Review

A Bibliometric Study of Issues in Educational Policy

Tamer Sarı [1] and Ahmet Aypay [2,*]

1. School of Foreign Languages, Pamukkale University, 20160 Denizli, Türkiye; tamersari@pau.edu.tr
2. Graduate School of Education, Nazarbayev University, Astana 010000, Kazakhstan
* Correspondence: ahmet.aypay@nu.edu.kz

Abstract: Education policies help to improve society by decreasing inequities and establishing effective learning environments. Periodic assessments can help researchers and policymakers uncover new obstacles and ensure progress on these ever-changing education policy concerns using critical theory. Bibliometric studies, a type of periodic study, emphasize the importance of data-driven approaches in the formulation and implementation of education policies. This study conducts a bibliometric analysis of education policy issues from 2000 to 2023. Based on keywords, we initially selected 931 articles from the Web of Science (WoS) database. Only articles in English were included, and we used PRISMA guidelines to reduce the number of articles to 363. We focused on citations, publication frequency, topics, trends, and issues. Two independent researchers analyzed the documents for reliability. For validity, we used transferability. We also used a content analysis of frequently cited articles. Our analysis revealed three prominent trends. The first trend pertained to controversial environmental issues and sustainability concepts in education policy. The second theme was professional development, special education, and school choice. The third one was science, vocational education, special education, and ICT. The content analysis results indicated that teaching and learning, professional development, science education, subject matter teaching, and mobile learning were the topics of the content analyzed articles. We found that relying solely on bibliometric review resulted in broad conceptualizations of educational policy issues, focusing primarily on efficiency and effectiveness. Additionally, we applied critical theoretical frameworks to conduct a more comprehensive analysis of the emergent issues identified through bibliometric analysis.

Keywords: issues; educational policy; academic trends; data-driven policymaking; critical policy sociology; critical theory

1. Introduction

Minimal research has been carried out using bibliometric methods on educational policy issues. While there has been research on educational policy topics in general [1,2], there remains a limited understanding of specific issues within educational policy and the critical evaluation of bibliometric research results. Furthermore, educational policy issues have traditionally been associated with the Traditional Policy Analysis (TPA) [3].

This study reviewed the literature using bibliometric methods, conducted content analysis and evaluated the results using Gale's Critical Policy Sociology [4] and Ball's Critical Analysis Template [5]. This study was innovative since it reviewed a large number of studies (363 articles from the WoS database), and it may be considered a relatively new approach to considering the issues in educational policy. Moreover, this study used content analysis of highly cited articles. Additionally, this study used a Critical Policy Sociology perspective to analyze the findings of bibliometric research. Critical approaches, namely policy historiography, policy archaeology, and policy genealogy. Finally, this study also evaluated the same findings of bibliometric research results with the Critical Analysis Template. The template first focuses on binaries: (a) orientation, focus, level, time, and space concerning the binaries. The second focus of the template was on (b) context and conceptualization binaries. The third focus of the template was on (c) justice and efficiency

as well as critical or incorporated binaries. The final focus of the template was on (d) voiced and silent binaries.

Studies indicate that systematic reviews are important, along with other types of reviews, for educational policy studies [1,6]. These studies are free from the limitations of single studies and allow the researchers to find consistencies, inconsistencies, and variability across similar studies. Thus, these studies may contribute to the accumulation of knowledge. Bibliometric reviews are also a type of literature review that includes analysis of published articles' citations, topics, trends, and issues and thus attempts to measure their impact [7].

The majority of review research focused on a single topic or subfield [8,9]. There is a gap that focuses on major issues in educational policy. Professional organizations define major issues [10,11] but typically only list them without relating them to one another or addressing inconsistencies and variability.

Education is directly related to the social and political structure of society, while the nature and outcomes of education broaden the theoretical basis of education policies. Pedagogical, social, economic, and philosophical theories have been frequently employed to guide education policies. These theories legitimize the establishment and development of the educational system. Some of these theories and their contributions to education are as follows: Sociology of education, which examines the education system in a social context [12]; contemporary educational theories emphasizing concepts such as democracy in education, student-centered learning, and multiple intelligences [13], and human development theories such as Piaget's theory of cognitive development and Erikson's theory of psychosocial development are implemented to determine educational policy strategies for children and young people [14]. Moreover, since education is considered a critical component of economic development, education policy might be based on economic and neoliberal theories [15]. Finally, philosophical methods such as pragmatism, idealism, and realism [16] could function as the basis for educational policy and be effective in deciding the general objective of education. These theories are typically employed in the formation of educational policies. Each country's education system is shaped by unique cultural, social, and economic dynamics; nevertheless, universal education and internationalization require similar responses to some of the basic concerns of education policies.

In addition to the theoretical foundations of educational policies mentioned above, it is also necessary to evaluate the effectiveness, tendencies, and outcomes of these policies. Gale [4] defines the three main areas of policy sociology as policy historiography, policy archaeology, and policy genealogy. Policy historiography involves the systematic study and documentation of historical events, trends, and narratives by analyzing past policies, their implementation, and their impact on societies. This attempt by policy historians provides insights into continuities and changes in governance over time by examining the motivations, ideologies, and social conditions that have shaped policies. Gale [4]'s policy archaeology involves analyzing historical material remains and artifacts to gain a deeper understanding of how policies were enacted and experienced on the ground. Finally, policy genealogy [17] traces the lineage and evolution of policies and governance structures, identifying the roots of contemporary practices and understanding how policies have been transmitted, adapted, or debated over generations. This historical perspective helps policymakers understand the long-term consequences of their decisions, fostering a more informed and reflective approach to policy development and implementation. Given these reasons, it can be alleged that the dynamic nature of both educational systems and educational policies leads to the inevitable evaluation of educational policies and practices by examining the relevant literature in the field, culminating in shaping future policies.

Policymakers are interested in researching the problems faced by education systems and seeking solutions through comparing and linking publications, which can contribute to the idea of producing common solutions, such as fostering international cooperation and sharing best practices. To emphasize this contribution, different approaches to similar problems should be related and evaluated. Bibliometrics is a statistical method used to

quantitatively evaluate the academic quality of publications and authors [18]. Bibliometric analysis is crucial for identifying patterns in research use, increasing visibility, predicting future trends, and mapping the state of the art [19]. Bibliometric analysis emerged in the early twentieth century and has evolved with significant methodological developments occurring in the 1960s. Historically, bibliometric methods have traced relationships between academic journal citations, and citation analysis has been used to search for materials and analyze their value. The development of bibliometric methods has been facilitated by the availability of comprehensive, searchable databases such as the WoS [20]. These methods have evolved to include the creation of maps and the detection of clusters. In recent years, there has been a significant increase in interest in the development and refinement of bibliometric methods, particularly in the non-information and library science (ILS) communities [21]. While traditional topics such as citation analysis, impact factors, and h-index research remain important, newer topics such as webometrics, mapping and visualization, and open access are being introduced as recurrent topics in bibliometrics.

Recent bibliometric studies in the field of education policy have revealed some basic trends. Karantali and Panagiotidis [8] identified a shift in research focus toward issues such as preschool programs, quality education, and access to higher education. Sezgin [7] emphasized the increasing international collaboration and interdisciplinary nature of educational research, with a particular emphasis on psychology. Hakvoort [9] identified six research topics through cluster analyses and labeled 'peace and value education', 'classroom management from coercive discipline to relationship building', 'constructive conflict resolution', 'classroom management programs', 'restorative justices and restorative approaches', and 'classroom challenges for teachers'. Zahra [22] emphasized the importance of theory application in policy-related research and called for greater engagement among academics. Bozdoğan [23] stated that there has been a significant increase in educational research on museum education, especially in the last five years, and that the USA is the most active country in this field. These studies underline the changing nature of educational policy research with increasing emphasis on international collaboration, interdisciplinary approaches, and the application of theory.

Future educational policies will likely focus on digital literacy, personalized learning strategies, and critical thinking, integrating digital tools and artificial intelligence. They will prioritize holistic development, addressing systemic gaps, and promoting inclusivity, diversity, and equity. The curriculum will prepare students for an interdependent, multicultural world, incorporating global perspectives. These policies will be dynamic, flexible, and adaptable, ensuring students have the necessary tools to succeed in a constantly changing environment [24].

This study used the policy historiography, genealogy, and archeology as described by Gale [4], as well as Ball's [5] Critical Analysis Template (See Table 1) to critically analyze the findings of studies:

Table 1. Ball's Critical Analysis Template.

a	Policy-oriented Multi-focus Multi-level Temporal Global/local Linked focus	Practice-oriented Single focus Single level Atemporal National/general Detached
b	Context rich Conceptually 'thick'	Context barren Conceptually 'thin'
c	Social justice	Social efficiency
d	Critical Voiced	Incorporated Silent

Ref. [5].

The purpose of this study is to investigate the complex nature of education policy issues using a critical perspective, as well as to reveal current issues and trends and to shed light on emerging topics. The following research questions have been created to investigate and evaluate issues in education policies:

1. Which sources in the literature on issues in educational policy have evidenced the greatest impact on academic discourse? (Authors, Documents and Sources)
2. How has research on education policy issues evolved over time in terms of thematic trends and scientific contributions?
3. What are the focal points and main findings of issues in education policy research reflected in primary sources?
4. How do Critical Policy Sociology and Critical Analysis Framework help to analyze the bibliometric study findings?

Review of the Literature

This section reviews the literature based on two different approaches. The first part of the literature review is based on the Traditional Policy Analysis (TPA) approach. These approaches are dominant in the educational policy field [25]. The second part of the literature reviewed is grounded in Critical Policy Analysis approaches [3].

A cursory examination of major issues in educational policy through online sources revealed that the top ten challenges facing public education today were as follows: decreased funding, school safety, discipline, chronic absenteeism, accountability–improvement dilemma, supporting undocumented students, the next technological revolution, and pushing back against the privatization in education [10]. Other sources identify major issues as follows: student achievement, school choice, class size, testing, early childhood education, school safety, and technology [11].

A recent bibliometric study [2] on educational research found the following high-density keywords in educational research between 2000 and 2017: Interactive learning environment and teaching/learning strategies; human capital and educational finance; teacher education; higher education; equity and social justice. This list is, in general, consistent with the NEA [10] and AU list of major issues in education [11].

Educational systems are complex and inherently slow to respond to change. Given these pressures from policymakers, it might be considered resistance to change in educational systems and schools may be a natural phenomenon [26]. The change in education policies has many aspects. The recent changes are closely related to Globalization and the New Public Management discourses [27]. One of them is the emergence of additional policy actors in state education policy, such as think tanks and educ-businesses [28].

Education policy plays a pivotal role in shaping the future of societies by providing the framework for educational systems and institutions to function effectively [29]. The dynamic nature of education policy underlines complex challenges such as learning, curriculum development, teacher preparation, resource allocation, ethics, cultural awareness, and the creation of effective educational frameworks [30]. Given this dynamic structure and its substantial impact on educational quality, accessibility, and equity, the importance of comprehending and reacting to developments and changes in education policy might become more clearly recognized. Investigating these issues is, therefore, crucial in unraveling the underlying complexities that affect learning outcomes, resource allocation, and societal progress.

Recent academic research on education policy issues has focused on various topics, including leadership [31], financing vocational and technical education [32], adult education policy [33], inclusive education for children with disabilities [34], and gender and sexuality in teacher education [35]. Studies have investigated changes in academics' servant leadership behavior and affective commitment during and after the first COVID-19 lockdown. Major issues include the absence of direct policy on vocational and technical education financing and the absence of expert involvement in policymaking. International governmental organizations have also been examined for their influence on national adult learning

and education systems. Research has also focused on the challenges and opportunities for young children with disabilities in rural communities, particularly in accessing early childhood development services [36,37]. However, there are still issues that have not been extensively researched, or solutions suggested for them, such as the impact of emerging technologies on education policies and the intersection of environmental sustainability and education policies.

Educational policies are significant in improving society and the improvement of learning environments. Identifying patterns, trends, and impacts of issues in education policy research from a critical perspective is required for identifying novel issues in a field where change and progress are inevitable. Recognizing the global and regional elements of education policies is relevant to making governance decisions on education, so we determined the objectives of this research as measuring scientific production, determining the intellectual framework, and identifying the main issues in education policies.

Governments and other educational institutions regulate and improve education through a set of principles, guidelines, and decisions with educational policies. These policies provide a vision, goals, and strategies to improve all aspects of education, including access and equity, inclusive education, quality, standardization, resources, curriculum, and the success of these changes in implementation.

Access and equity are crucial in shaping educational policies, ensuring equal opportunities for all individuals regardless of socio-economic background. These policies aim to dismantle barriers to education, providing resources and support to marginalized groups. This commitment to inclusivity fosters a more just society and contributes to a nation's development by harnessing the diverse talents of its population [38].

Inclusive policies in education aim to create environments that cater to diverse needs, involving inclusive teaching methods, flexible curriculum frameworks, and targeted support services [39]. These policies include accommodation for students with disabilities, a culturally responsive curriculum, and promoting inclusive teaching practices. They aim to create supportive school climates, fostering an equitable and enriching educational experience [40].

Education policies are crucial for establishing standards, guidelines, and frameworks that guide instruction, teacher training, resource allocation, and equity [41]. They ensure a rigorous educational experience, promote effective teaching practices, and minimize disparities among student populations. These policies are essential for maintaining high-quality education systems and preparing students for success in an ever-evolving world [42].

Educational policies regulate the development of standardized examinations while also encouraging the use of alternative assessment methods such as project-based evaluations, portfolios, and performance activities. They promote a comprehensive understanding of student abilities, reducing reliance on high-stakes standardized testing. This balanced approach fosters a more nuanced assessment landscape and captures student learning and achievement better [43]. Neoliberal approaches to creating accountability structures on teacher work create adverse effects on teacher demoralization and devalue teachers' work by ultimately negatively influencing students' academic and social development [44].

The implementation of educational policies faces challenges due to insufficient funding, resource distribution disparities, and budget fluctuations. These issues can exacerbate existing inequalities, hinder long-term planning, and lead to instability in policy implementation. Balancing equitable resource distribution and adequate funding is a complex task [45,46].

Policy implementation faces challenges such as unclear communication, insufficient resources, resistance to change, policy complexity, inconsistent enforcement, and lack of monitoring. Political changes and leadership shifts can also disrupt continuity. Successful policy implementation requires careful planning, collaboration, communication, and flexibility to adapt strategies in response to challenges.

Educational policy recognizes the interdependence of educational systems between the challenges faced by all countries globally and new networks and structures [47–49].

International cooperation and sharing best practices address issues such as inclusiveness, student readiness, and access to quality education. Initiatives such as UN Sustainable Development Goal 4 and the OECD Program for International Student Assessment (PISA) promote inter-country comparisons [50]. Global educational policy encourages creative concepts and valuable resource exchange [51], while reforms are relational and negotiated locally [52].

As a result of this review, we may claim that TPA places greater importance on leadership, plans, strategies, costs, effectiveness, adaptations, standardization, implementation, examination, and evaluation of educational policies. Based on these observations, it can be argued that changes or reforms are often driven by TPA approaches, making them positivist in nature.

On the other hand, critical approaches to educational policy are also on the rise. Critical Scholars were dissatisfied with the increasing power and control in education based on the TPA [53]. These scholars argue that critical evaluation of educational policy contributes to a democratic society [54]. They examined federal-level politics [55], testing and accountability [56], feminist approaches [57], and the role of race [58].

Critical policy scholars focus on various levels of educational policymaking: local, state, federal, and global levels [3]. Critical policy scholars search for alternative leadership approaches [57,59]. Duarte and Brewer [60] focus on teachers' resistance to standardization in writing. Special education is viewed from class, race, language, disability, and segregation perspectives by critical policy scholars. Schools segregate special education students through rationalized structures based on special education placement, and this has received significant criticism [3,55,61–65]. There are also interventions to the social organization of schooling through fundraising in schools based on neoliberal expectations [66].

2. Materials and Methods

2.1. Design

The research's topics and multiple methods, such as bibliometric and document analysis, were utilized in this study. Bibliometric analysis was employed in the initial phase of the investigation to address the first and second research questions. In an era where empirical contributions are generating a high volume of fragmented and disputed research streams, bibliometric analysis is particularly valuable for science mapping [67]. Bibliometrics is particularly useful for mapping scientific knowledge. The WoS database offers information on output, diffusion, cooperation, and impact. In this manner, it is possible to conduct bibliometric analysis by making use of data that are associated with the results of scientific research [68].

In the second phase of the investigation, document research was utilized to investigate the third research question. Document research, as a qualitative method, entails a systematic process of analyzing and assessing documents through the discovery, selection, appraisal, and synthesis of data housed within them [69].

Other types of review studies focus on specific educational policy issues, such as narrative reviews, vote-counting reviews, meta-analyses, meta-synthesis, best evidence synthesis, and meta-ethnography. All these types of studies may be considered systematic reviews. These reviews prevent policymakers from basing the policies on the findings of single studies. Policymakers and researchers incorporate multiple studies to identify patterns, consistencies, inconsistencies, and variability across similar studies. Thus, these reviews contribute to the knowledge base in education policy [6]. However, these reviews focus on specific issues to see whether there is consistency or variability of the findings across studies on specific issues, such as Improving Low-Achieving Middle Schools.

2.2. Database Selection

Global and regional indexing and citation databases cover journals, books, reviews, and conference proceedings. Each database has its style, research area, and concentration. WoS was chosen to extract these data because of its social science coverage. WoS databases

search the world's highest-quality academic literature in the social sciences, arts, and humanities from journals, conference proceedings, symposia, seminars, colloquia, workshops, and conventions [70]. WoS provides curated, high-quality bibliometric data for academic research.

2.3. Search Query

To access bibliographic data on issues in education policy, the following search query was run in the search field type in the main search interface of the WoS database: "education (All Fields) and policy (Subject) and subject (Author Keywords) and Article or Review Article or Early Access (Document Types) and Article or Review Article or Early Access (Document Types) and Education Educational Research or Education Specialized or Social Sciences Interdisciplinary or Education Scientific Disciplines or Social Issues or Psychology Education or Cultural Studies or Sports Sciences (Web of Science Categories)."

2.4. Inclusion/Exclusion Criteria

During the inclusion/exclusion phase, as displayed in Figure 1, the documents obtained through the search query were evaluated following the recommended reporting items for systematic reviews and meta-analysis (PRISMA) standard [71].
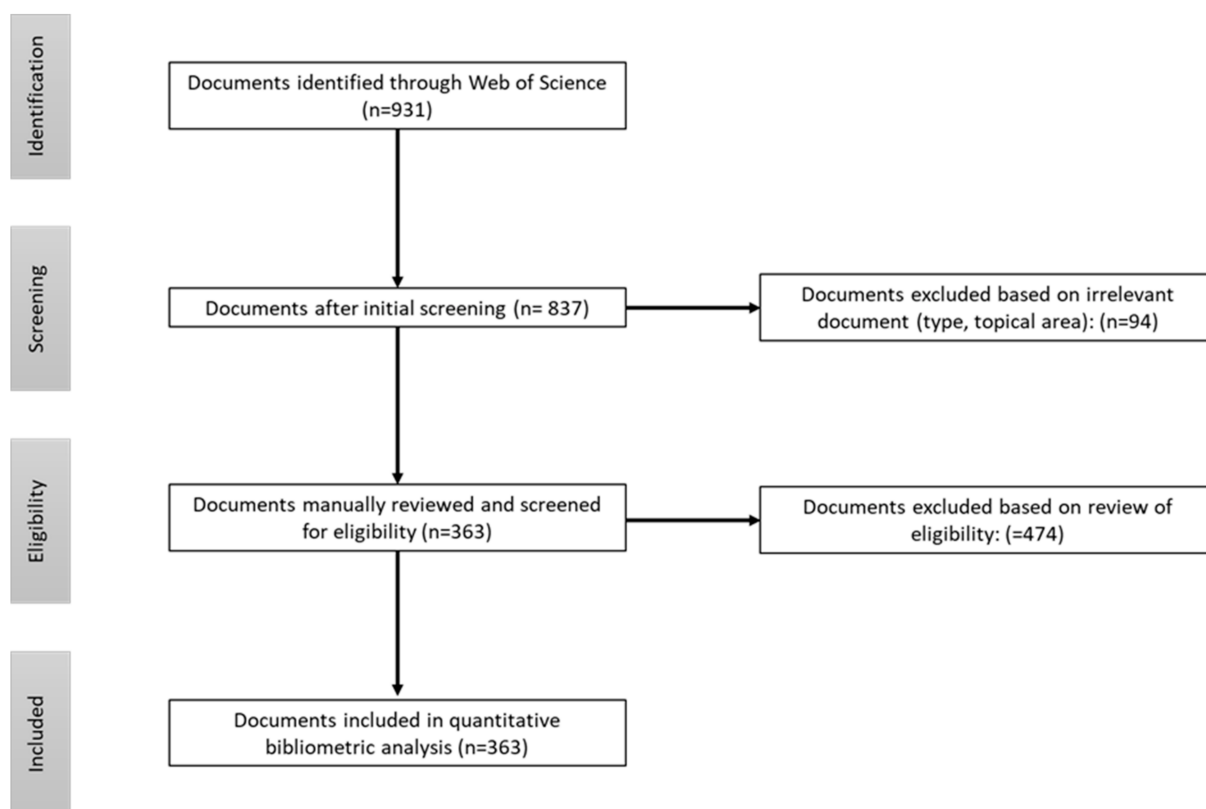
Figure 1. PRISMA guidelines describing the collection of documents from WOS.

As a result of the first search in the WoS Core Collection, 931 documents were obtained. A total of 94 documents were excluded as a result of the publication type and research field filters, and 837 results were obtained. No publication year filter was applied to access these 837 documents. The results obtained were analyzed by the researchers in terms of the content of educational policy issues, and 474 documents were excluded as a result of this review. The ranking was based on article type, review article type, early access (Document Types), and field of study (e.g., psychology, social issues, interdisciplinary studies in education, or educational research). The WoS categories included the following

fields: Education, Culture, and Sport. No geographical or linguistic filters were applied. The quantitative bibliometric analysis included 363 documents.

2.5. Data Analysis

Whole bibliographic data were extracted from the WoS database in plain text file format. The bibliometrix R package was first loaded and started with R Studio. The biblioshiny (version 4.1) software was launched by entering the command biblioshiny into the R terminal.

The biblioshiny interface for bibliometrix from the R Statistical Package was used to carry out the current bibliometric research. It contains several characteristics that are useful for conducting in-depth bibliometric analyses [67]. It is an application that operates as a web interface for the bibliometrix program. Finally, a WoS file in plain text format was submitted to the biblioshiny interface.

Co-authorship analysis was used to identify patterns of collaboration between authors and institutions, citation analysis to understand the impact and influence of publications, and keyword analysis to explore thematic trends and emerging topics. Also, co-authorship networks were used to visualize the relationships between authors and sources, and citation maps were used to show how publications are cited by each other. Finally, keyword landscapes were used to explore the development of thematic trends over time.

2.6. Validity and Reliability

This study utilized a two-phased methodology to ensure validity and reliability. In the initial phase of the research, the researchers conducted independent analyses of the bibliometric procedure. Subsequently, these data were compared, revealing no disparities in the analysis outcomes. For the second phase of the investigation, we employed document analysis, which is a qualitative research method. Content analysis was employed to analyze the articles included in this study during the document analysis phase. The qualitative component of this study was assessed for validity and reliability utilizing reliability and transferability factors. This study has conceptual validity and comprehensibility since all the studies are included in a highly regarded database, the WoS database. All these studies are peer-reviewed, and this adds to the validity of this study. The database is an open-source database and is accessible to all. There are 363 studies included, and this is comprehensible. In addition to bibliometrics, we conducted content analysis of the studies. This may also be considered as evidence of validity. Our selection criteria were open, and we tried to reduce the possibility of bias in our work. We might also argue that the corpus of studies included in this study was reliable since they were not only included in peer-reviewed journals in the WoS database but were also consistently cited over time. Peer review and citations over time contribute to consistency, which provides additional evidence of the reliability of this study. Both researchers coded these data, and the percentage of agreement was computed for reliability, which pertains to the congruence of the findings with reliability and indicates the internal validity of the research [72]. The formula devised by Miles et al. [73] was employed to determine the percentage of agreement, producing a value of 92.5%. The transferability criterion, as defined by Guba et al. [74], pertains to the external validity of the research. In this study, the research methodology, inclusion-exclusion criteria, and data analysis process were explained in detail.

3. Results

The following findings address the literature on issues in education policy and were acquired within the parameters of the research's purpose. The research findings are provided in tables and figures.

3.1. Sources on Issues in Educational Policy

The prominent authors in educational policy research have been analyzed, and the findings obtained are presented in this section.

Ten highly cited authors in this field appear in Table 2. One of the highly cited authors on educational policy issues is D.L. Zeidler. Zeidler [75] started making significant contributions to education policy in 2009, with four documents covering education policy topics that have accumulated 320 citations. Remarkably, there are few highly cited papers. Furthermore, the current increase in publications might be attributable to the growing interest in educational policy research and the assumption that there is an inadequate supply of authors on educational policy issues. Finally, a word of caution is needed here since the keywords used in this may not capture all the complexity and the multifaceted nature of educational policy and the authors.

Table 2. Most relevant authors.

Author	h_index	g_index	m_index	Total Citations (TC)	Number of Publications (NP)	Publication Year Start (PY_S)
Zeidler DL	3	4	0.2	320	4	2009
Hill HC	2	2	0.1	284	2	2004
Chang SC	1	1	0.167	260	1	2018
Hsu TC	1	1	0.167	260	1	2018
Hung YT	1	1	0.167	260	1	2018
Ball DL	1	1	0.05	205	1	2004
Demirbas A	1	1	0.071	202	1	2010
Hiebert J	2	2	0.08	195	2	1999
Sadler TD	2	2	0.133	169	2	2009
Chang CY	1	1	0.167	121	1	2018

Figure 2 illustrates the distribution of scientific productivity according to Lotka's law. Figure 2 demonstrates that 96.9% of researchers who conducted studies on educational policies published only one publication, 2.3% published two publications, 0.4% published three publications, and the remaining 0.3% published four research studies in the field. Lotka's law suggests the ratio of researchers contributing to a field with a single publication to all publications should be 60%, the ratio of researchers contributing with two publications to those contributing with a single publication should be 1/4, and the ratio of those contributing with three publications should be 1/9, as reported by Lotka [76]. When educational policy studies are reviewed using Lotka's law, it becomes clear that the attributable literature seems inadequate.
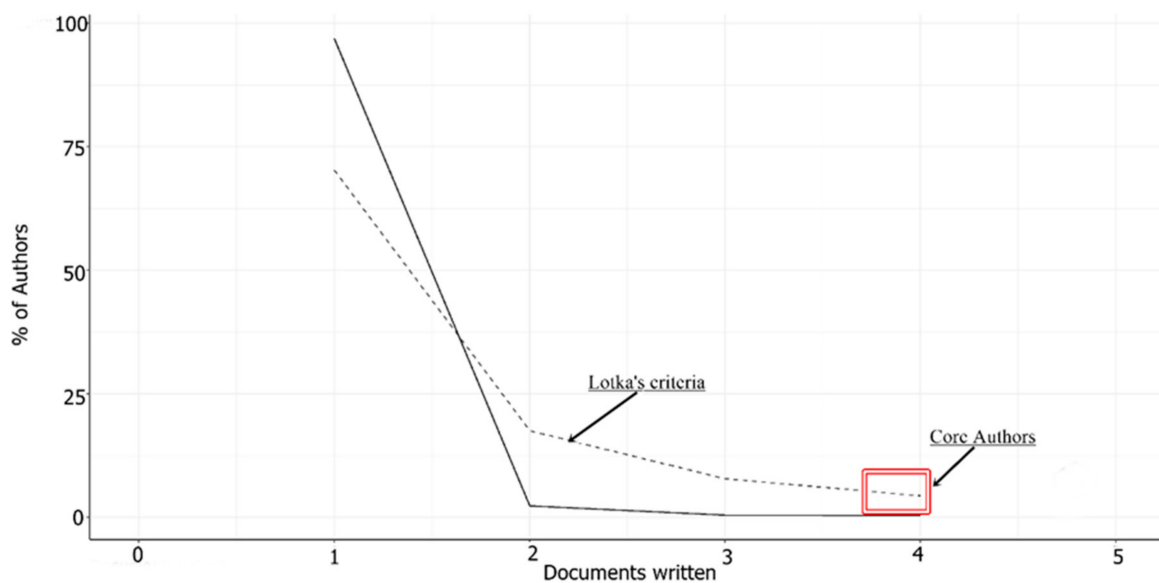
Figure 2. Author production through Lotka's law.

Figure 3 displays five distinct clusters. The historiograph network was generated with a specified number of nodes (20) and the capacity to determine each node with a brief identifier consisting of the first author's name and the year of publication. The acquired result could be evaluated based on the impact of sorting from left to right, employing the year algorithm. Figure 3 indicates a citation connection among Cotton [77], Kello [78], and Jerome [79]. The formation of five separate clusters and the interconnections between each cluster signify various issues within the field of education policy research. To establish the connection between the clusters and identify the shared characteristics among them, we examined the association between the Author co-keywords and Keywords Plus within the same cluster. These factors play a crucial role in shaping the historiographic network, as revealed in Table 3.
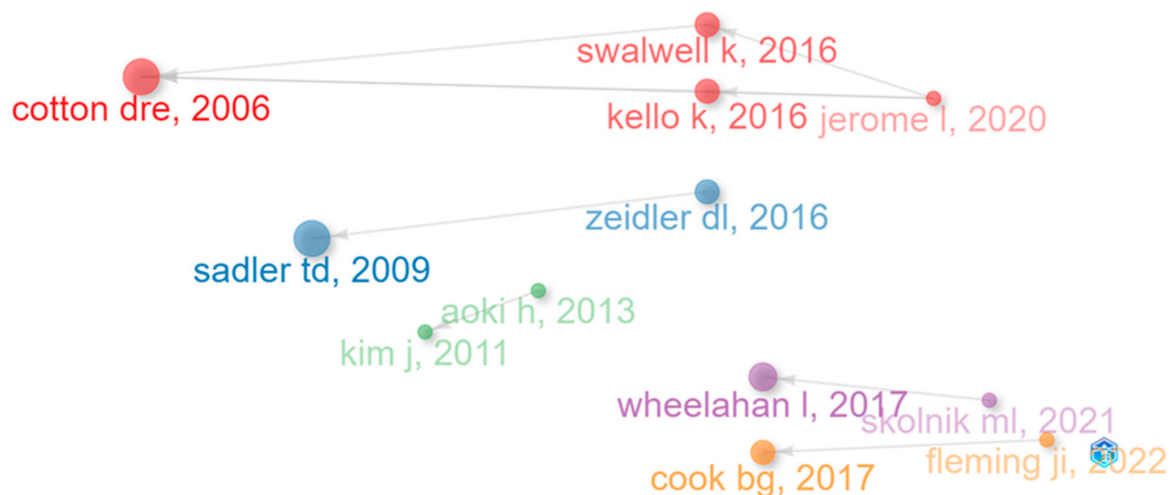
Figure 3. Historiograph Network.

The "Historiograph Network" allows researchers to visualize and analyze documents for relationships and discover themes and multidisciplinary connections. Furthermore, with the "Historiograph Network", dynamic analyses can be performed to study changes over time. When examining the historiograph network illustrated in Figure 3, the darker lines connecting the bubbles in the historiograph indicate stronger connections across sources. Each bubble could represent an article or topic. The magnitude of the bubbles signifies attributes such as occurrence or impact. The bubbles or lines are color-coded to signify separate categories.

The historiograph network of the studies in the first cluster comprises "controversial issues and teachers" within the scope of author co-keywords examined in Table 3. This depicts the determination of publications with a significant impact factor within the field in terms of occurrence or impact, as well as the sequential flow of the concepts evaluated. In other words, Cotton (2006) was the initiating work in the examination of the concepts of controversial issues and teachers' attitudes, and beliefs. The concepts of controversial issues and teachers were investigated further with the connection of Cotton [77], Kello [78], and Jerome [79]. The contextual context of "socio-scientific issues, scientific literacy" subsequently evolved in the second cluster. The third cluster covers "pedagogical issues", the fourth "vocational education policy issues", and the fifth "legal and policy issues" network.

Table 3. Historiograph Network Content.

Document	Title	Author Co-Keywords	Keywords_Plus	Cluster
Cotton DRE, 2006	Teaching controversial environmental issues: neutrality and balance in the reality of the classroom	Controversial Issues; Teachers' Attitudes; Teachers' Beliefs	Education; Attitudes; Beliefs; Science	1
Swalwell K, 2016	Teaching through turmoil: social studies teachers and local controversial current events	Controversial Issues; Current Events;	Students Argumentation; Participation; Sensemaking; Issues; Policy	1
Kello K, 2016,	Sensitive and controversial issues in the classroom: teaching history in a divided society	Sensitive and Controversial Issues; Divided Societies; Teacher Positions	Perspectives; Narratives; Education; Identity	1
Jerome L, 2020	Teaching about terrorism, extremism, and radicalization: some implications for controversial issues pedagogy	Controversial Issues; Citizenship Education; Countering Violent Extremism	Teachers	1
Sadler TD, 2009	Scientific literacy, PISA, and socio-scientific discourse: Assessment for progressive aims of science education	Socio--scientific Issues; Scientific Literacy; Assessment; Policy; PISA	Biological Conservation; Issues; Argumentation; Standards; Context; Skills	2
Zeidler DL, 2016	Stem education: a deficit framework for the twenty-first century? A sociocultural socio-scientific response	Stem; Socio-scientific Issues; Sociocultural Issues; Scientific Literacy	Socio-Scientific Issues; Science-Education; School Science; Literacy	2
Kim J, 2011	An analysis of educational informatization level of students, teachers, and parents in Korea	Improving Classroom Teaching; Pedagogical Issue		3
Aoki H, 2013	Propagation and level: factors influencing the ICT composite index at the school level	Media in Education; Pedagogical Issue	Teachers	3
Wheelahan L, 2017	Vocational education qualifications' roles in pathways to work in liberal market economies	Vocational Education Policy Issues: Learning in Life and Work Transitions	Transition	4
Skolnik ML, 2021	Canada's high rate of short-cycle tertiary education attainment: a reflection of the role of its community colleges in vocational education and training	Policy Issues; Vocational Education and Training; Vocational Higher Education		4
Cook BG, 2017	Null effects and publication bias in special education research	Experimental Design; Policy Issues; Interventions	Replication Research; Meta-analysis; Psychology; Intervention;	5
Fleming JI, 2022	Open access in special education: a review of journal and publisher policies	Open Science; Legal; Policy Issues; Change; Innovation	Publication Bias; Open-Science	5

3.2. Thematic Trends

The prominent concepts and trend topics in terms of authors' keywords for issues in education policy research have been analyzed, and the results obtained have been presented in this section.

To ascertain the frequency of issues covered in publications on educational policies, an analysis was conducted on the keywords in the titles. The analysis included the title itself, trigrams, and a count of the number of words (10). The analysis revealed that certain keywords were frequently used in the text. These include "high school students" (f = 3), "initial vocational education" (f = 3), "English language ideologies" (f = 2), "pre-service science teachers" (f = 2), "social studies teachers" (f = 2), "teaching based on socio-scientific

issues" (f = 2), "teacher professional development" (f = 2), "access program rural" (f = 1), "action research approach" (f = 1), and "active social policy" (f = 1) (Figure 4).
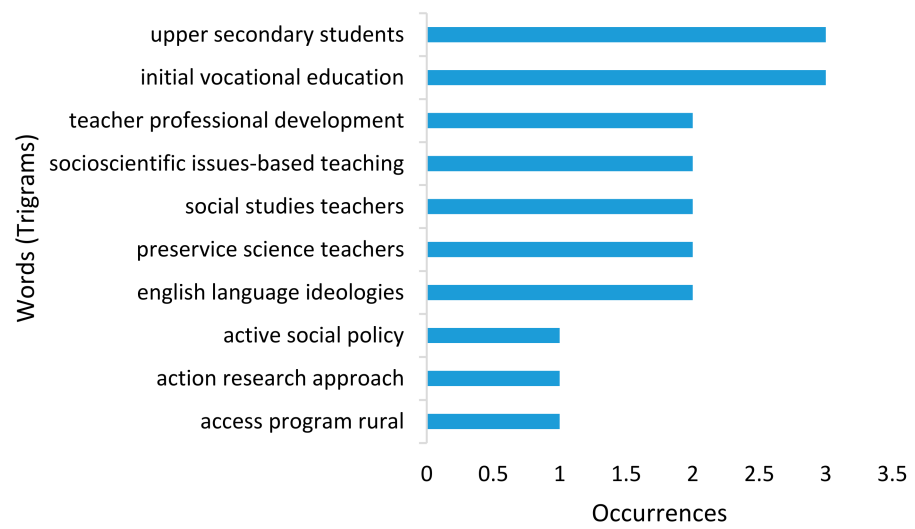

Figure 4. Most relevant words.

Figure 5 displays the trends in education policy research by year and period on the subject matter. The line connecting the years indicates the timeline of the trends, indicating that they remain on the list of priorities. The size of the bubble corresponds to the number of education policy trend words, which denotes that the relevant trend phrase was used as a keyword in a significant number of publications within a specific period.
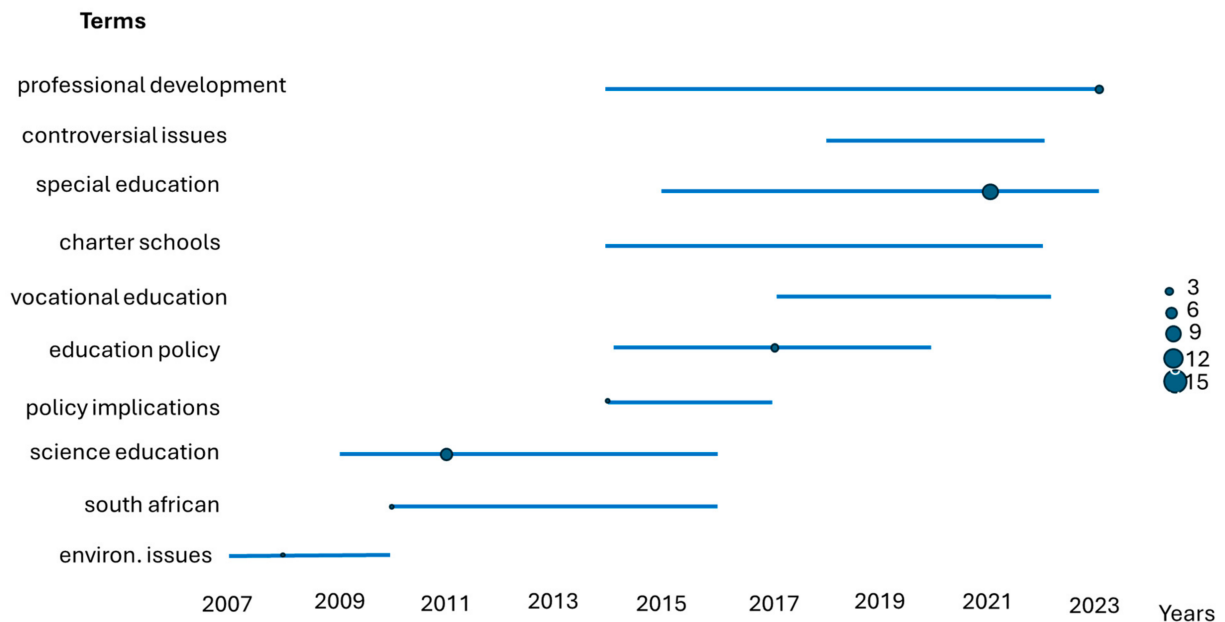

Figure 5. Trend topics.

Although WoS data reflect educational policy research since 1993, no trend has been found in data presented in Figure 5 for the period preceding 2007. This may be considered as a lack of a research trend due to the variety and novelty of this study's topics or the wide range of educational policy issues and the fact that researchers have covered a variety of topics. Between 2007 and 2010, the "environmental issues" theme on the agenda emerged. The terms "professional development", "special education", and "charter schools" were

the trends that remained on the agenda for the longest time. In terms of intensity, the terms science education (2011, f = 8), vocational education (2018, f = 16), and special education (2021, f = 12) were emphasized.

3.3. Focus Points and Main Findings in Primary Sources

The most globally cited documents (refer to Table 4), which assess the citations received not only by educational policy publications but also from other fields, were identified to pick out the publications contributing to the field of educational policy issues. The six publications obtained in terms of citation critical points have been investigated in terms of focus points and main findings (See Table 5).

Table 4. Most global cited documents.

Paper	DOI	Total Citations	TC per Year	Normalized TC
Hsu T.C., 2018, Comput Educ.	10.1016/j.compedu.2018.07.004	260	43.33	8.01
Hill H.C., 2004, J Res Math Educ.	10.2307/30034819	205	10.25	3.27
Sadler T.D., 2009, J Res Sci Teach	10.1002/tea.20327	163	10.87	7.76
Hiebert J., 1999, J. Res. Math. Educ.	10.2307/749627	127	5.08	1.73
Zeidler. D.L., 2016, Cult. Stud. Sci. Educ	10.1007/s11422-014-9578-z	123	15.38	7.12
Chang C.Y., 2018, Comput. Educ.	10.1016/j.compedu.2017.09.001	121	20.17	3.73

Table 5. Content analysis results.

Document	Abstract/Summary	Main Findings
Hsu T.C., 2018	The article proposes different instructional approaches, such as project-based, problem-based, cooperative, and game-based, and highlights potential areas of future research and concerns.	• CT is a universal skill that is not limited to computer engineers but rather a way of human thinking and problem-solving, applicable to daily life and various fields of knowledge.
Hill, H.C., 2004	Teachers who took part in the Mathematics Professional Development Institutes demonstrated enhanced performance on these metrics over the extended summer workshop phase of their program.	• There has been limited success in ascertaining the extent and timing of teachers' acquisition of mathematical knowledge through professional development initiatives financed by policymakers. • Teachers demonstrated enhanced proficiency in their pedagogical knowledge of mathematics through the intensive summer workshop component of their program. • The duration of the summer workshop and its emphasis on mathematical analysis, reasoning, and communication were expected to influence teachers' learning.

Table 5. *Cont.*

Document	Abstract/Summary	Main Findings
Sadler T.D., 2009	The PISA assessment approach appears to be well aligned with overall objectives.	• PISA introduces a novel method for evaluating students' advancement in science education, which is in line with the overall objectives of the Socio-scientific Issues (SSI) movement. However, there is a weak correlation between PISA and SSI in terms of the individual questions asked in the test.
Hiebert J., 1999	Debates on mathematics education's future often confuse research's role in resolving disputes, with researchers often overestimating or underestimating empirical evidence and expectations often overestimating its potential.	• The correlation between the findings of research in mathematics education and the content of the NCTM Standards is intricate. • The standards are shaped not only by research but also by society's expectations, historical practices, and the values held by specialists in the field. • The standards are declarations regarding the most highly esteemed aspects of mathematics education.
Zeidler D.L., 2016	STEM-related science education goals are typically represented and discussed in the literature.	• The research challenges the wisdom of present science education goals connected to STEM and proposes a different way of thinking about it, using a sociocultural approach and considering socio-scientific factors.
Chang C.Y., 2018	Mobile learning has mostly been used to teach fundamental nursing concepts and skills, as well as long-term care and obstetrics and gynecology.	• Mobile nursing education has not widely embraced commonly used mobile learning methodologies. Most studies in this field have mostly focused on teaching skills and acquiring basic knowledge rather than developing higher-level thinking abilities. Furthermore, there has been a rise in the quantity of research employing an experimental methodology, prioritizing learners' cognitive performance and perspectives over their learning activities.

Content analysis results are presented in Table 4 (Figure 5). It was discovered that the content analysis results shown in Table 4 (Figure 5) were connected. This relationship can be seen as adequate proof that researchers are focused on particular field issues while looking into educational policy concerns and that these topics are given importance in the field of educational policy. Challenges requiring new policy solutions were identified, including science education, vocational education, special education, socio-scientific challenges, and controversial subjects with a wide range of implications.

4. Discussion

The purpose of this research was to shed light on emerging phenomena while investigating the complex nature of educational policy issues, current concerns and trends, understanding the historical development of educational policy issues, gaining valuable insights into policy constants as well as variations over time, and learning about contemporary policy debates and decision-making. To achieve this goal, we conducted a bibliometric analysis of 363 papers. We examined citations, publication frequency, topics, trends, and years related to educational policy issues. We also conducted a content analysis with the most frequently used words and the six most influential papers. The real contribution of this paper to the literature might be focusing on trends and issues in education policy literature from a critical perspective. There have been studies that adopt critical perspectives at national and international levels. However, this study performed bibliometric analysis with a critical policy sociology perspective in educational policy research.

The main conclusions were as follows. First, although there was a growing interest in educational policy in 2009, the productivity of authors in education policy was relatively small. The majority (60%) of educational policy researchers published only one publication. Lotka's law also suggests the need for increased publications in educational policy per author. Lotka's law is an authoritative tool for understanding the distribution of productivity of researchers in each field. This law is used to analyze the sociology of scientific research and the production of scientific knowledge. For example, Zeidler [75] was found to be a prominent author on educational policy issues, with four publications containing 320 citations.

Among the primary concerns regarding secondary education's position in the discourse on education policy are accessibility and quality for all students. Moreover, secondary education needs to be flexible enough to provide alternative pathways to both higher education and vocational education. High dropout rates are also among the pressing issues in secondary education [80].

The following trends in education policy research by year and periods on the educational policy emerged. The first one is "environmental issues" for the period between 2007 to 2010. Lysgaard et al. [81] also found an increase in the literature and argued that the integration of environmental and sustainable concepts into educational policy remains a contentious issue, with the idea of sustainability and its implications causing confusion and disagreement in policy circles, regardless of the context. Policy issues in education themselves create extensive policy challenges. This points to the local dimension of environmental and sustainability research in terms of the global/local versus national/general distinction in Ball's Critical Analysis Template [5]. Along with the Sustainable Development Goals (SDGs), environmental education and sustainability created debates in educational policy circles [82]. Research may be the sole basis for shaping education policy, with the potential for policy impact to be gradual and indirect [83].

A second trend in professional development was special education, and charter schools were the longest-lasting trends. As the interdependence between educational systems and glocalization increases, so does the need for professional development, such as in-service training, mentoring, and teacher evaluation [84]. Based on the TALIS study, an average of 90% of teachers in lower secondary education participated in professional development (PD) programs. In terms of intensity, on average, teachers participated in PD programs less than one day per month. In contrast, a considerable number of teachers thought that

PD programs did not address their needs. The three most frequently sought PD programs are: "Teaching special learning needs students", followed by "ICT teaching skills", and "Student discipline and behavior". Policy-makers need to make sure that PD programs are available and teachers are supported to participate in these PD programs [85]. Similarly, Hardy et al. [86] found inconsistencies between policy field logic and teachers' work, which affects teacher learning and policy implementation. This suggests that learning across professions and a reflexive mindset are necessary for effective implementation.

In terms of intensity, we found science education, vocational education, and special education were the most published areas. These two topics are usually considered among the STEM fields. Special education is important for inclusive education policies.

Science in education primarily identifies, inspires, and prepares students for future fields, which is crucial for economies and population health. The shortage of specialists urgently needs to be remedied for sustainable economic and industrial development in the 21st century, requiring immediate attention [87].

Furthermore, scientifically and technologically literate persons are necessary to enable sustainable technological development and other societal uses of science. Without knowledge and awareness, technological developments might serve short-term objectives, resulting in reactionary behavior and environmental harm. Moral significance arises from the interaction of science and technology with traditional values in decision-making related to sustainable development and expanding potential [87]. Zhang et al. [88] argued that there is a gap between the findings of educational psychology and science education.

Finally, the Internet, Communication, and Digital Technologies (ICT) were associated with the basis of Knowledge Society, revolutionizing societies. As the information is widely available, it allows everyone to access it while also increasing the digital divide and creating inequalities. Because of this, it is challenging for education to support students in gaining a range of competencies and guarantee that the world is dynamic and inclusive [87].

Garritzman [88] argued that education policy was considered the main function of knowledge-based economies and that it connected education policy with other social policies. First, countries expand their educational systems to facilitate access to higher levels of education as they become more prosperous. Second, the author claimed that the expansion of early childhood education was related to the workforce participation of women. Education policy influences inequalities in education, such as tracking, funding, and the vocational focus of education. Educational policies may work, and relieving inequalities in one area may create inequalities in other areas.

Unesco [89,90] works to define inclusion and equity strongly and comprehensively, monitor progress, and establish common goals through SDGs. Hardy et al. [40] studied inclusive education policies at international, national, and sub-national levels in the Global North. They found that there was some progress in certain areas while there was deterioration in others.

The contemporary education policy landscape is undergoing a significant shift towards innovative teaching methodologies and assessment measures. Project-based, problem-based, cooperative, and game-based learning strategies are being used to reshape the academic landscape and promote interactive learning. However, the effectiveness of these strategies depends on teachers' proficiency and professional development.

An important issue in education policy is aligning these methods with assessment techniques. Sadler [91] raises concerns about the compatibility of the PISA methodology with science education objectives, highlighting the need for developing evaluation metrics that reflect pedagogical changes and educational goals. Hiebert [92] highlights the complexities between mathematical education research and NCTM Standards, suggesting a holistic review of these standards considering changes in teaching methods and educational goals.

The focus of education policy in STEM fields is currently under scrutiny, with Zeidler [75] advocating for a sociocultural perspective and Chang et al. [93] emphasizing the importance of balancing knowledge acquisition with the development of critical thinking skills in educational policy. Given these findings on the role and function of education and

schooling, neoliberal approaches in education and the idea of technology as a panacea for educational issues together explain some of the change attempts in education [94]. These topics may be considered within liberal approaches since they were more focused on the questions of whether the program/policy works and how it works. [95].

The discussion of findings up to this point reflects more on the efficiency aspects (Do the policies work? and how?) of policy issues. Using critical perspectives, we evaluate the findings from a broad range of critical perspective questions (what, why, how, who, where). For example, our focus was on "What/how/who/why [the topic] is a public problem?" Therefore, from a critical policy sociology perspective, first, we discussed our findings from a histography perspective [4,96]. As indicated earlier, the title of Table 3 was "Historiograph Network Content." The first four issues in the table were about controversial issues. The other topics included teaching controversial issues, scientific literacy based on PISA, STEM, informatization, ICT, vocational education, special education, and open access in special education. These policies reflect the New Public Management approach or Managerialism. Controversial issues related to the content of the curriculum, such as evolution and scientific literacy, are closely related to standardized testing, STEM education, ICT, and vocational education in general, which were included in a conservative agenda in education policy. Special education might be an exception depending on the conceptualization of the policy problem.

The second concept from critical policy sociology is archaeology [4,96]. Archaeology helps us uncover remains and analyze artifacts of past policies and societal structures. This is how discourses, practices, and institutions constructed the forms of knowledge and power relations in education policy. How various policies guide us to understand various forms of interventions result in or make possible certain outcomes, events, and ideas. Therefore, we may be able to describe and label them. Thus, we socially construct the problems. We found the following thematic trends: high school students, vocational education, teacher professional development, special education, charter schools, and science education. Similar issues emerge when we look at persistent education policy issues such as environmental issues, teacher professional development, special education, and charter schools. Based on these findings, we see that the policies were defined with a neoliberal outlook and provide a top-down approach in terms of power relations. These findings also point out persistent issues and failures rather than successes. Again, we see standardization and accountability, privatization and marketization, globalization and neoliberalism, and technology and surveillance mechanisms. Here, we did not see publications concerning social justice, equity, and the development of alternative discourses.

Genealogy in policy sociology [4,96] shows us the evolution of governance structures and education policies. We see that governance and policies are consistent and connected across time and space. We can see the underlying ideologies and power dynamics that shape the governance of education systems. Genealogical analysis informs us of the economic, social, and cultural contexts of the continuity of education policies.

In addition to Gale's [4] Critical Policy Sociology, we also used Ball's [5] Critical Analysis Template. We found that the same issues persist in the second column where all the issues were described: (a) practice-oriented, single-focus, single-level, atemporal, notional-general, and detached. For instance, the articles in Table 5 were all assessment-focused studies. They identify the practical problems based on the school, teacher, or students but not the policy itself. (b) conceptually thin, almost all the studies in Table 3 with historiograph network content focused on controversial issues. The content areas in Table 3 were isolated from the broad field of social policy changes. (c) social efficiency, displayed trend topics in Figure 5 by year and duration on the subject matter. Environmental issues, professional development, special education, and charter schools were the trends that remained on the agenda for an extended period. In terms of intensity, the terms science education, vocational education, and special education were emphasized. Issues in Tables 3 and 5 lack theoretical orientation. Theoretical orientation was necessary to identify power struggles. (d) incorporated and silent. Policies were implemented for people from

above, and they did not take into account the social diversity of individuals. Moreover, we were also unable to locate studies that address the effects of policies on the issues of poverty, oppression, and inequality.

This study used Gale's Critical Policy Sociology and Ball's Critical Analysis Template to identify issues in social policy studies. Based on these critical perspectives, we were able to classify the findings as practice-oriented, single-focus, single-level, atemporal, national-general, and detached approaches. The studies focus on practical problems rather than policy and often focus on controversial issues. Trends in education, such as environmental issues, professional development, special education, and charter schools, were dominant in the publications. These findings might point out an important issue in education policy that implementation often fails to consider access, equity, diversity, and sustainability [97].

4.1. Conclusions

In conclusion, the current issues in education policy revolve around aligning innovative teaching methodologies, teacher professional development, assessment techniques, and educational standards with the evolving goals of education, particularly in STEM fields. A holistic approach is needed to ensure that education policy is not only effective but also relevant. The research findings indicate that changes in education systems and schools are driven by the imperative to adapt to the changing needs of students, connect technology for enhanced learning experiences, address global challenges, prioritize holistic development, and reduce inequalities in education.

While there was a surge in interest in educational policy issues in 2009, productivity among authors remained low, with a significant number publishing only one publication. Lotka's law suggests an increase in publications per author, with prominent authors such as Zeidler publishing extensively on educational policy issues.

Based on this review, the TPA perspective the following conclusions were reached: Between 2007 and 2010, SDGs and environmental concerns were major topics in research on educational policies. The emergence of environmental problems draws attention to the regional focus of sustainability and environmental research and poses significant policy concerns. Inconsistencies between policy field logic and teachers' work that impact teacher learning and policy implementation are among the trends in professional development, indicating the necessity for cross-professional learning and a reflexive mentality.

A significant portion of teachers participate in professional development programs, and special education and charter schools are two long-standing trends in this area. Policy-makers must guarantee the accessibility and backing of these initiatives while also ensuring that they cater to the demands of educators. Within STEM domains, science education, vocational education, and special education are the most frequently published areas.

These points draw attention to several trends, issues, and factors in professional development, educational policy research, and the significance of scientific literacy in influencing sustainable development and societal advancement. Innovative teaching strategies and evaluation techniques, such as project-based, problem-based, cooperative, and game-based learning, are becoming more prevalent in educational policy. All of these teaching and learning strategies, however, are only as effective as the teachers' professional development and skill levels. Concerns have been raised regarding these approaches' consistency with the goals of science education; thus, it is imperative to match them with evaluation techniques.

Education policy in STEM subjects is being scrutinized, with sociocultural viewpoints supporting the development of critical thinking abilities and information acquisition. Neoliberal perspectives, technology, and strategies support change initiatives in education. A conservative approach to education policy includes standardized testing, STEM education, ICT, and vocational education, all of which are strongly linked to contentious themes in the curriculum, such as evolution and scientific literacy.

Critical policy sociology's archaeology concept helps analyze past policies and societal structures, revealing how discourses and institutions construct knowledge and power

relations in education policy. Using bibliometric methods, we extracted data, ordered temporally, and then categorized thematically. Thematic trends include high school students, vocational education, teacher professional development, special education, charter schools, and science education. These policies are neoliberal and top-down and focus on standardization, accountability, privatization, marketization, globalization, and technology surveillance mechanisms, lacking social justice, equity, and alternative discourse development. Genealogy in policy sociology reveals the evolution of governance structures and education policies, revealing consistent and connected governance across time and space, influenced by ideologies and power dynamics.

Through the utilization of bibliometric methods and a critical policy sociology perspective, this study provided valuable insights into the literature on educational policy issues. With the bibliometric methods, we first identified that liberal, efficiency and effectiveness-oriented conceptualizations of issues in education policy mainly focused on how the policies work. However, using a critical policy sociology perspective and critical policy template, we were able to reveal that our analysis was biased towards efficiency-oriented and liberal policies. This perspective mainly provided how the reviewed policies work. Critical policy sociology and critical policy template, on the other hand, provided a more comprehensive perspective on the definition of policy problems, the positioning of policy actors given who benefits from the policy, and how external/societal factors influence issues in educational policy. The use of critical policy sociology and critical policy templates helped us to ask more relevant questions, such as why the policy issues exist and the nature of problems, texts, contexts, discourses, and praxis. Grouping of the temporal, thematic, and aspects of these data led us to uncover discursive practices while using the meta-analytical template, which helped us identify theoretical, epistemological, and methodological issues in educational policy research.

4.2. Recommendations

Given the complexity of issues in education policy outlined in the preceding discussion and conclusions, we propose the following recommendations for researchers and policymakers.

For Researchers: More research is needed to explore the effectiveness and potential drawbacks of innovative teaching methodologies such as project-based, problem-based, cooperative, and game-based learning from a critical policy perspective. We recommend that research and development efforts be directed toward professional development programs that are associated with better student outcomes. In addition, academics may conduct more critical policy research on innovative teaching methodologies and attempt to align teaching strategies with the evolving goals of education.

We recommend researchers use multiple approaches and methodologies to capture a holistic understanding of the complexity of issues. Researchers can both quantitatively and qualitatively examine the dynamics of a field, which may lead to a more robust and nuanced understanding of a field than TPA. An interdisciplinary approach may provide better insights into the issues in the field. Researchers can focus on how central and intensive the issues are in the field while they may also focus on how the issues may create clusters.

For Policy Makers: It is imperative to reassess the compatibility of the assessment methods currently used with the goals of education. Policymakers should consider the need for a balance between knowledge acquisition and the development of critical thinking skills while formulating education policies. It is essential to approach the issues in education policy holistically, considering all aspects, including teaching methodologies, teacher professional development, assessment techniques, and educational standards. Collaboration between researchers, teachers, and policymakers is crucial for the development of effective and relevant educational policies. Parents, administrators, and teachers may need to develop mechanisms to follow the global trends from a critical policy scholarship

perspective rather than a policy science perspective since the latter excludes ideology and values.

We recommend policymakers and grant providers design more effective interventions. They can make decisions based on connective structures. They can also require increased coordination and collaboration among researchers and implementers. Policymakers may better allocate resources to support vulnerable groups. They may also require evidence-driven approaches in the design, implementation, and evaluation processes.

In conclusion, these recommendations aim to provide a roadmap for addressing the current issues in education policy with a critical, comprehensive, and collaborative approach. By focusing on these areas, we can hope to foster an educational environment that is adaptable, inclusive, and conducive to the development of critical thinking skills.

4.3. Limitations

The following limitations have been acknowledged in the research. First, documents indexed by Web of Science and Scopus, the two main social science databases, should have been examined concurrently to obtain data that might contribute more to the accomplishment of the research's purpose. However, it was determined that the data processing techniques of both databases varied and that this may result in data loss during the research phase, and as comparable studies had been completed using the Scopus database, the Web of Science core collection was preferred. Second, the investigation database contained only documents written in English. Published research in languages other than English, on the other hand, may provide a more comprehensive overview of the issue at discussion. However, considering that this study's objective was to develop a worldwide viewpoint on the subject, documents in English have been considered to provide the optimal chance to achieve this objective.

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