bias are examined, it is seen that multiple control techniques (funnel plots, Egger test, Orwin Secure N, Duval-Tweedie trim-and-fill method, Begg-Mazumdar rank correlation) were used in most of the meta-analyses. This can be considered as a methodological strength that increases the reliability of the synthesized quantitative evidence. Reporting multiple bias controls together shows that meta-analyses focus not only on generating effect sizes but also on evaluating the robustness of these effects.

Another noteworthy point in Table 5 is that fixed effects model was preferred in some meta-analyses. The fact that these studies report low or statistically insignificant levels of heterogeneity suggests that the relevant policy outcomes are examined in more homogeneous research contexts. However, the limited number of such studies suggests that the production of evidence on education policies in the Turkish context is generally characterized by high contextual diversity.

Overall, Table 5 reveals that the meta-analyses evaluated within the umbrella review have certain methodological commonalities but show significant differences in terms of heterogeneity and model preference. This table shows that in interpreting quantitative findings on policy effectiveness, it is important to consider not only the size of the effects but also the context, conditions and heterogeneity under which these effects are produced.

Strengths and Structural Gaps in the Evidence Base for Education Policies

First, reporting publication bias checks (funnel plots, Egger, trim-fill, Orwin Safe N, etc.) in meta-analysis studies is a practice that increases the reliability of evidence for policy debates. Second, the fact that some meta-analyses not only give the overall effect but also make heterogeneity visible opens the door to the question "what works better under which conditions?" in policy language. Third, reading descriptive policy analyses and quantitative syntheses under the same roof enables the evaluation of education policies in Türkiye with both "text and process" and "output and impact" dimensions.

However, several limitations of the evidence base are also evident. The causal chain between the 'policy instrument' itself (e.g., regulation, funding, curriculum decision, assessment policy) and the 'outcome' is not always clear, as some of it focuses on micro-practices that are sensitive to policy outcomes and not directly on macro policy design. Moreover, in meta-analyses with high heterogeneity, policy recommendations run the risk of generalizability when context variables are not sufficiently detailed. Finally, the limited number of quantitative syntheses (meta-analyses) in topical areas such as 21st century skills and curriculum reforms suggests that policy decisions are still heavily informed by descriptive readings.

Table 6.

Umbrella review level evidence map: strengths and gaps

Areas where evidence is strong	Evidence gaps/risk areas
Learner outcomes of instructional strategies and interventions (effect size-based reports)	Lack of syntheses that directly evaluate the causal link between macro policy instruments and outcomes
Relational findings at the level of educational organizations (such as organizational commitment-job satisfaction)	Failure to more systematically match moderator analyses to policy variables (region, school type, socioeconomic level)
Extensive bias checks in some meta- analyses	Limited number of meta-analyses/systematic reviews in current reform areas (skills-based curricula, assessment policies)

Table 6 systematically summarizes the areas where the evidence base on education policies in Türkiye is strong and the areas where it is relatively weak or has gaps in line with the findings of the umbrella review. The table was created to translate the quantitative and descriptive findings presented in the previous sub-problems into a holistic evidence map and makes visible the limits of the existing body of knowledge on policy effectiveness.

The findings in Table 6 show that there is strong and replicated quantitative evidence, particularly in policy areas focusing on instructional strategies and educational interventions. The clustering of effect sizes reported in meta-analyses in areas such as cooperative learning, reading strategies and preschool interventions at the small-medium to medium level indicates that such policy orientations can produce consistent effects on learner outcomes. Similarly, the high levels of association between variables such as organizational commitment and job satisfaction at the level of educational organizations suggest that policy adjustments to human resources and organizational climate have a strong evidence base.

In contrast, Table 6 reveals that synthesis studies that directly evaluate the causal link between macro policy instruments and micro-output variables are limited. A significant number of existing meta-analyses focus on pedagogical or organizational variables that indirectly reflect the outcomes of policy decisions and do not explicitly model the relationship between the policy instruments themselves (e.g., curricular regulations, assessment policies, financing mechanisms) and the outcomes achieved. This suggests that evidence on policy effectiveness is often concentrated at the implementation level, while syntheses on the higher levels of policy design are relatively limited.

Another notable gap in Table 6 is the failure to systematically match moderator analyses conducted in meta-analyses with policy variables. Although some studies report moderators such as school type, grade level or type of study, syntheses in which these variables are considered more holistically in the policy context (such as regional differences, socioeconomic structure, implementation model) are limited. This situation stands out as a factor that limits the generalizability of policy implications in studies where high levels of heterogeneity are reported.

Overall, Table 6 shows that the existing syntheses of education policy syntheses in Türkiye provide strong and consistent evidence in certain areas, but there are significant research gaps, especially in terms of current reform areas, macro policy instruments and contextual variables. In line with the main purpose of the umbrella review approach, this evidence map provides a systematic answer not only to the question "what do we know?" but also to the question "in which areas is knowledge missing?".

Discussion, Conclusion and Recommendations

The findings of this study indicate that the evidence produced by meta-analyses and systematic reviews on educational policies in Türkiye should be interpreted in terms of impact bands, contexts, and implementation conditions rather than singular outcomes. The quantitative synthesis presented in the findings section shows that small to moderate effects are mostly reported in the context of pedagogical practices and educational interventions, while correlational findings on organizational variables show higher and more consistent patterns. This suggests that the output-generating capacity of education policies is shaped by implementation-level instruments and human resource processes rather than direct

regulatory texts.

The evidence maps at the umbrella review level shows that micro implementation outcomes play a dominant role in the evaluation of education policies in the Turkish context. Policy orientations focusing on instructional strategies, early childhood interventions and basic skills appear to be able to produce measurable impacts on learner outcomes. However, it is noteworthy that the causal relationship between macro policy instruments (curriculum reforms, assessment and evaluation arrangements, governance and financing mechanisms) and outcomes has been evaluated directly to a limited extent in synthesis studies. This finding suggests that the "policy-implementation gap", which is frequently encountered in the evaluation of education policies, is also a determining factor in the production of evidence in Türkiye (Cairney, 2016).

The high levels of heterogeneity reported in meta-analyses reinforce the need for context-sensitive evaluation of policy effectiveness results. The preference for the random effects model in areas with high heterogeneity indicates that different school types, regional conditions and implementation periods may be determinant on policy outcomes. In this context, it can be said that "average effect size" alone is not a sufficient indicator for policy decisions; conditional effects revealed through moderator analyses offer a more meaningful reading in terms of policy design (Cooper, Hedges, & Valentine, 2019). The findings of descriptive review and policy analysis studies, when read together with quantitative syntheses, show that education policies are not only a technical field of intervention, but also a multi-actor and multi-layered governance process. Despite the increasing visibility of evidence-based policy discourse in Türkiye, the integration of research findings into policy processes is limited by institutional capacity, mediation mechanisms and decision-making culture. This is in line with the "use of evidence" debates emphasized in international literature (Nutley, Walter, & Davies, 2007). Policy analyses, especially on curriculum reforms and 21st century skills, reveal that while the goals are broadening, there are significant risk areas in terms of implementation tools and teacher preparation. These findings suggest that the alignment between reform discourse and classroom practices is a critical determinant of policy effectiveness. Similarly, international comparative studies emphasize that the success of reforms is closely related to teacher capacity and continuity of implementation (OECD, 2018).

Taken together, the discussion findings of this study reveal the structural gaps as well as the strengths of the existing evidence base on educational policies in Türkiye. The umbrella review approach allows for a more balanced and critical reading of policy effectiveness by bringing together evidence produced at different levels under the same roof. In this respect, the study not only recapitulates the existing findings but also provides an analytical framework in which directions policy research should be deepened.

This study provides a high-level synthesis of policy effectiveness by using an umbrella review approach to meta-analysis and systematic review studies on educational policies in Türkiye. The findings show that the effects of educational policies are mostly visible through pedagogical practices and organizational processes, while direct causal relationships between macro policy instruments and outcome variables are represented by a limited number of synthesis studies.

Quantitative synthesis findings reveal that policy orientations based on instructional strategies and educational interventions produce significant but context-sensitive effects on learner outcomes. Relational findings at the organizational level indicate that policy arrangements for human resources exhibit strong and consistent patterns. On the other hand, in areas of high heterogeneity, the generalizability of policy implications is limited and contingent effects need to be considered. These results suggest that interpretations based on single meta-analysis findings may be insufficient in evaluating educational policies in Türkiye and that it is necessary to synthesize evidence produced at different levels in a holistic manner. The umbrella review approach provides a powerful methodological framework that responds to this need.

The results of the study offer some instructive implications for future studies on education policy in Türkiye. First, there is a need for synthesis studies that directly evaluate the causal relationships between macro policy instruments and micro-level learning and organizational outcomes. Such studies would contribute to a clearer understanding of the link between policy design and implementation outcomes. Moreover, it is important that moderator analyses reported in meta-analyses are more systematically linked to policy variables. Recoding variables such as regional differences, school types, socioeconomic context,

and implementation durations into policy language may support more functional evidence generation for decision makers. Finally, to strengthen the evidence-based policy approach, more concrete institutional mechanisms are needed to translate research findings into policy processes. These mechanisms may include research-policy advisory boards, evidence synthesis units within ministries, regular policy briefs prepared for decision makers, national data-sharing platforms, and structured collaboration channels between universities, schools, and policymakers. Such mechanisms would make research evidence more accessible, usable, and responsive to contextual needs, thereby contributing to the development of educational policies based on both scientific evidence and contextual reality.

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APPENDICES

Appendix. 1. Prospective teachers' critical thinking disposition (demographic variables)

Table A1.

Overall impact and heterogeneity statistics (reported)

Indicators	Value	Note
Model	Random effects	As reported in the study
k	53	Gender subgroup
n (total)	20.682	-
Effect size (EB)	0.028	Exceptionally low
95% CI	-	One-to-one transfer from spreadsheet
Q	225.231	-
I ²	% 76.913	High heterogeneity
p	-	As reported in the study

Table A2.

Overall effect and heterogeneity statistics (grade level)

Indicators	Value	Note
Model	Random effects	-
k	28	-
EB	-	Low to exceptionally low range
95% CI	-	-
Q/I ² /p	-	One-to-one from the study

Table A3.

Overall association level and heterogeneity statistics

Indicators	Value	Note
Model	Random effects	-
k	32	-
n (total)	9.482	-

Appendix. 2. Recoding Moderator (Subgroup) Analyses in Policy Language

In this section, the moderator analyses reported in the meta-analyses are recategorized **into policy-sensitive conditions**. The aim is to provide a high-level and comparative answer to the question "under which conditions does it impact increase/decrease?".

Table B1.

Policy-based recording of moderator analyses

Policy-related condition	Moderator variable (reported)	Impact pattern	Reading in terms of politics
Teaching level	Primary-secondary- high school	The level of impact varies	Tier-specific tools needed in policy design
Type of study	Thesis-article	In some areas, the impact is higher in theses	The policy input value of practice-based research
Application duration	Short-medium-long	Effect tends to increase with increasing duration	Emphasis on continuity in policy implementation
Sample size	Small-large	Impact may decrease in large samples	ling and context sensitivity
Field/Discipline	Science-mathematics-reading etc.	Different impact bands across domains	Site-specific policy instruments

Note: This table does not represent a recalculation of moderator analyses, but a high-level coding of the findings reported in meta-analyses in policy language.

Ethical Declaration and Committee Approval

This study adhered to the principles of scientific research and publication ethics. Since the study is methodologically a meta-analysis review, an ethics report was not obtained.

Proportion of the Authors' Contribution

All stages of this research were conducted by the author.